STOP WASTING POWER

ELECTRICAL DIAGNOSTIC INVESTIGATION REPORT

This report has been anonymised to protect client confidentiality.

Prepared for: Confidential Client

Building Type

Large Hotel

Investigation

72-Hour On-Site Electrical Diagnostic Investigation

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Confidentiality Statement

This report is an anonymised copy of an Electrical Diagnostic Investigation undertaken for a commercial client.

The identity of the client, the property's location and any information that could identify the building have been removed to preserve confidentiality. The electrical measurements, engineering observations, analysis, conclusions and recommendations remain representative of the original investigation.

Stop Wasting Power

Independent Electrical Diagnostic Investigations for Commercial Buildings

EXECUTIVE SUMMARY Background

Stop Wasting Power was commissioned to undertake a 72-hour Electrical Diagnostic

Investigation of this hotel in order to identify opportunities to reduce electrical operating costs.

The investigation included continuous monitoring of the main incoming electrical supply together with selected distribution boards serving the principal engineering services within the building.

Measured electrical data was analysed alongside physical inspection of plant and equipment to determine where electricity was being consumed, why that consumption was occurring and whether commercially worthwhile opportunities existed to reduce operating costs.

Summary of Findings

The investigation identified a number of opportunities to reduce electrical operating costs.

The most significant opportunities were associated with the operation and control of existing engineering systems rather than the replacement of major plant or the installation of additional technologies.

In particular, the investigation identified opportunities to improve the operation of pumps and associated control systems where equipment appeared to be operating independently of demand.

The investigation also identified several operational improvements capable of delivering worthwhile savings with little or no capital expenditure.

Importantly, the investigation also identified several areas where no engineering intervention was justified, preventing unnecessary capital expenditure.

Commercial Assessment

The recommendations contained within this report have been prioritised according to:

- Estimated annual financial benefit
- Estimated implementation cost
- Indicative payback period
- Overall commercial priority

Where capital expenditure could not be commercially justified, no recommendation has been made.

Electricity Supply Review

Following receipt of a full year's electricity invoices, Stop Wasting Power can compare the building's measured electrical demand with its contracted electricity supply arrangements.

Where appropriate, supporting evidence can be provided to assist discussions with the electricity supplier regarding contracted capacity and the elimination of unnecessary capacityrelated charges.

Overall Conclusion

This investigation demonstrated that significant opportunities to reduce electrical operating costs remained despite previous investment in energy-saving technologies.

The greatest opportunities were found through detailed examination of the operation and control of existing engineering systems.

AREA	ENGINEERING RECOMMENDATION	ESTIMATED ANNUAL SAVINGS OPPORTUNITY	EST. COST TO RECTIFY	PAYBACK
PLANT ROOM	Optimise Pump and BMS control strategy	£13,000 - £15,000	£4,000 - £5,000	3 – 5 months
KITCHEN PLANT ROOM	Improve Ventilation Control Strategy	£4,000 - £7,000	£1,500 - £4,000*	Typically <12 months
STAFF AREA LIGHTING	Replace fluorescent lighting & improve control	~£12,000	£8,000 - £10,000	8 – 10 months
Public Area Lighting Poor control/no daylight sensing	Daylight sensing/improved lighting control	£2,000 - £5,000	Low	<12 months
Bedroom Block	Operating correctly – no intervention recommended	Minimal	N/A	N/A

ESTIMATED ANNUAL SAVINGS OPPORTUNITY : £27,000 – £32,000 Indicative

Reduction: 15–20% of total electricity cost

Note: The overall savings opportunity is presented as a conservative estimate and is not the simple total of every individual item shown above. Some operational savings may overlap and have therefore been moderated to avoid potential double counting.

At the time this report was prepared, Stop Wasting Power had not received a full year's electricity invoices. Once these are available, we will review the client's contracted electricity supply arrangements and compare them with the measured electrical demand recorded during this investigation.

This may identify further opportunities to reduce operating costs by optimising contracted supply capacity or eliminating unnecessary capacity-related charges where appropriate.

1. SCOPE OF THE INVESTIGATION

Purpose of the Appointment

Stop Wasting Power (SWP) was commissioned to undertake an independent engineering investigation into the hotel's electrical energy consumption and the operation of its principal engineering systems.

The purpose of the investigation was to establish, through measured engineering evidence, where the hotel could reduce operating costs and avoid unnecessary capital expenditure without compromising operational performance or guest comfort.

The investigation was designed not simply to identify where electricity was being consumed, but more importantly to determine **why** it was being consumed and whether practical, commercially worthwhile opportunities existed to improve efficiency.

The objective throughout the investigation was to identify the **lowest-cost commercially justifiable solution**, whether that involved operational changes, improved controls or, where genuinely necessary, replacement of equipment.

Scope of Services

The investigation comprised four distinct stages:

1. Measure

Temporary electrical monitoring equipment was installed on selected distribution boards and engineering systems to record electrical demand under normal hotel operating conditions.

Monitoring was undertaken over a representative operating period to establish how the building behaved throughout both occupied and unoccupied periods.

2. Diagnose

The recorded electrical data was analysed to identify unusual operating characteristics and opportunities requiring further engineering investigation.

