

EVI-SICEE-RESEARCH BRIEF-11

Innovation ecosystem conditions that enable youth- and women-led clean energy enterprises to scale in South Africa

SEPTEMBER 2026

Ann Numi¹, Rebecca Hanlin², Mourine Cheruiyot¹

African Centre for Technology Studies (ACTS), Nairobi, Kenya¹
University of Johannesburg, South Africa²

Design and layout by Peter Ongalo



This research brief draws on key insights collected from key actors within the clean energy ecosystem in South Africa supplemented by a literature review under the EVI-SICEE project. The brief outlines the key enabling ecosystem conditions for scaling Youth- and Women-Led Clean Energy Enterprises (CEEs) in South Africa. In addition, the brief also provides recommendations for the key actors within the clean energy ecosystem to foster these key enabling ecosystem conditions to create an inclusive environment for the scaling of these enterprises in South Africa.

KEY MESSAGES

- Youth- and women-led clean energy enterprises are essential to South Africa's clean energy transition, contributing to innovation, job creation, energy access, and inclusive economic development.
- Enterprise scaling focuses on the period after enterprise creation i.e. the sustainability of business and business growth.
- Enterprise scaling depends on the strength of the innovation ecosystem, not on entrepreneurs alone. Access to incubation, partnerships, finance, knowledge, and markets are critical ecosystem elements for sustainable business growth.
- Policy interventions should prioritise ecosystem strengthening rather than just isolated business incubation support to unlock the full potential of youth- and women-led clean energy enterprises and accelerate South Africa's Just Energy Transition
- Key priorities to strengthen the enabling ecosystem include strengthening incubation, partnerships, networks, finance, skills development, and access to certification and markets.

BACKGROUND

Comprehensive national data on Youth- and women-led clean energy enterprises (CEEs) remain limited, existing evidence indicates that they operate primarily within the small, medium, and micro-enterprise (SMME) sector and are creating new opportunities for employment, innovation, and sustainable development (Mali, 2025). Youth- and women-led clean energy enterprises are becoming increasingly important contributors to South Africa's clean energy transition. The rapid expansion of the clean energy sector, driven in part by persistent electricity shortages and growing demand for reliable energy solutions, has further stimulated entrepreneurial activity among youth and women (IEA, 2024). Most of these enterprises are concentrated in urban provinces such as Gauteng, the Western Cape, and KwaZulu-Natal, where access to markets, finance, technical expertise, and innovation support is stronger. However, an increasing number are also emerging in rural areas, delivering decentralized clean energy solutions that improve energy access and support local livelihoods (Diale et al., 2021). Despite their growing contribution, youth- and women-led enterprises continue to face systemic barriers that limit their ability to scale due to systemic barriers within the broader innovation ecosystem. The policy brief highlights the ecosystem conditions that support enterprise scaling and provides practical recommendations for policymakers, universities, innovation support organisations, development partners, industry associations, and ecosystem builders seeking to strengthen South Africa's clean energy innovation ecosystem and accelerate an inclusive and just energy transition.

ABOUT THE RESEARCH

The study adopted a qualitative approach to collect empirical data through case studies (between September 2025 and March 2026) from selected clean energy enterprises and key ecosystem actors, providing insights into enterprise experiences and the systemic conditions influencing their development and scaling. The respondents included managers and employees of youth- and women-led clean energy enterprises, government representatives, innovation support organizations, researchers, business incubators, development partners, and industry experts. This project was funded by the Canadian International Development Research Centre (IDRC). The project was conducted by researchers at the SARChI Chair in Transformative Innovation at the University of Johannesburg in South Africa and the project lead organization, the African Centre for Technology Studies (ACTS) in Kenya.

