Facilities manager to complete green italic sections

Building Log Book
Sample College
Address 1
Address 2
Address 3
Address 4

Facilities manager responsible for log book: *Name*

Signed:

Emergency Contact Details

This building log book was prepared by Eco-Manual Ltd

Log Book Version: No. 1 Date: 01/03/2021

This building log book is analogous to a car handbook, providing the facilities manager with easily understood information about how the building is intended to work. It also allows ongoing building energy performance and major alterations to be recorded.

Please ensure that this log book is kept up-to-date and in a readily accessible (designated) position. It contains important information for anyone carrying out work on the building and its services.

This log book is to be kept at all times in: *Room name/no. and location in that room*

Electronic master is kept at: *Server/PC directory name and file name*

Contents

1 Updates and annual reviews

2 Purpose and responsibilities

3 Links to other key documents

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7 Summary of areas and occupancy

8 Summary of main building services plant

9 Overview of controls/BMS

10 Occupant information

11 Metering, monitoring and targeting strategy

12 Building energy performance records

13 Maintenance review

14 Major alterations

15 Results of in-use investigation

1 Updates and annual reviews

The log book should be reviewed annually as part of the organisation's quality assurance system and an entry should be made for each review. Where the log book has been updated then the changed pages should be recorded.

Review Date	Description of annual log book review and updates made	Pages updated or added	Facilities manager's signature	Date
	Contract Handover took place on *01/03/2021*			

2 Purpose and responsibilities

Purpose of a building log book

This log book is an easily accessible focal point of current information for all those working in the building. It has four main functions:

- **Summary of the building:** it is a summary of all the key information about the building, including the original design, commissioning and handover details, and information on its management and performance. In being a summary, it does not wholly duplicate or replace the O&M manuals. The log book is necessary for compliance with Building Regulations Part L2 - 2000.
- **Key reference point:** it is the single document in which key building energy information is logged. It may be regarded as the hub document linking many other relevant documents. The log book should provide key references to the detail held in less accessible O&M manuals, BMS manuals and commissioning records. It should therefore be kept in a readily accessible (designated) position in the main building operations room and should not be removed without the approval of the facilities manager.
- **Source of information/training:** it provides a key source of information for anyone involved in the daily management or operation of the building and to anyone carrying out work on the building and its services. It will be relevant to new staff and external contractors/consultants and may play a role in staff training and induction.
- **Dynamic document:** it is a place to log changes to the building and its operation. It is also used to log building energy performance and continual fine-tuning commissioning. It is essential that it is kept up-to-date. Alterations should only be made with the approval of the facilities manager and should be signed and dated by that person.

Further guidance on using building log books is given in Action Energy Good Practice Guide GPG 348: *Building log books — a user's guide*, available from www.actionenergy.org.uk

The building log book was prepared by: Eco-Manual Ltd

Facilities manager responsible for log book: *Name*
Emergency contact details

Key responsibilities of facilities manager:

— to ensure that the log book is correct and up-to-date at building handover and when passing it on to a successor
— to ensure that the log book is kept up to date on an ongoing basis including any changes to the building fabric, services, operation or management
— to ensure that building maintenance and energy performance are logged
— to ensure that all those working in the building are made aware of the information contained in the log book
— to ensure that the log book is kept in its designated location at all times.

3 Links to other key documents

Document (where applicable)	Location
Emergency procedures	*Location*
Health and safety file master index	*Location*
Hazard Register	*Location*
O & M manuals	*Location*
Maintenance schedules	*Location*
Record drawings	*Location*
Equipment log books (e.g. boiler log book)	*Location*

4 Main contacts

Emergency contact name 1 *Address* *Address* *Postcode* *Tel. no. and e-mail*	***Emergency contact name 2*** *Address* *Address* *Postcode* *Tel. no. and e-mail*
Building Architect	**Building services design consulant**
Lead contractor	**Mechanical services subcontractor**
Electrical services subcontractor	***Other***
Other	***Other***
Facilities management contractor name *Address* *Address* *Postcode* *Tel. no. and e-mail*	***Maintenance contractor name*** *Address* *Address* *Postcode* *Tel. no. and e-mail*

5 Commissioning, handover and compliance

Commissioning overview

Commissioning of mechanical and electrical systems was carried out by M & E Contractor over the period January to March 2021. The systems have been tested and commissioned to CIBSE commissioning codes available at the time.

CIBSE Commissioning Code	Followed? (Yes/No)	Certificate included in appendix? (Yes/No)
Code M: Commissioning management	Yes	No – Located in O & M
Code A: Air distribution systems	Yes	No – Located in O & M
Code B: Boilers	Yes	No – Located in O & M
Code C: Automatic controls	Yes	No – Located in O & M
Code L: Lighting	Yes	No – Located in O & M
Code R: Refrigerating systems	Yes	No – Located in O & M
Code W: Water distribution systems	Yes	No – Located in O & M

Commissioning results

Commissioning period **November – December 2011**	**1. Was the system and its controls installed as shown in the design drawings?**	**2. Did operation meet the design specifications in all the required modes? (Yes/No)**	**3. Did the system operate efficiently in all modes? (Yes/No)**	**Comments/problems?** Where the answer is NO, indicate any commissioning problems or significant changes that have been made to the designs during (or as a result of) installation/commissioning, or any value engineering exercises, including any significant commissioning failures and remedial work that took place.
LPHW Heating Systems	Yes	Yes	Yes	
Mechanical Ventilation	Yes	Yes	Yes	
Pumps	Yes	Yes	Yes	
VRF Heating and Cooling	Yes	Yes	Yes	
Hot & Cold Water Services	Yes	Yes	Yes	
Natural Gas Installation	Yes	Yes	Yes	
Automatic BMS Controls	Yes	Yes	Yes	
Solar Hot Water System	Yes	Yes	Yes	
Natural Ventilation AOV Controls	Yes	Yes	Yes	
Lighting	Yes	Yes	Yes	
Data Installation	Yes	Yes	Yes	
CCTV	Yes	Yes	Yes	
Security Systems	Yes	Yes	Yes	
Access Control	Yes	Yes	Yes	

Air infiltration

A building air pressure test was carried out on 01/02/2021 and showed a measured air permeability of 5.28 m³/h/m², within the target standard of 10 m³/h/m² at 50 Pa in Part L2. The client's design target for the building was 10 m³/h/m².

Handover

Handover took place on:	01/03/2021
End of defects liability period:	01/03/2022
The handover procedure was managed by: (Lead Designer)	Eric Wright Construction Ltd

The documents handed over are listed in Section 3 – Key Documents

6 Overall building design

General description of building

Sample College was built in 2021, consisting of four storeys of occupied space which provides an classrooms, informal social learning space, refectory, kitchens and training kitchens, Learning Resource Centre, science rooms, cellular offices, open plan office space, board room and meeting rooms. The building is ventilated via a combination of mechanical and natural ventilation systems. Central heating boilers supply radiators and gas fired water heaters provide hot water for hand washing and catering.

Client requirements

The following is a summary description of the original client design requirements for the building:

External summer design conditions:	28°C
External winter design conditions:	-4°C
Internal design temperatures:	16°C to 21°C (room depending)
LPHW flow temperature:	80°C
LPHW return temperature:	60°C
HWS storage temperature:	60°C
HWS circulation temperature:	55°C
Blended HWS supply temperature:	43°C

Conceptual design

The building is designed to utilise a combination of mechanical ventilation and natural ventilation via manual opening windows. In the event of a window being manually opened the mechanical ventilation to that room will shut down to prevent energy wastage.

The majority of rooms throughout the building are provided with variable refrigerant flow (VRF) heating and cooling air conditioning. Fresh air supply is provided to the refectory and kitchens via supply air handling units. Classrooms and office areas are provided with fresh air supply via supply air handling units. Dirty air is extract from these areas via air handling units and fans.

Space heating is provided to areas without air conditioning systems via wall mounted radiators.. Space heating is supplied via 6 no. gas fired condensing boilers located in the fourth floor plantroom. VT and CT heating pumps are variable speed drive although the boiler shunt pumps and hot water secondary return pumps are not. Hot water is generated via 3 no. gas fired water heaters which supplies hot water to all hot water outlets except for science rooms. These are provided with hot water via local electric water heaters. The main central hot water system is also supplemented by roof mounted solar thermal panels which pre-heat hot water to reduce gas consumption needed to increase the water to the required temperature.

