GRIDWATCH

A LOW-COST APPROACH TO MEASURING THE RELIABILITY OF POWER SYSTEMS

Across sub-Saharan Africa, more than half a billion people cannot access electricity, while millions more live with unreliable and intermittent sources of power.[1] Data on power quality at the customer level are limited or nonexistent in these contexts. In response to this challenge, *n*Line has developed **GridWatch**, an innovative, low-cost way to measure grid performance and provide estimates of key performance indicators for grid reliability.

Utility companies can use GridWatch data to identify, track, and respond to outages more rapidly; **regulators** can use the data to monitor utility performance; and **donors** and **governments** can use it to better target investments in infrastructure to help deliver reliable power to the communities that need it most.

*n*Line provides a turnkey deployment of GridWatch, allowing any of these stakeholders to directly measure grid behavior quickly, precisely, and affordably.

GridWatch Delivers Affordable and Accurate Data on Power Grid Performance

- GridWatch measures power outages and quality in real time through individual plug-in sensors. These low-cost sensors gather high-resolution data—as precise as the individual customer or service point and as frequently as every two minutes—and are combined with advanced data analytics to provide measurements of:
  - Duration of power outages (SAIDI).
  - Number of power outages (SAIFI).
  - Voltage quality (average voltage and voltage spikes and sags).
  - Grid frequency.
- GridWatch monitors grid performance across varied contexts including national bulk power grids, mini- or micro-grids serving individual communities, business parks, or public facilities such as health care centers, schools, and market centers, and systems powered by renewable energy sources.

Achieving **Sustainable Development Goal 7—ensuring access to affordable, reliable, sustainable, and modern energy for all**—will require investments to strengthen and expand power grids. GridWatch data can provide a roadmap for strategic investments.

GridWatch Makes Reliability Tracking Easy for Utilities, Regulators, and Donors

- GridWatch reports key performance indicators, including frequency and duration of power outages.
- Sensors measure voltage and grid frequency, providing insights on power surges and sags (or brownouts).
- Using data gathered across individual sensors, GridWatch highlights patterns in power supply quality. Data can also be compared against utility company reports of SAIDI and SAIFI indicators.

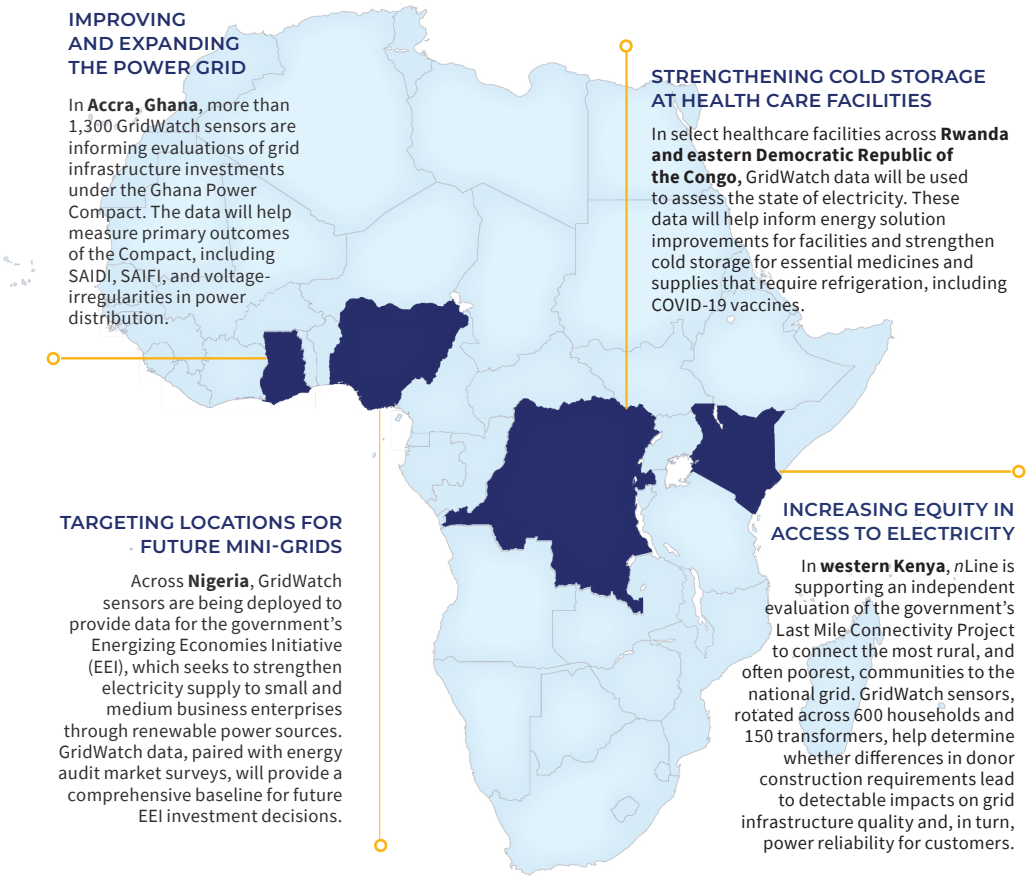
THE INTERSECTION OF ELECTRICITY AND EQUITY