Key highlights from study findings

The study examined four youth- and women-led CEEs operating across the solar and biogas sectors. Although these enterprises differ in their technologies, business models, and target markets, they face many common challenges within South Africa's clean energy innovation ecosystem. At the same time, the case studies demonstrate how business incubation, strategic partnerships, research collaborations, innovation networks, and community engagement can strengthen enterprise capabilities and support business growth. Table 1 summarises the key characteristics of each case study, the systemic barriers encountered, the ecosystem conditions that enabled enterprise scaling. While these cases are not representative of all youth- and women-led CEEs in South Africa, they provide valuable insights into the systemic conditions that enable or constrain enterprise scaling. By highlighting common experiences and mechanisms across the cases, the findings provide an important basis for further research and policy debate on building a more inclusive clean energy innovation system.

Table 1: Summary of selected case studies: barriers, enabling ecosystem conditions

Case study	Brief description	Key barriers	Enabling ecosystem factors
Amahlathi Eco-Tech (AET)	Women-led clean energy enterprise developing innovative energy-efficiency technologies, including the HotSpot geyser sleeve to reduce household electricity consumption.	• Limited access to commercial finance for scaling • Lengthy SABS certification and regulatory approval • Resistance from established manufacturers • High commercialization and production costs • Gender bias in a male-dominated sector	• Funding from Technology Innovation Agency (TIA), Industrial Development Corporation (IDC), Council for Scientific and Industrial Research (CSIR) and Small Enterprise Development Agency (SEDA) • Participation in Global Cleantech Innovation Programme (GCIP) • Technical mentorship and business incubation • University and research partnerships
Kusini Water	Youth and women-led enterprise providing solar-powered water generation technologies to improve water access in water-scarce communities.	• Limited growth capital • Ageing municipal infrastructure • Theft and vandalism of solar equipment • Slow municipal procurement processes	• Strategic partnerships with Nedbank, Edge Growth and municipalities • Innovation support from enterprise accelerators • Community engagement and co-design approaches
Kaeane Renewable Energy Developers	Youth-led renewable energy enterprise delivering solar energy systems and energy services to households, businesses and public institutions.	• Limited access to finance • Skills shortages • Weak market access • Policy uncertainty • Limited business management capacity	• Entrepreneurship training • Mentorship programmes • Partnerships with government and private sector • Technical support from innovation intermediaries
Tshilidzi Tshawe (His Grace) Cooperative	Youth-led community-based cooperative promoting biogas technologies using agricultural and organic waste to improve rural energy access and livelihoods.	• Low public awareness of biogas technologies • Limited finance for expansion • Weak market demand • Technical skills gaps • Limited rural infrastructure	• Community mobilisation and awareness campaigns • Support from universities and extension services • Training and mentorship • Collaboration with local stakeholders

The case studies show that youth- and women-led CEEs face interconnected financial, institutional, market and capability barriers that restrict their ability to scale. While many of these challenges affect SMEs generally, they can be particularly severe for youth and women entrepreneurs because of more limited access to finance, established business networks, technical expertise and market opportunities. Women-led enterprises additionally face gender bias and exclusion within male-dominated technical and business environments, while youth-led enterprises experience difficulties associated with limited business experience, growth capital and market connections. At the same time, the cases demonstrate that incubation and mentorship, university and research partnerships, access to incubation support, strategic business networks, and community engagement can help overcome these disadvantages.

Key enabling ecosystem conditions that support scaling

The study found that the ability of youth- and women-led CEEs to scale depends not only on the capabilities of individual entrepreneurs and their ability to scale their businesses. It also depends on the innovation ecosystem in which they operate. Five ecosystem conditions emerged from our study of the four distinct enterprises as particularly important, across all four cases, for enabling enterprise growth and long-term sustainability. These enabling conditions are broadly consistent with those identified in the wider literature on clean energy and green entrepreneurship, particularly the importance of access to finance, incubation, mentorship, knowledge networks and strategic partnerships for enterprise growth (Emma, 2025). However, the case studies add an important inclusion dimension by showing that these forms of support can be especially consequential for youth- and women-led CEEs. As one enterprise owner explained, access to formal support programmes and partnerships provided not only technical and business assistance but also credibility, networks and access to opportunities that were otherwise difficult to obtain. This is particularly important where youth and women entrepreneurs have weaker access to established industry and investor networks or face gender- and age-related barriers to finance and market opportunities. Thus, incubation and partnerships can perform a compensatory role by helping these enterprises overcome structural barriers within the wider ecosystem.