Electrical monitoring identifies **how** a building is behaving.

Engineering investigation establishes **why**.

Where monitoring indicated unexpected electrical demand, a detailed physical inspection was undertaken to determine the underlying cause.

3. Recommend

Engineering recommendations have been prepared only where measured evidence and engineering inspection demonstrated that a commercially worthwhile opportunity exists.

Where existing equipment was found to be operating correctly, no recommendation for replacement has been made.

Where improvements could be achieved through operational control, engineering housekeeping or relatively modest controls modifications, these options have been considered before recommending capital expenditure.

4. Verify

Where recommendations are implemented, SWP recommends that follow-up electrical monitoring is undertaken to verify that the anticipated operational and financial benefits have been achieved.

Investigation Methodology

The investigation included:

- Temporary electrical monitoring of selected distribution boards and engineering systems.
- Analysis of recorded electrical demand at 30-second intervals.
- Comparison of daytime and overnight electrical demand.
- Detailed engineering inspection of plant rooms, engineering systems and selected electrical installations.
- Assessment of operational control strategies and engineering housekeeping.
- Review of Building Management System (BMS) operation where practical.
- Identification of unnecessary base electrical loads.
- Assessment of opportunities to improve operational efficiency.
- Preparation of practical recommendations supported by measured engineering evidence.

The investigation was carried out during normal hotel operation without disruption to guests or hotel services.

Independence

SWP provides independent engineering advice only.

We do **not** manufacture, supply or install equipment, undertake controls modifications, specify particular products or represent manufacturers, installation contractors or energy technology providers.

Accordingly, the findings and recommendations contained within this report have been prepared solely in the operational and financial interests of the client and are based entirely upon the engineering evidence obtained during the investigation.

Recommendations contained within this report are not influenced by the commercial interests of any third party.

Distribution Boards Monitored

The following areas were monitored during the investigation:

- Main Incoming Electrical Supply
- Plant / Boiler Room
- Kitchen / Plant Room
- Main Hotel Distribution Board
- Laundry
- Bedroom Block Distribution Board
- Other engineering services where considered appropriate during the investigation

Engineering Philosophy

This investigation follows a simple engineering principle:

Measure. Diagnose. Recommend. Verify.

The purpose of the investigation is not to recommend the replacement of equipment wherever opportunities are identified, but to determine the **lowest-cost commercially justifiable solution** supported by measured engineering evidence.

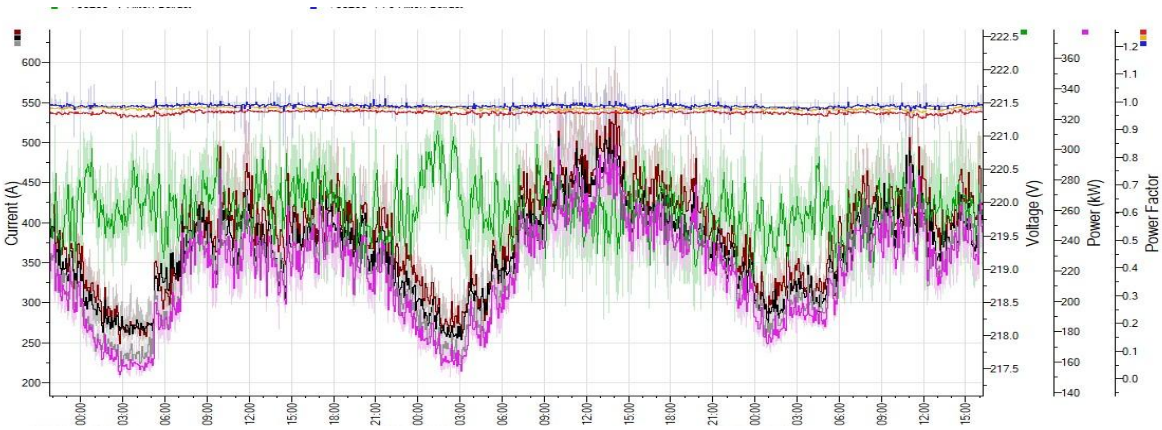
Where existing equipment is found to be operating correctly, no recommendation for replacement is made.

Where improvements can be achieved through better operational control, engineering housekeeping or modest controls modifications, these options are considered before capital expenditure is recommended.

Recommendations contained within this report are therefore based upon measured engineering evidence, supported by physical inspection and commercial assessment.

Where no worthwhile engineering opportunity was identified, no recommendation has been made. The purpose of this investigation is not to identify opportunities to spend money. It is to identify opportunities to save money through informed engineering decisions based upon measured evidence.

2. INCOMER (Estimated Annual Carbon 446.64 tonnes)



Day/Date	Off Peak	Peak
Tue. 23 May	183.5kw	249.3kw
Wed. 24 May	149.3kw	297.2kw
Thur. 25 May	149.8kw	330.1kw
Fri. 26 May	166.0kw	310.7kw

Engineering Observation
The Peak/Off-Peak comparison demonstrated that, although the hotel's electrical demand reduced overnight, a substantial base electrical load remained. This indicated that significant engineering systems continued operating outside periods of peak occupancy and justified further investigation of the building's principal electrical loads.

