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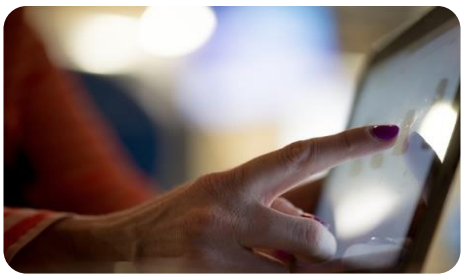
ENERGY AUDIT – BUILDING PERFORMANCE EVALUATION

PROPERTY ADDRESS: Torpedo Factory Group
The Old Torpedo Factory
St. Leonards Road
Greenford Broadway
NW10 6ST

REPORT REFERENCE: 125164

CONTENTS



1.0 SIGN OFF SHEET

1.1 CLIENT INFORMATION

CLIENT NAME:	Np-105, Icentre Howard Way Interchange Park Newport Pagnell	**INSTRUCTED BY:**	Jamie Finn
POSTCODE:	MK16 9PY	**CLIENT REFERENCE:**	125164

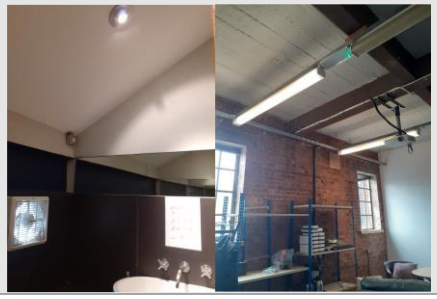
1.2 SURVEY DETAILS

DATE OF SURVEY:	16/03/2023	**CONSULTANT:**	Alex Purslow

1.3 REPORT DETAILS

REPORT TYPE:	Energy Audit	**REPORT VERSION:**	1.0
REPORT COMPLETED BY:	Abena Owusu-Amoah	**COMPLETED DATE:**	03/05/2023
REPORT AUTHORISED BY:	Keifer Ballard	**AUTHORISED DATE:**	03/05/2023
REPORT ISSUED DATE:	03/05/2023	**REPORT ISSUED TO:**	Jamie Finn

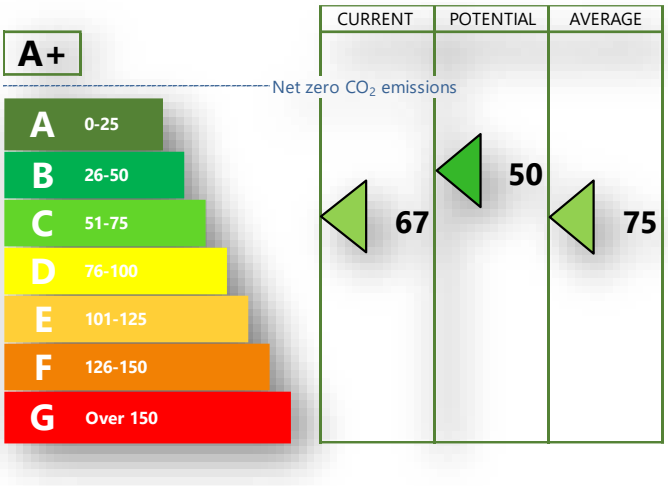
2.0 EXECUTIVE SUMMARY PROPERTY

BUILDING USE:	The property is currently being used as an a**udio-visual** equipment rental service
BUILDING REGULATIONS:	The property was built to the Pre 1964 Building Regulations.
CONSTRUCTION DETAILS:	The building is a solid brick property with a loft insulated pitched roof. 
LIGHTING INVENTORY:	The lighting within the property is a mixture of LED and T8 bulbs throughout. 
WINDOWS:	The glazing at the property is 4-6-4 double glazing wooden frame with a U-value of 3.439W/m2-K. 
HEATING & COOLING:	The property has a biasi m90e gas boiler that is not in used. Heating to the property is provided by electric radiators. Cooling to the property is provided by an air cooler unit. 
HOT WATER:	Hot water to the floors is provided by a greenstar 24i gas boiler. 
RENEWABLES:	There are currently no renewables installed on site.

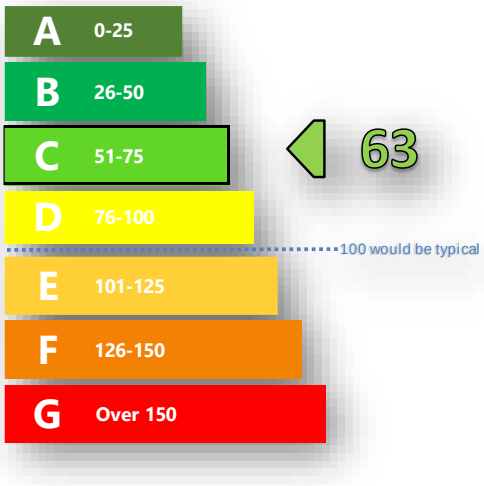
2.1 EXECUTIVE SUMMARY FINANCIAL

This property currently holds an EPC rating of C67 with a potential to become a B50 . A typical property of this type would normally rate C75 . The energy usage based on the billing data provided over a 12-month period for property was 92,519 kWh producing a DEC rating C63 .

EPC RATING



DEC RATING



An Energy Performance Certificate (EPC) reviews how a property is constructed along with energy consuming attributes that are installed, such as lighting or heating systems. It provides a property with an A to G rating with A being the most energy efficient and G being the least. Each property is compared against the notional building which is preset by the DCLG (Department for Communities and Local Government) using an SBEM (Simplified Building Energy Modelling) calculation tool, resulting in rating between A and G.

