CrossBoundary Energy

Renewable power supply in practice

A case study of diesel and cost reductions across telecommunications infrastructure in **Freetown, Sierra Leone**

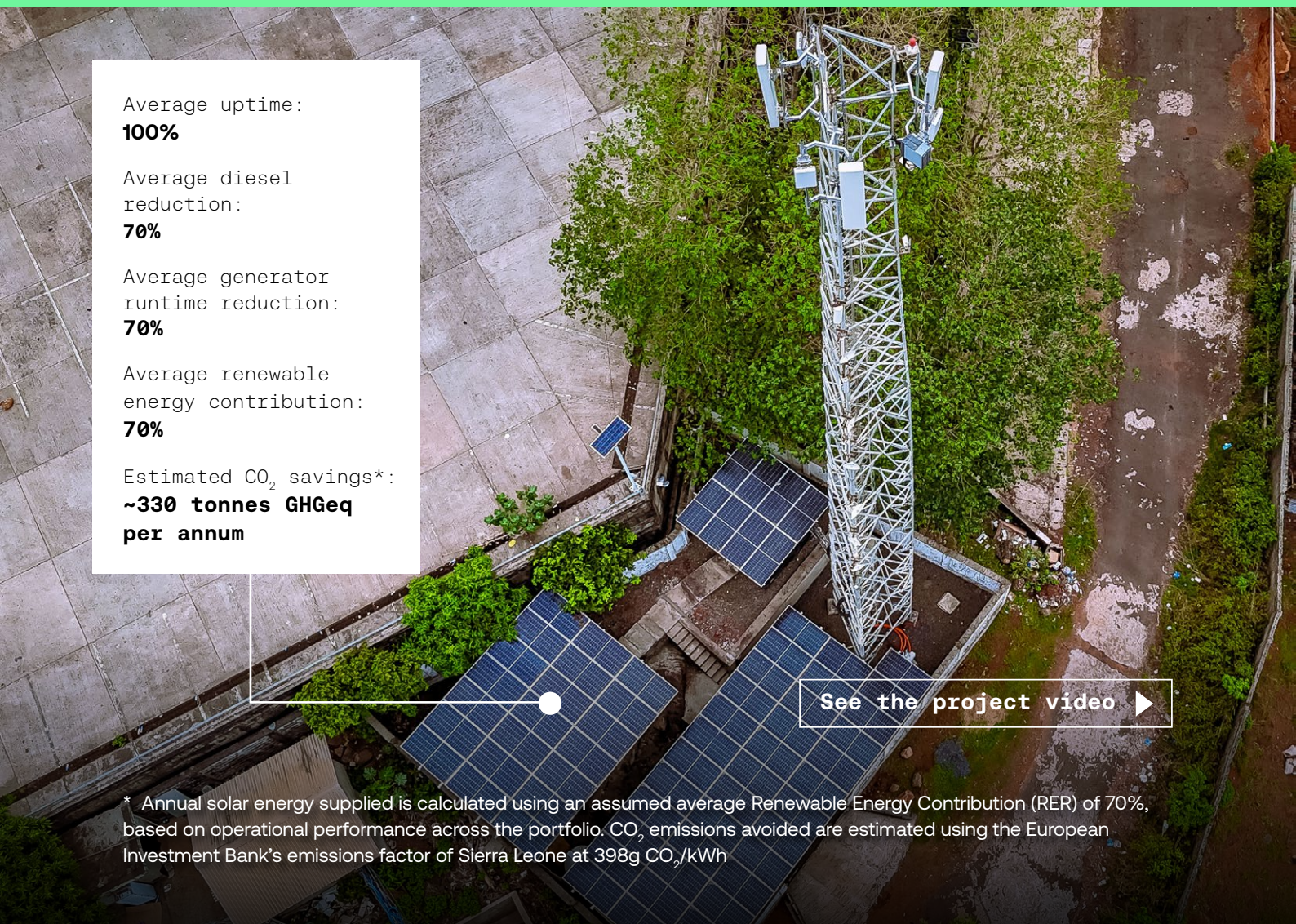


Client:
ZoodLabs (a Rasab Company)

Sector:
Telecommunications

Location:
Freetown, Sierra Leone

Infrastructure:
5G telecom signal towers, data centre, PoPs



Average uptime:
100%

Average diesel reduction:
70%

Average generator runtime reduction:
70%

Average renewable energy contribution:
70%

Estimated CO_2 savings*:
~330 tonnes GHGeq per annum

See the project video

* Annual solar energy supplied is calculated using an assumed average Renewable Energy Contribution (RER) of 70%, based on operational performance across the portfolio. CO_2 emissions avoided are estimated using the European Investment Bank's emissions factor of Sierra Leone at 398g CO_2/kWh

Telecommunications networks are among the world's most critical infrastructure. A typical mobile network operator in Africa spends up to 40% of its operating expenditure on energy, making electricity one of its largest controllable costs[1]. In markets with unreliable grids, this dependence on diesel generation drives even higher operating costs through fuel logistics, maintenance and security.

