CHINA-AFRICA ENERGY INNOVATION COOPERATION ACCELERATOR PROJECT

CASE COLLECTION REPORT

China Renewable
Energy Engineering Institute

Impact Hub Shanghai

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EDITORIAL INFORMATION AND COPYRIGHT STATEMENT

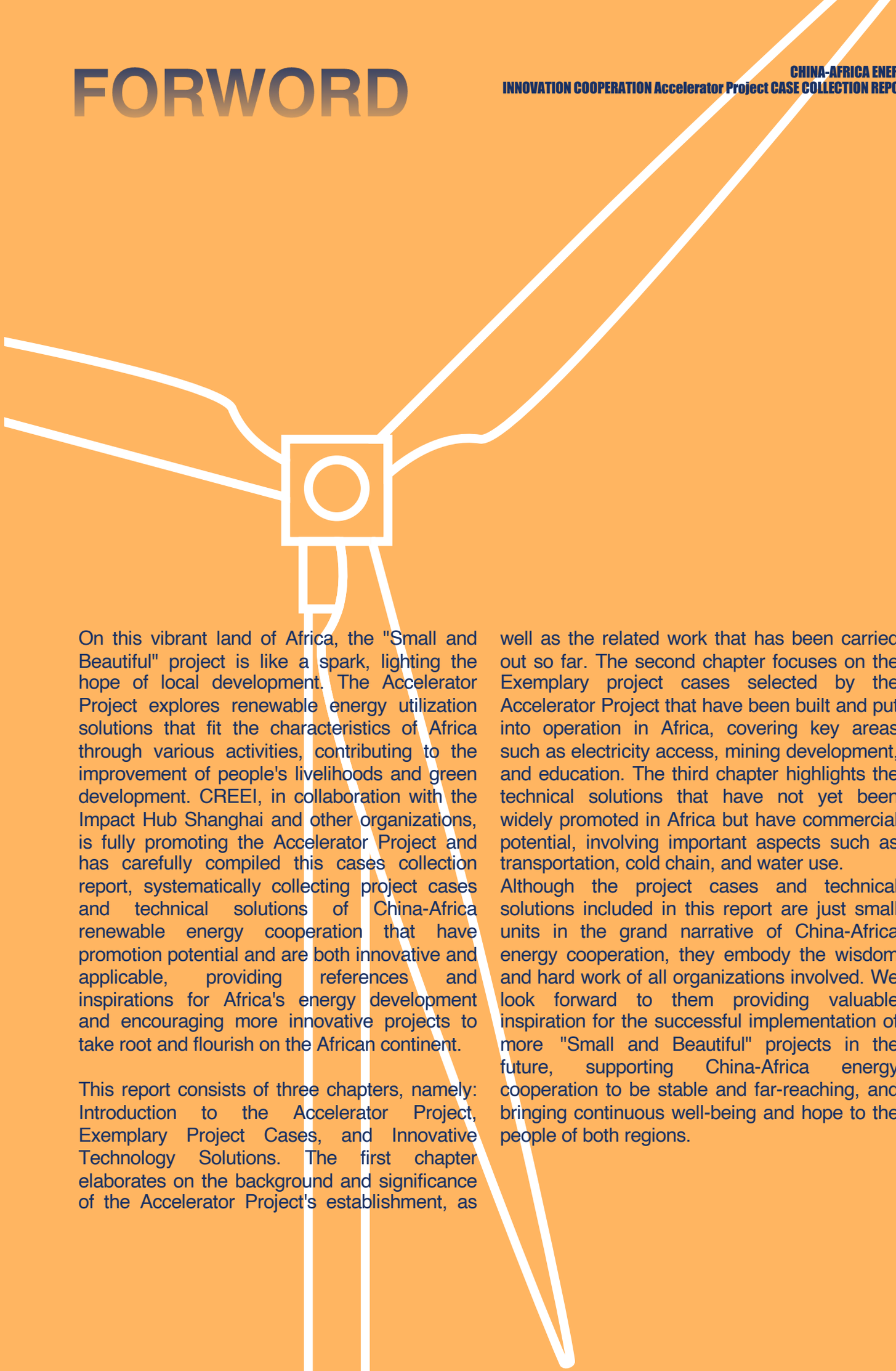
PREFACE

Energy, as an indispensable material foundation for the progress of human society, holds an obvious and significant position and plays a crucial role. From firewood in primitive societies to coal, oil, natural gas, nuclear energy and renewable energy in modern times, every transformation of energy has profoundly influenced the progress and development of human society. In the context of the global energy transition, renewable energy has gradually become an important force driving economic growth and achieving sustainable development. Africa has abundant renewable energy resources, with the development potential of its hydropower, wind power, and solar energy resources ranking among the top in the world. The African Union (AU) has been committed to promoting the just transformation and sustainable development of energy on the African continent. Rooted in AU's *Agenda 2063*, developing renewable energy is a long-term vision adopted by Africa's leaders through the AU and is highly consistent with the continent's aspirations for prosperity and inclusive growth.

Renewable energy is clean, low-carbon, endlessly replenished, and can be harnessed on the very spot where it is needed; its vigorous expansion is therefore of immediate and far-reaching importance for extending electricity access, uplifting livelihoods, and advancing socio-economic progress across Africa. As a leading architect of the global energy transition, China has amassed a wealth of experience covering a wide range of application scenarios from large-scale base development to "Small and beautiful" projects construction. It has formed a full-chain and multi-scenario technological accumulation, contributing valuable "Chinese solutions" to global energy transition, especially to the sustainable energy development of developing countries such as Africa. Among these contributions, the "Small and beautiful" model stands out for its low risk, short timelines, quick results, and direct benefits to people's daily lives. Acting as the ideal complement to large, centralised schemes, it marches in tandem with them, each strengthening the other. With these distinctive strengths, such projects are injecting fresh momentum into Africa's energy landscape, becoming a steadfast force for universal access, economic vitality, and shared prosperity.

To facilitate the implementation of more "Small and beautiful" projects in Africa, CREEI initiated the China-Africa Energy Innovation Cooperation Accelerator Project (hereinafter referred to as "Accelerator Project"), aiming to explore more energy utilization solutions that better meet the needs of African people, are more adapted to local conditions, and are more innovative, in order to promote the coordinated development of electricity access and improvement of well-being. The Forum on China-Africa Cooperation (FOCAC) Summit in Beijing held in September 2024, as an important milestone in deepening cooperation between China and Africa, explicitly included the Accelerator Project within its support scope in the outcome document *FOCAC - Beijing Action Plan* (2025-2027).