1. Business incubation support

Business incubators and support organisations play a vital role in helping enterprises move from innovation to commercialisation. Organisations in South Africa that provide this support include the TIA, CSIR and SEDA. Across the case studies, entrepreneurs received varying forms of technical assistance, mentorship, product development and commercialisation support, entrepreneurship training, and investor-readiness assistance. These interventions strengthened capabilities in business and financial management, strategic planning, leadership and communication, product development, technology commercialisation, and engagement with potential investors and customers. The findings therefore suggest that incubation provides more than technical support: it can help bridge capability, knowledge and network gaps that might otherwise prevent early-stage youth- and women-led CEEs from progressing from innovation to commercialisation and growth.

2. Strategic partnerships and access to finance

Partnerships with government departments, municipalities, financial institutions, universities, private companies, and development partners were found to be essential for enterprise growth in our four case studies. These collaborations enabled entrepreneurs to access finance, technical expertise, infrastructure, new markets, and business opportunities. Strategic partnerships also enhanced enterprise credibility and created opportunities for technology demonstration, procurement, and market expansion. For example, Kusini Water's partnerships with Nedbank, Edge Growth, municipalities and other development partners helped the enterprise access business development support, engage potential markets and deploy its solar-powered water technologies in communities. Similarly, Amahlathi Eco-Tech drew on relationships with the TIA, IDC, CSIR, SEDA, installers and industry actors to support product development, testing, commercialisation and efforts to overcome certification-related barriers. These cases demonstrate that partnerships provide more than individual resources: they can connect emerging enterprises to otherwise difficult-to-access finance, knowledge, legitimacy, customers and procurement networks, thereby strengthening their capacity to commercialise innovations and scale. Universities and public research organisations played an important role in generating knowledge, supporting technology development, and strengthening entrepreneurial capabilities. Across the four case studies, engagement with universities and research organisations provided access to different combinations of technical expertise, technology development and testing, research support, entrepreneurship training, mentorship, and commercialisation guidance.

For example, Amahlathi Eco-Tech benefited from technical and innovation support involving the CSIR as it developed and sought to commercialise its energy-efficiency technology. Tshilidzi Tshawe Cooperative benefited from links with the University of Venda and other technical support actors, which supported learning and capacity development around biogas technology and its application within rural communities. Kaeane Renewable Energy Developers benefited from training and mentorship that strengthened both technical and entrepreneurial capabilities, while Kusini Water's engagement with innovation and knowledge partners helped strengthen the development and application of its solar-powered water solutions.

3. Networks and knowledge exchange

Strong networks enable entrepreneurs to learn from peers, connect with mentors, access industry expertise, and identify new business opportunities. Participation in innovation platforms, industry associations, and clean energy networks improved access to information, investment opportunities, and strategic partnerships. These networks also facilitated knowledge sharing and technology diffusion, reducing isolation among youth- and women-led enterprises.

For example, the owner of Amahlathi Eco-Tech described joining relevant industry networks as part of the process of building credibility for the company's energy-efficiency technology while it awaited formal certification. These relationships enabled the enterprise to obtain industry endorsement, engage installers and potential customers, and build confidence in the product despite the certification barrier. Other case-study enterprises similarly benefited from networks established through incubation and mentorship programmes, universities, municipalities, development partners, and private-sector organisations, which created opportunities for knowledge exchange, business referrals, technology demonstration, and market access. This is particularly important for women-led enterprises because the study also identified exclusion from informal male-dominated networks as a barrier to accessing business opportunities; formal innovation networks can therefore provide alternative pathways to relationships, information and opportunities that might otherwise remain inaccessible.

4. Community engagement and market development

Community engagement emerged as a key factor in promoting the adoption of clean energy technologies. Our case study enterprises invested in awareness campaigns, demonstrations, community training, and participatory approaches to build trust and increase public acceptance of technologies such as solar energy, water purification systems, and biogas. This was particularly important for enterprises introducing relatively unfamiliar technologies into underserved or rural markets, where low public awareness and previous negative experiences with clean energy projects could constrain demand. For example, Tshilidzi Tshawe (His Grace) Cooperative reported having to undertake extensive awareness raising, including engaging local radio stations, to overcome negative perceptions of biogas and generate customer interest. Similarly, community engagement enabled enterprises such as Kusini Water to better understand local needs and adapt solutions to the contexts in which they were deployed.