The on-site engineering investigation was undertaken over a 72-hour period, with the main incoming electrical supply monitored continuously for approximately 96 hours in order to establish the overall electrical behaviour of the building during normal hotel operation.

The extended monitoring period provided a high-level overview of the building's electrical demand and formed the starting point for the investigation.

Analysis of the monitored data enabled us to identify:

- Daily operating patterns.
- Peak periods of electrical demand.
- Overnight base load.
- Stability of electrical supply.
- Power Factor performance.
- Unusual electrical behaviour requiring further investigation.

The main incoming supply does not identify the cause of unnecessary electrical consumption. Instead, it enables us to determine where more detailed investigation should be concentrated.

Initial Observations

Review of the monitored data indicated that the building was operating with a stable electrical supply throughout the monitoring period.

Power Factor remained consistently high and no significant supply abnormalities were identified.

However, analysis of the demand profile suggested that further investigation of the building's engineering systems was warranted, in order to establish whether electrical demand was reducing appropriately during periods of low occupancy and reduced operational activity.

For this reason, detailed monitoring of selected distribution boards and associated engineering systems was undertaken.

Conclusion

The main incoming electrical supply provided the overall picture of how the building behaved during the investigation.

The remainder of this report sets out the detailed examination of the principal engineering systems and identifies where electrical energy was being consumed, why it was being consumed and whether opportunities existed to reduce operating costs.

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3. ASSESSMENT OF THE EXISTING VOLTAGE OPTIMISATION SYSTEM

The hotel had previously invested in a Voltage Optimisation (VO) system as part of its energy management strategy.

As part of this investigation, the operation of the Voltage Optimiser was reviewed alongside the measured electrical data obtained during the monitoring period.

The Voltage Optimiser was found to be operating correctly and no evidence was found to suggest that the equipment itself was defective or malfunctioning.

However, the measured electrical evidence demonstrated that the principal opportunities to reduce electrical operating costs did **not** lie with the incoming electrical supply voltage.

Instead, significantly greater opportunities were identified within the operation and control of the building's existing engineering systems.

It is important to recognise that the suitability of Voltage Optimisation cannot be determined from an electricity bill alone. An electricity invoice records **how much** electricity has been consumed, but provides no information regarding **which electrical loads** are responsible for that consumption or how those loads behave throughout the day.

Whether Voltage Optimisation is likely to provide a worthwhile commercial return depends upon the characteristics of the electrical loads within the building. This can only be established through measured electrical monitoring and detailed engineering investigation.

In this hotel, many of the principal electrical loads identified during the investigation were associated with circulation pumps, ventilation systems and other engineering plant operating under Variable Speed Drive (VSD) control.

Variable Speed Drives electronically regulate the voltage and frequency supplied to the motor in order to achieve the required operating conditions. Consequently, improvements to the control philosophy governing these systems are likely to deliver significantly greater savings than modest reductions in the incoming supply voltage alone.

The investigation therefore concluded that, whilst the existing Voltage Optimisation system may continue to provide some benefit, the measured engineering evidence obtained during this investigation does **not** support the conclusion that Voltage Optimisation represents the principal opportunity for further electrical savings at this site.

Nor would the findings of this investigation support the installation of similar equipment across other properties without first undertaking individual engineering investigations.

Every commercial building is different. Investment decisions should therefore be based upon measured engineering evidence rather than assumptions that a particular technology will provide the greatest benefit in every building.

The findings of this investigation reinforce a fundamental engineering principle:

First establish where electricity is being consumed. Then determine why. Only then can the most appropriate and commercially justifiable solution be identified.

The investigation therefore proceeded with a detailed assessment of the building's principal engineering systems, where substantially greater opportunities to reduce electrical operating costs were identified.

3.1 POWER FACTOR ASSESSMENT

The existing Voltage Optimisation system incorporated power-factor-correction capability.

Power factor was reviewed as part of the electrical investigation and remained consistently between **0.98 and 0.99** throughout the monitoring period, as shown on the main incoming supply graph.

This represents excellent performance and indicates that the Voltage Optimisation system was operating successfully in this respect.

A poor power factor can increase the current required to deliver useful electrical power and, depending upon the electricity supply agreement, may result in additional supplier charges. The high measured power factor indicates that no further expenditure on additional power-factor-correction equipment is technically or commercially justified.

The investigation therefore concluded that, although Voltage Optimisation was not identified as the principal source of further energy savings at this hotel, the existing system was providing a clear benefit through effective power-factor correction.

No further action is recommended in respect of power factor.

4. PLANT ROOM INVESTIGATION

Following analysis of the main incoming electrical supply, the Plant Room was identified as one of the hotel's largest individual electrical loads and selected for detailed investigation.

Electrical monitoring indicated that demand reduced only modestly during periods of low occupancy, suggesting that significant items of plant continued operating largely independently of the changing requirements of the building.

A detailed engineering inspection was therefore undertaken to establish:

- which items of equipment were responsible for the recorded electrical demand;
- whether the measured operating profile reflected the actual requirements of the hotel; and
- whether commercially worthwhile opportunities existed to reduce electrical operating costs.