FORWORD

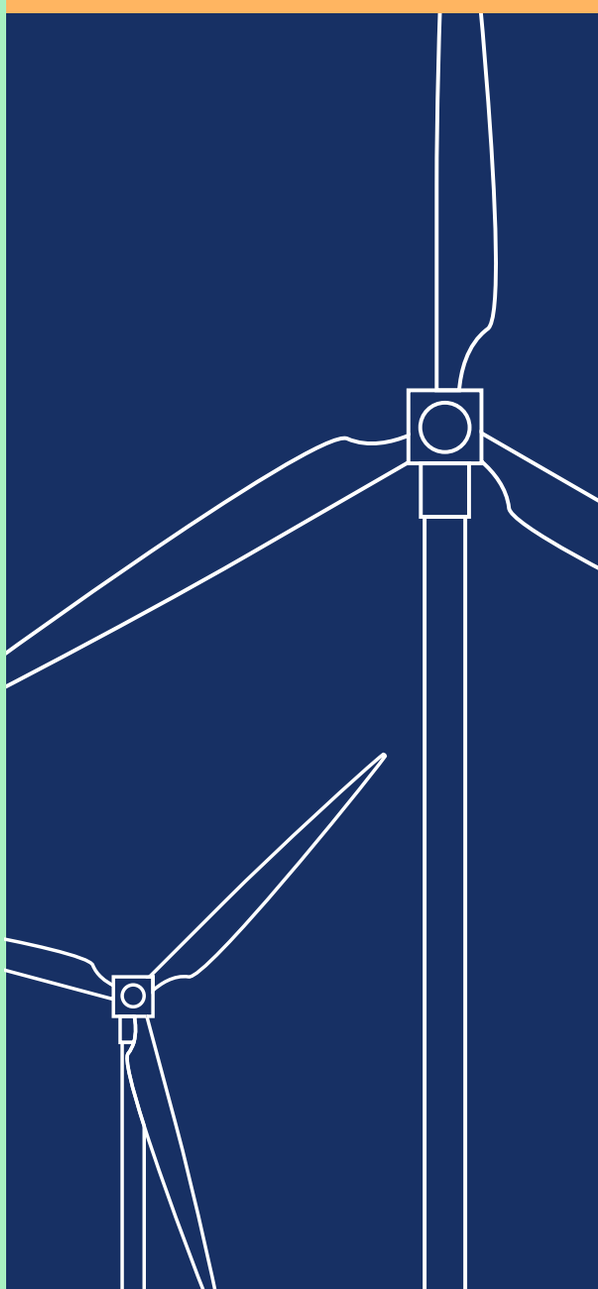


On this vibrant land of Africa, the "Small and Beautiful" project is like a spark, lighting the hope of local development. The Accelerator Project explores renewable energy utilization solutions that fit the characteristics of Africa through various activities, contributing to the improvement of people's livelihoods and green development. CREEI, in collaboration with the Impact Hub Shanghai and other organizations, is fully promoting the Accelerator Project and has carefully compiled this cases collection report, systematically collecting project cases and technical solutions of China-Africa renewable energy cooperation that have promotion potential and are both innovative and applicable, providing references and inspirations for Africa's energy development and encouraging more innovative projects to take root and flourish on the African continent.

This report consists of three chapters, namely: Introduction to the Accelerator Project, Exemplary Project Cases, and Innovative Technology Solutions. The first chapter elaborates on the background and significance of the Accelerator Project's establishment, as well as the related work that has been carried out so far. The second chapter focuses on the Exemplary project cases selected by the Accelerator Project that have been built and put into operation in Africa, covering key areas such as electricity access, mining development, and education. The third chapter highlights the technical solutions that have not yet been widely promoted in Africa but have commercial potential, involving important aspects such as transportation, cold chain, and water use.

Although the project cases and technical solutions included in this report are just small units in the grand narrative of China-Africa energy cooperation, they embody the wisdom and hard work of all organizations involved. We look forward to them providing valuable inspiration for the successful implementation of more "Small and Beautiful" projects in the future, supporting China-Africa energy cooperation to be stable and far-reaching, and bringing continuous well-being and hope to the people of both regions.

CONT-ENTS



01

Introduction to the Accelerator Project

As an innovative exploration in the field of renewable energy, the Accelerator Project is a "Small and Beautiful" project that focuses on improving the livelihoods of people in Africa. On the one hand, it empowers innovative enterprises committed to carrying out such projects in Africa, It helps them better understand the African market and integrate into the construction of China-Africa energy cooperation, promoting a win-win situation for their own growth and the improvement of people's livelihoods in Africa. On the other hand, it focuses on identifying and disseminating "Small and Beautiful"project cases and technical solutions that are in line with the actual situation in Africa, innovative and adaptable, stimulating new ideas for China-Africa energy cooperation, supporting to solve local electricity problems, and injecting impetus into enhancing people's well-being and promoting sustainable development in Africa.

The Accelerator Project was planned and launched in 2023, hosted by CREEI, and organized by Impact Hub Shanghai, and also received the support and assistance of several professional institutions, including the Chinese Renewable Energy Industries Association (CREIA), the China Association of International Engineering Consultants (AIEC), the International Center on Small Hydro Power (ICSHP), the Belt and Road Environmental Technology Exchange and Transfer Center (Shenzhen), the Shanghai Society for Sustainable Development, the Chongqing Renewable Energy Society, the Shanghai Fosun Public Welfare Foundation, and the Tencent TanLIVE platform.

Under the joint efforts and collaborative promotion of all parties, the Accelerator Project meticulously organized and implemented a series of diverse and practical activities, including selection discussions, scheme reviews, technical visits, capacity building training, and international exchanges. These activities multi-dimensionally and deeply enhanced the capabilities of innovative enterprises to participate in China-Africa cooperation, an systematically selected and promoted a batch of "Small and Beautiful" project cases and technical solutions of renewable energy that benefit people's livelihood. This not only opened up new ideas for China-Africa energy cooperation but also provided beneficial inspirations for deepening practical cooperation in the future.

01

Introduction to the Accelerator Project

Figure 1-1 Discussion on the selection criteria for "Small and Beautiful" project cases and technical solutions

- **The China-Africa Energy Innovation Cooperation Symposium**
- **October 2023**

The symposium was held in Shanghai. Nearly 30 representatives from industry associations, investment institutions, universities, and energy enterprises were invited to attend. They discussed the selection criteria for "Small and Beautiful" project cases and solutions, and had in-depth exchanges of views on the next steps and implementation measures for the Accelerator Project.

Figure 1-2 Discussion and deployment of the work plan for the Accelerator Project

- **Accelerator Project Kick-off Meeting and "Small and Beautiful" Project Promotion Symposium**
- **November 2023**

The symposium was held in Shenzhen. Nearly 20 representatives from the organizing, co-organizing and supporting units as well as related industry institutions attended the meeting to discuss and deploy the work plan for the Accelerator Project. The symposium made it clear that all sides will provide support for the Accelerator Project by leveraging their own advantages in aspects such as event organization, resource connection, capacity building and media promotion.

Figure 1-3 Gu Hongbin from CREEI giving a speech at a related event during COP28

- **The Accelerator Project Series of Events Held During COP28,**
- **December 2023**

The 28th Conference of the Parties to the UN Climate Change Conference (COP28) was held in Dubai. During the conference, the organizing party of the Accelerator Project held a side event titled “Innovative Leadership in China-Africa Cooperation: Unleashing the Potential of ‘Solar Plus’” in line with the launch of the Accelerator Project. About 10 representatives from the UN and relevant industries in China and Africa attended and delivered speeches, focusing on the application and promotion of "Small and Beautiful" photovoltaic projects in diverse scenarios in Africa. Meanwhile, representatives of the Accelerator Project also took advantage of related activities at COP28 to offer suggestions on promoting China-Africa cooperation and the Accelerator Project.

01

Introduction to the Accelerator Project

Figure 1-4 Jiang Hao from CREEI announced the official launch of the Accelerator Project

- **The Accelerator Project was Officially Launched**
- **December 2023**

The "Belt and Road" Green and Low-Carbon Transformation Cooperation Symposium was held at the China Pavilion of COP28. At the event, the Accelerator Project was officially launched. The related activities were covered in special reports by mainstream media such as Xinhua News Agency, enhancing the influence of the Accelerator Project and raising the international community's recognition of "Small and Beautiful" projects. This has played a positive role in promoting the benefits of "Small and Beautiful" projects in Africa and advancing China-Africa energy cooperation.

Figure 1-5 Accelerator call for projects and promotion

- **Accelerator Project Collection and Promotion Meeting**
- **January 25, 2024**

To systematically promote the collection of project cases and technical solutions, an Accelerator Project Collection And Promotion Meeting was held, focused on the analysis of project positioning, clarification of selection criteria, and planning of implementation paths. Through professional interpretation and interactive Q&A, it effectively enhanced the participating organizations ' understanding of the project's value, laying a cognitive foundation and collaborative framework for the subsequent precise selection of high-quality solutions and efficient promotion of demonstration projects.

Figure1- 6 Yang Shuzhi from CREEI delivering a speech at the first round of the Accelerator Project's proposal review meeting

- **The First Round of the Proposal Review Meeting for the Accelerator Project**
- **June 2024**

To enhance the feasibility of the selected technical solutions and accelerate their implementation, the Accelerator Project successfully held the first round of the proposal review meeting in Shanghai. The meeting has invited a panel of industry experts to conduct an in-depth assessment focusing on technology readiness, economic viability, and risk management, thereby providing professional guidance and optimization recommendations for the subsequent implementation of technical solutions.