Community engagement can be especially important for youth- and women-led CEEs because these enterprises may lack the established reputation, market visibility, customer base and institutional relationships enjoyed by larger or longer-established firms. Direct engagement with communities therefore provides an important means of building legitimacy and trust, demonstrating the value of new technologies, and developing markets from the ground up. Community relationships therefore represent not simply a mechanism for technology adoption, but an important form of social capital and market-building that can help youth- and women-led enterprises overcome some of the disadvantages associated with being newer and less established actors within the clean energy innovation system.

Recommendations

Based on the findings, the following policy actions are recommended;

1. Provide incubation support beyond the start-up stage

Incubation, mentorship and innovation support helped the enterprises studied to strengthen business management capabilities, access technical expertise and prepare for commercialisation. However, support needs continued beyond the early stages of enterprise development. Enterprises subsequently encountered challenges associated with certification, accessing finance, production, market access and expanding operations. This suggests a gap between supporting enterprises to start and supporting viable enterprises to scale. Studies show that incubators and accelerators can provide important combinations of training, mentorship, networking and access to resources, but that sustained support and finance remain important as firms progress towards scaling (Muathe & Otieno, 2022).

Recommendation: Government, innovation agencies and development partners should provide stage-appropriate incubation and acceleration, extending from early technology development through testing, certification, commercialisation and growth. Support should combine technical assistance with financial management, investor readiness, mentorship, market development and connections to finance and procurement opportunities. Post-incubation support is particularly important for women and young entrepreneurs, who may have fewer established business networks, financial resources and industry connections on which to draw once formal programmes end.

2. Build university–enterprise partnerships from innovation through to commercialisation

The cases indicate that universities and public research organisations can address resource and knowledge gaps that youth- and women led CEEs cannot easily overcome internally. They can provide access to specialised technical knowledge, research capabilities, technology testing and validation, entrepreneurship support and connections to wider innovation networks. Importantly, this role need not be restricted to enterprises originating within universities. The EVI-SICEE cases suggest value in connecting research institutions with existing start-ups and community-based enterprises that need technical capabilities to improve, validate or commercialise their technologies. Universities also play a key role as coordinators and enablers within entrepreneurship ecosystems, while highlighting the importance of sustainable financing for university-based incubation and enterprise support (Gumbo & van der Westhuizen, 2026)

Recommendation: Universities should be supported to become long-term innovation partners, rather than only providers of training or once-off technical assistance. University incubators, laboratories and technology-transfer structures should be accessible to youth- and women-led CEEs both inside and outside universities. Partnerships should link enterprises to applied research, laboratories and testing facilities, student and researcher expertise, intellectual-property and technology-transfer, incubation and commercialisation support. Dedicated outreach mechanisms should connect these capabilities to rural and community-based CEEs, which may have the greatest difficulty accessing specialised research infrastructure.

3. Promote inclusive networks that translate connections into opportunities

Networks provided enterprises with access to technical knowledge, mentors, partners, customers and opportunities that they could not generate independently. The Amahlathi Eco-Tech experience illustrates that - while navigating certification challenges, relationships with installers and other industry actors helped the enterprise establish credibility and confidence in its technology. At the same time, the qualitative evidence indicates that access to networks is not gender-neutral. Institutional support as important elements of a supportive entrepreneurial ecosystem.

Women can be excluded from informal, male-dominated spaces through which relationships and commercial opportunities are generated. Stoker et al. (2025) highlights that women entrepreneurs navigate gendered and racialised constraints within entrepreneurial networks and strategically use networks to acquire resources and legitimacy. Lekoloane et al. (2025) also identifies mentoring, networking and institutional support as important elements of a supportive entrepreneurial ecosystem.

