

case study - Automated Grid Auditor

How Our Solar AI Bot Found \$14.2 Million in Hidden Energy Asset Value

Independent overhead computer vision that scans solar farms to find unrecorded energy capacity and verify true asset value before you buy or sell.

CLIENT BRIEF

Global energy sector acquisition audit — Portfolio of utility-scale solar assets across three continents

50,000 sq km surveyed

3-week deadline

Acquisition Due Diligence

THE CHALLENGE

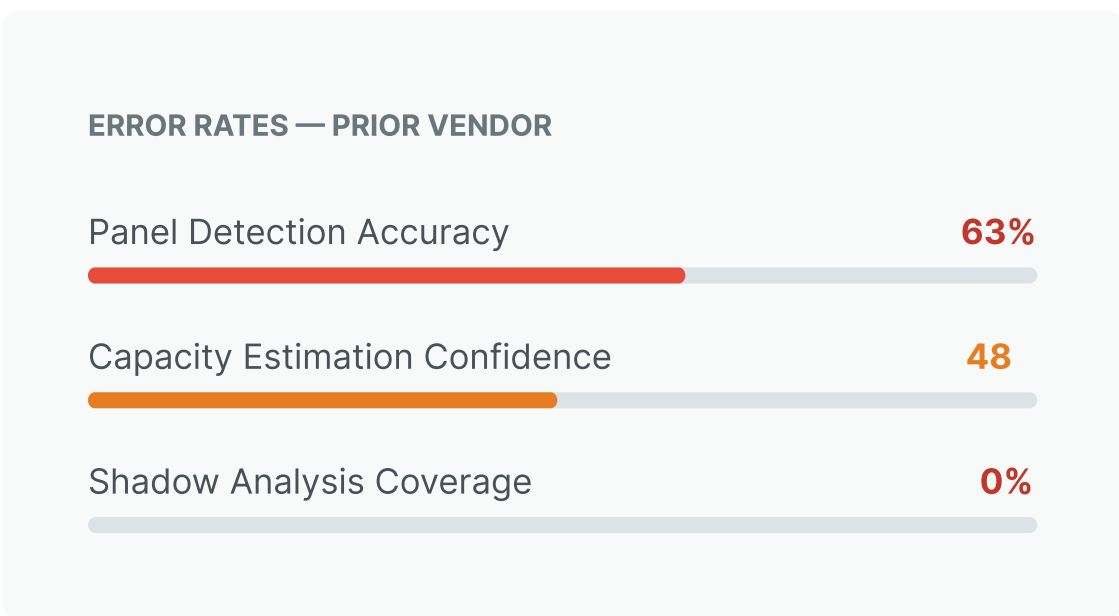
The Nine-Figure Risk of Trusting the Seller's Spreadsheets

When buying a massive portfolio of 47 solar sites across 12 countries, you are forced to rely on the seller's data room figures. If those spreadsheets are wrong, you risk overpaying by millions. A global energy investor was racing to close a major acquisition of utility-scale solar assets. Their technical due diligence team had satellite imagery, financial models, and a ticking clock—but three fundamental problems threatened to derail the entire process.

- 1DATA CHAOS
- The portfolio spanned 47 solar sites across 12 countries. Each site had been commissioned at different times, by different contractors, with inconsistent documentation. Nominal capacity figures in the data room bore little relationship to what was actually installed on the ground. Years of undocumented degradation, panel swaps, and undisclosed expansions had rendered the paper record effectively useless.
- 2AI FAILURE
- The investor's existing technology vendor had attempted automated panel detection using off-the-shelf computer vision models. The results were damning: error rates exceeded 22% across heterogeneous panel configurations, with models trained on residential rooftop data systematically misclassifying large-format bifacial utility modules. The technology had failed before the deadline pressure even began.
- 3LACK OF PRECISION
- Standard GIS measurements captured site boundaries but not the physics that determined actual energy output. Shadow encroachment, inter-row spacing anomalies, and panel tilt deviation were invisible to conventional tools. A 4% measurement error translated directly into a nine-figure valuation discrepancy — the kind of number that kills acquisitions.