Low-income communities often lack reliable electricity, limiting economic opportunities and forcing households to spend a greater share of income on inefficient sources of power.[2] With accurate and detailed data from GridWatch, investors and utilities can target improvements for equitable access to reliable power, a vital step toward lifting communities out of poverty.

Gridwatch can give donors, governments, and utilities the data they need to invest in power infrastructure in targeted ways, strategically strengthening the power grid and expanding access to reliable power.

GridWatch Informs Investments Across Sectors

GridWatch is an agile, utility-independent tool that can quickly provide specific data on power quality across a range of sectors. **Donors, governments, and utilities need accurate, real-time data to focus power infrastructure investments on the most vital improvements and the most underserved communities. GridWatch can deliver these data.**



IMPROVING AND EXPANDING THE POWER GRID

In **Accra, Ghana**, more than 1,300 GridWatch sensors are informing evaluations of grid infrastructure investments under the Ghana Power Compact. The data will help measure primary outcomes of the Compact, including SAIDI, SAIFI, and voltage-irregularities in power distribution.

STRENGTHENING COLD STORAGE AT HEALTH CARE FACILITIES

In select healthcare facilities across **Rwanda and eastern Democratic Republic of the Congo,** GridWatch data will be used to assess the state of electricity. These data will help inform energy solution improvements for facilities and strengthen cold storage for essential medicines and supplies that require refrigeration, including COVID-19 vaccines.

TARGETING LOCATIONS FOR FUTURE MINI-GRIDS

Across **Nigeria**, GridWatch sensors are being deployed to provide data for the government's Energizing Economies Initiative (EEI), which seeks to strengthen electricity supply to small and medium business enterprises through renewable power sources. GridWatch data, paired with energy audit market surveys, will provide a comprehensive baseline for future EEI investment decisions.

INCREASING EQUITY IN ACCESS TO ELECTRICITY

In **western Kenya**, *n*Line is supporting an independent evaluation of the government's Last Mile Connectivity Project to connect the most rural, and often poorest, communities to the national grid. GridWatch sensors, rotated across 600 households and 150 transformers, help determine whether differences in donor construction requirements lead to detectable impacts on grid infrastructure quality and, in turn, power reliability for customers.

To learn more about how *n*Line can tailor GridWatch systems to support infrastructure investments and development:

Visit: https://nline.io/

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Read: https://medium.com/nline-inc

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References

1. International Energy Agency, United Nations Development Programme (UNDP), and International Renewable Energy Agency, "Policy Brief #1: Achieving Universal Access to Electricity," in *Accelerating SDG7 Achievement: Policy Briefs in Support of the First SDG7 Review at the UN High-Level Political Forum 2018* (United Nations Department of Economic and Social Affairs, 2018), https://sustainabledevelopment.un.org/content/documents/18041SDG7_Policy_Brief.pdf.

2. United Nations Development Programme (UNDP) and University of Bergen, "Policy Brief #8: Interlinkages Among Energy, Poverty and Inequalities," in *Accelerating SDG7 Achievement: Policy Briefs in Support of the First SDG7 Review at the UN High-Level Political Forum 2018* (United Nations Department of Economic and Social Affairs, 2018), https://sustainabledevelopment.un.org/content/documents/18041SDG7_Policy_Brief.pdf.

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