Recommendation: Government, incubators, industry associations and development partners should establish inclusive, outcome-oriented clean energy networks linking women and young entrepreneurs to established firms, financiers, municipalities, universities, suppliers and potential customers. These platforms should go beyond networking events. Their performance should be measured through tangible outcomes including commercial partnerships, mentorship relationships, investment secured, procurement opportunities, technology demonstrations and new customers and by whether women and young entrepreneurs gain meaningful access to influential industry networks.

4. Develop finance appropriate to different stages of enterprise growth

Access to finance was one of the most persistent constraints across the cases. The problem was not simply obtaining start-up capital. Enterprises needed finance at different stages for technology development, equipment, testing and certification, production, recruitment, demonstration projects and working capital. Some enterprises relied heavily on directors' own resources, while lengthy procurement and payment cycles created additional cash-flow pressures. This demonstrates a potential financing gap between innovation and commercial scale. The effects can be particularly significant for women and young entrepreneurs who have fewer accumulated assets, shorter credit and business histories and weaker connections to conventional investor networks. According to Abebe et al. (2025), access to capital as persistent constraints for women entrepreneurs. Grants, equity and other forms of appropriate capital for emerging clean-energy businesses have been identified as key sources of capital (Sharma et al., 2025).

Recommendation: Government, development finance institutions, commercial financiers and development partners should develop a financing mechanism aligned with the enterprise lifecycle. This could combine grants and seed funding for innovation and demonstration; dedicated finance for testing and certification; concessional loans and guarantees for equipment and production; and blended finance or patient capital for scaling. Eligibility and risk-assessment approaches should be reviewed to ensure that limited collateral or short trading histories do not systematically exclude otherwise viable youth- and women-led enterprises.

5. Link skills development to the capabilities required for scaling

The case studies illustrate that technical knowledge alone is insufficient to build a scalable CEE. Entrepreneurs also need capabilities in financial management, strategic planning, marketing, leadership, communication, customer engagement, regulatory compliance and investment readiness. Training and mentorship received by enterprises such as Kaeane Renewable Energy Developers and Tshilidzi Tshawe Cooperative helped strengthen entrepreneurial and technical capabilities. The important policy issue is therefore not simply more training, but training that addresses the changing capabilities enterprises require as they move from start-up to commercialisation. Ogujiuba et al. (2023) highlighted that skills, finance and access to support organisations such as incubators and industry associations are interconnected elements of the SME ecosystem.

Recommendation: Universities, Technical and Vocational Education and Training (TVET) colleges, incubators and industry organisations should jointly develop scaling-oriented capability programmes combining clean-energy technical skills with commercial and managerial competencies.

Training should respond to enterprise stage and include financial management, costing and pricing, procurement, marketing, regulatory compliance, negotiation, leadership and investor readiness. Formal training should be complemented by long-term mentorship from experienced entrepreneurs and clean-energy industry practitioners, enabling entrepreneurs to apply new capabilities to actual commercial challenges.

Conclusion

The case studies demonstrate that scaling youth- and women-led CEEs in South Africa depends not only on the capabilities of individual entrepreneurs, but on the strength and inclusiveness of the innovation ecosystem around them. Across the four cases, access to incubation and mentorship, finance, university and research support, strategic partnerships, networks and markets helped enterprises navigate barriers to commercialisation and growth. At the same time, persistent constraints including limited finance, certification and procurement barriers, weak market linkages and unequal access to networks show that these ecosystem resources remain fragmented and unevenly accessible. The policy priority is therefore to move beyond isolated interventions towards a coordinated and inclusive ecosystem that supports enterprises throughout the scaling journey. Government, universities, intermediaries, financial institutions, industry and development partners need to work together to connect technical support, finance, certification, networks and market opportunities. Ensuring that women and young entrepreneurs can access and benefit from these resources will strengthen the sustainability and growth of CEEs while broadening participation in and the economic benefits of South Africa's just energy transition.