The investigation concentrated principally upon the circulation pumps, associated Variable Speed Drives (where fitted), the Building Management System (BMS) and the overall control strategy governing the operation of the Plant Room.

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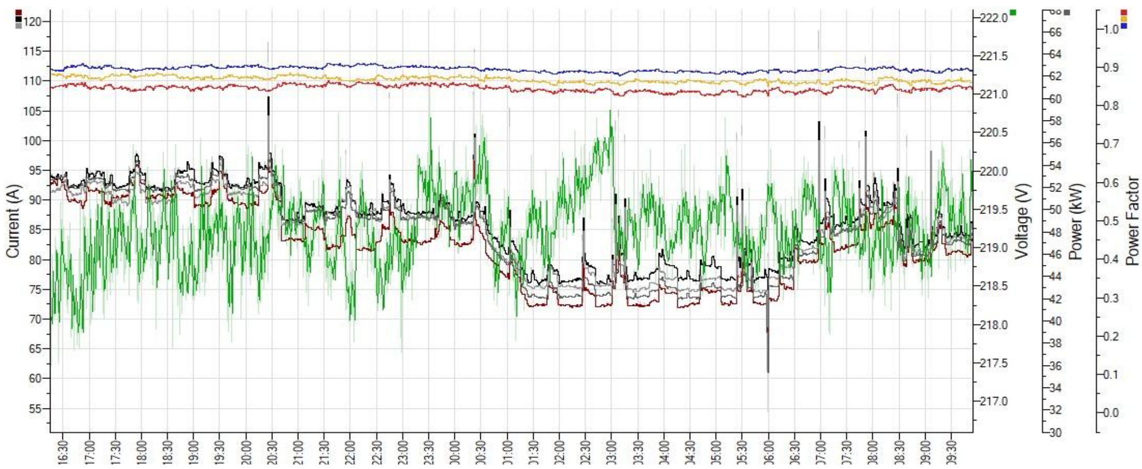
5. PLANT ROOM ELECTRICAL DEMAND PROFILE

PLANT ROOM (Estimated Carbon 108.3 tonnes)



PLANT ROOM ELECTRICAL PEAK/OFF PEAK DEMAND

Day/Date	Off Peak	Peak
Sat. 27 May	47.2kw	54.8kw
Sun. 28 May	31.8kw	51.0kw

Engineering Observation

The Plant Room electrical demand reduced only modestly during off-peak periods despite a significant reduction in the operational demands placed upon the hotel. This suggested that major items of plant continued operating largely independently of actual building demand.

The Plant Room was therefore identified as the highest priority area for detailed engineering investigation

5.1 ENGINEERING ASSESSMENT

Inspection confirmed that the principal electrical loads within the Plant Room were associated with the building's circulation pumps, their Variable Speed Drives and the associated Building Management System controls.

The circulation pumps appeared appropriately sized for the maximum design requirements of the building and no evidence was found to suggest that replacement of the pumps themselves was necessary.

Similarly, no obvious evidence was found to indicate that the Variable Speed Drives had reached the end of their operational life or required replacement. However, one Variable Speed Drive appeared to have been bypassed at the time of the investigation and should be reviewed to determine whether this was intentional, temporary or the result of previous maintenance work.

The measured electrical profile suggests that the existing control strategy no longer reflects the varying operational demands placed upon the building.

In our opinion, the principal opportunity lay in reviewing and recommissioning the existing control philosophy rather than replacing serviceable engineering equipment. This is an important distinction. The opportunity identified relates to the operation of the existing engineering systems rather than the condition of the equipment itself.

6.PLANT ROOM IMPLEMENTATION & COMMERCIAL ASSESSMENT

Recommended Implementation

A suitably qualified Building Management System (BMS) or Controls Engineer should be instructed to:

- confirm that all Variable Speed Drives are operating correctly;
- investigate the Variable Speed Drive that appeared to have been bypassed and reinstate automatic operation where appropriate;
- record the existing operating parameters of each circulation pump;
- verify the calibration and operation of associated sensors;
- review the existing BMS control philosophy;
- optimise pump operating speeds so that they respond appropriately to actual heating and hot water demand;

- confirm that minimum pump speeds continue to maintain satisfactory circulation, system stability and guest comfort;
- recommission the revised control strategy; and
- undertake follow-up electrical monitoring to verify performance.

Estimated Implementation Cost

Based upon the scope of work identified during the investigation, the anticipated cost of reviewing, recommissioning and optimising the existing control strategy is estimated to be in the order of:

£4,000–£5,000

This estimate assumes that the existing pumps, Variable Speed Drives and associated controls remain serviceable.

Estimated Commercial Benefit

Optimisation of the existing control strategy is estimated to reduce annual electricity costs by approximately:

£13,000–£15,000 per annum

This represents the single largest opportunity identified during the investigation.

Indicative Payback

Estimated Cost	Estimated Saving	Indicative Payback
£4,000–£5,000	£13,000–£15,000	Approximately 3–5 months

Verification

Following implementation, the Plant Room should be re-monitored to confirm:

- reduced overnight electrical demand;
- satisfactory response of the pumps to changing building demand;
- maintenance of occupant comfort and system performance; and
- achievement of the anticipated financial savings.