For off-grid and weak-grid sites, diesel generators often operate for more than 8,000 hours per year[2], consuming thousands of litres of fuel annually and requiring frequent servicing. Beyond the financial burden, operators must also contend with fuel theft, equipment failures, and rising pressure to reduce greenhouse gas emissions, all while maintaining near-perfect network availability.

1 GSMA. (2014, November 26). Tower Power Africa: Energy challenges and opportunities. GSMA Mobile for Development.

2 Market Growth Reports. (2026, July 10). Generators in telecommunication market size, share & trends analysis, 2035. Market Growth Reports.



ZoodLabs (a Rasab Company) is a Sierra Leonean telecommunications and digital infrastructure company that operates broadband, fibre, internet, data centre and 5G services. CrossBoundary Energy partnered with ZoodLabs to provide renewable-powered energy infrastructure for its telecommunications network, including cable landing station facilities, fibre Points of Presence (PoPs), and telecommunications sites around Freetown.

The telecommunication towers were Sierra Leone's first 5G infrastructure, enabling faster internet speeds around the capital. The energy solution provided by CrossBoundary Energy since 2025 includes ground-mounted or rooftop solar PV, Battery Energy Storage Systems (BESS), and backup diesel generators. The energy is supplied through an Energy Services Agreement with an uptime performance commitment.



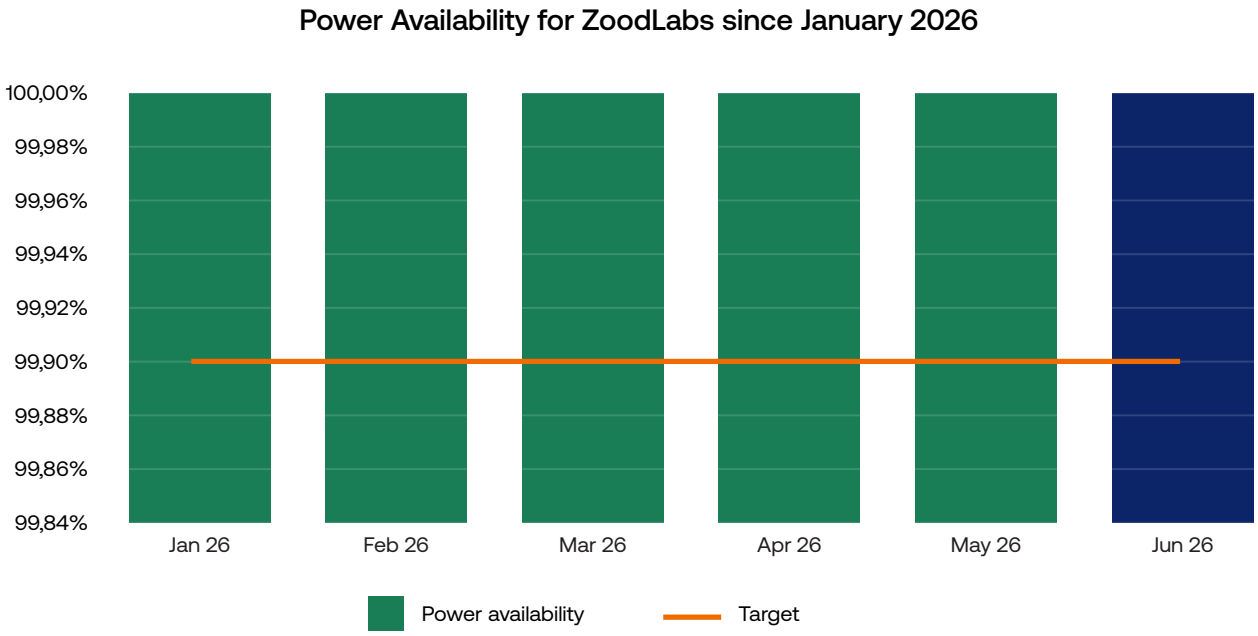
A local construction approach

The energy solution was delivered through a locally-led execution model, with CrossBoundary Energy contracting Sierra Leonean engineers and technicians to carry out civil works, equipment installation, commissioning, and quality assurance. By investing in local skills and knowledge transfer, the project has built long-term technical capacity while enabling faster mobilisation, lower construction costs, and greater ownership of the infrastructure.