The building is controlled via a building management system (BMS) via 2 no. automatic controls panels located in the second and fourth floor plantrooms. The control panel's Trend controllers are linked via a local cat5e IT Ethernet connection on to the college's IT Intranet system, which incorporates a link with a virtual supervisory PC consisting of a Trend 963 graphical user interface, which provides full monitoring of all the controlled systems operational values and alarms and allows the user to make adjustments of system set points and operating time schedules.

The supervisory PC incorporates several levels of access linked to individual user ID's, with each user's access level being password protected.

Special design features

- Solar hot water system.
- Variable refrigerant flow air conditioning systems.
- Natural ventilation via opening windows and automatically adjusting motorised dampers based on CO2 levels.
- PIR solenoid valves for water saving to WC areas.
- PIR lighting and dimmable lighting.

Design assessment

The design team carried out an assessment of carbon emissions using the carbon emissions method. This showed the calculated annual carbon emissions of the building are estimated to be 16.5 kg $CO_2/m^2/yr$ and this should be no greater than those from a notional building of the same size and shape designed to comply with the Elemental Method.

Benefits and limitations of the design

Key 'dos and don'ts'

Do:

(1) Ensure good filter maintenance in fan coil units and air handling units to avoid restricting air flow.
(2) Monitor the BMS to ensure good operation.
(3) Carry out surveys to ensure that local heating/cooling controls are set correctly.

Don't:

(1) Allow additional office equipment to be added that may exceed design heat gains leading to comfort problems.
(2) Run the main plant beyond the actual occupancy requirements – in particular, avoid 24 hrs/day.
(3) Allow local control settings to result in excessive heating/cooling consumption.

7 Summary of areas and occupancy

Occupancy and activities

The total number of occupants in the building is *Insert number*

Main Occupied Areas	Weekday Hours	Saturday Hours	Sunday Hours	Total Hours/Week	Flextime (Yes/No)?	Late Working Sometimes (Yes/No)?	No. of Occupants
Insert	*Insert*	*Insert*	*Insert*	*Insert*	*Yes/No*	*Yes/No*	*Insert*
Insert	*Insert*	*Insert*	*Insert*	*Insert*	*Yes/No*	*Yes/No*	*Insert*
Insert	*Insert*	*Insert*	*Insert*	*Insert*	*Yes/No*	*Yes/No*	*Insert*
Insert	*Insert*	*Insert*	*Insert*	*Insert*	*Yes/No*	*Yes/No*	*Insert*
Insert	*Insert*	*Insert*	*Insert*	*Insert*	*Yes/No*	*Yes/No*	*Insert*
Insert	*Insert*	*Insert*	*Insert*	*Insert*	*Yes/No*	*Yes/No*	*Insert*
Insert	*Insert*	*Insert*	*Insert*	*Insert*	*Yes/No*	*Yes/No*	*Insert*

Insert a summary of the main activities in each different zone of the building.
Insert a summary of the likely occupancy patterns including numbers of people and occupancy periods.

Floor areas

The total floor area of the building is 14,026.42m² (based on gross floor area) including all external plant areas.

	% of total area by servicing system						**Total %**	**Total area (m²)**
Area type	Untreated (%)	Naturally ventilated with heating (%)	Mechanically ventilated with heating (%)	Mixed mode (%)	Heating and cooling only (%)	Full air conditioning with mech ventilation (%)		
Ground Floor	2.03%	21.19%	49.47%	0.00%	0.00%	27.31%	100.00%	4079.29
First Floor	4.82%	23.06%	42.55%	0.00%	0.88%	28.69%	100.00%	3952.86
Second Floor	7.71%	29.43%	12.76%	0.00%	0.00%	50.10%	100.00%	3137.39
Third Floor	5.75%	29.66%	7.50%	0.00%	0.00%	57.09%	100.00%	2037.61
Main Plant Areas	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	819.27
Total area (m²)	**1451.51**	**3303.58**	**4253.11**	**0.00**	**34.91**	**4983.31**		**14026.42**

8 Summary of main building services plant

Mechanical plant

Item	Model	Qty	Manufacturer
Air & Dirt Separator	CVAD-R150 Air and Dirt Separator	1	Fabricated Products
Air Conditioning	REYQ32P8 32HP VRVIII COMPACT HEAT RECOVERY OUTDOOR UNIT 3PH	2	Daikin Air Conditioning
	REYQ36P9 36HP VRVIII COMPACT HEAT RECOVERY OUTDOOR UNIT 3PH	1	
	REYQ30P8 30HP VRVIII COMPACT HEAT RECOVERY OUTDOOR UNIT 3PH	3	
	FXSQ20P VRV DC INVERTER DUCTED WITH INCL FILTER	12	
	FXSQ25P VRV DC INVERTER DUCTED WITH INCL FILTER	5	
	FXSQ32P VRV DC INVERTER DUCTED WITH INCL FILTER	4	
	FXSQ40P VRV DC INVERTER DUCTED WITH INCL FILTER	11	
	FXSQ50P VRV DC INVERTER DUCTED WITH INCL FILTER	6	
	FXSQ63P VRV DC INVERTER DUCTED WITH INCL FILTER	29	
	FXSQ80P VRV DC INVERTER DUCTED WITH INCL FILTER	14	
	FXSQ100P VRV DC INVERTER DUCTED WITH INCL FILTER	9	
	FXSQ125P VRV DC INVERTER DUCTED WITH INCL FILTER	5	
	BSVQ100P8B SINGLE BSVQ BOX 10KW (20-100)	74	
	BSVQ160P8B SINGLE BSVQ BOX 16KW (20-160)	10	
	BSVQ250P8B SINGLE BSVQ BOX 25KW (160-250)	1	
	BRC1D52 STANDARD WIRED REMOTE CONTROLLER WITH 7 DAY TIME CLOCK	15	
	DCS601C51 INTELLIGENT TOUCH CONTROLLER	1	
	KRCS01-4 REMOTE ROOM SENSOR	66	
Air Conditioning - N243 Boardroom	FBQ60C DC INVERTER DUCTED SPLIT INDOOR UNIT INCL FILTER	2	Daikin Air Conditioning
	RZQS125DV1 COMFORT INVERTER SPLIT OUTDOOR UNIT (1PH)	1	
Air Conditioning - N185 Comms Room	FAQ71B / RZQ71D3V1 WALL MOUNTED SEASONAL INV HEAT PUMP SPLIT SYSTEM (1PH)	2	Daikin Air Conditioning
Air Handling Unit	AHU NO 1- ASV 1850-110INT	1	Air Source Ventilation
	AHU NO 2- ASV 1050-1060EXT	1	
	AHU NO 3- ASV 1450-1460EXT	1	
	AHU NO 4- ASV 1050-1060EXT	1	
	AHU NO 5- ASV 1750-1010INT	1	
	AHU NO 6- ASV 1450-1010EXT	1	
	AHU NO 7- ASV 1250-910INT	1	
	AHU NO 8- ASV 1450-1010EXT	1	

BMS Controls	MCP1 - FOURTH FLOOR PLANTROOM MCP2 - SECOND FLOOR PLANTROOM	1 1	Buiding Technology Systems
Boilers	PARAMOUNT TWO 115 NG COND 115KW BOILER	6	Potterton Boilers
Booster Set	INCOMING MCW BOOSTER - GTKS20/4HM9ZT 240-1-50 MCW BOOSTER - GHV20/10SV07F030T/UK 400-3-50 LAB BOOSTER - GTKS20/2HM7ZT 240-1-50 INPUT DUTY	1 1 1	ITT Lowara
Burning Bench Extract System/ Filters	50JMBIF/20/2/6/14/3PH BIFURCATED FAN UNIT C/W DOL STARTER AND FWX3 INVERTER NON STD F5 GENERAL PURPOSE BAG FILTER F5 TO EN779, FP5.3P/22MMH SIZE: 495H X 495W X 300D ACT HEPA FILTER REF: GA/H14/C-H 500H X 500W X 292D ACT ACTIVATED CARBON CELLS 495H X 495W X 600D ACT	2 4 4 4	Flakt Woods Northern Fans
Cold Water Meters	WM2 & WM3 - 65MM ITRON WOLTEX COLD WATER METER WM4 - 25MM ITRON ADUADIS COLD WATER METER WM5 - 50MM ITRON FLOSTAR COLD WATER METER	2 1 1	MWA Technology
Cold Water Storage Tank	LAB - DECCA ONE PIECE D16 1073 X 876 X 787MM 568 LITRES MAIN - DECCASECTIONAL HPM DP402010 4150 X 2150 X 1075MM 8000 LITRES	1 1	Decca Tanks
Compressed Air Services	ATLAS COPCO VARIABLE SPEED DRIVE ROTARY SCREW AIR COMPRESSOR MODEL GA30VSDFF OIL WATER SEPARATOR MODEL OSC95 VERTICAL RECEIVERS 500 LITRES WITH RELIEF AND BY-PASS VALVES	1 1 2	Medical Pipeline Services
Electric Water Heaters - Lab Areas	AQUAPOINT WATER HEATER AP3/15 AQUAPOINT AP30 30L ZIP 15LTR VARIPOINT-2 2-2KW ZIP VARIPOINT 30L WALL MOUNTED 3.0KW	2 1 6 4	Zip Water Heaters