01

Introduction to the Accelerator Project

Figure 1-7 The Accelerator Project was written into the outcome document of the 2024 Beijing Summit of the Forum on China-Africa Cooperation

- **Accelerator Project Incorporated into the Outcome Document of Beijing Summit**
- **September 2024**

The FOCAC Beijing Summit adopted the *FOCAC–Beijing Action Plan* (2025-2027), which lists the "Accelerator Project" as a flagship initiative for pragmatic energy cooperation. This provides robust policy backing for the project and will further enhance its demonstration and leadership role in China-Africa energy innovation cooperation.

Figure 1-8 The team related to the Accelerator Project attended the second China-Africa Energy Cooperation Project Promotion Conference

- **Attend the China-Africa Energy Cooperation Project Promotion Conference**
- **October 2024**

Organized the Accelerator Project team to attend the second China-Africa Energy Cooperation Project Promotion Conference in Beijing. Distinguished attendees include representatives from the African Union Commission, the Department of Infrastructure and Energy of AU, the AUDA(African Union Development Agency)–NEPAD, the African Energy Commission, as well as 8 Ambassadors and a total of 32 diplomatic envoys from 17 African embassies in China. This conference provided a high-level international exchange and cooperation platform for organizing Accelerator Project team.

Figure 1-9 AU experts engaged in discussions and knowledge-sharing with team members

- **Conducted Capacity Building Training**
- **October 2024**

Diplomatic envoys from African embassies in China, experts from the African Union, senior executives of energy companies, and specialists in finance and law have been invited to provide capacity building training for the Accelerator Project teams. Through systematic knowledge transfer and experience sharing, the program empowers participants, deepens their understanding of Africa's energy sector, and strengthens their ability to adapt to market dynamics.

01

Introduction to the Accelerator Project

Figure 1-10 Gong Heping from CREEI leads a technical visit

- **A Technical Visit is Organized for the Accelerator Project Team**
- **October 2024**

The Accelerator Project team visited the Yizhuang Smart Park of Goldwind Sci & Tech Co.,Ltd. to conduct on-site research. The visit enabled the project team to learn from the advanced experiences of China's leading renewable energy equipment manufacturing enterprises in the fields of wind power, smart energy storage, green agriculture, and carbon reduction, thereby supporting the deepening of technical cooperation in the future.

Figure 1-11 The second round of the proposal review meeting for the Accelerator Project

- **The Second Round of the Proposal Review Meeting for the Accelerator Project**
- **October 2024**

The second round of the proposal review meeting for the Accelerator Project was held in Beijing. Based on the first round of proposal review, this meeting conducted an in-depth evaluation and targeted guidance focused on dimensions such as innovation and impact, thereby enhancing the quality of shortlisted project proposals and technical cases and laying a solid foundation for their subsequent roll-out.

Small Sparks, Big Change: Seeding Innovation in Renewable Energy

After two rounds of rigorous expert reviews, the Accelerator Project has finally selected three exemplary project cases and innovative technical solutions in the field of renewable energy. In Africa, a continent brimming with development potential, "Small and Beautiful" cooperation offers new ideas for promoting electricity access and sustainable development. In this context, we compile this Cases Collection Report, aiming to provide reference and inspiration for organizations interested in such cooperation and sow the seeds of innovation.

The project cases and technical solutions included in this Cases Collection Report have potential for promotion, innovation and applicability. Among them, all the exemplary project cases are engineering projects that have been completed and put into operation in Africa, covering key areas such as electricity access, mining development, and education; the innovative technical solutions though have not yet been widely promoted in Africa, they have commercial potential and involve important aspects such as transportation, cold chain, and water use.

02

Exemplary Project Cases

1.Empowering Rural Communities
-Ethiopia Snnp Tum Renewable Energy Microgrid Project

2.Solar Energy: Lighting the Torch of Learning
-Solar Media

3.Injecting Green Impetus into the Development of the Mining Industry
-Zambia Itezhi-Tezhi Photovoltaic Power Station

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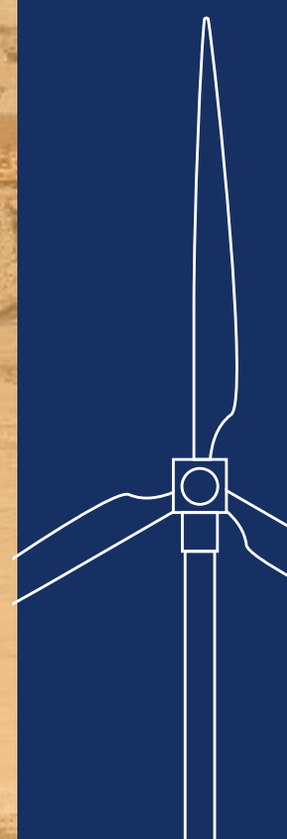


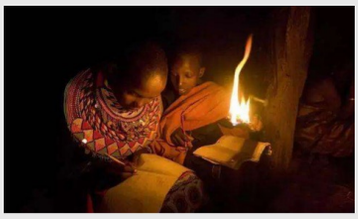
CASE 1

Empowering Rural Communities -Ethiopia Snnp Tum Renewable Energy Microgrid Project

02

Exemplary Project Cases

Attaining energy security, achieving transition from traditional to modern and clean sources of energy and ensuring access of a majority of their citizens to electricity, and raising the share of renewable energy in total energy production.
-*Agenda 2063,* African Union



According to the latest reports issued by the International Energy Agency (IEA) and other authoritative institutes, more than 666 million people worldwide still lack access to electricity, approximately 85 percent of whom live in sub-Saharan Africa. Among the twenty countries with the largest un-electrified populations, eighteen are located in this region. Local households rely primarily on traditional biomass fuels such as firewood and charcoal, for cooking and heating. This approach offers limited energy efficiency and places notable pressure on ecosystems as well as on household health.

Given these circumstances, conventional solutions that depend on extending national grids or expanding traditional energy sources are constrained by high costs, difficult terrain, and underdeveloped infrastructure, rendering them unable to meet urgent local demand in the short term. In contrast, renewable-energy microgrids-with their distributed deployment, superior cost-effectiveness, and inherent sustainability-offer substantial potential. They can rapidly and flexibly bridge the "last mile" of electricity access, providing a fresh perspective for expanding energy access across sub-Saharan Africa.

Case 1

Empowering Rural Communities -Ethiopia Snnp Tum Renewable Energy Microgrid Project

02

Exemplary Project Cases

Ethiopia, a major African nation with a population exceeding 100 million, has achieved an electrification rate of roughly 80 percent in urban areas amid sustained economic and social development. However, the rural electrification rate still leaves considerable room for further expansion. In remote rural localities, dispersed settlements and long distances from the main grid make grid extension technically difficult, preventing residents from accessing reliable modern electricity. Encouragingly, these regions are endowed with abundant solar and wind resources, enabling the deployment of renewable-energy microgrids-wind and solar power generation units, and energy storage devices-to serve as an innovative pathway for raising rural electrification levels. Microgrid projects can operate in either grid-connected or in islanded mode without relying on the main grid, offering universal applicability across diverse geographic and infrastructural contexts.

The renewable microgrid project is a compact generation-and-distribution system that relies primarily on distributed renewable resources (such as photovoltaic and wind power) and incorporates energy storage devices, energy management, electric loads, distribution facilities, and monitoring/protection units. Its control platform dynamically balances supply and demand: during periods of abundant sunlight or wind, it can charge the energy storage device while meeting the users' demands. Conversely, during nighttime or calm conditions, the stored energy is dispatched to maintain a stable power supply. The system can function autonomously or in parallel with the main grid, ensuring high deployment flexibility.