A Display Energy Certificate reviews how much energy a property has consumed over a 12-month period compared against the property type, size and hours of occupancy. It provides a property with an A to G rating with A being the most energy efficient and G being the least. Each property is compared against the notional building which is preset by the DCLG (Department for Communities and Local Government) using the ORCalc (Operational Rating) calculation tool, resulting in rating between A and G.

TYPE	DESCRIPTION	UNITS (KWH)	£/KWH	ANNUAL SPEND	KWH/M2
ELECTRICITY	ACTUAL	90,172	£0.412	£37,165	83
GAS	ACTUAL	2,347	£0.047	£111	83
TOTAL	ACTUAL	92,519	-	£37,276	

The above table breaks down the simulated energy consumption of the property by fuel type. Comparing the EPC rating with a typical new building of its type shows that the property is currently performing less efficiently than the average new build property. This is thought to be due to the inefficient lighting and heating installed within the building . The DEC rating is less efficient than that of a typical property which suggests that the property could be used more efficiently by the occupants to reduce its consumption.

The estimated savings are based upon an average unit. Currently it is projected that this property could save up to £18,772 . It is recommended that a full feasibility study is performed prior to any investments being progressed.

TYPE	SAVING	KG/CO2	KWH
BEHAVIORAL	£1,858	872	4,509
INVESTMENT	£16,914	15,229	41,042

3.0 ENERGYPLUS AUDIT METHODOLOGY

3.1 PROCESS

The audit is aimed at identifying areas of improvement within the building which could better the overall energy efficiency; reduce energy consumption and assess its subsequent energy performance rating.

In summary, the energy audit process is as follows;

- ✓ Pre-survey data gather
- ✓ Collect electric and gas billing information
- ✓ Comprehensive site survey by an accredited assessor
- ✓ Generation of baseline building model with HVAC and lighting attributes
- ✓ Scenario Modelling – several individual options and impact assessment
- ✓ Combined co-variance model which includes all above options and total impact
- ✓ Recommendation report and supporting documentation
- ✓ Issue scenario models for review and run additional simulations

3.2 SOFTWARE SIMULATION

The simulation software uses a combination of government approved energy simulation tools and methodologies which include;

- ✓ SBEM (Simplified Building Energy Model) provides an analysis of the energy consumption of a building. The SBEM calculates the monthly carbon dioxide emitted and energy used by a building given its construction, geometry, use, lighting, equipment and HVAC. SBEM ratings are scored on a scale of 1 to 100, with 1 being the worst and 100 being a zero usage of energy.

- ✓ Energy Assessment and Reporting Methodology TM22. This describes a method for assessing an office building's energy and building services performance. It is primarily aimed at tackling;

    - Poorly performing buildings and systems
    - The cause(s) of poor performance
    - Benchmarking the operating procedures including hours of use, and levels of service provision including lighting levels and system efficiencies.

The TM22 Assessment Method assesses a building's actual energy consumption per unit floor area, and other aspects of performance, against established benchmarks from Energy Consumption Guide 19.

3.3 REPORT LIMITATIONS

This report will not make recommendations but may make observations on any of the following areas:

- ✓ Computer, Telecommunication and Ancillary equipment
- ✓ Behavioural modifications
- ✓ Working practices
- ✓ Improvements with an estimated Return on Investment greater than 10 years.

All recommendations and simulations contained within this report are based upon industry standards and not any specific manufacturer's products, installations or equipment. Further simulation work would be recommended once a product selection has been made to provide more accurate simulations. It is recommended that a full feasibility study is carried out prior to the commissioning of any upgrades to determine fixed costs and suitability within the property.

This report is published for general information only and not to be relied upon in any way. Although high standards have been used in the preparation of the information, analysis and projections presented in this report, no responsibility or liability whatsoever can be accepted for any loss or damage resultant from any use of, reliance on or reference to the contents of this document.

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- ✓ The consequences of this report being used for any purpose or project other than that which it has been commissioned
- ✓ The report being distributed to any third party with whom an agreement has not been executed

The work undertaken to provide the basis of this document has utilised data and sources available at the time of completing both the site survey and report. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true representative data. Should additional data become available Compliance365 reserves the right to review such information and modify opinions expressed in this report accordingly.

4.0 BUILDING MODEL BASELINE

4.1 OVERVIEW

To provide accurate simulations the model's projected energy usage is calibrated using historical consumption figures. These figures are obtained by reviewing existing billing information which has been produced from actual meter readings (not estimated). A comparative analysis of the two is then performed to ensure the projected consumption data accurately reflects the previous billing period.

4.2 ENERGY CONSUMPTION DATA

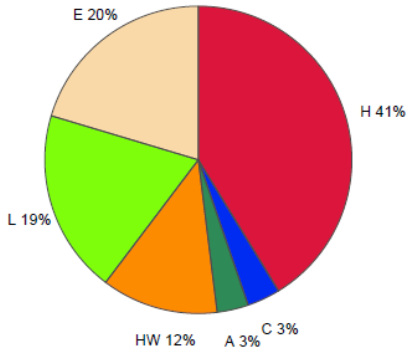
From our projected simulation, we estimate that the buildings operation and infrastructure consumes 92,519 kWh's across a 12-month period. From the 90,172 kWh's that is electricity usage and 2,347 kWh's that is gas usage. This equates to £37,276 at £0.412 per kWh for electricity and £111 at £0.047 per kWh for gas. The price per kWh is based on a the billing data provided.