Fans - Main Systems	EF1 – DIRTY EXTRACT SYSTEM 1 – FLAKT WOODS DDPF8AL DUCT MOUNTED TWIN FAN UNIT. DUTY 1.0M³/S @ 200PA	1	Flakt Woods
	EF2 – DIRTY EXTRACT SYSTEM 2 – FLAKT WOODS DDFP8AL DUCT MOUNTED TWIN FAN UNIT DUTY 0.8M³/S @ 250PA	1	
	EF3 – DIRTY EXTRACT SYSTEM 3 – FLAKT WOODS BDPF8AL DUCT MOUNTED TWIN FAN UNIT DUTY 1.6M³/S @ 250PA	1	
	EF4 – WORKSHOP – FLAKT WOODS 45JM/20/2/6/34 LONG CASED AXIAL FAN DUTY 3.4M³/S @ 300PA	1	
	1EF01 – PRODUCTION KITCHEN EXTRACT – FLAKT WOODS 45JM/20/2/6/34 LONG CASED AXIAL FAN DUTY 3.1M³/S @ 450PA	1	
	1EF02– RWE KITCHEN EXTRACT – FLAKT WOODS 45JM/20/2/6/32 LONG CASED AXIAL FAN DUTY 3.1M³/S @ 300PA	1	
	1EF03 – TRAINING KITCHEN – FLAKT WOODS 71JM/20/4/6/30 LONG CASED AXIAL FAN DUTY 5.5M³/S @ 300PA	1	
Fans - Local Systems	1EF06 – N185 COMMS ROOM – HELIOS MBD160/4EX EXTRACT FAN C/W ON/OFF SWITCH	1	Flakt Woods
	2EF01 – N218 PREP ROOM – FLAKT WOODS ILC1M INLINE EXTRACT FAN C/W PIR DETECTOR/TIMER & ME1.1 SPEED CONTROLLER.	1	
	2EF02 – N228 PREP ROOM – FLAKT WOODS ILC1M INLINE EXTRACT FAN C/W PIR DETECTOR/TIMER & ME1.1 SPEED CONTROLLER.	1	
Gas Fired Water Heater	EC230/700 ECOFLO NATURAL GAS A432	3	Andrews Water Heaters
Gas Meters	GM1 - 100MM CPT G400 TURBINE GAS METER	1	MWA Technology
	GM2 & GM3 - 50MM CPT G65 TURBINE GAS METER	2	
	GM4 & GM7 - 80MM CPT G100 TURBINE GAS METER	2	
	GM5 & GM6 - 40MM TBX30L TURBINE GAS METER	2	
Gas Proving System	INTELLIGAS 100/P STAND ALONE PROVING SYSTEM LAB	10	Intelligas
	EGIP-1/KS KITCHEN C/W 2 APS & EMERGENCY STOP	3	
	ZEV20 GAS VALVE	7	
	ZEV32 GAS VALVE	2	
	ZEV40 GAS VALVE	1	
	ZEV50 GAS VALVE	1	
	ZEV65 GAS VALVE	2	
Grilles	ADT SQUARE LOUVRED FACE FOUR WAY BLOW DIFFUSER	376	Trox
	LVS EXTRACT AIR VALVES	85	
Motorised Dampers	100-315 DIA SB SERIES ROUND CONTROL DAMPER WITH EXTENDED SPINDLE	172	BSB
	315 DIA > BSB DD SERIES WITH EXTENDED SPINDLE	13	
Overdoor Heaters	TRW 9 RECESSED LPHW WARM AIR CURTAIN	2	Diffusion

PIR Solenoid Valves	DAN EV 220B 15B 1/2" SOL VLV BODY 32U7115 DAN EV 220V 20B 3/4" SOL VLV BODY 32U7120 DANFOSS EVR 2-40 N/C COIL 240V CABLE 1M	24 14 38	Danfoss
Pressurisation Unit	MIKROFILL 800 ELECTRONIC FILLING DEVICE, 800LITRE EXPANSION VESSEL	1	Mikrofill Systems Limited
Pumps	CT HEATING - GRUNDFOS TPD 65-230/2 3KW 3PH VT HEATING RAD & UFH - GRUNDFOS UPSD 40-100F 1PH DHWSR - GRUNDFOS UPS 40-180/2FB 3PH BOILER SHUNT PUMPS - GRUNDFOS UPS25-80 1PH	1 2 1 6	Grundfos
Radiant Tubes	VSA20LHNCE10-5 VISION VSA20 20KW HERRINGBONE 10.5M AMBIRAD VSA25LHNCE8 VISION VSA25 25KW LINEAR HERRINGBONE 8M VSA25LHNCE10-5 VISION VSA25 25KW LINEAR HERRINGBONE 10.5M VSA25UHNCE VISION VSA25 25KW U TUBE HERRINGBONE VSA20LFNCE7 VISION VSA20LF 20KW FORCED LINEAR 7M VSA20LFNCE10-5 VISION VSA20LF 20KW FORCED LINEAR 10.5M VSA25LFNCE10-5 VISION VSA25LF 25KW FORCED LINEAR 10.5M VSA20UTNCE VISION VSA20 U 20KW TUBE SC3-SZ SMART COM ENERGY MANAGEMENT CONTROL SC-BB SMART COM BLACK BULB SENSOR	4 1 9 1 3 2 2 2 7 7	Ambirad
Radiators	STELRAD COMPACT STELRAD LST STELRAD VERTEX P2 RADIATOR	114 1 4	Stelrad

Sanitaryware	AR1148WH ALCONA CC PAN WHITE HO	1	Twyford
	AR1438WH ALCONA BTW PAN WHITE	44	Bathrooms
	AD4622WH ALCONA 560 SEMI RECESSED BASIN 2 TAP HOLE WHITE	36	
	AR2342WH SSIO 4 LITRE LOW VOLUME FLUSH EXPOSED CISTERN PUSH BUTTON	1	
	CX9540XX SSIO 4 LITRE LOW VOLUME FLUSH CONCEALED CISTERN CP LEVER	7	
	FC1034WH CLEANERS SINK AND GRATING WHITE	8	
	FW1738WH FLOW WALL HUNG WC PAN	1	
	FW4811WH FLOW 500 HANDRINSE BASIN 1TH	1	
	FW4960WH FLOW SEMI-PEDESTAL	1	
	VC7002WH CLIFTON BOWL URINAL WHITE	20	
	SA4212WH SOLA 500 WASHBASIN 2TH WHITE	11	
	BRISTAN CROSS TOP BIB TAPS CHROME VAXBIBC	8	Bristan
	BRISTAN Z DUS 1/2 C DESIGN UTILITY NON-CONCUSSIVE BASIN PILLAR TAP	117	
	DEVA VISION VSN123 SELF CLOSING BASIN TAP	1	Deva
	WB48503 STAINLESS MAXI BASIN	1	Stainless Design
	MIRA 11570311 WHITE FLIGHT SHOWER TRAY	1	Mira
	1800 X 600 STAINLESS STEEL GRADE 304 DOUBLE BOWL DOUBLE DRAINER SINK C/W SUPPORT STAND	1	Sissons
	SISSONS CENTINEL STAINLESS STEEL WALL HUNG URINAL C/W CISTERN	6	
	SISSONS CENTINEL STAINLESS STEEL WALL HUNG CONTRACT WASHTROUGH LONG	8	
Solar Hot Water System	3m² 30-TUBE EVACUATED TUBE COLLECTORS MODEL DF100	6	AES Solar
	1000 LITRE UNVENTED SINGLE COIL CALORIFIER	1	
	DELTASOL BS SOLAR DTC CONTROLLER	1	
	AM1 ALARM MODULE	1	
	SD3 SMART DISPLAY	1	