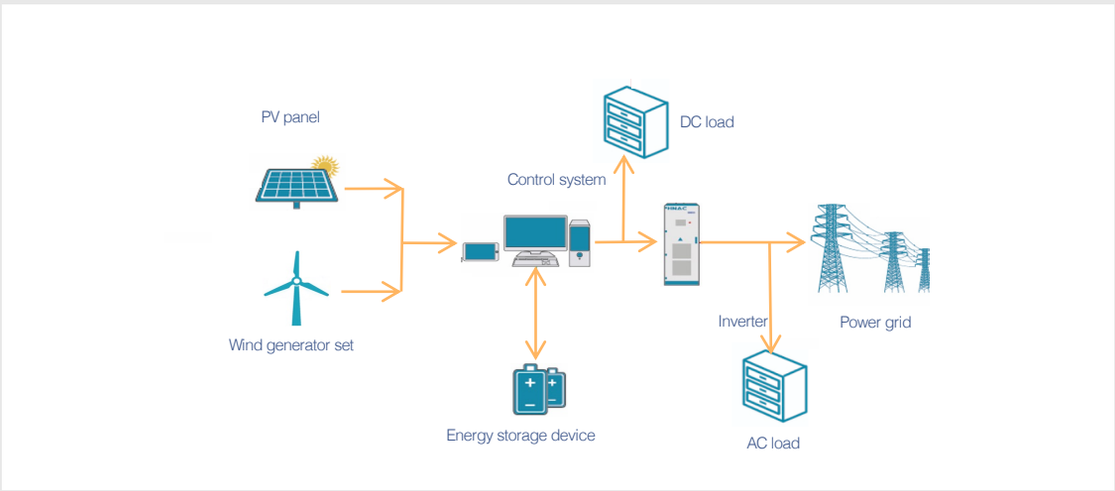


Figure 2-1 Schematic Diagram of the Principle of the Renewable-Energy Microgrid Project

CASE 1

Empowering Rural Communities -Ethiopia SNNP Tum Renewable-Energy Microgrid Project

Photovoltaic Power Generation Device

Energy Storage System

Figure 2-2 Ethiopia SNNP Tum Renewable-Energy Microgrid Project

The SNNP Tum Renewable-Energy Microgrid Project is located in SNNP Tum, Southern Nations, Nationalities and Peoples' Region, Ethiopia. Construction began in August 2023 and commercial operation began in October 2024. The project is equipped with 550 kW of photovoltaic modules, a 130 kVA diesel generator as a backup power source, and a 750 kWh lithium iron phosphate battery energy storage system, ensuring stable power supply for 24 hours. The project adopts the energy management system (EMS) independently developed by Guodian Nanjing Automation Co., Ltd, which enables real-time optimization and control of energy distribution: during the daytime, priority is given to photovoltaic power supply, and surplus electricity is stored in the battery system; at night or on rainy days, it automatically switches to battery power supply, and only starts the diesel generator in very special circumstances. Compared with the traditional pure diesel power generation mode, this system improves the overall energy efficiency by 25% and reduces diesel consumption by 70%.

Note: The above case-related information is provided by Guodian Nanjing Automation Co., Ltd

CASE 1

Empowering Rural Communities -Ethiopia SNNP Tum Renewable-Energy Microgrid Project

02

Exemplary Project Cases

The SNNP Tum Renewable-Energy Microgrid Project generates approximately 880 MWh annually, supplying electricity to community public-service facilities and households in the surrounding communities. It has been officially selected as a demonstration project under Ethiopia's National Electrification Program. During the project's advancement, a specialized capacity building training program was carried out for 20 local technicians, establishing a talent support system for the project's sustainable development. Based on the practical experience accumulated from the project, stakeholders are actively promoting the development of subsequent microgrid projects, which are expected to benefit millions of rural residents. At the same time, by driving the development of related industries, more job opportunities will be created for the local area.

Figure 2-3 Project engineers providing training for local technicians

Note: The above case-related information is provided by Guodian Nanjing Automation Co., Ltd

CASE 2

Solar Energy: Lighting the Torch of Learning -Solar Media

02

Exemplary Project Cases

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations.

-Sustainable Development Goal (SDG) 4,United Nations

Data from UNESCO and other agencies indicate that approximately 100 million primary and secondary school-aged children in Africa remain out of school. Among these, sub-Saharan Africa has the highest number of out-of-school children and the highest out-of-school rates globally, with 18.8 % of primary school-aged children and 36.7 % of secondary school-aged adolescents not attending school. In remote rural areas of Africa, access to educational resources remains a significant challenge. Shortages of reliable electricity and lack of internet connectivity represent key obstacles for local communities in accessing modern technological knowledge and practical skills. The urgent imperative, therefore, is to explore and implement innovative educational solutions. Solar Media, an integrated device that combines photovoltaic power supply with multimedia educational content delivery, is emerging as a promising tool, offering new hope and possibilities for improving education in Africa's most isolated regions.

CASE 2

Solar Energy: Lighting the Torch of Learning -Solar Media

02

Exemplary Project Cases

Solar Media is an innovative device that integrates photovoltaic technology with multimedia functionality, purpose-built to address the dual demands for lighting and education in off-grid and offline areas. Its core components include compact photovoltaic panels, energy-storage unit, LED lighting system, and video-capable multimedia player. Beyond providing reliable illumination for nighttime study and daily activities, Solar Media also enables users in remote rural communities to access educational videos covering school curricula, medical guidance, and agricultural techniques through its built-in player. This content empowers users to expand their knowledge, enhance practical skills, broaden their perspectives, and strengthen individual capabilities. Designed with portability and practicality in mind, Solar Media is compact, lightweight, and easily transportable, ensuring effortless deployment and use in the most resource-constrained environments.

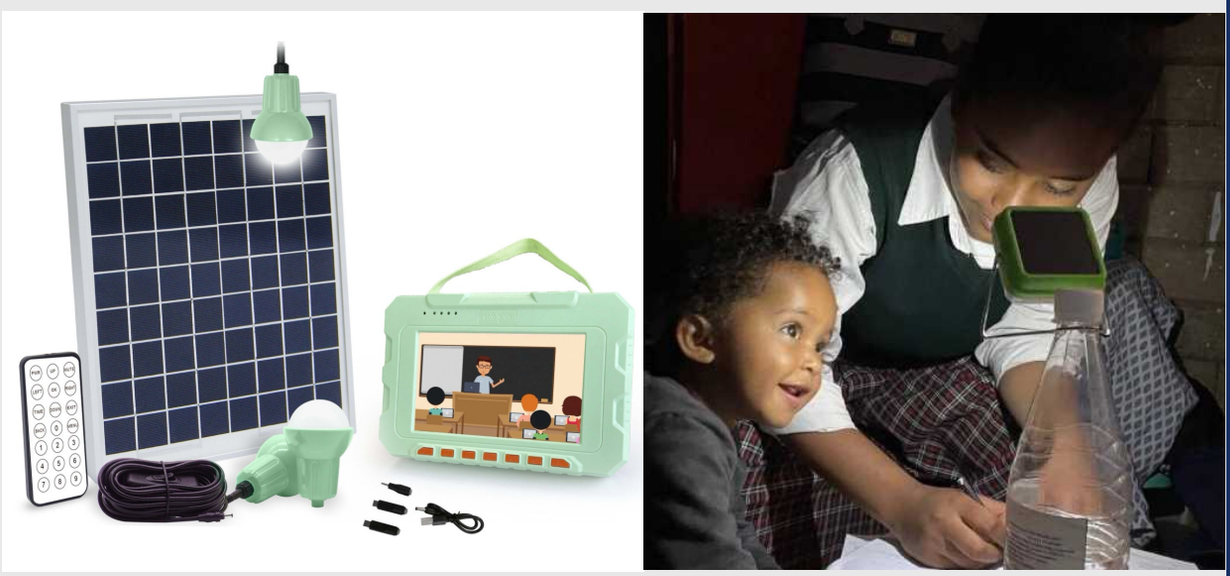


Figure 2-4 Main components of solar media

Note: The above case-related information is provided by Shenzhen Solar Run Energy Co., Ltd.

CASE 2

Solar Energy: Lighting the Torch of Learning -Solar Media

02

Exemplary Project Cases

Currently, Solar Media project, invested in by Shenzhen Solar Run Energy Co., Ltd., has entered its pilot phase in Africa. In partnership with a Kenyan enterprise MaMa Layla, the project has delivered more than 700 Solar Media units to the remote village of Nthunguni. This project facilitates the holistic development of local communities in areas such as education, agriculture, health, and skills training. It promotes knowledge sharing and cultural exchange, extends educational resources to the "last mile", advances educational equity, and contributes significantly to poverty alleviation through education.

Figure2-5 Local Community Worker in Kenya Demonstrating Solar Media

Note: The above case-related information is provided by Shenzhen Solar Run Energy Co., Ltd.