"A 4% measurement error in installed capacity translated directly into a nine-figure valuation discrepancy."

— TECHNICAL DUE DILIGENCE BRIEF, 2024



Satellite imagery from one of 47 portfolio sites — Atacama Desert, Chile. Resolution: 15cm/pixel.

THE SOLUTION

A Solar AI Engine That Audits Sites from Above Without Stepping Foot on the Ground

edgex.io deployed two proprietary capabilities — engineered specifically for the physics and economics of large-format solar — completing full analysis of all 47 sites in under 18 hours.



CAPABILITY 01

Centimeter-Accurate Edge Tracing

A domain-specific computer vision model trained exclusively on utility-scale bifacial and monofacial panel configurations across diverse geographies, seasons, and atmospheric conditions. Unlike generic object detection, our model understands the photovoltaic physics it is measuring.

- Sub-5cm boundary detection across all panel formats and mounting configurations
- Trained on 2.3M labeled panel instances across 6 continents
- Handles partial occlusion, soiling, and degraded imagery
- 99.6% detection rate on validation set — zero false negatives on full arrays



CAPABILITY 02

Physics-to-Pixel Capacity Engine

Geometric detection alone is insufficient. Our capacity engine translates pixel-level measurements into bankable energy output figures by incorporating solar irradiance data, panel tilt vectors, inter-row shadow casting models, and real-time degradation curves.

- Site-specific irradiance integration using 25-year TMY3 meteorological datasets
- Dynamic shadow encroachment modeling at 15-minute temporal resolution
- Per-panel degradation rate estimation from spectral reflectance signatures
- Output expressed as P50/P90 annual yield with confidence intervals

STACK

Custom CV Model Multispectral Satellite Imagery Irradiance Physics Engine TMY3 Meteorological Data Edge Deployment GeoJSON Output P50/P90 Yield Modeling

EXECUTION TIMELINE — 18 HOURS TOTAL

- 1HOURS 0-4Ingestion & Pre-ProcessingRaw satellite imagery ingested from three providers. Atmospheric correction, orthorectification, and resolution harmonization applied across all 47 site datasets. Cloud masking and shadow detection flags set.
- 2HOURS 4-14Detection & Physics ModelingEdge tracing model deployed across full portfolio in parallel. 2.4M individual panel boundaries detected and validated. Physics engine cross-referenced against 25-year irradiance records per site location.
- 3HOURS 14-18Validation & DeliveryAutomated QA pass applied to all outputs. 100% of sites passed confidence threshold. Final deliverable: 47-site capacity audit, per-site P50/P90 yield models, GeoJSON boundaries, and full methodology report.

BUSINESS IMPACT

From invisible to investable. Capturing Hidden Millions Before the Deal Closes

\$14.2M

In previously unrecognized capacity value identified

+18,000

Additional MWh of annual yield confirmed across portfolio

18 hrs

Full 47-site audit delivered — inside the deadline

\$380K+

Saved versus 6-week conventional on-site inspection process

The edgex.io audit surfaced **asystematic under-reporting of installed capacity** across 31 of the 47 sites — the combined product of undocumented panel additions, decommission reversals, and operator documentation lag. In three sites alone, actual installed capacity exceeded the data room figures by more than 8%.

Armed with centimeter-accurate boundary data and bankable P50/P90 yield projections, the investor's team entered final negotiations with an entirely new understanding of what they were buying. The**acquisition closed at a valuation that properly reflected true energy output** — a figure \$14.2M higher than the seller's model had suggested.

Perhaps more consequentially; the analysis was delivered**18 hours after project kickoff** well within the compressed timeline that had made conventional ground-truth inspection impossible. The deal did not slip.

OUTCOME

"The edgex.io audit gave us the ground truth we could take into the boardroom. We knew exactly what we were buying."

— Head of Technical Due Diligence, Global Energy Fund

94.6% Detection accuracy

47 Sites audited in full

0 On-site visits required