Electrical plant

Item	Model	Qty	Manufacturer
Distribution Board	MGI1252 - 125A Type A MGBN6 - 6 outgoing way Type B MGBN8 - 8 outgoing way Type B MGBN18 - 18 outgoing way Type B MGBN24 - 24 outgoing way Type B MGBN12516S4 - 125A, Type B split metereing board MGBN12512S8 - 125A, Type B split metereing board MGAN9 - 125A, Type A MG6C6 - 400/630A Panel board	3 1 1 4 3 5 6 2 1	Dorman Smith
Fire Detection	6400/RDN/BC3/10 - Repeater Panel 600/DCN/4LPN - Main Panel	2 2	Protec
Disabled Refuge	EVC/08 - 8 way panel	1	Protec
CCTV	NJ-ND400 - NVR NJ-NV200 - NVR	1 1	Panasonic
Intruder Alarm	Galaxy GD520 Control Panel	1	Galaxy

Electricity distribution

Electrical power is provided to the main building by a new United Utilities HV switch and transformer supplying a new purpose built Section panel, distributing the electricity around the building. The panel is provided with integral meters to monitor the electricity consumption to the campus building via the BMS.

An additional lift supply has been installed to the Main Building evacuation lift via a changeover switch located within the main Building.

A purpose built electricity Section panel is provided to meet the electrical requirements of the building. The panel installed in the main switch room complete with integral meters provides electricity monitoring of outgoing supplies to lighting/power distributions boards and kitchen/mechanical supplies.

Gas distribution

One new metered mains gas supply is provided to supply the boilers, hot water heaters, workshop gas a heater, lab gas taps and kitchen catering appliances. The incoming meter is located in the Ground Floor Goods/Bin Store. Separately metered gas supplies are provided to the labs, workshops, kitchens heating boilers and water heaters. All of the meters are monitored by the BMS via a pulse output signal.

Water services

One new metered incoming mains cold water supply is provided to supply the various cold water outlets throughout the building and the hot water system. The main incoming external meter is located in an accessible chamber on the west side of the building. Another meter is located as the water enters the building in the Ground Floor Goods/Bin Store.

Mains cold water is distributed from this point to a combined cold water break tank/booster set located in the Goods/Bin Store. Water is boosted via a service riser to the Fourth Floor Plantroom. A separate mains cold water storage tank and booster set is provided to circulate cold water throughout to serve the building domestic water requirements. A dedicated mains cold water storage tank and booster set is also provided to circulate cold water to the cold water outlets in the lab areas.

Hot water is generated in the Fourth Floor Plantroom via 3 no. gas-fired hot water storage heaters. Cold water is pre-heated via solar thermal panels located on the Second Floor flat roof area. The pre-heated hot water is then heated to the required temperature by the gas-fired water heaters and circulated to the hot water outlets throughout the building.

Hot water for the lab areas is generated by local electric undersink water heaters located in each room.

Heating services

Heating is provided by 6 no. natural gas fired condensing boilers located within the Fourth Floor plantroom. Space heating is provided to various areas via a combination of radiators and underfloor heating heating.. Pumped variable temperature circuits are provided to serve the underfloor heating and radiators. A pumped constant temperatuere circuit is provided to serve the air handling unit frost and re-heat coils. Overall control of the heating system components is via the BMS, local control is also available in the form of thermostatic radiator valves on radiators and local room thermostats on underfloor heating in the Ground, First and Second Floor Street areas..

Control settings

Low pressure hot water is supplied at 80°C at full load and the BMS decreases this to a minimum of 20°C depending upon weather conditions. Boilers operate within an optimised fully adjustable time schedule and operate on a sequenced basis.

Safety features

The common boiler flow temperature is monitored by a high limit thermostat which is set at 95°C and each boiler is also provided with a pressure/temperature relief valve.

Energy/water saving features

High efficiency condensing boilers, weather compensated and optimisation control.

Ventilation Services

The building is designed to utilise a combination of natural and mechanical ventilation. In the majority of areas mechanical ventilation is provided. In normal occupancy rooms, i.e. classrooms, offices, conference areas, etc. where mechanical ventilation is provided, the manually opening windows are linked via micro switches to ensure that if all windows in the room are open the mechanical ventilation shuts down. When one or more windows are closed the dampers adjust depending on the CO2 levels within the room which are monitored by wall mounted sensors in each room. If CO2 levels reduce below a pre-determined set-point the motorised dampers will modulate to reduce the mechanical ventilation to the room. The central air handling plant serving the area will then modulate to balance the air volumes and reduce energy consumption. There are 5 no. supply and extract heat recovery air handling units provided to serve the general office/classroom areas.

Dedicated air handling plant is provided to serve the 3 no. kitchens supplying air to kitchen canopies. Air is extracted from the 3 no. kitchens via dedicated extract fans located in the kitchen ceiling voids.

A dedicated extract fan is also provided to extract air from the Ground and First Floor Workshop areas.

Dirty air is extract from various WC areas via 3 no. twin extract fans serving the Ground, First, Second and Third Floors.

Local extract fans are also provided to extract air from the Second Floor Prep Rooms and Chemical Store.

Control settings

The supply air handling units are controlled to maintain the supply air temperature at an adjustable set point initially set at 22°C. The air handling units and extract fans operate on an adjustable time schedule controlled by the BMS. The supply and extract air handling units automatically modulate fan speed via inverters depending on the various local room damper positions.

Energy/water saving features

Variable speed fans, automatic opening natural ventilation to Second Floor Street area. Automatically modulating volume control dampers operating on CO2 and interlocked to manually openable windows.

Cooling Services

The majority of areas throughout the building are provided with variable refrigerant flow (VRF) heating and cooling air conditioning using R410a refrigerant. A network of refrigerant pipework connects 6 no. systems consisting of external condenser units to a series of ceiling void fan coil indoor units. External condenser units are located within external plant compounds on 2 no. roof areas. Cooling is also provided to the First Floor N185 comms room via 2 no. wall mounted split system indoor units connected to 2 no. external condenser units also located within the external compound. A dedicated split system is also provided to supply 2 no. fan coil indoor units serving the Second Floor Boardroom N243.

Control settings

The VRF system is controlled via an interface controller mounted within the BMS control panel. The VRF system is enabled to the dictates of an adjustable time schedule and once enabled operates to the dictates of the local VRF settings. The central controller can also be accessed by the BMS front end to provide overriding control of the various schedules and set points. The third floor principalship area and restaurant are provided with dedicated local controllers which can also be prohibited by the central controller. All other areas are provided with room return air temperature sensors which are monitored by the central controller. The Comms Room and Boardroom systems are stand-alone and operate off the dictates of the local controllers.

Energy/water saving features

Automatic temperature sensing and time control to prevent operation when not necessary.

Domestic Hot and Cold Water Services

Hot water is generated in the Fourth Floor Plantroom via 3 no. gas-fired hot water storage heaters. Cold water is pre-heated via solar thermal panels located on the Second Floor flat roof area. The pre-heated hot water is then heated to the required temperature by the gas-fired water heaters and circulated to the hot water outlets throughout the building.

Hot water for the lab areas is generated by local electric undersink water heaters located in each room.

Mains cold water is distributed from this point to a combined cold water break tank/booster set located in the Goods/Bin Store. Water is boosted via a service riser to the Fourth Floor Plantroom. A separate mains cold water storage tank and booster set is provided to circulate cold water throughout to serve the building domestic water requirements. A dedicated mains cold water storage tank and booster set is also provided to circulate cold water to the cold water outlets in the lab areas.

Control settings

The solar pre-heat system operates under the dictates of a dedicated Differential Temperature Controller (DTC). When a temperature difference between the solar panels and the solar pre-heat cylinder exceeds 6°C the solar pump operates and transfers heat from the solar panels to the cylinder. The pre-heated water is then transferred through the 3 no. gas-fired water heaters and if necessary lifted to a maximum water storage temperature of 60°C. The hot water heaters are controlled under a time schedule by the BMS control panel located in the Fourth Floor Plantroom.

Safety features

The hot water flow temperature is monitored by a high limit thermostat which is set at 65°C.