CASE 2

Solar Energy: Lighting the Torch of Learning -Solar Media

02

Exemplary Project Cases

Jamlick Mutwiri, who manages apiculture at a local child-friendly space, says that the Solar Media has equipped him with extensive, professionally oriented knowledge and skills in beekeeping. The content covers bee biology and behavior, colony nutrition, hive management, honey-quality assessment, and integrated pest and disease control. In favorable weather, he harvests up to 150 kg of honey from his 91 hives.

Rehema Yusuf, a mother of three living in a remote village near Mitito Andei, Makueni County, Kenya, used the Solar Media to access structured hairdressing tutorials. Mastering the techniques through systematic training, she now offers hairdressing services to her community, generating substantial income that enables her to provide for her children more effectively.

Note: The above case-related information is provided by Shenzhen Solar Run Energy Co., Ltd.

CASE 3

Powering Sustainable Mining Development -Zambia Itimpi Solar Power Station

02

Exemplary Project Cases

Transparent, equitable and optimal exploitation of mineral resources to underpin broad-based sustainable growth and socio-economic development.
-African Mining Vision (AMV), African Union

The African continent holds exceptionally abundant mineral resources. Proven reserves account for roughly 30 % of the global total. Africa's share of global gold reserves reaches 40%, while its chromium and platinum resources constitute about 90%. In addition, significant reserves of diamonds, copper, cobalt, manganese, nickel, uranium, rare-earth elements, as well as coal, oil, and natural gas are present. Complementing these endowments, Africa enjoys exemplary solar energy potential. The coupling of photovoltaics with energy-storage technologies can markedly reduce the mining sector's reliance on conventional fossil-fuel generation and accelerate the green transformation of mining operations across the continent.

CASE 3

Powering Sustainable Mining Development -Zambia Itimpi Solar Power Station

Zambia, a landlocked country in south-central Africa and a participant in the Belt and Road Initiative, is endowed with numerous rivers and abundant hydropower resources. For a long time, hydropower has been the dominant source of its electricity supply. However, in recent years, severe drought conditions have led to a sustained decline in hydroelectric generation, reducing the country's power supply capacity. Managed power outages have been implemented periodically, which has posed challenges to the steady development of the local mining sector. In the context of the global energy transition, the rapid expansion of solar PV generation has become a critical pathway for Zambia to alleviate electricity shortages, safeguard mining operations, and cut carbon emissions.

A utility-scale PV power station converts sunlight directly into direct-current electricity via PV panels, and then converts the direct current (DC) into alternating current (AC) through inverters. Finally, the voltage is raised and connected to the local power grid or directly supplied to surrounding enterprises for use. Such power stations are best sited in regions with abundant solar resources and available land. Post-mining land (including tailings ponds, waste dumps, and subsidence zones) is typically extensive and unsuitable for most other uses, making it ideal for building utility-scale PV power stations, enabling productive land reuse. This approach delivers clean energy to mining enterprises, reduces energy expenditures, lowers dependence on fossil fuels, and enhances both the stability and security of power supply.

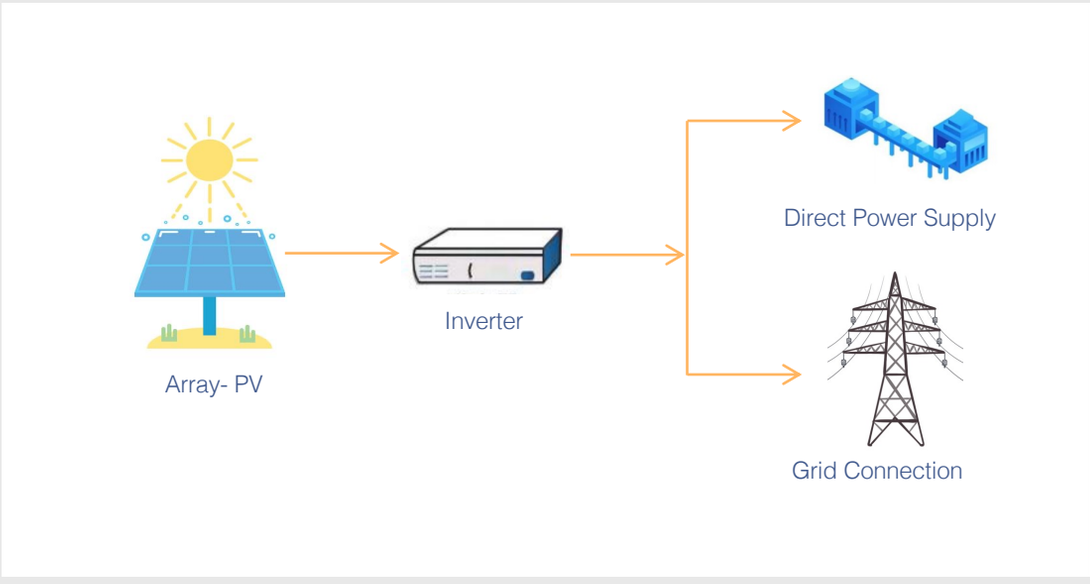


Figure 2-6 Schematic Diagram of the Principle of a PV Power Station

CASE 3

Powering Sustainable Mining Development -Zambia Itimpi Solar Power Station

02

Exemplary Project Cases

The Itimpi Solar Power Station is the flagship outcome of Zambia's drive to scale up solar PV generation. It is located in Kitwe, Copperbelt Province, the economic and electricity load center of Zambia, covering 31.5 hectares and comprises a 50 MW solar PV plant together with its associated evacuation facilities. Construction began in February 2023, and the official grid-connection ceremony was held on 10 April 2024. President Hakainde Hichilema attended the event and delivered remarks, emphasizing that the Itimpi Solar Power Station is of great significance for Zambia to address climate change, promote economic development and achieve energy diversification.

The Itimpi Solar Power Station is invested in by Zambian enterprise Copperbelt Energy Corperation (CEC), with PV modules supplied by Chint New Energy Technology Co., Ltd. It is the largest tracking-type PV project completed to date in Zambia and delivers higher generation efficiency than fixed-tilt installations, with an expected annual output exceeding 100 GWh. The project employs PV modules specifically engineered for African climatic conditions, ensuring long-term, stable operation under the continent's complex weather patterns while minimizing failure risk and maintenance costs.

Figure 2-7 President Hakainde Hichilema of Zambia Attends Grid-Connected Power Generation Ceremony for Itimpi Solar Project

Note: The above case-related information is provided by Chint New Energy Technology Co., Ltd.

CASE 3

Powering Sustainable Mining Development -Zambia Itimpi Solar Power Station

02

Exemplary Project Cases

Figure 2-8 The Itimpi Solar Power Station

The successful operation of the Itimpi Solar Power Station has effectively alleviated the structural imbalance between electricity supply and demand in Copperbelt Province, mitigated power shortages caused by drought, enhanced the reliability of power supply for local industries and mining operations, and injected a cleaner and more stable source of electricity into Zambia's socioeconomic development. Hon. Collins Nzovu, Minister of Green Economy and Environment, commended the project, "The Itimpi Solar Power Station will significantly advance Zambia's green economy agenda and is instrumental in ensuring the country's energy transition and diversification."

Crispin Chilundu, a local resident, offers a personal testament to the project's tangible impact on livelihoods. He said, "Some of us run barber shops here, when the power goes out, our businesses simply stop. With this PV power station project now feeding the grid, we expect fewer blackouts and better days ahead."

During construction, the Itimpi Solar Power Station also generated more than 1,000 local jobs, stimulated regional economic activity, and stands as a flagship model of China–Zambia energy cooperation.

Note: The above case-related information is provided by Chint New Energy Technology Co., Ltd.