4.3 BUILDING RATING & CONSUMPTION

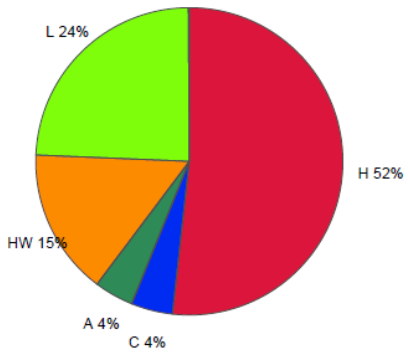
The following set of charts display the anticipated SBEM annual energy consumption breakdown from the SBEM calculation. It can be seen that the largest consumption is on the Heating (41%), Equipment (20%) and Lighting (19%). The Energy Performance Rating (EPC) is C67 .

Annual Energy Consumption

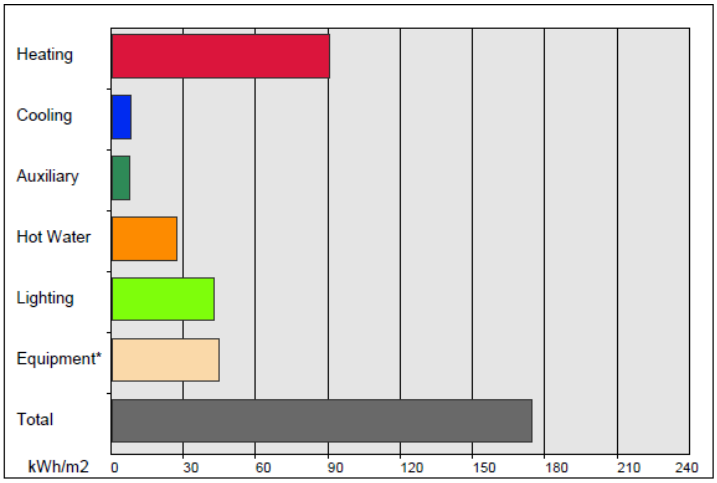
(Pie chart including Equipment end-use)

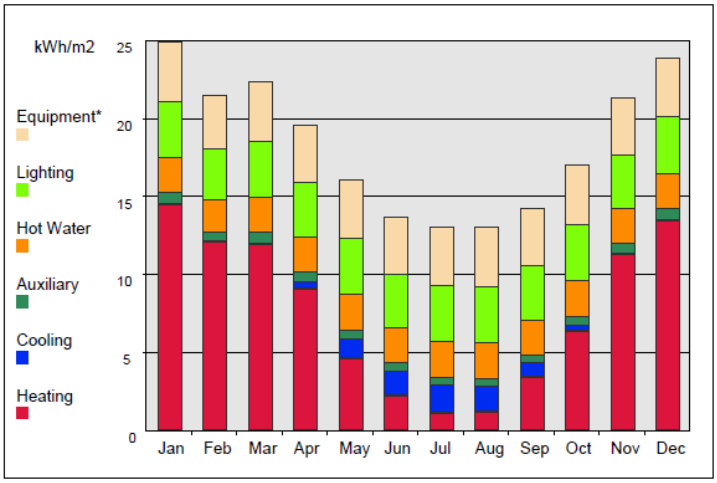


(Pie chart excluding Equipment end-use)



(*) Although energy consumption by equipment is shown in the graphs for information, this end-use has not been included in the total results of the building or the calculation of the ratings.





KEY

CODE	DESCRIPTION	SUMMARY
H	Heating	The amount of energy consumed to heat the space/building
C	Cooling	The amount of energy consumed to cool the space/building
A	Auxiliary	The energy associated with fans, pumps, and controls with HVAC systems
HW	Hot Water	The amount of energy consumed to heat the water used in the space/building
L	Lighting	The amount of energy consumed to light the space/building
E	Equipment	The amount of energy consumed by the equipment used in the building this includes IT / office equipment and kitchen equipment.

As detailed in the previous graph, Heating is projected as being the biggest consumer in the property. This is because of the demand for heating within the property. Equipment is the next biggest consumer. This is due to the specialist equipment such as audio and recording equipment in use within the property.

5.0 AUDIT FINDINGS

5.1 RECOMMENDATIONS – PROPERTY

There are various energy efficiency options available to the client, many of which offer the potential of a reasonable payback period. The following options have been highlighted (each of which will be accompanied by a software configuration file with the 3D building model to allow for further investigation and scenario analysis).

N.B. The graphs detailed against each recommendation detail how energy is consumed throughout the property over a 12-month period, showing the different attributes e.g. lighting and heating in contrasting colours. This shows how the energy profile of the property has altered from the baseline graph in section 3.3, and changes per simulated upgrade.

5.1.1 LOW ENERGY LIGHTING

RECOMMENDATION	ESTIMATED ANNUAL SAVINGS			EXPECTED EPC	ESTIMATED NEW CONSUMPTION (kWh)		NEW EMISSIONS RATING (kgCO2/m2)	APPROX COST	PAYBACK (YEARS)	FUNDING OPTIONS
	£	KGCO2	KWH		ELECTRICITY	GAS				
LOW ENERGY LIGHTING	£796	607	1,930	C66	88,242	2,347	27	£2,177	2.7	-

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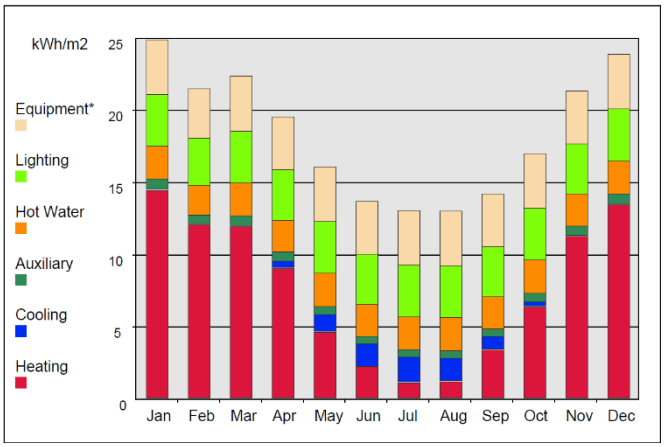

