

LOULO GOLD MINE, MALI



Solar on an off-grid mine, with no battery. Three years on, the mine tripled it.

On an unconnected site the limit on solar is not the resource, it is the ramp. The standard answer is a BESS and the capital it ties up. At Loulo, second-scale forecasting took that role instead: the energy management system commits the diesel units **before** the drop rather than after it. Phase one went live in August 2020 with 24 MWp and no storage at all. In 2023 the mine added **48 MW of PV and 24 MWh of battery**, a decision the operator took on the strength of how the forecasting had performed. That is the part worth remembering: the client came back and tripled the solar.

24 → 72

MWp of PV, tripled across two phases, on a **65 MW** heavy fuel oil and diesel grid

0 → 24

MWh of storage, none in phase one, added in phase two as a choice rather than a prerequisite

15.6 MI

of fuel avoided in **phase one alone**, or 42,050 t CO₂e, per Barrick's Q1 2022 report



Measurement station and PV field at Loulo. Hemispherical fisheye cameras placed around the plant capture cloud formations that satellite imagery and irradiance sensors do not resolve.

1

Detect.

Fisheye cameras on site see approaching cloud that 3 km satellite imagery and pyranometers cannot resolve.

2

Forecast.

Algorithms predict the rise or fall in PV output at the second, backed by satellite at 15 minutes and short-term models from 5 minutes to one hour.

3

Act.

The forecast reaches the energy management system, which starts or unloads the gensets ahead of the event. Maximum renewable penetration at optimal spinning reserve.

Why it matters what the operator gained, beyond the fuel

Capex deferred, then chosen

Phase one ran with **no BESS at all**. Storage arrived three years later, sized against a system already known to work.

Reserve kept optimal

Spinning reserve is sized against what is **coming**, not against the worst case, so fewer engines run for nothing.

Maintenance planned

Operators use the forecast to **schedule work** on the thermal plant in the windows generation allows.

Scientific backing

Co-developed with the O.I.E. centre of **Mines Paris PSL** and ARMINES. Main contributor to IEA PVPS Task 16.

Integrated on site

Delivered with **SPIE** over dedicated priority links into the plant control architecture, and with Africa Power Services as EPCM.

Replicated

Kibali, in the Democratic Republic of Congo, is under way on the same principle.

World's largest PV plant

CalibSun is the forecasting provider at Khavda, the world's largest solar plant.

The client reinvested

Five full Sahel rainy seasons in production, and a threefold extension of the solar plant in 2023.

Independent

No OEM, utility or platform ownership. We never compete with a partner's customers.