03

Innovative Technical Solutions

1.Bridging the Final Mile for Mobility
-New Energy Operated Tricycles and Their Supporting Infrastructure

2.Safeguarding Food Storage and Transportation
-Sustainable Energy and Nano Phase Change Energy Storage Technology

3.Harvesting Hope: Drinking Water from the Air
-Portable DC Atmospheric Water Generator/ Large Scale Distributed Atmospheric Water Supply Station

China Renewable Energy Engineering Institute (CREEI)
Impact Hub Shanghai

SOLUTION 1

Bridging the Final Mile for Mobility -New Energy Operated Tricycles and Their Supporting Infrastructure

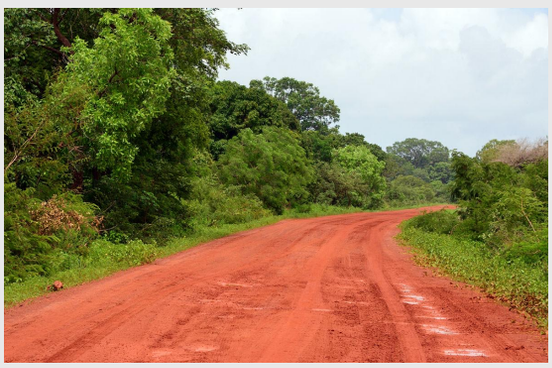
03

Innovative Technical Solutions

Electric two-and three-wheelers offer enormous potential to help shift passenger and cargo transportation towards global sustainability.

-International Finance Corporation（IFC）

In many rural areas across Africa, communities often face limited options for transportation, coupled with a lack of diverse and accessible mobility solutions. Due to underdeveloped transportation infrastructure, less-than-ideal road conditions, and limited availability of fossil fuels, modern vehicles such as cars and trucks often face operational challenges. Consequently, agricultural products frequently cannot reach markets in time, which hampers farmers' income and constrains the economic potential of these regions.



SOLUTION 1

Bridging the Final Mile for Mobility -New Energy Operated Tricycles and Their Supporting Infrastructure

03

Innovative Technical Solutions

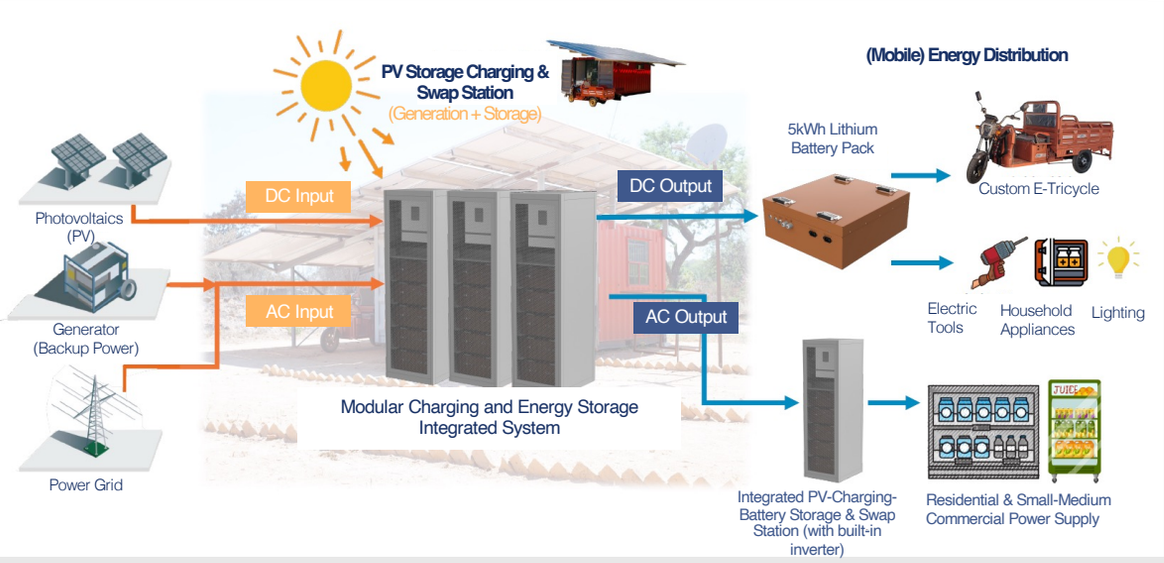


Figure 3-1 Application models of new energy operated tricycles and their supporting infrasturcture

New energy operated tricycles offer sufficient payload capacity, high maneuverability, and rugged durability, enabling reliable operation on Africa's complex rural road networks. By leveraging abundant local solar resources, integrated PV-charging-battery storage & swap stations can readily address recharging needs, delivering an environmentally friendly, low-carbon, and efficient solution for local farmers' goods transportation.

Figure 3-2 Integrated PV-charging-battery storage & swap station

Note: The above case-related information is provided by Jiangsu Zhinengjie Energy Technology Co., Ltd.

SOLUTION 1

Bridging the Final Mile for Mobility -New Energy Operated Tricycles and Their Supporting Infrastructure

03

Innovative Technical Solutions

Jiangsu Zhinengjie Energy Technology Co., Ltd. has adapted mainstream Chinese electrically operated tricycles to meet the specific demands of rural Africa. The company retrofitted the tricycles with a purpose-built 5 kWh lithium iron phosphate (LFP) battery pack, enabling a fully laden range of more than 100 km at loads of 300–400 kg (equivalent to 4–5 passengers). A "hire-purchase plus battery-swap" business model has been adopted, supported by a network of swap stations-each covering a 15 km service radius. These stations deliver rapid battery exchange, routine maintenance and repair services for electric tricycles. Meanwhile, their energy storage batteries can also provide power support to nearby households and other energy users, achieving diversified energy utilization.

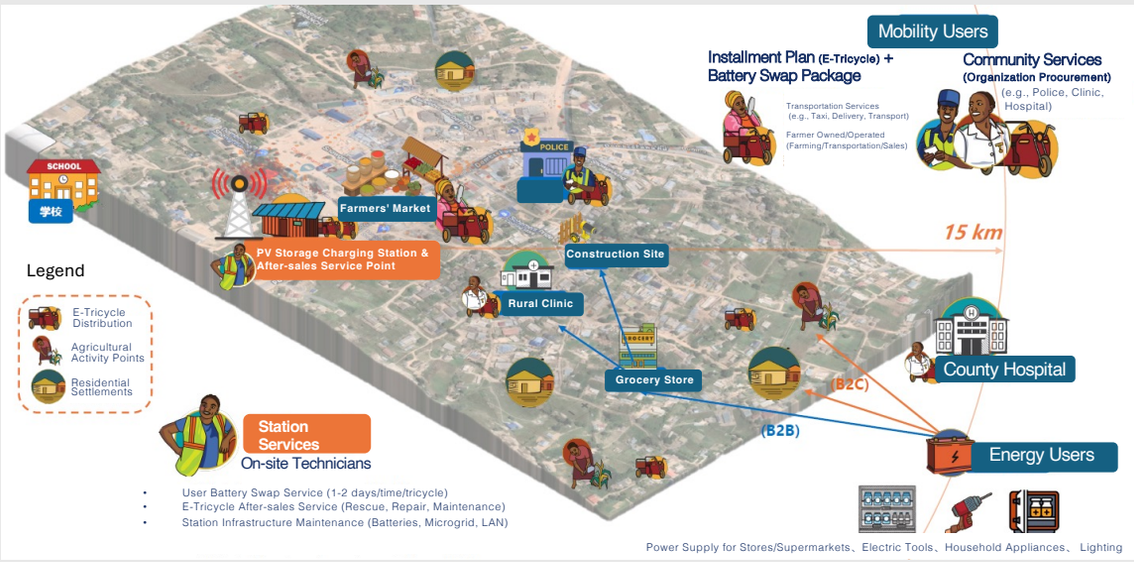


Figure 3-3 Application scenarios of new energy operated tricycles and supporting infrasturcture

Note: The above case-related information is provided by Jiangsu Zhinengjie Energy Technology Co., Ltd.

SOLUTION 1

Bridging the Final Mile for Mobility -New Energy Operated Tricycles and Their Supporting Infrastructure

03

Innovative Technical Solutions

In Zimbabwe, a fleet of new energy operated tricycles driven exclusively by women is rapidly expanding. After only a few days of intensive driving training, these women took to the roads one after another, becoming "taxi drivers" for villagers travelling between rural markets, community clinics, schools, and farmlands. While offering affordable mobility to their communities, they are also earning a considerable income. Some households further reduce operating costs through "group leasing," sharing a single vehicle among several families; others have used the service to launch small businesses of their own.

Figure 3-4 Rural women trained to become "tricycle drivers"

Figure 3-5 At the market in Weza, Zimbabwe, local women are waiting for passengers on new energy operated tricycles

Note: The above case-related information is provided by Jiangsu Zhinengjie Energy Technology Co., Ltd.

