



HIDDEN OVERCHARGES CASE STUDY

Exposing Hidden Overcharges: How Sensor Data Uncovered a £10,000 Billing Discrepancy

At a Glance

01

30%
Overcharge Identified

02

40.6 MWh
of Phantom Usage

03

£10,262
in Annual Savings

04

~£900
Average monthly
discrepancy

05

0.98
Supplier assumed
Power Factor

06

0.64
Mean Measured
Power Factor across
three phases

Issue:

In late 2024, our analysis revealed a critical issue at a school in Enfield: the electricity supplier was consistently overcharging. The school's bills reflected energy usage nearly 30% higher than what our sub-metering data recorded.

The Root Cause:

The energy supplier had been billing based on an assumed power factor of 0.98, while real-time sensor data showed the average power factor was closer to 0.64. This mismatch inflated the apparent power, leading to higher billed usage – even when actual demand was lower.

What the data showed:

In November 2024, the supplier billed for 13.41 MWh, but OAK's monitoring showed only 9.28 MWh – a discrepancy of 4.13 MWh, translating to an estimated overcharge of £1,023.

The Solution

Following our investigation, we raised the issue directly with the school and explained the cause of the discrepancy. To prevent future overcharges and improve efficiency, we recommended installing a Power Factor Correction (PFC) device which will help them save over £10,000 annually.

 [Learn More here](#)

Issue

34.7 %

Difference in Mean Measures vs Billed Power Factor, Resulting in £ 900 in Overcharges per Month



The Root Cause

There was a large difference in Power Factor between phases.

The mean Power Factor was 0.64, but min was 0.32 and max 0.94, compared against 0.98 which was the assumption from the electric supplier.

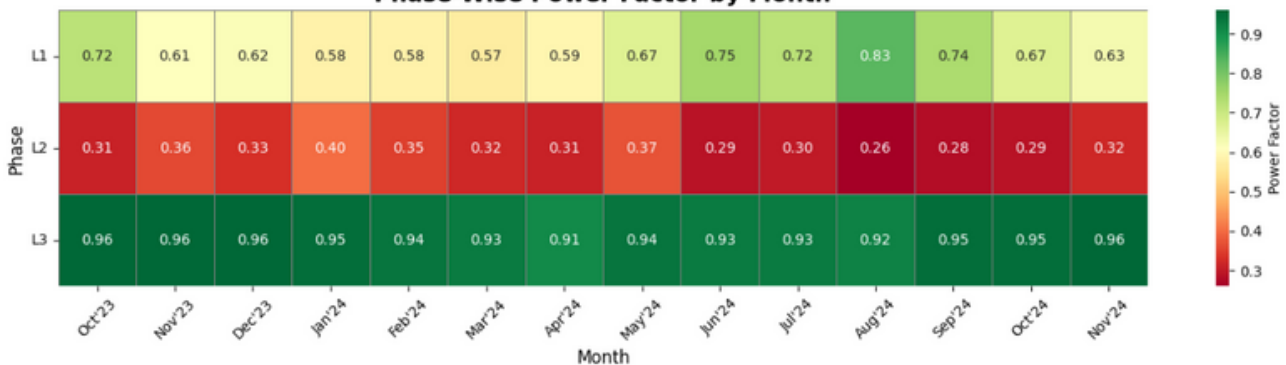
Instead of being charged for Reactive Power, the client got charged for Active Power.

Cost Comparison

Active Power = 15.1953 p/kWh

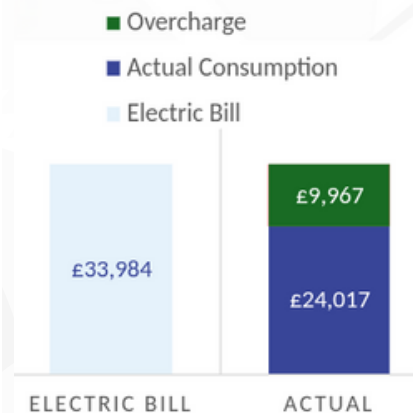
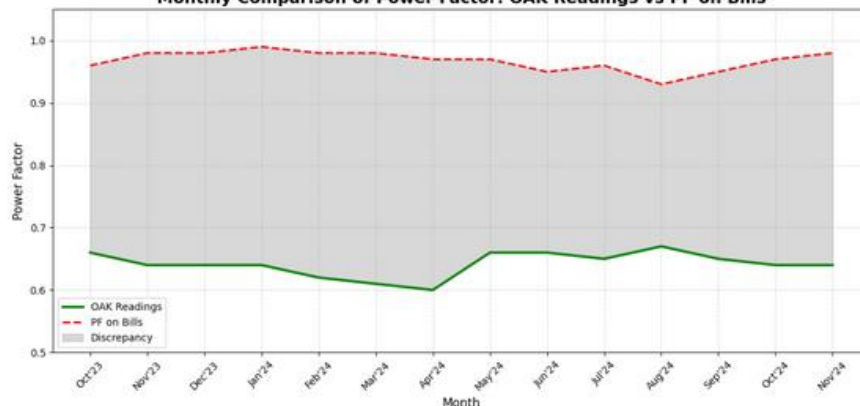
Reactive Power = 0.394 p/kVArh

Phase-Wise Power Factor by Month



What the Data Showed

Monthly Comparison of Power Factor: OAK Readings vs PF on Bills



Reactive Power was being charged as Active Power, due to the incorrect Power Factor, together with the higher Apparent Power consumption.



Through our monitoring we proved Active Power was 9.28MWh, instead of the billed 13.41 MWh, annually.

Parameters	Bill	OAK Readings
Reactive Energy (kVArh)	925	75,695
Reactive Energy Cost	£4	£298
Active Energy (kWh)	127,605	85,544
Active Energy Cost	£33,981	£23,719
Total Cost	£33,984	£24,017



Impact



34.7% difference in mean measures vs billed



42.3% increase in electricity cost

Fix



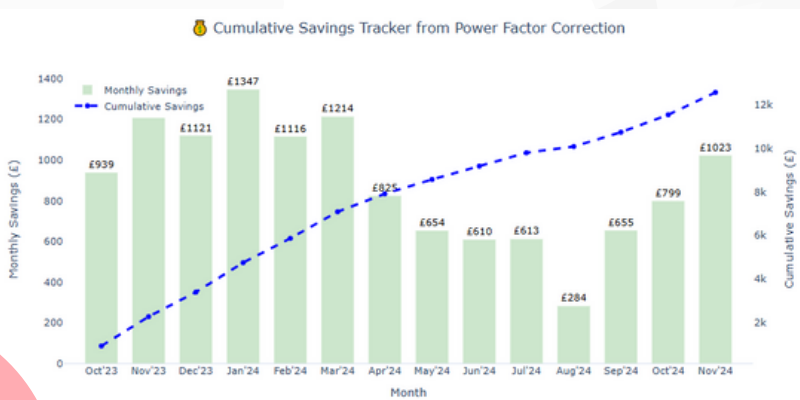
30% electricity bill reduction



826kg CO2e less in emissions annually

Cost Comparison

By installing Power Factor Correction mean Power Factor was stabilised at 0.96. This lowered the Apparent Power from 13.41 MWh to 9.28 MWh. Not only did this lower costs with 30% but also lowered emissions with 826 kg CO2e. ROI for Power Factor Correction forecasted to be 0.8 years.



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 hello@oak-network.com

 +44 736 158 8061