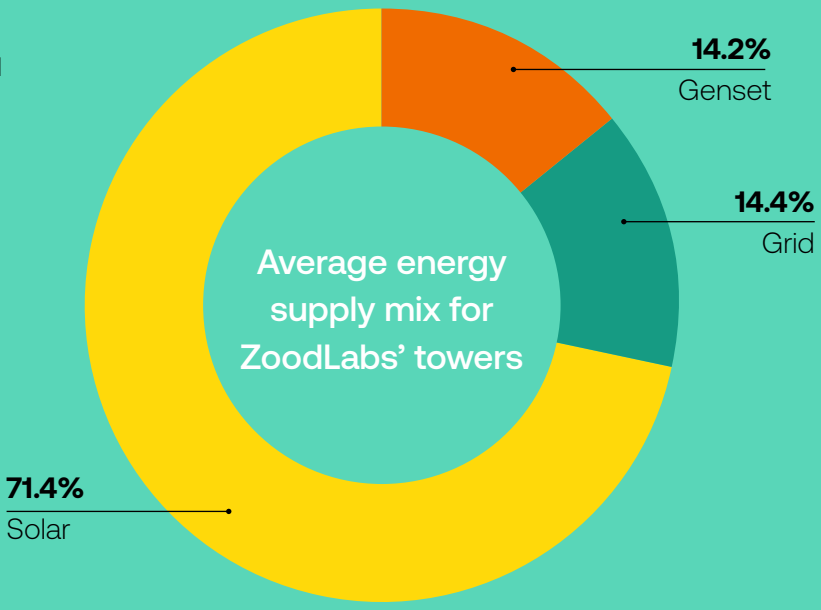
The rollout was executed in phases across the portfolio, with each site undergoing detailed surveys before the installation of solar PV, battery energy storage systems, diesel generators, and power distribution equipment. Construction activities were carefully planned to minimise disruption to live telecommunications services, while rigorous testing and commissioning ensured every site met CrossBoundary Energy's performance and reliability standards before starting commercial operation.

This approach enabled the successful deployment of renewable energy infrastructure across the sites while establishing a capable local team to support the assets throughout their operational life.

Cumulatively, the project added 1.02 MWp solar PV, 790 kW diesel generators, and 3.5 MWh BESS across the 37 sites. Since commercial operations began, the sites have delivered 100% uptime in 2026 and reduced diesel usage significantly.



By replacing diesel as the primary energy source with intelligently managed renewable energy, CrossBoundary Energy has helped ZoodLabs to achieve carrier-grade reliability while significantly reducing fuel consumption, operating costs, and emissions. The energy-as-a-service model enables ZoodLabs to focus on expanding and operating its networks, rather than managing energy infrastructure.





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How renewable power can provide reliable uptime with significant cost benefits

Telecommunications sites require consistent uninterrupted power, as even a brief outage can disrupt network connectivity and affect thousands of users. Unlike other commercial operations, telecoms sites are typically space-constrained with challenging accessibility and need to ensure reliability and minimise operating costs.

Each site was individually designed based on its load profile, available installation space, and solar resource. The system combines solar PV, battery energy storage, and backup diesel generation to maximise solar penetration while maintaining uptime. Intelligent controls prioritise solar and battery power, with diesel generators operating only when needed. The systems thus deliver high power availability, while drastically reducing diesel consumption compared to conventional generator-only solutions.

But achieving 100% uptime requires more than robust engineering; it depends on proactive monitoring and disciplined operations. Every site is remotely supervised through CrossBoundary Energy's monitoring platform, which provides real-time visibility into solar generation, battery performance, generator operation, and site alarms. This enables potential issues to be identified and addressed before they impact operations.

A dedicated operations and maintenance team also supports the portfolio through preventive maintenance, predictive performance analysis, and rapid field response, ensuring faults are resolved quickly and equipment continues to operate at peak performance. Continuous optimisation of system controls has maximized renewable energy utilisation, resulting in a large renewable energy contribution, reducing diesel consumption and generator runtimes by 70%, while consistently delivering 100% power availability across the network.

This combination of intelligent monitoring, data-driven maintenance, and responsive field support has enabled CrossBoundary Energy to provide carrier-grade reliability for one of Sierra Leone's most critical telecommunications networks.