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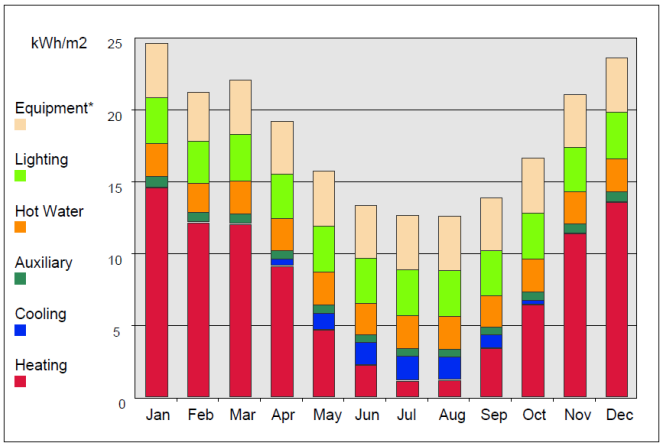
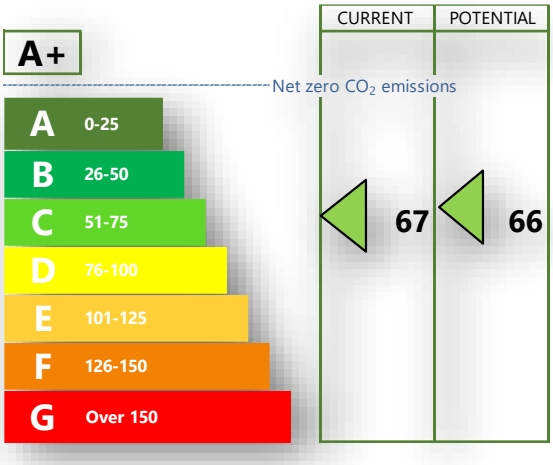


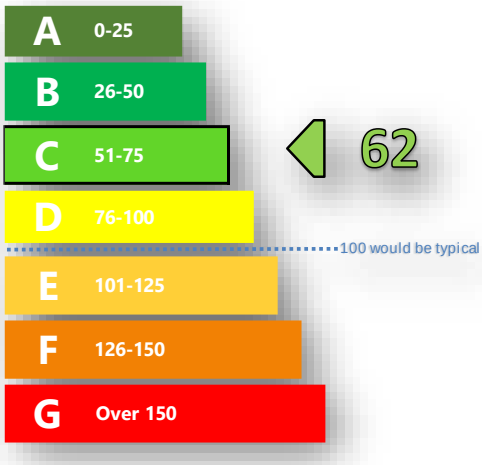
The lighting currently installed in The Old Torpedo Factory a mixture of LED and T8 lamps. Although some of these are energy efficient, it is recommended that the T8 bulbs lamps be replaced with an energy efficient equivalent such as T5 bulbs. Upgrading to energy efficient lighting throughout the property would reduce the wattage emitted from circa 50 Watts per lamp to as low as 11 depending on what was installed. Upgrading to Low Energy Lighting can be a cheaper alternative to replacing the lighting with LED. As with LED, when upgrading it must be taken into consideration the effect a reduction in secondary heat would have on the heating system, requiring it to consume more energy to compensate for the heat previously emitted by the lighting to maintain the desired ambient temperature. Switching to low energy lamps would reduce electricity consumption by 1,930 kWh saving £796, offering an estimated net saving of £796 and 1,930 kWh per annum.

The Installation of Low Energy lamps within the property would improve the EPC rating to C66 and the DEC rating to C62.

EPC RATING



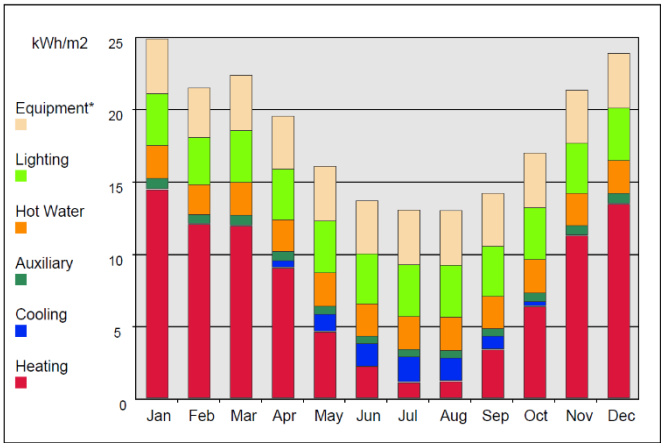
DEC RATING



5.1.2 LED LIGHTING

RECOMMENDATION	ESTIMATED ANNUAL SAVINGS			EXPECTED EPC	ESTIMATED NEW CONSUMPTION (kWh)		NEW EMISSIONS RATING (kgCO2/m2)	APPROX COST	PAYBACK (YEARS)	FUNDING OPTIONS
	£	KGCO2	KWH		ELECTRICITY	GAS				
LED LIGHTING	£1,329	1,013	3,223	C65	86,949	2,347	26	£6,778	5.1	-