SOLUTION 2

Safeguarding Food Storage and Transportation -Sustainable Energy and Nano Phase Change Energy Storage Technology

03

Innovative Technical Solutions

Reduce food loss and waste by improving storage facilities and transportation infrastructure to minimize post-harvest losses and food waste.

***-Comprehensive Africa Agriculture Development Programme (CAADP) Strategic Framework and Action Plan*（2026-2035）,African Union**

Building sustainable and resilient agri-food systems to ensure food security and drive economic prosperity across Africa is the long-term vision of the AU for the continent's agricultural development. However, about three-quarters of Africa's land area lies between the Tropics of Cancer and Capricorn, characterized by abundant solar radiation and generally warm climates, which poses challenges to food preservation. Studies indicate that up to 40% of perishable food is lost due to inadequate cold-chain infrastructure for storage and transportation. Strengthening cold-chain infrastructure would therefore optimize food utilization, create additional income opportunities for farmers, and enhance food security across the African continent. Market data indicate that Africa's cold-chain logistics sector was valued at approximately US$10.88 billion in 2024 and is projected to reach US$14.85 billion by 2029, reflecting a compound annual growth rate of 8.28%.

SOLUTION 2

Safeguarding Food Storage and Transportation -Sustainable Energy and NANO Phase Change Energy Storage Technology

03

Innovative Technical Solutions

Chronic electricity shortages in Sub-Saharan Africa have constrained the development of cold chain infrastructure. By leveraging its abundant renewable energy resources and integrating power generation with Nano-phase change energy storage technology, the region can develop highly efficient and sustainable energy solutions for cold chain applications.

Phase Change Materials (PCMs) have emerged as an ideal thermal management medium, owing to their advantages of high energy storage density within their phase transition temperature range, rapid thermal response, exceptional thermal stability, and long cycle life. An energy storage system built with Nano-PCMs can be charged by daytime photovoltaic power generation, and then discharge cold energy continuously at night or during power outages. This process ensures a stable temperature in the cold chain environment, thereby effectively safeguarding the storage and transportation of perishable goods such as food and pharmaceuticals.

Renewable energy-based Nano-phase change energy storage technology is uniquely positioned as a suitable solution for electricity-scarce environments. Its application can effectively foster the construction and sustainable development of cold chain systems in Sub-Saharan Africa.

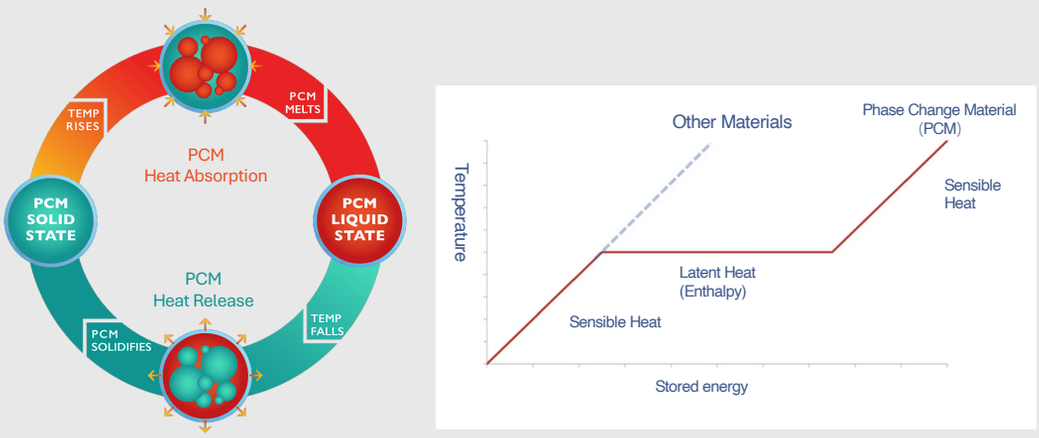


Figure 3-6 Schematic diagram of the principle of Nano-phase change energy storage technology

SOLUTION 2

Safeguarding Food Storage and Transportation -Sustainable Energy and Nano Phase Change Energy Storage Technology

03

Innovative Technical Solutions

According to Ningbo Passive Edge Material Co., Ltd., its newly developed high-thermal-conductivity, all-solid-state phase-change temperature-control module functions like a "thermal battery," storing and releasing latent heat at a preset temperature. Compared with conventional materials, the module delivers a 3–5-fold increase in thermal conductivity, offers a service life exceeding ten years, and is non-leaching and non-flammable, ensuring superior safety and reliability. During daylight, the module is "charged" with cooling via solar energy; at night, it automatically "discharges" cooling, maintaining stable temperatures even during power outages while markedly reducing energy consumption and O&M costs. Its compact, plug-and-play design integrates easily with photovoltaic systems, making it ideally suited for temperature-critical yet power-unstable applications such as vaccine cold rooms, agricultural produce cold stores, and mobile medical units.

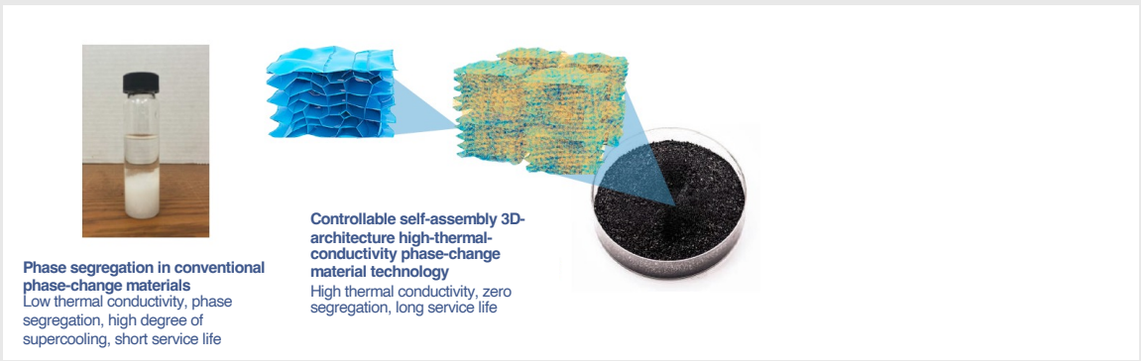
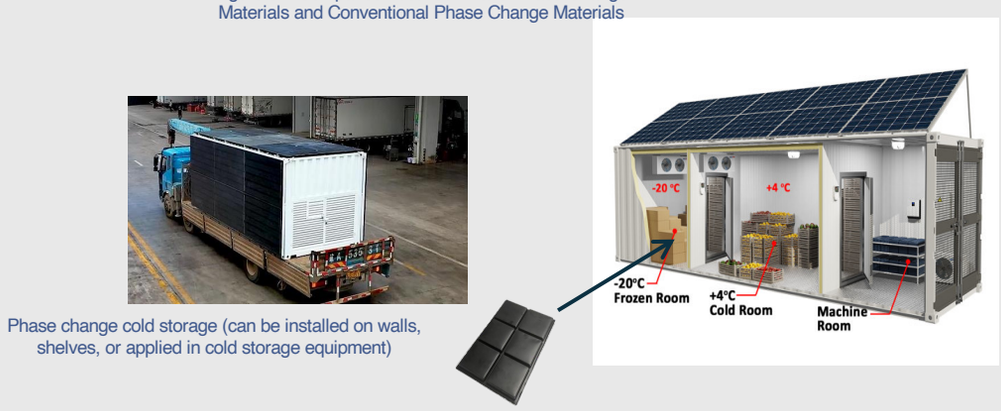


Figure 3-7 Comparison between Nano Phase Change Materials and Conventional Phase Change Materials



Phase change cold storage (can be installed on walls, shelves, or applied in cold storage equipment)

Figure 3-8 Application Scenarios of PV + Nano Phase Change Energy Storage Technology

Note: The above-mentioned information about the solution is provided by Ningbo Passive Edge Material Co., Ltd.