Energy/water saving features

Solar hot water pre-heat system reducing gas consumption required to heat water to required temperature.

WC and urinal flushing cisterns supplied with PIR solenoid shut-off valves located in WC areas to prevent mains cold water usage when not in occupancy.

Lighting/Daylighting

The ground floor entrance lobby and Street areas have recessed down-lights with high frequency fluorescent lamps controlled via PIR sensors and control boxes.

The ground and first floor workshop areas have suspended IP-Rated, high frequency linear fluorescent fittings, these are controlled with manual switches local to each area through a contactor arrangement.

The first floor kitchens and refectory area utilise IP-Rated, recessed modular fittings with high frequency fluorescent lamps. These are manually switched, local to each area.

The lighting to the classrooms and office areas on all floors consists of recessed modular light fittings with high frequency fluorescent lamps. Control of the fittings is via local switches and PIR detectors used in absence mode, with the addition of on/off control to the 'whiteboard' row of fittings. All of these fittings have the ability to be dimmed via the local switches and control boxes.

The third floor conference rooms have dimmable recessed down-lights that are control via scene setting plates and control boxes which enable various scenes to be applied. They are also controlled via PIR sensors set in absence mode.

Corridor and circulation areas utilise recessed modular light fitting with high frequency lamps, these are controlled via PIR sensors and control boxes. 50% of the corridor lights remain on when no presence is detected if the adjacent rooms are occupied.

Toilet lighting to all floors have recessed down lights and the lighting is controlled by PIR sensors with presence detection.

Store rooms are controlled via PIR detection, the staircase lighting is controlled by PIR sensors on each floor.

An external lighting scheme has been installed consisting of a combination of bollards wall mounted lights and lights mounted on 4 metre lamp post columns in area's between the existing college buildings, the main road and LRC as indicated on the drawing including lighting mounted on 4 metre columns running along the front elevation / road of the South Building as indicated on external lighting drawing 1177-E-63-EX-01. The lighting circuits have been wired back into the new main building external lighting distribution board via lighting contactors / enclosure. The lighting contactors are controlled time-clock including a photo cell mounted on the main building roof. The on – off switching of the contactors can be changed to suit the college requirements.

Lighting provided in the plant-room area generally consists of fluorescent light fittings and is controlled by a combination of light switches.

Emergency lighting consists of both emergency light fittings integral to the main lighting and self contained emergency exit signs, both surface and recessed versions. The emergency test and

monitoring system is fully integrated within the control boxes and head end software is installed on the server PC.

Energy saving features

Lighting controlled in multiple zones by PIR detection and daylight dimming control.

9 Overview of controls/BMS

The building's main ventilation systems, domestic water and heating system is controlled by a Trend building management system which controls and monitors all of the associated main plant via 2 no. automatic controls panels.

The control panels Trend controllers are linked via a local cat5e IT Ethernet connection on to the college's IT system, which incorporates a front end graphical user interface, which provides full monitoring of all the controlled systems operational values and alarms and allows the user to make adjustments of system set points and operating time schedules.

A display unit mounted on the main control panel fascia allows all of the main plant functions to be monitored and operational set points adjusted.

All of the systems operational monitored temperature values and main control valve outputs are logged at 15 minute intervals allowing full historical checking of the systems operation.

All operational pumps and fans run times are logged for remote monitoring and each item run time is associated with an adjustable maintenance run time alarm.

Generally Hand/Off/Auto switches on the panel fascia, allow control of the plant. For normal operation these switches should all be set to the 'Auto' position, allowing the control system to operate as described below. The 'Hand' position is a test position only and should not be used on a daily basis except for test and maintenance purposes.

Indicator lamps on the panel show operational and fault status conditions of each plant item.

<u>Main control/monitoring functions</u>

- Heating system plant including boilers, pumps, pressurisation unit and overdoor heaters.
- Ventilation system plant including air handling units and extract fans
- Window microswitches and CO2 sensors interfaced with local mechanical ventilation motorized control dampers
- Natural ventilation automatic opening vents to Second Floor Street Area
- Domestic cold water systems plant including booster sets and storage tanks
- Domestic hot water system plant including hot water heaters and pump
- VRF heating and cooling air conditioning (Web browser function on front end computer)
- Gas supply main automatic isolation valve to plantroom
- Water leak detection
- Energy metering

Authorised personnel

The following staff have been trained for operation and maintenance of the BMS:

Operative Name – Job Title
Operative Name – Job Title
Operative Name – Job Title
Operative Name – Job Title

10 Occupant information

(This information should be photocopied and passed on to the building occupants, particularly new staff members)

Your working environment

In order to achieve a good working environment it is important that you understand how to control the building services in your space.

Heating

Heating is provided to your building by 2 different systems. The majority of areas are heated by air conditioning units mounted above the ceiling. The system is fully automatic in control and operates depending on internal temperature conditions. Some rooms have also been provided with wall mounted remote controllers for local operation.

Heating is provided some offices, corridors and toilet areas by radiators which are controlled by thermostatic radiator valves.

Set the temperature you require and then leave it for a while to see how the temperature settles down. Make minor adjustments if necessary but don't alter them too much as the system may over compensate and you will get too hot/cold. Avoid over heating as this wastes energy and the resulting CO_2 emissions contribute to global warming.

Ventilation/air conditioning:

Fresh air is provided to the building either via supply fans which blow air through the ceiling grilles or by openable windows. Lower windows can be opened manually. If all windows are opened in a room the air will stop blowing through the grilles. This will reduce energy usage from the mechanical fan systems when outside air is used to ventilate a space through the windows.

If a room is only partially occupied the ventilation to the room may reduce as the system reacts to carbon dioxide levels.

Air conditioning is provided to the majority of rooms and the system is fully automatic in control and operates depending on internal temperature conditions. Smaller rooms have also been provided with wall mounted remote controllers for local operation.

If possible do not open the windows when the air conditioning is operating as this will waste energy and affect performance of the system.

Lighting

The fluorescent lighting is controlled via switches located by the entrance doors to each area. In order to save energy the lights have a number of energy saving features:

- The lights adjacent the windows have automatic dimming controls related to the amount of daylight entering the room.
- Lighting within classrooms is automatically switched off when nobody is in the room.

Lights in the toilets switch ON when they detect someone moving and OFF when nobody is in the room.

Corridor lighting is controlled automatically when movement is detected and contain the following energy saving features

- The corridor lighting is reduced to '50% on' when the adjacent rooms are occupied.
- Within the Street areas the lights automatically dim relative to the amount of available daylight.

Office equipment

The more that PCs, printers, etc. are left on unnecessarily, the more likely that your office will overheat. This also wastes energy – make sure any energy saving features are turned ON to automatically power down equipment after a certain time.

Simple energy 'do's and don'ts'

- Avoid ventilation grilles with furniture and books as this will result in a lack of heating/ventilation.
- Set thermostats to the required temperature then leave them alone. Do not use them as ON/OFF switches.
- Set panel heater thermostats to the required temperature then leave them alone. Do not use them as ON/OFF switches. If you turn these fully OFF on Friday night then don't expect heat on Monday morning.
- Do not overheat or over-cool your space as this increases running costs and causes extra emissions of CO_2 into the external atmosphere, contributing to global warming.
- Only switch the lights ON as and when necessary as they result in significant emissions of CO_2 into the external atmosphere, contributing to global warming.
- Shut windows at night for security purposes and to prevent heat loss that could make your space cold when you come in the next day.
- Ensure that PCs, printers etc. are not left ON unnecessarily and have any energy saving features enabled as this will prevent your space from overheating and save energy, thereby reducing CO_2 emissions to the external atmosphere that lead to global warming.

Kitchen

Gas proving: Each kitchen is provided with a gas/ventilation interlock panel which operates a kitchen gas valve. This is controlled directly by a standalone gas proving unit which once provided with an air flow proved signal from the kitchen extract fan, the gas is made available for operation.

Once available for operation the unit is enabled by manual operation of fascia mounted key switch which starts a gas pressure check for leaks on the kitchen pipe work system, if no leaks are detected during the test period, the kitchen gas isolation valve is opened. Please ensure that all gas appliances are switched off prior to proving the gas on the panel.

Note – operation of the kitchen knock off switch will cause the kitchen gas valve to be immediately closed.

Hobs and ovens: Only switch hobs and ovens ON when you need them in order to save energy.

Fridges/freezers: Keep the doors closed as much as possible in order to save energy.