References

- Abebe, G., Cassidy, R., & Weis, T. (2025). Access to Capital and Women's Entrepreneurship.
- Diale, C. D., Kanakana-Katumba, M. G., & Maladzhi, R. W. (2021). Ecosystem of Renewable Energy Enterprises for Sustainable Development: A Systematic Review. *Advances in Science, Technology and Engineering Systems Journal*, 6(1), 401–408. <https://doi.org/10.25046/aj060146>
- Emma, L. (2025). Entrepreneurial Culture as a Driver of Business Growth and Innovation in Emerging Markets. https://www.researchgate.net/publication/388679666_Entrepreneurial_Culture_as_a_Driver_of_Business_Growth_and_Innovation_in_Emerging_Markets
- Gumbo, E., & van der Westhuizen, T. (2026). Leading Entrepreneurship Ecosystems in Higher Education: A Case of Universities South Africa's EDHE as an Ecosystem Coordinator and Enabler. In T. van der Westhuizen (Ed.), *Innovative Pedagogies for Entrepreneurship Education: Insights and Reflections from South Africa* (pp. 497–525). Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-07204-7_21
- IEA. (2024). South Africa—Countries & Regions. IEA. <https://www.iea.org/countries/south-africa/energy-mix>
- Keown, H. (2019). The development of a socio-economic model to promote women empowerment initiatives in the renewable energy sector of South Africa. <https://doi.org/10.13140/RG.2.2.16486.37443>
- Lekoloane, K., Mamabolo, A., & Mbokota, G. (2025). Business growth mentorship for female-owned enterprises in South Africa. *South African Journal of Business Management*, 56(1), Article 1. <https://doi.org/10.4102/sajbm.v56i1.4958>

Mali, N. (2025). An exploratory study of financial access along the renewable energy sector value chain: The case of SMMEs in South Africa. <https://open.uct.ac.za/items/afb13df6-3ac7-44a0-85aa-8c7811caf8cb>

Muathe, S., & Otieno, V. (2022). STARTUP INCUBATION AND ACCELERATORS IN AFRICA; ARE START-UPS SCALING UP IN KENYA? *American International Journal of Social Science Research*, 23–28. <https://doi.org/10.46281/aijssr.v11i1.1688>