BEFORE



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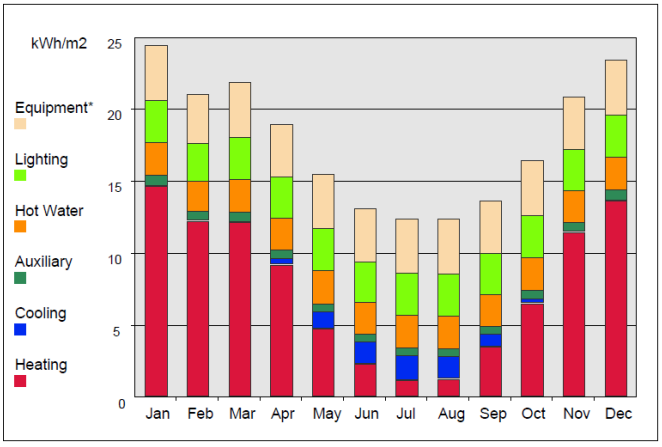
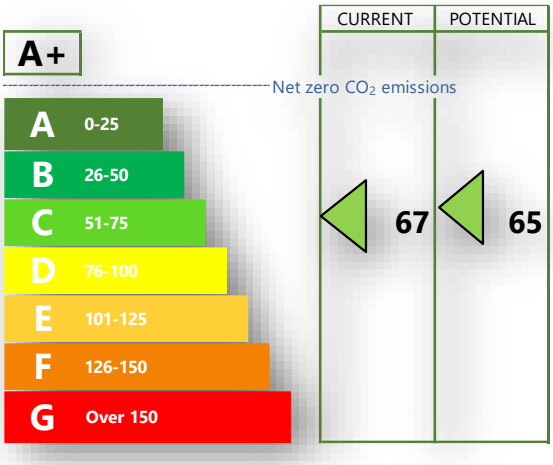


The lighting currently installed in The Old Torpedo Factory a mixture of LED and T8 lamps. Although some of these are energy efficient, it is recommended that the T8 lamps be replaced with an LED equivalent. Upgrading to energy efficient lighting throughout the property would reduce the wattage emitted from circa 50 Watts per lamp to as low as 4 depending on what was installed. When upgrading it must be taken into consideration the effect a reduction in secondary heat would have on the heating system, requiring it to consume more energy to compensate for the heat previously emitted by the lighting to maintain the desired ambient temperature. Switching to LED lamps would reduce electricity consumption by 3,223 kWh saving £1,329, offering an estimated net saving of £1,329 and 3,223 kWh per annum.

The Installation of LED lamps within the property would improve the EPC rating to C65 and DEC rating to C61.

EPC RATING



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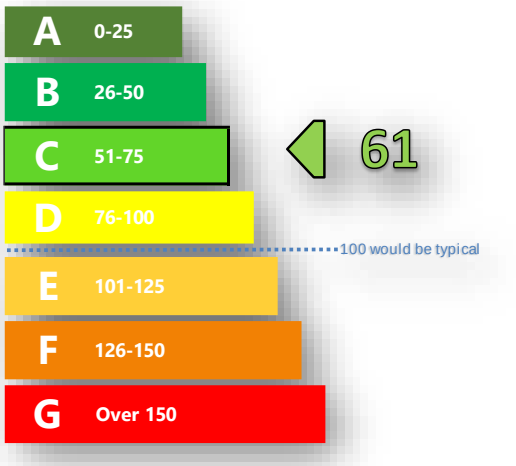
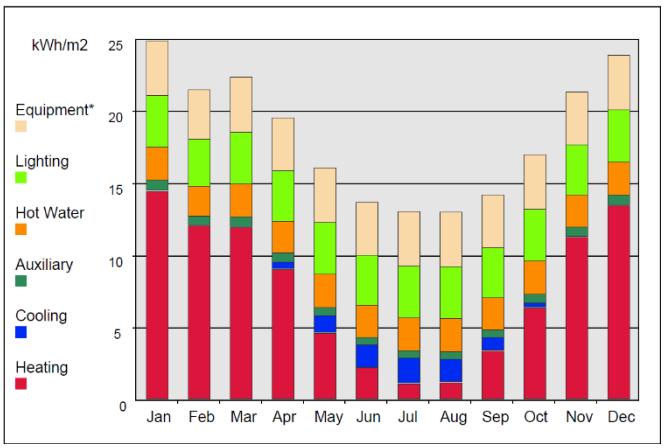


5.1.3 SOLAR PANELS

RECOMMENDATION	ESTIMATED ANNUAL SAVINGS			EXPECTED EPC	ESTIMATED NEW CONSUMPTION (kWh)		NEW EMISSIONS RATING (kgCO2/m2)	APPROX COST	PAYBACK (YEARS)	FUNDING OPTIONS
	£	KGCO2	KWH		ELECTRICITY	GAS				
SOLAR PANELS	£12,365	7,847	30,000	C59	77,161	2,347	18	£78,000	6.31	-

BEFORE



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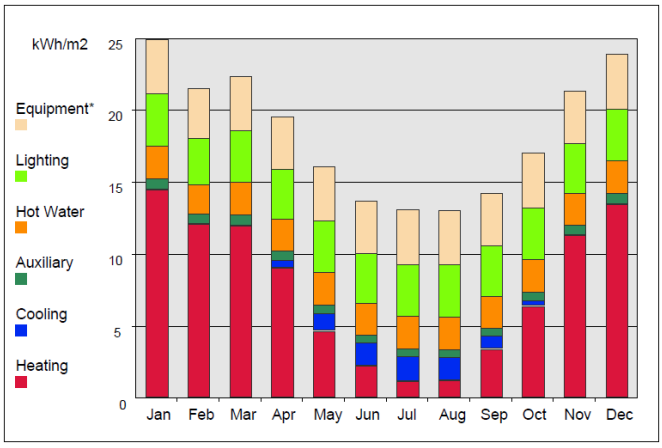


Due to the estimated 183m2 available, south facing roof space at The Old Torpedo Factory, it is recommended to consider the installation of Solar PV Panels. Solar PV is intended to reduce a buildings reliance on electricity drawn from the national grid through on-site generation. As Solar PV generated electricity is a renewable source of electricity, electricity spend is reduced as well as the buildings carbon footprint. Using the MCS calculation method, the simulated 93 panel array with a peak power of 39.06kWp (fig. 1) is estimated to generate 30,000 kWh of electricity and contribute to approximately 14% of total electricity use. Each subsequent array would increase the electricity generated. A 183m2 array has been simulated for indicative purposes, however, a full feasibility study must be carried out to assess the size of PV array suitable for The Old Torpedo Factory. This recommendation assumes that the roof is structurally sound enough for installers to safely access and fit the solar panel array.