Engineering Conclusion

The investigation found **no evidence that replacement of the existing pumps or Variable Speed Drives was necessary.**

The opportunity identified was one of **control rather than equipment**.

In our opinion, reviewing and recommissioning the existing control strategy offers the most commercially attractive solution and is expected to deliver substantial financial savings whilst making full use of the client's existing engineering investment.

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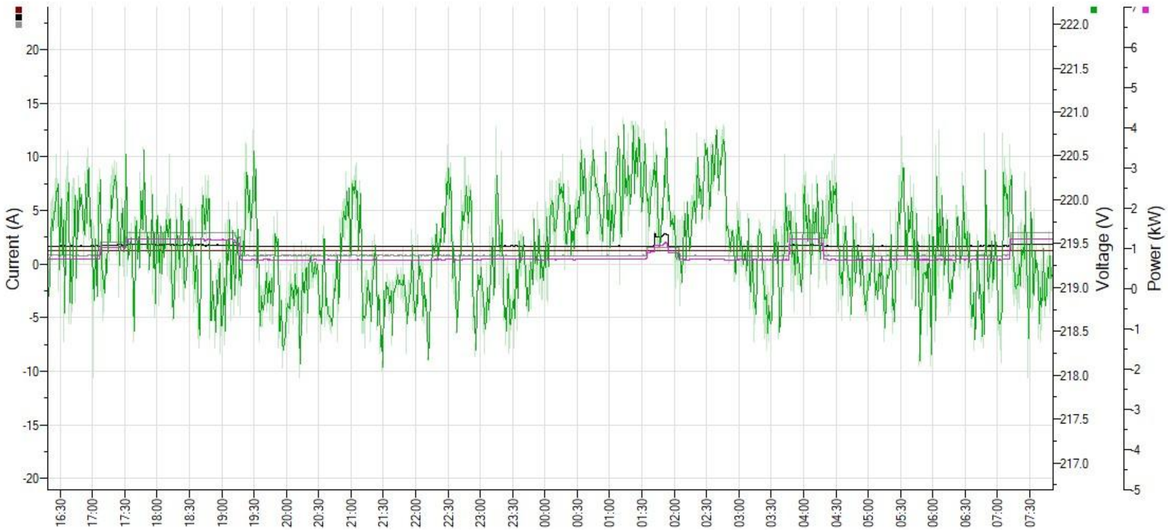
7. SITE ENGINEERING OBSERVATIONS

7.1 STAFF AREA LIGHTING Staff Area Lighting (1 board) (Estimated Annual Carbon 1.8 tonnes)



DATE	OFF PEAK	PEAK
24 MAY	0.7KW	1.2KW
25 MAY	0.7KW	1.2KW

Engineering Observation
The monitored lighting distribution board recorded an off-peak demand of approximately **0.7 kW** and a peak demand of approximately **1.2 kW** on both monitored days.
The relatively small increase during occupied periods indicated that a substantial proportion of the connected load remained energised continuously.
The additional daytime demand was consistent with normal staff-area activity, including lighting and small socket loads. However, the persistent off-peak load warranted further investigation.
A subsequent physical inspection identified fluorescent lighting in staff, basement and service areas (served by different boards) operating for prolonged periods irrespective of occupancy.

Engineering Assessment

Continuous operation of the fluorescent lighting resulted in unnecessary electrical consumption and increased maintenance requirements through avoidable lamp and control gear replacement.

The principal opportunity was to:

- replace the existing fluorescent fittings with suitable LED alternatives;
- introduce occupancy sensing in intermittently used areas; and
- divide lighting into appropriate control zones so that only the areas in use remained illuminated.

Any fittings required for safety, security or emergency purposes should remain operational in accordance with the relevant requirements.

Recommended Implementation

A suitably qualified electrical contractor should be instructed to:

1. Survey and record the type, rating and location of the existing fluorescent fittings.
2. Confirm which fittings are required to operate continuously for safety or operational reasons.
3. Replace appropriate fluorescent fittings with LED equivalents providing suitable illumination levels.
4. Install occupancy sensors in staff lift areas, basement areas, corridors, stores and the delivery tunnel where appropriate.
5. Divide large areas into separate lighting zones where this would prevent unnecessary operation.
6. Set suitable sensor time delays to reflect the way each area is used.
7. Confirm satisfactory illumination levels following completion.
8. Provide an updated lighting schedule identifying replacement fittings and control arrangements.

Indicative Implementation Cost

Based on approximately 80 fittings and the associated control improvements, the anticipated implementation cost is estimated to be:

£8,000–£10,000

This allowance includes replacement LED fittings, occupancy controls, installation, testing and commissioning. The final cost should be confirmed by the appointed electrical contractor.

Estimated Commercial Benefit

The estimated reduction in annual electricity and associated maintenance costs is:

Approximately £12,000 per annum

The actual saving would depend on the wattage of the replacement fittings, final operating hours and the extent to which automatic controls reduced unnecessary use.