Dishwasher: Make sure the dishwasher only operates with full racks – half loads will waste energy,

Hot water: Only use the hot water you really need in order to save energy.

Save energy: Kitchens can use significant amounts of electricity, gas and hot water. Controlling the kitchen equipment properly will help reduce running costs and avoid extra emissions of CO_2 into the external atmosphere that contribute to global warming.

Lab/Workshops

Gas proving: Each lab/workshop with gas supplies is provided with a gas proving panel which operates a gas solenoid valve. This is controlled directly by a standalone gas proving unit which once provided a pressure proved signal, the gas is made available for operation. Once available for operation the unit is enabled by manual operation of fascia mounted key switch which starts a gas pressure check for leaks on the pipe work system, if no leaks are detected during the test period, the gas isolation valve is opened. Please ensure that all gas taps/valves are switched off prior to proving the gas on the panel.

Note – operation of the emergency knock off switch will cause the lab gas valve to be immediately closed.

Compressed Air Services – Labs/Workshops

Compressed air services are provided to the new labs/workshop areas. These are supplied by new compressed air plant located in the Second Floor plantroom. Lab desks are provided with compressed air taps which can be opened using the lever handles. Workshops are provided with compressed air via lever operated valves. Care should be taken to ensure that any appliances are

connected prior to operating the compressed air and ensure all lever handles are closed before disconnecting any appliances.

Specialist Gas Services – Workshops

Workshops in the building have been provided with a range of specialist gases consisting of oxygen, propane, argon and argon mix. The gas supplies are fed from the manifolds located in the ground floor Oxy Store and the ground floor Mechanical Engineering Workshop. Particular care should be taken when using these gases and connecting/disconnecting appliances. Full operating instructions on the manifold systems can be found in the mechanical operation and maintenance manuals. Please refer to these instructions prior to utilising any of these services.

11 Metering, monitoring and targeting strategy

Metering Schedule

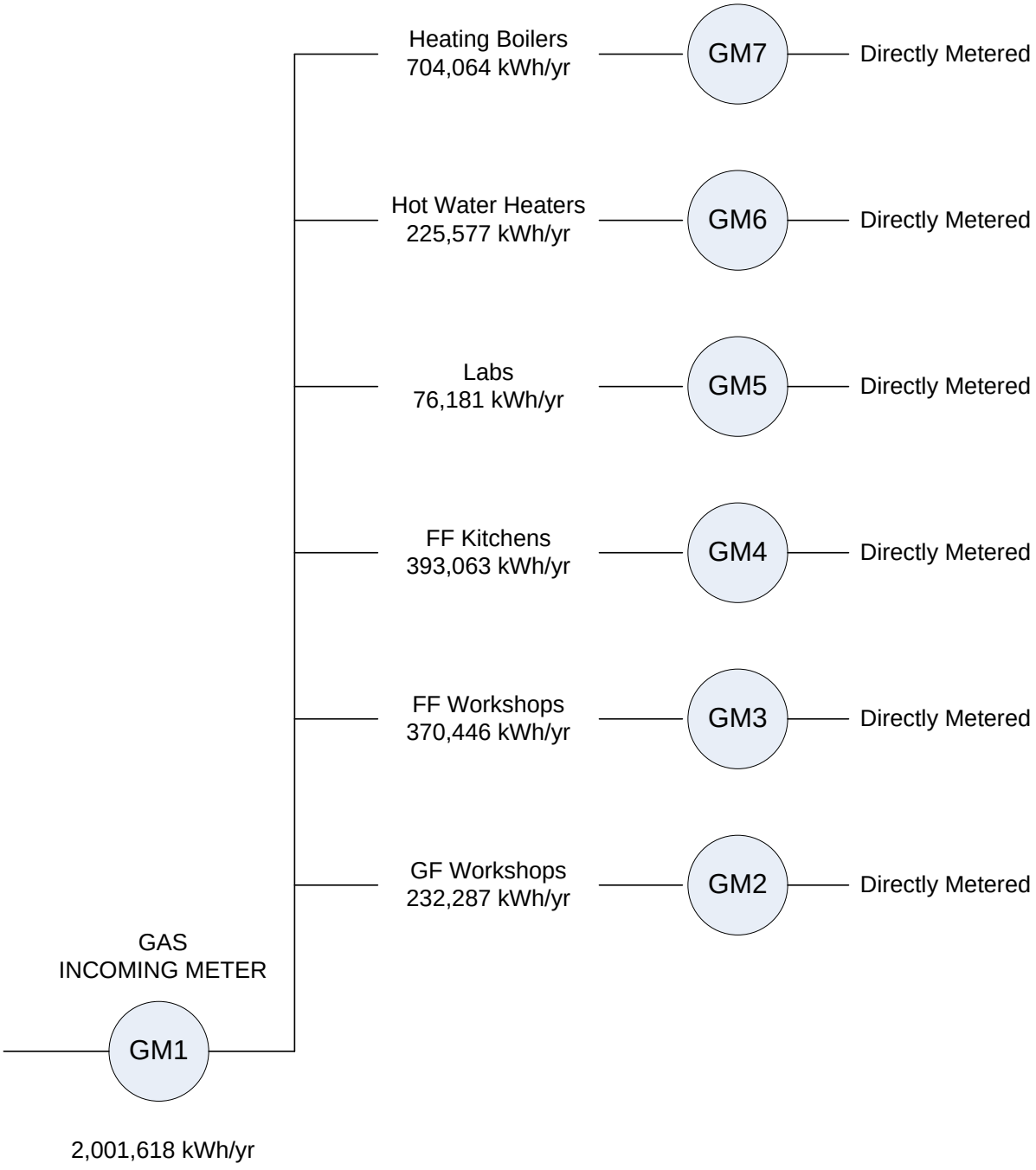
The following provides a list of meters and design estimates of the likely end use consumptions. See Action Energy General Information Leaflet GIL 65: *Metering energy use in new non-domestic buildings*, for an example, including how to arrive at a good metering schedule. A copy is provided on the CD-ROM associated with CIBSE TM31 and printed copies are available from (www.actionenergy.org.uk). CIBSE TM22 also provides a means of assessing energy use in buildings.

Total estimated incoming fuel			Gas: 2,001,618 kWh/year Electricity: 558,939 kWh/year					
Energy			**Meters**		**Method**		**Meter Location**	
Type of incoming energy	Main end-use	Estimated end-use consumption (kW·h/yr)	Meter no./code	End use / area / system / circuit or tenancy to be measured	Measurement method and calculation where appropriate	Estimated consumption through each meter (kW·h/yr)	List of meters	Location
Gas	Main Incoming	2,001,618	GM1	Entire Building	Directly Metered	2,001,618	Gas Meter	Ground Floor Goods Bin Store
	GF Workshops - Radiant Tubes	232,287	GM2	GF Workshops	Directly Metered	232,287	Gas Meter	GF Joinery Workshop
	FF Workshops - Radiant Tubes	370,446	GM3	FF Workshops	Directly Metered	370,446	Gas Meter	FF P & P Workshop
	Kitchens	393,063	GM4	FF Kitchens	Directly Metered	393,063	Gas Meter	FF Kitchen Gas Riser
	Labs	76,181	GM5	SF Labs	Directly Metered	76,181	Gas Meter	FF P & P Workshop
	Hot Water Heaters	225,577	GM6	Hot Water Heaters	Directly Metered	225,577	Gas Meter	Fourth Floor Plantroom
	Heating Boilers	704,064	GM7	Heating Boilers	Directly Metered	704,064	Gas Meter	Fourth Floor Plantroom
Electricity	Main Incoming	558,939	EM1	Entire Building	Directly Metered	558,939	Multi KWh Meter	Main Switch Room
	DBG/1	2,160	EM2	Lighting	Directly Metered	2,160	KWh Meter	MV Workshop
	DBG/1	8,960	EM3	Power	Directly Metered	8,960	KWh Meter	MV Workshop
	DBG/2	48,800	EM4	Power	Directly Metered	48,800	KWh Meter	Mech Eng. W/shop
	DBG/3	2,160	EM5	Lighting	Directly Metered	2,160	KWh Meter	Mech Eng. W/shop
	DBG/3	14,880	EM6	Power	Directly Metered	14,880	KWh Meter	Mech Eng. W/shop