The Installation of LED lamps within the property would improve the EPC rating to C59 and DEC rating to C54.

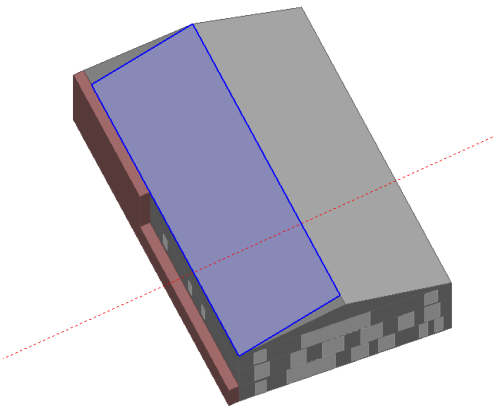
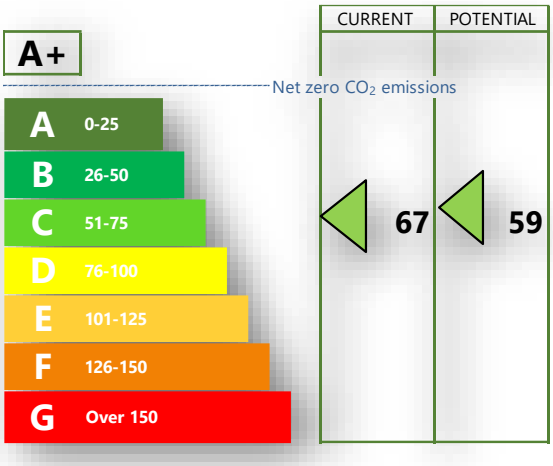


Fig 1. Solar panel array on The Old Torpedo Factory

EPC RATING



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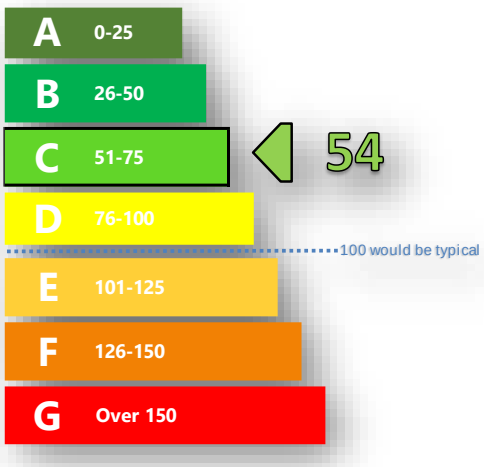
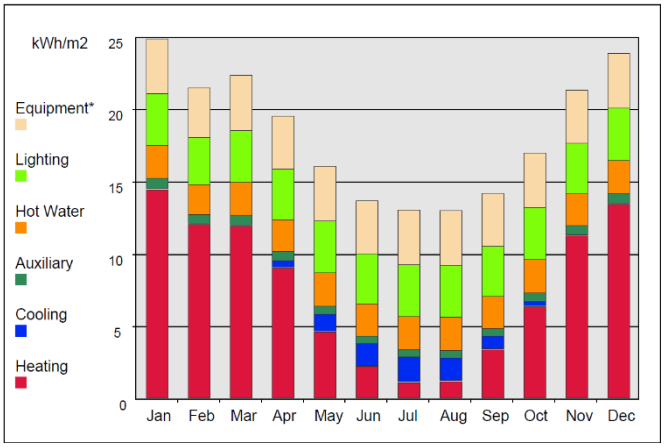


5.1.4 AIR PERMEABILITY

RECOMMENDATION	ESTIMATED ANNUAL SAVINGS			EXPECTED EPC	ESTIMATED NEW CONSUMPTION (kWh)		NEW EMISSIONS RATING (kgCO2/m2)	APPROX COST	PAYBACK (YEARS)	FUNDING OPTIONS
	£	KGCO2	KWH		ELECTRICITY	GAS				
AIR PERMEABILITY	£875	758	2,127	C65	88,049	2,343	26	£1,018	1.2	-