Indicative Payback

Indicative implementation cost	Estimated annual saving	Indicative payback
£8,000–£10,000	Approximately £12,000	Approximately 8–10 months

Verification

Following implementation, operating hours should be reviewed to confirm that lighting switched off during unoccupied periods while maintaining safe and suitable illumination.

A short period of electrical monitoring could be undertaken where the lighting circuits were separately accessible.

Engineering Conclusion

The existing lighting remained serviceable, but its continuous operation created a substantial and avoidable operating cost.

Replacement with LED fittings, combined with improved occupancy control, offered a straightforward reduction in electricity consumption with a payback period of less than one year.

7.2 PUBLIC AREA LIGHTING

Engineering Observation

During the physical inspection of the hotel, decorative lighting within the main reception area, including chandeliers, feature lighting and floor lamps, was observed operating throughout daylight hours despite the area benefiting from substantial natural daylight through floor-to-ceiling glazing.

The investigation found that the lighting installation was already fitted with LED lamps. Whilst these are significantly more efficient than traditional lighting, unnecessary daytime operation still represents avoidable electrical consumption.

Engineering Interpretation

Unlike the Staff Area Lighting, the principal opportunity did not relate to the type of lighting installed but to the way in which it was controlled.

The investigation found no engineering justification for replacing the existing LED fittings.

Instead, the opportunity lay in ensuring that decorative lighting operated only when required to maintain the desired ambience for guests.

Recommended Implementation

The hotel should review the control strategy for decorative lighting within public areas.

Consideration should be given to:

- introducing daylight sensing where appropriate;

- incorporating automatic time scheduling through the Building Management System (where available);
- dividing decorative lighting into separate control zones; and
- retaining manual override facilities for special events or operational requirements.

The final control strategy should maintain the hotel's presentation and guest experience whilst preventing unnecessary daytime operation.

Indicative Implementation Cost

Low

The recommended improvements are expected to involve relatively minor alterations to the existing lighting control arrangements rather than replacement of the lighting installation itself.

Estimated Commercial Benefit

Based upon the observations made during the investigation, improvements to the control strategy are estimated to reduce annual electricity costs by approximately:

£2,000–£5,000 per annum

The actual saving will depend upon operating hours, occupancy patterns and the final control strategy adopted.

Engineering Conclusion

The existing LED lighting installation appeared appropriate and no recommendation is made to replace the fittings themselves.

The opportunity identified relates solely to improving the operational control of decorative lighting so that it responds more effectively to available natural daylight whilst maintaining the standard of presentation expected within the hotel.

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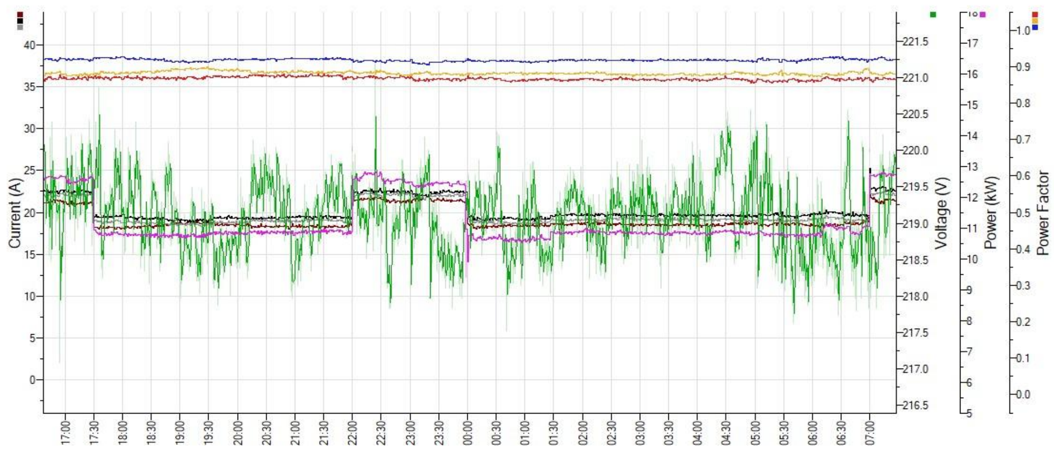
8. KITCHEN PLANT ROOM

KITCHEN PLANT ROOM – (estimated annual carbon 24.2 tonnes)



DATE	OFF PEAK	PEAK
25 MAY	9.0 kw	12.8 kw
26 MAY	9.0 kw	12.8 kw

Engineering Observation

The Kitchen Plant Room recorded a peak electrical demand of approximately 12.8 kW and an off-peak demand of approximately 9.0 kW on two consecutive monitoring periods.

The monitored load therefore reduced by only approximately 30% outside normal operating hours, indicating that around 70% of the daytime electrical demand remained present overnight.

The consistency of these results over both monitoring periods suggests that this was an established operating pattern rather than an isolated occurrence.

The Kitchen Plant Room principally served the kitchen inlet fans, extract fans and associated air-handling equipment

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Engineering Interpretation

The measured electrical profile indicated that a significant proportion of the kitchen ventilation system continued operating during periods when kitchen activity would normally be expected to reduce substantially.