DBG/4	4,320	EM7	Lighting	Directly Metered	4,320	KWh Meter	Mech Eng. W/shop
DBG/4	12,675	EM8	Power	Directly Metered	12,675	KWh Meter	GF Classrooms
DBG/5	4,320	EM9	Lighting	Directly Metered	4,320	KWh Meter	GF Classrooms
DBG/5	12,764	EM10	Power	Directly Metered	12,764	KWh Meter	Joinery W/shop
DBG/6	4,320	EM11	Lighting	Directly Metered	4,320	KWh Meter	Joinery W/shop
DBG/6	14,742	EM12	Power	Directly Metered	14,742	KWh Meter	Admin Area
DBG/7	4,320	EM13	Lighting	Directly Metered	4,320	KWh Meter	H&B Area
DBG/7	12,928	EM14	Power	Directly Metered	12,928	KWh Meter	H&B Area
DBG/8	10,000	EM15	Power	Directly Metered	10,000	KWh Meter	Comms Rooms
DB1/1	4,230	EM16	Lighting	Directly Metered	4,230	KWh Meter	Classrooms
DB1/1	14,566	EM17	Power	Directly Metered	14,566	KWh Meter	Classrooms
DB1/2	4,230	EM18	Lighting	Directly Metered	4,230	KWh Meter	Welding W/shop
DB1/3	14,573	EM19	Power	Directly Metered	14,573	KWh Meter	Welding W/shop
DB1/4	4,320	EM20	Lighting	Directly Metered	4,320	KWh Meter	Classrooms
DB1/4	14,677	EM21	Power	Directly Metered	14,677	KWh Meter	Classrooms
DB1/5	4,320	EM22	Lighting	Directly Metered	4,320	KWh Meter	Plumbing W/shop
DB1/5	14,577	EM23	Power	Directly Metered	14,577	KWh Meter	Plumbing W/shop
DB1/6	54,320	EM24	Power	Directly Metered	54,320	KWh Meter	Refectory
DB1/7	34,786	EM25	Power	Directly Metered	34,786	KWh Meter	Kitchens
DB1/8	24,784	EM26	Power	Directly Metered	24,784	KWh Meter	Rest. & Staff
DB2/1	5,439	EM27	Lighting	Directly Metered	5,439	KWh Meter	Classrooms
DB2/1	15,678	EM28	Power	Directly Metered	15,678	KWh Meter	Classrooms
DB2/2	5,304	EM29	Lighting	Directly Metered	5,304	KWh Meter	Classrooms
DB2/2	14,588	EM30	Power	Directly Metered	14,588	KWh Meter	Classrooms
DB2/3	3,450	EM31	Lighting	Directly Metered	3,450	KWh Meter	Classrooms
DB2/3	15,488	EM32	Power	Directly Metered	15,488	KWh Meter	Classrooms
DB2/4	2,243	EM33	Lighting	Directly Metered	2,243	KWh Meter	Classrooms
DB2/4	14,577	EM34	Power	Directly Metered	14,577	KWh Meter	Classrooms
MCC1	55,688	EM35	Power	Directly Metered	55,688	KWh Meter	Mech Plant
MCP02	25,678	EM36	Power	Directly Metered	25,678	KWh Meter	Mech Plant
DB3/1	2,354	EM37	Lighting	Directly Metered	2,354	KWh Meter	HE Area
DB3/1	24,678	EM38	Power	Directly Metered	24,678	KWh Meter	HE Area
DB3/2	2,354	EM39	Lighting	Directly Metered	2,354	KWh Meter	Staff Area
DB3/2	24,688	EM40	Power	Directly Metered	24,688	KWh Meter	Staff Area