BEFORE



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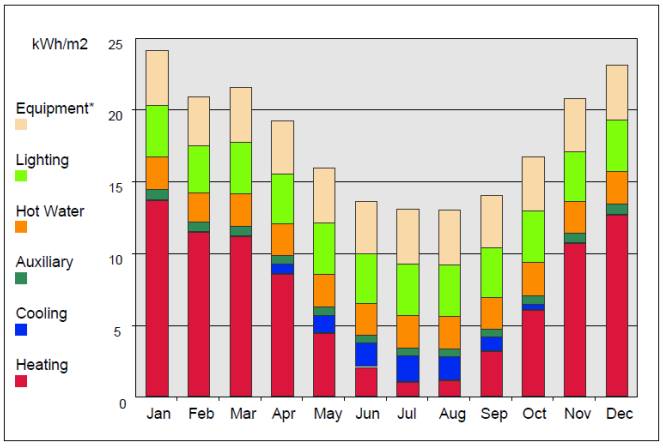
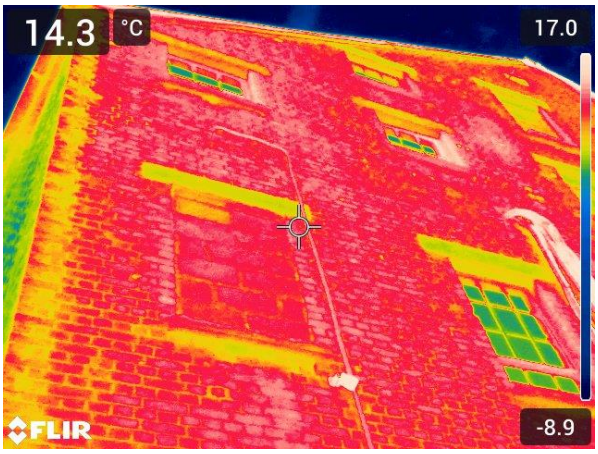


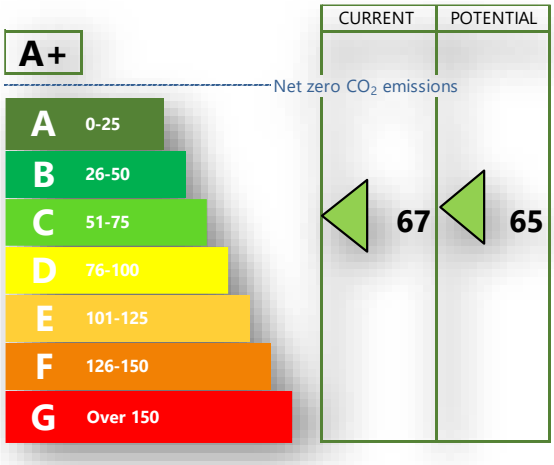
Reducing the amount of air permeability within a property allows less energy to escape from the building through gaps around windows and doors. Due to many glazed areas within the Property, the recommendation is to carry out an air permeability survey to identify and seal all the gaps in the external leaf using a foam sealant.

For indicative purposes, the assumption is that the current infiltration rate is 25, in line with SBEM energy assessment conventions, due to the building age. An air permeability test has yet to take place. This upgrade's results depend on the ability to achieve the target infiltration rate. A higher-end infiltration rate will result in lower savings. Thermal images were taken during the site visit to help identify gaps in the external leaf of the property. The images have been included below. Areas of red shows the warmest parts of the property with blue being the coldest.



Reducing the Property's airtightness infiltration rate at 50 Pa (m3/hr-m2) from 25 to 5 would improve the EPC rating to a C65 and the DEC to C62 (from C63).

EPC RATING



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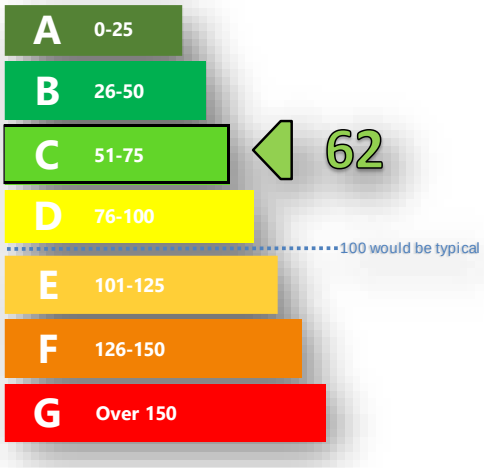
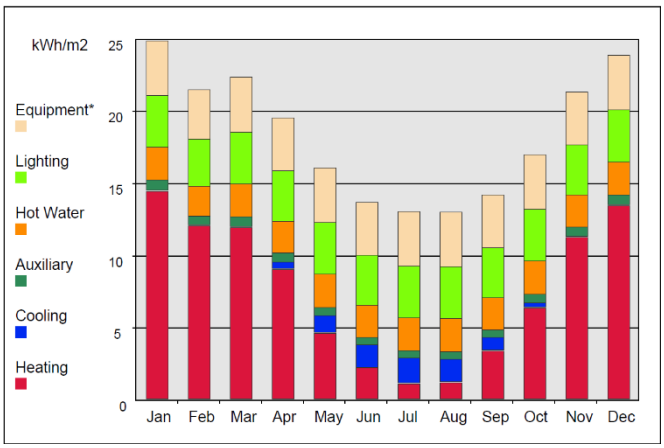


5.1.5 EXTERNAL WALL INSULATION

RECOMMENDATION	ESTIMATED ANNUAL SAVINGS			EXPECTED EPC	ESTIMATED NEW CONSUMPTION (kWh)		NEW EMISSIONS RATING (kgCO2/m2)	APPROX COST	PAYBACK (YEARS)	FUNDING OPTIONS
	£	KGCO2	KWH		ELECTRICITY	GAS				
EXTERNAL WALL INSULATION	£2,309	1,895	5,602	C63	84,571	2,346	25	£35,634	15.4	-