The investigation found no evidence to suggest that this was caused by defective equipment. The more likely explanation is that the ventilation plant was operating continuously, or with limited automatic control, outside normal kitchen operating hours.

Although the precise operational requirements of the hotel should first be confirmed, the measured electrical demand indicated that this area offers a worthwhile opportunity to reduce electricity consumption.

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9. KITCHEN PLANT ROOM RECOMMENDATIONS

Option 1 – Programmed Time Control (Preferred)

The hotel should first establish the actual operational requirements of the kitchen, including food preparation, cleaning operations and any overnight room-service provision.

Where continuous operation is not required, a suitably qualified electrical or controls contractor should install programmable time control to automatically shut down the kitchen ventilation plant following completion of kitchen operations and restart it prior to breakfast preparation.

The installation should include:

- programmable seven-day time scheduling;

- manual override facilities;
- retention of any statutory safety ventilation;
- suitable interlocking between supply and extract systems;
- recommissioning following installation.

This represents the preferred solution as it provides the lowest implementation cost whilst potentially delivering the greatest financial return.

Option 2 – Variable Speed Drive Control

If the hotel's operational requirements genuinely require the ventilation system to remain operational throughout the night, the installation of Variable Speed Drives should be investigated.

Rather than operating continuously at full duty, the ventilation plant could then operate at reduced speed during periods of low demand before automatically returning to full output when required.

The suitability of this approach will depend upon the existing fan motors, operational requirements and the mechanical design of the ventilation system.

Quotations should therefore be obtained from a specialist ventilation controls contractor before this option is considered further.

10.KITCHEN PLANT ROOM IMPLEMENTATION & COMMERCIAL ASSESSMENT

Indicative Implementation Cost Option 1 – Programmable Time Control Estimated implementation cost: £1,500–£4,000

Option 2 – Variable Speed Drives

Implementation cost cannot be accurately estimated without a detailed survey of the existing ventilation installation.

Quotations should therefore be obtained from a specialist Variable Speed Drive or ventilation controls contractor.

Estimated Annual Saving Option 1 – Programmable Time Control

Based upon the measured overnight electrical demand, programmed shutdown of the ventilation system during periods when it is not operational is estimated to reduce annual electricity costs by approximately:

£4,000–£7,000 per annum

The actual saving will depend upon the hotel's operating hours and electricity tariff.

Option 2 – Variable Speed Drives

Where overnight shutdown is operationally impossible, Variable Speed Drives may still provide worthwhile savings by reducing fan speeds during periods of lower demand.

Although the precise saving cannot be predicted until a detailed engineering assessment has been completed, the measured electrical demand suggests that significant reductions in electricity consumption remain achievable.

Verification

Following implementation, the Kitchen Plant Room should be re-monitored to confirm:

- reduction in overnight electrical demand;
- satisfactory operation of the ventilation system;
- maintenance of required kitchen environmental conditions;
- achievement of the anticipated financial savings.

Engineering Conclusion

The Kitchen Plant Room represented a significant opportunity to reduce electrical operating costs.

The measured electrical demand indicated that the majority of the ventilation load remained present outside normal operating hours.

The investigation found no evidence that replacement of the existing ventilation equipment was necessary.

The preferred solution is to determine whether the ventilation plant can be automatically shut down when the kitchen is not operational. Only where continuous overnight operation is genuinely required should Variable Speed Drives be considered.

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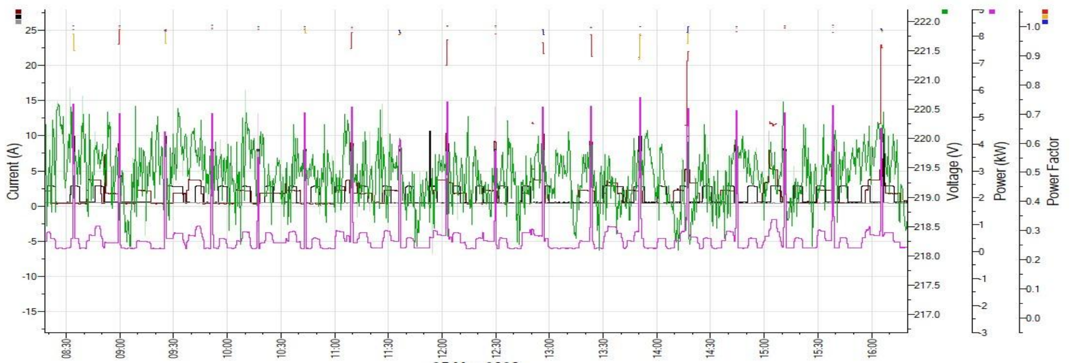
11. GUEST BEDROOMS

GUEST BEDROOM BLOCK (Estimated Annual Carbon 1.2 tonnes)



DATE	OFF PEAK	PEAK
25 MAY	0.1KW	5.7KW

Engineering Observation – Control Strategy Performing Correctly
Unlike the Plant Room and Kitchen Plant Room, the Bedroom Block demonstrated a very low off-peak electrical demand of approximately **0.1 kW**.
The electrical profile reduced naturally during periods of low occupancy and increased only in response to genuine operational demand.
Short-duration peaks were evident throughout the monitoring period and were consistent with intermittent building loads, such as guest lift operation or other shared services, rather than a continuous electrical demand.
The monitored profile demonstrates an electrical system responding appropriately to occupancy and operational requirements.
No engineering intervention is recommended for this area.