SOLUTION 2

Safeguarding Food Storage and Transportation -Sustainable Energy and Nano Phase Change Energy Storage Technology

03

Innovative Technical Solutions

Ningbo Passive New Materials Technology Co., Ltd. has partnered with African firm Solar Tribe to pilot a sustainable energy and nano-phase change energy storage solution in Tanzania. Previously, power shortages forced the country's fisheries to bear high preservation costs; the new "PV + PCM" system cuts cold-storage expenses to between 1/20 and 1/30 of traditional ice-based methods. The technology reliably maintains the freshness of perishable products under high-temperature conditions and is catalyzing greener development across the sector.

Figure 3-9 Applications of PV + Nano-PCM energy storage technology in Tanzania

Note: The above-mentioned information about the solution is provided by Ningbo Passive Edge Material Co., Ltd.

SOLUTION 3

Harvesting Hope: Drinking Water from the Air -Portable DC Atmospheric Water Generator/ Large Scale Distributed Atmospheric Water Supply Station

03

Innovative Technical Solutions

Ensure access to water and sanitation for all and achieve sustainable management.
By 2030, achieve universal and equitable access to safe and affordable drinking water for all.

-Sustainable Development Goal (SDG) 6, United Nations

Many regions of Africa, due to climatic conditions, geographical constraints and insufficient infrastructure, face significant challenges in accessing safe drinking water. According to joint statistics from the United Nations International Children's Emergency Fund (UNICEF) and the World Health Organization (WHO), an estimated 418 million people on the continent still lack access to basic drinking water services, with approximately 297 million others relying on unprotected water sources. Across the continent, , approximately 30% of diseases are linked to unsafe water, tragically resulting in over 500,000 children losing their lives to diarrhea each year. Improving access to safe drinking water is a key link in enhancing the health and well-being of African people and promoting sustainable regional development.

SOLUTION 3

Extracting "Water of Hope" Straight from the Air -Portable DC Atmospheric Water Generator/ Large Scale Distributed Atmospheric Water Supply Station

03

Innovative Technical Solutions

Atmospheric water generation (AWG) is a technology that extracts moisture from the air and converts it into usable liquid water. Among the available methods, the condensation-based approach employs refrigeration to cool air below its dew point, causing water vapor to condense into liquid water. This method enables rapid water production but is generally unsuitable for low-humidity environments. Alternatively, the adsorption-based method utilizes adsorbents (such as lithium chloride) to capture water vapor from the air. The adsorbed moisture is then released through heating or light exposure and subsequently condensed into liquid water. Although this method exhibits a relatively slower water production rate, it remains effective in low-humidity environments.

According to Mayu (Beijing) New Energy Tech Co., Ltd., the water generation products utilize AWG technology and can be powered by renewable energy sources. Based on environmental characteristics and water demand requirements, the company adapts its technology by employing either the condensation-based or adsorption-based approach, flexibly integrating its self-developed constant temperature and humidity system or air-return chamber. This has resulted in a diverse product matrix that covers various application scenarios, broader temperature and humidity conditions, and multiple water output capacities. The product range includes DC-powered portable atmospheric water generators for individual or household use, as well as large-scale distributed atmospheric water stations designed for multi-household or community applications.

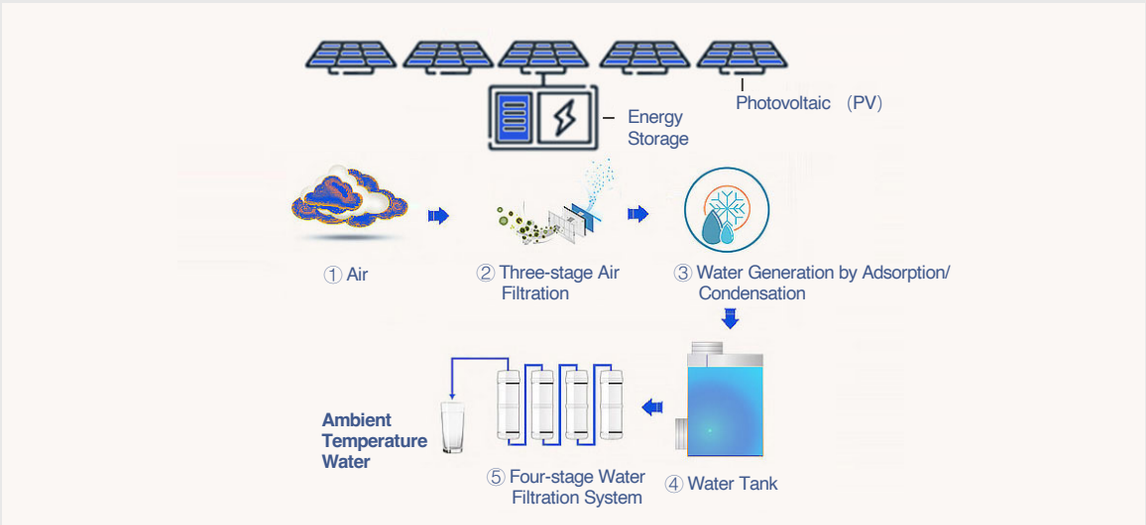


Figure 3-10 Schematic diagram of the principle of renewable energy + air-to-water generation

SOLUTION 3

Harvesting Hope: Drinking Water from the Air -Portable DC Atmospheric Water Generator/ Large Scale Distributed Atmospheric Water Supply Station

03

Innovative Technical Solutions

According to Mayu (Beijing) New Energy Tech Co., Ltd., the company has advanced conventional atmospheric water-generation technology so that it remains highly efficient and stable even under extreme conditions (ambient temperature -30°C to 50°C, relative humidity < 20% RH). The enhanced process is therefore well-suited to arid regions such as the Sahara Desert and its periphery. The product range spans from a 20 kg portable unit for household emergency supply to distributed systems producing 10–30 tonnes per day. Beyond addressing drinking-water shortages, these systems can support agricultural irrigation, livestock development, and desertification control, thereby fostering sustainable local economic growth.

Figure 3-11 20 kilograms portable solution for household and emergency drinking water

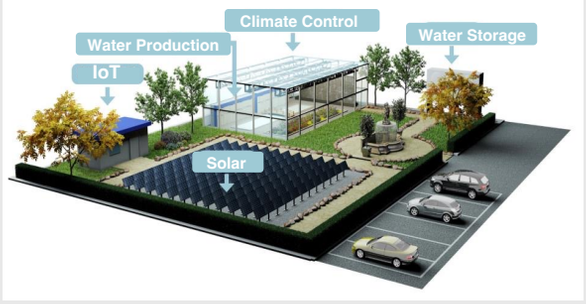


Figure 3-12 Distributed water stations with a daily output of 10 to 30 tonnes

Note: The above-mentioned information about the solution is provided by Mayu (Beijing) New Energy Tech Co., Ltd.

SOLUTION 3

Harvesting Hope: Drinking Water from the Air -Portable DC Atmospheric Water Generator/ Large Scale Distributed Atmospheric Water Supply Station

03

Innovative Technical Solutions

Figure 3-13 The technical solution implemented in the Goluo Tibetan autonomous prefecture, Qinghai province, located in western China

Application 1: Western China's High-Altitude Region

On the power- and water-scarce Qinghai-Goluo Plateau, the integration of photovoltaic arrays with Mayu atmospheric water generators now provides local herders with a stable supply of clean domestic and drinking water.

Note: The above-mentioned information about the solution is provided by Mayu (Beijing) New Energy Tech Co., Ltd.

SOLUTION 3

Harvesting Hope: Drinking Water from the Air- Portable DC Atmospheric Water Generator/ Large Scale Distributed Atmospheric Water Supply Station

03

Innovative Technical Solutions

Figure 3-14 The technical solution deployed in the Kakuma Refugee Camp

Application 2:
African Semi-Arid Zone

Kakuma Refugee Camp, located in Turkana County, northwestern Kenya, lies in a semi-desert area marked by aridity and waterscarcity. Under the leadership of United Nations High Commissioner for Refugees (UNHCR), Mayu has implemented a comprehensive water solution for the camp that includes: micro-utilities delivering potable water, dedicated supplies for medical posts, drinking water for a garment factory, and safe water for multiple schools. The project has markedly alleviated local water stress and significantly improved residents' quality of life.

Note: The above-mentioned information about the solution is provided by Mayu (Beijing) New Energy Tech Co., Ltd.

China-Africa Energy Innovation Cooperation Accelerator Project
Cases Collection Report