BEFORE



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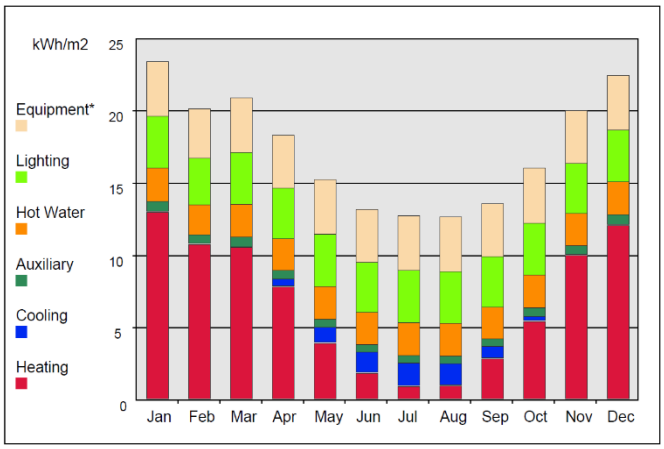
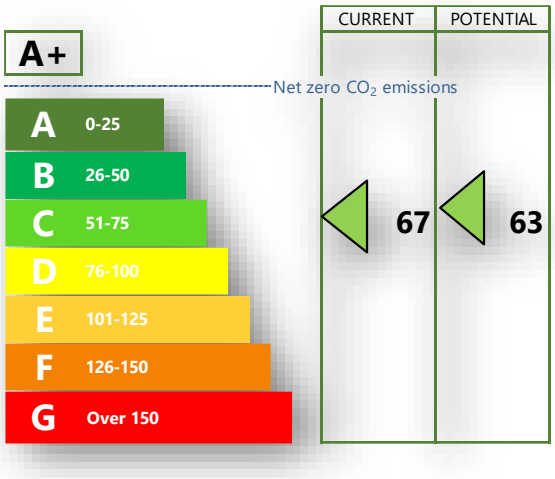


The recommendation is the installation of solid external wall insulation with the property. This upgrade can reduce the amount of heat lost from the property. Introducing insulation in line with 2010 regulations (England + Wales) would reduce the property's heat loss U-value to 0.27 W/m2/K. This upgrade would improve the EPC rating to C63 and the DEC rating to C59.

EPC RATING



DEC RATING

5.2 RECOMMENDATIONS – BEHAVIOURAL

Upon completing the survey at the Torpedo Factory Group , it became apparent that there were several operational and behavioral savings to be made within the property. Changing operator's habits and ensuring the energy is not wasted within a company can save up to 10% of an overall energy bill.

5.2.1 STAFF TRAINING

RECOMMENDATION	ESTIMATED ANNUAL SAVINGS		
	£	KGCO2	KWH
STAFF TRAINING	£1,858	872	4,509

Providing training to staff within a property can help to ensure that energy is considered by users whilst occupying the building. Electing an energy champion within the staff who is tasked with ensuring users are reducing the consumption and carbon footprint means that energy reduction is a goal as opposed to a bind. Getting staff on board with and focused on reducing their energy consumption whilst on site can reduce the energy usage by up to 10% per annum.

5.3 RECOMMENDATIONS – WATER

The below recommendations specifically target the water usage within the Torpedo Factory Group helping to reduce wasted water within the property. Water is normally a utility that is not targeted for reduction within properties as it is not seen as being a consumption however reducing the amount of water used within a property can reduce a company's water bill.

5.3.1 PUSH TAPS TO TOILETS

Some of the taps within the Torpedo Factory Group are twist taps. It is recommended that these be upgraded to push taps as these taps are controlled manually and can often be left on or drip if not turned off enough. Investigation would be required to the cost of installation, however converting taps to push taps can save up to 80% of the water used.

6.0 SUMMARY

Below is an outline summary of the recommended energy saving measures that can be taken to reduce cost, improve efficiency and lower CO_2.

LOW-COST INVESTMENT OPTIONS							
SCENARIO	ESTIMATED ANNUAL SAVINGS			COST £*	PAYBACK PERIOD	CURRENT EPC	EXPECTED RATING
	£	KGCO2	KWH				
LOW ENERGY LIGHTING	£796	607	1,930	£2,177	0.1	C67	C66
LED LIGHTING	£1,329	1,013	3,223	£6,778	0.2	C67	C65
SOLAR PANELS	£12,365	7,847	30,000	£78,000	6.3	C67	C59
AIR PERMEABILITY	£875	758	2,127	£1,018	1.2	C67	C65
EXTERNAL WALL INSULATION	£2,309	1,895	5,602	£35,634	1.3	C67	C63
STAFF TRAINING	£1,858	872	4,509	-	-	C67	-
COMBINED SAVINGS							
SCENARIO	ESTIMATED ANNUAL SAVINGS			COST £*	PAYBACK PERIOD	CURRENT EPC	EXPECTED RATING
	£	KGCO2	KWH				
LOW ENERGY LIGHTING COMBINED	£18,230	15,688	44,234	£116,830	2.86	C67	C51
LED LIGHTING COMBINED	£18,772	16,101	45,551	£121,430	2.83	C67	B50

*Prices are based on industry averages therefore payback periods are estimated. For a fixed cost quote and better understanding of payback period that can be achieved for any upgrade works a full feasibility study must be carried out. All costs are exclusive of VAT

7.0 NET ZERO - NEXT STEPS

This report highlights key areas for improvement identified from an on-site survey in order to reduce the impact of carbon emissions by The Old Torpedo Factory whilst reducing energy spend and consumption. Based upon previous discussion and information provided we understand Eco Driver have begun considering the road to Carbon Net Zero. The next recommended steps following the site-specific energy audit reports is to assist Eco Driver by performing an organisation-wide energy baseline report using the government's carbon guidance recommended Streamlined Energy and Carbon Reporting (SECR) methodology. This will report on annual energy use relating to gas, purchased electricity, transport fuel and associated greenhouse gas emissions, allowing Compliance365 to analyse and identify highest consumers and calculate an organisational intensity ratio to set targets and drive reduction of carbon consumption through recommend improvement measures and next steps in pursuit of Net Zero.