Engineering Interpretation

This behaviour represents an example of an engineering system operating as expected.

Electrical demand broadly reflected occupancy rather than remaining substantially constant throughout the day and night.

This contrasts with the Plant Room and Kitchen Plant Room, where significant electrical loads remained present during off-peak periods.

The Guest Bedroom profile therefore provides a useful benchmark for how electrical demand should respond when engineering systems are appropriately controlled.

Engineering Conclusion

No significant opportunity for additional energy reduction was identified within the Guest Bedroom accommodation.

The existing control philosophy appeared appropriate and no major engineering intervention is currently recommended.

Future investment should instead be directed towards those areas identified elsewhere within this report where substantially greater financial returns can be achieved.

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12. FUTURE OPERATIONAL CONSIDERATIONS

The principal engineering findings arising from this investigation have been presented in the preceding sections of this report.

During the physical inspection of the hotel, a number of additional opportunities were also identified. These observations were not supported by dedicated electrical monitoring and should therefore be regarded as operational or asset-management considerations rather than immediate engineering recommendations.

Whilst individually offering smaller financial returns than the principal findings within this report, they represent sensible opportunities for continued improvement as part of the hotel's ongoing maintenance and refurbishment programmes.

12.1 Guest Room Energy Management

Engineering Observation

Guest bedrooms relied primarily upon manual operation of lighting, electrical accessories and climate control by individual occupants.

While this arrangement was common within many hotels of a similar age, it relied heavily upon guest behaviour and provided limited opportunity for automatic reduction in energy consumption when rooms were unoccupied.

Future Considerations

Should future bedroom refurbishment be undertaken, consideration should be given to incorporating modern guest-room energy management technology, including:

- occupancy-based lighting control;
- automatic setback of heating and cooling when rooms are unoccupied;
- window contact sensors to prevent unnecessary heating or cooling when windows are open;
- control of non-essential socket circuits where appropriate.

These measures should only be implemented where supported by a satisfactory commercial appraisal and integrated into planned refurbishment works.

Engineering Conclusion

The monitored electrical profile indicated that guests generally used the bedroom facilities responsibly, with electrical demand reducing naturally during periods of low occupancy. This suggested that good guest behaviour was already making a positive contribution towards energy conservation, allowing future improvements to focus on building systems and operational control while maintaining the high standard of guest comfort expected within the hotel.

12.2 Catering Equipment & Asset Replacement

Engineering Observation

Several refrigeration and catering appliances appeared to be original installations and were therefore likely to have lower energy efficiency than equivalent modern equipment.

Food hot-hold tables were also observed operating when not actively required.

Recommended Action

The hotel should continue to develop good operational housekeeping by ensuring catering equipment operates only when required.

As refrigeration and catering equipment reaches the end of its operational life, replacement equipment should be selected on the basis of both operational suitability and energy performance.

Immediate wholesale replacement is **not** recommended solely on the basis of age.

Engineering Conclusion

The preferred strategy is to maximise the useful life of existing serviceable equipment whilst ensuring that future replacement programmes incorporate energy-efficient alternatives wherever commercially appropriate.

12.3 Planned Asset Management Philosophy

Throughout this investigation, opportunities have been identified where improvements in operational control are likely to provide greater financial benefit than replacement of existing equipment.

The investigation found no evidence to support unnecessary capital expenditure where existing plant remained serviceable.

Future investment should therefore follow the following principles:

- optimise existing control systems before replacing equipment;
- improve operational procedures wherever practical;
- maintain existing engineering plant appropriately;
- incorporate energy improvements within planned refurbishment programmes; and
- replace equipment only where supported by engineering evidence and commercial justification.

This approach minimises unnecessary capital expenditure whilst ensuring that future investment delivers the greatest possible operational and financial benefit.

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13. OVERALL ENGINEERING CONCLUSION

The investigation has demonstrated that significant reductions in electrical consumption can be achieved without widespread replacement of engineering plant.

Measured electrical monitoring, combined with detailed engineering inspection, identified several opportunities where improvements to operational control are likely to provide substantially greater financial benefit than major capital expenditure.

Importantly, the investigation also identified several areas where no engineering intervention was justified at the time of the investigation. Existing systems such as the Bedroom Block electrical distribution were found to be operating appropriately and should remain unchanged other than through normal maintenance and future asset replacement.

The recommended implementation programme should therefore focus initially upon improvements to operational control, engineering housekeeping and low-cost controls modifications before considering larger capital projects.

This approach enables the hotel to reduce both operating costs and unnecessary capital expenditure whilst maintaining the high standards of comfort and service expected by its guests.

The findings contained within this report represent the engineering opinion of Stop Wasting Power based upon the measured data obtained during the monitoring period, together with observations made during the physical inspection of the hotel.

Where recommendations are implemented, follow-up monitoring is recommended in order to verify the resulting reduction in electrical consumption and confirm that the anticipated commercial benefits have been achieved.