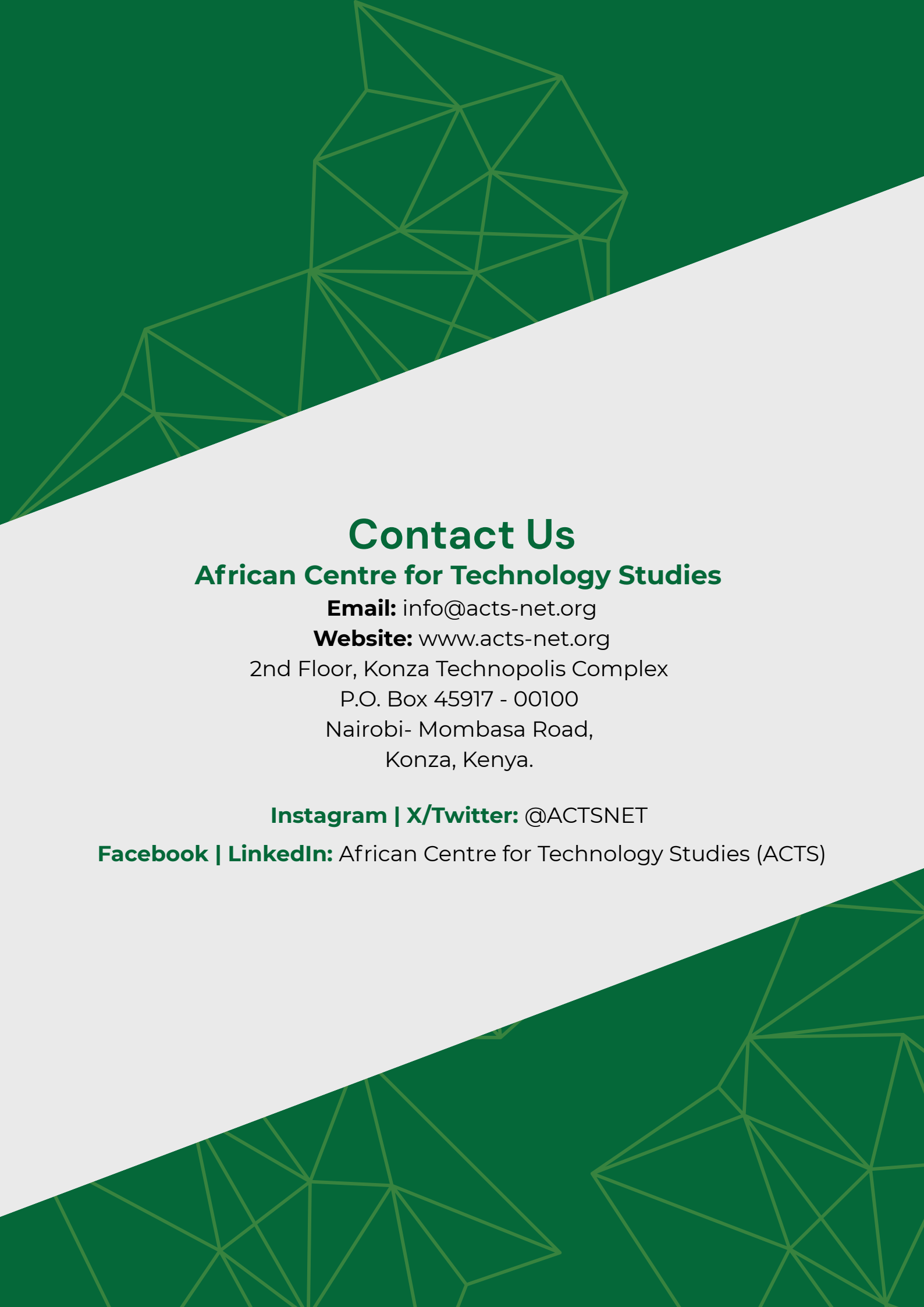
Müller, S., Boso, N., Dey, P., Gurtner, N., Gurtner, S., Bellwald, N., Dembetembe, G., Gallant, N., Gulma, S. A., Ljung, M., Maisela, S., Mbangiswano, S., Nevo, C. M., & Nwachukwu, J. (2026). African innovation and entrepreneurship research for sustainable development: A young scholars' perspective. *Africa Journal of Management*, 12(2), 156–208. <https://doi.org/10.1080/23322373.2026.2633092>

Ogujiuba, K. K., Eggink, M., & Olamide, E. (2023). Interaction and Main Effects of Finance Support and Other Business Support Services on the Entrepreneurial Ecosystem: A Case Study of the Mpumalanga Province, South Africa. *Economies*, 11(6), 157. <https://doi.org/10.3390/economies11060157>

Sharma, A. K., Kumar, D. A., & Priya, T. (2025). GREEN FINANCING OPTIONS, EXPLORING GRANTS AND SUBSIDIES FOR SUSTAINABLE STARTUPS, ACCESSING GREEN LOANS AND GRANTS. *LEX LOCALIS*, 23.

Stoker, S., Cruz-Garcia, A., & Wakkee, I. (2025). Unveiling belonging: Women entrepreneurs' belonging strategies to navigate the embedding process. *International Journal of Gender and Entrepreneurship*, 18(1), 107–128. <https://doi.org/10.1108/IJGE-07-2024-0221>

Note: This research brief was developed by the SARCHI-Trilateral Research Chair in Transformative Innovation (TRCTI), University of Johannesburg under the Evidence for Informing Scaling And Impact In Youth And Women-Led Clean Energy Enterprises (EVI-SICEE) in Africa project funded by IDRC and implemented by a consortium led by the African Centre for Technology Studies (ACTS).



Contact Us

African Centre for Technology Studies

Email: info@acts-net.org

Website: www.acts-net.org

2nd Floor, Konza Technopolis Complex

P.O. Box 45917 - 00100

Nairobi- Mombasa Road,

Konza, Kenya.

Instagram | X/Twitter: @ACTSNET

Facebook | LinkedIn: African Centre for Technology Studies (ACTS)