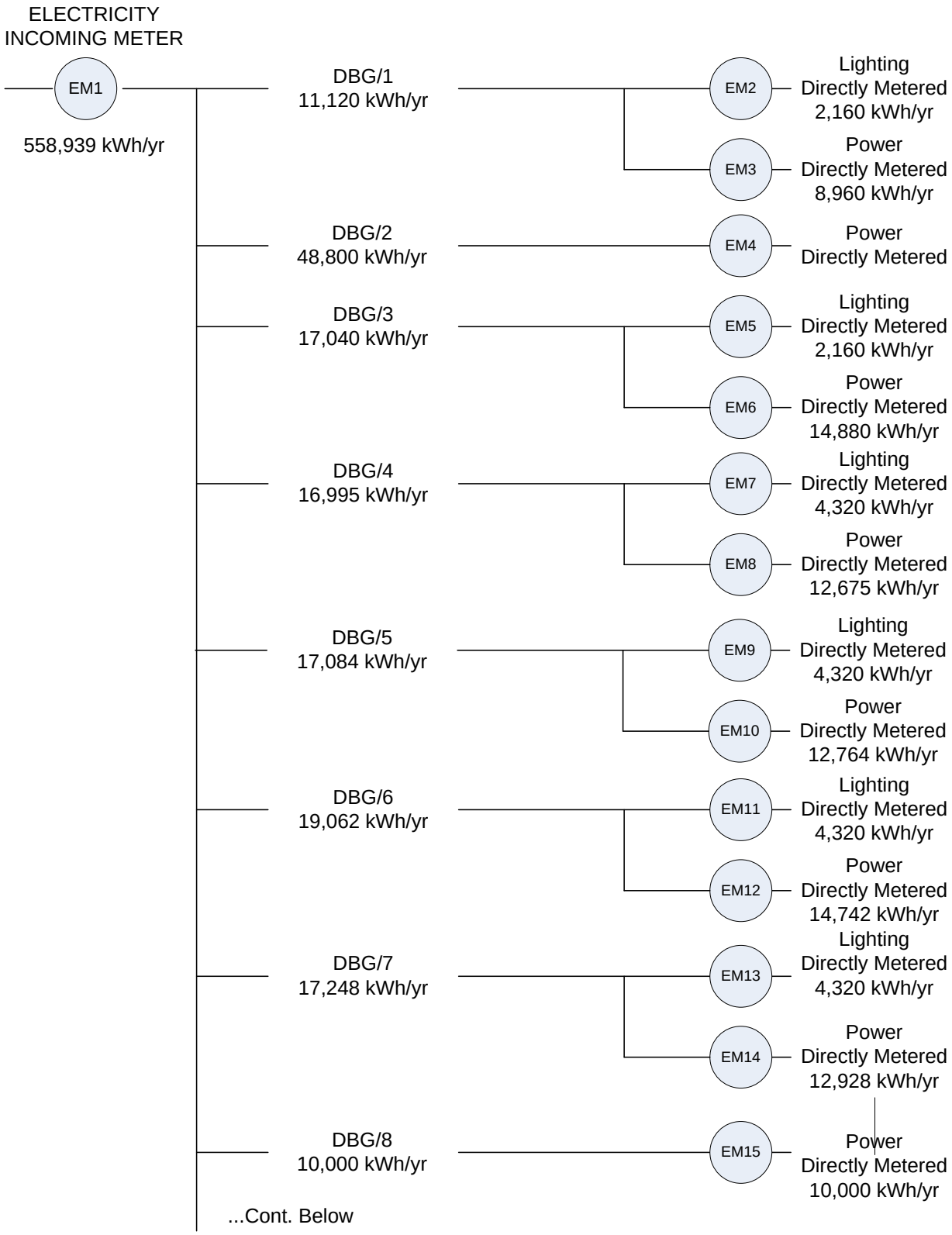
Metering Strategy

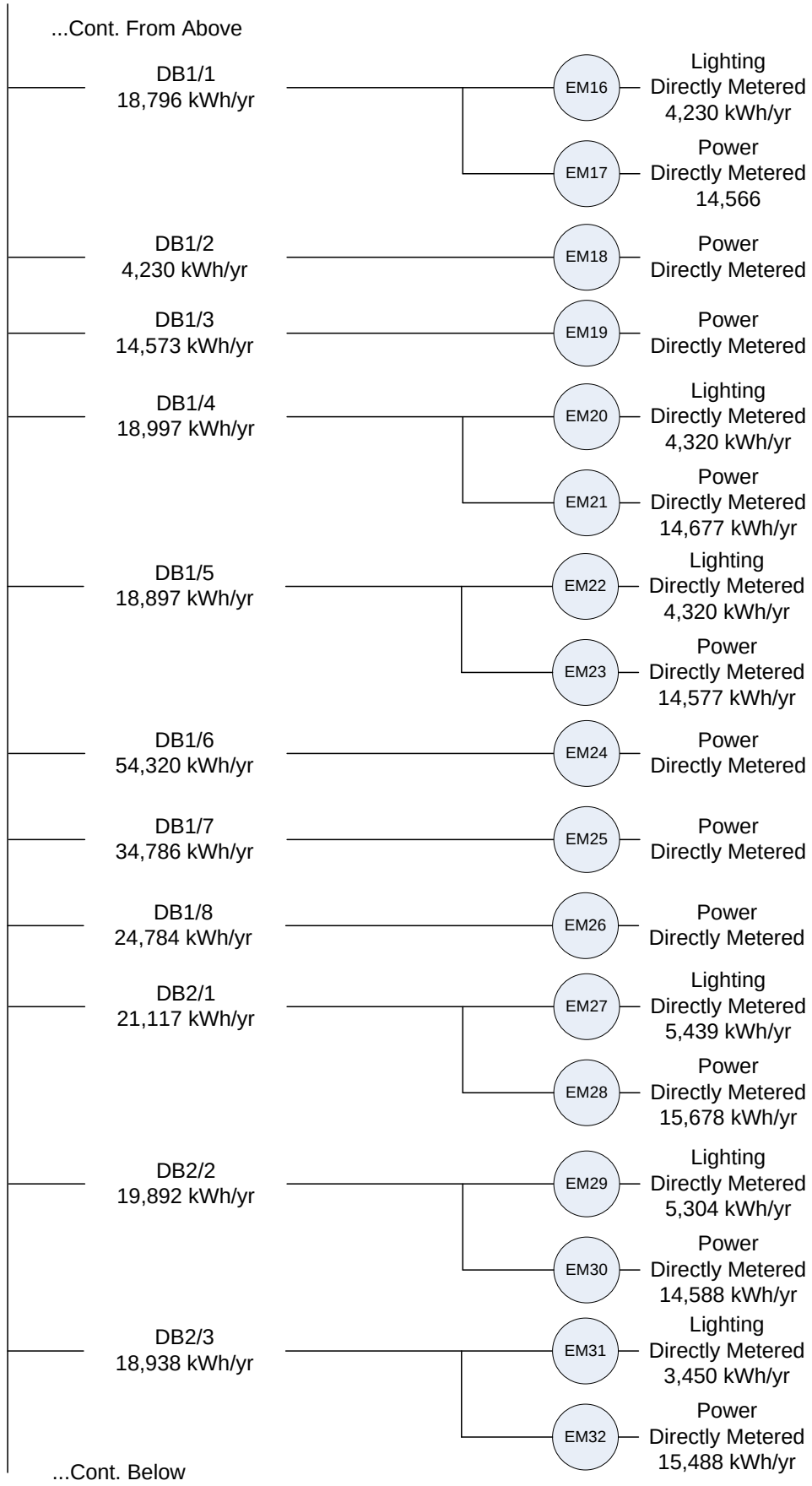
Gas

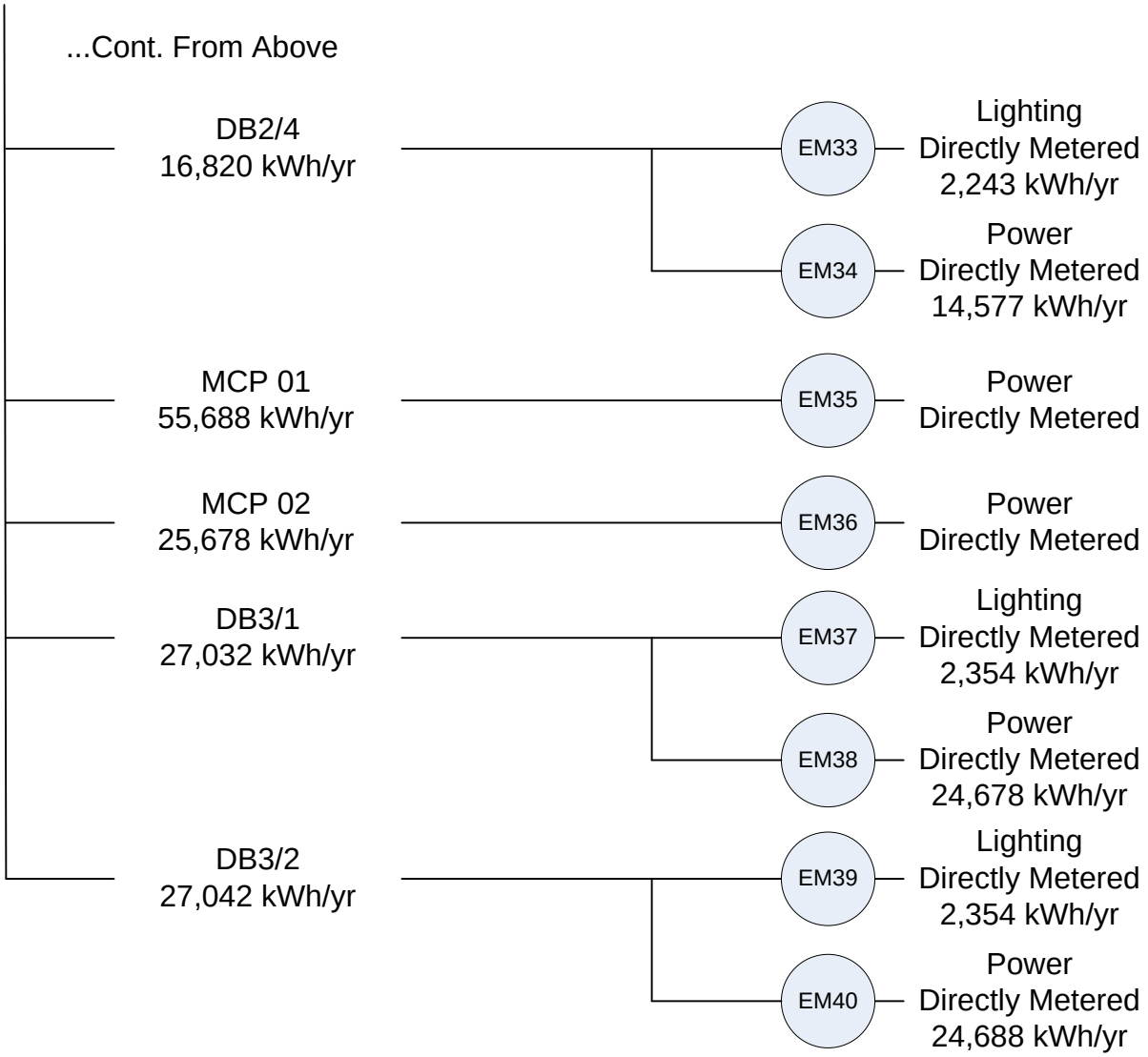


Read the meters monthly and log the readings on the meter reading pro forma in a separate file. From these readings add up the energy consumption for each end use for the year and log these in the building performance section. See GPG 348 for an example.

Metering Strategy
Electricity




...Cont. From Above
DB1/1
18,796 kWh/yr
EM16
Lighting
Directly Metered
4,230 kWh/yr
EM17
Power
Directly Metered
14,566
DB1/2
4,230 kWh/yr
EM18
Power
Directly Metered
DB1/3
14,573 kWh/yr
EM19
Power
Directly Metered
DB1/4
18,997 kWh/yr
EM20
Lighting
Directly Metered
4,320 kWh/yr
EM21
Power
Directly Metered
14,677 kWh/yr
DB1/5
18,897 kWh/yr
EM22
Lighting
Directly Metered
4,320 kWh/yr
EM23
Power
Directly Metered
14,577 kWh/yr
DB1/6
54,320 kWh/yr
EM24
Power
Directly Metered
DB1/7
34,786 kWh/yr
EM25
Power
Directly Metered
DB1/8
24,784 kWh/yr
EM26
Power
Directly Metered
DB2/1
21,117 kWh/yr
EM27
Lighting
Directly Metered
5,439 kWh/yr
EM28
Power
Directly Metered
15,678 kWh/yr
DB2/2
19,892 kWh/yr
EM29
Lighting
Directly Metered
5,304 kWh/yr
EM30
Power
Directly Metered
14,588 kWh/yr
DB2/3
18,938 kWh/yr
EM31
Lighting
Directly Metered
3,450 kWh/yr
EM32
Power
Directly Metered
15,488 kWh/yr
...Cont. Below



Read the meters monthly and log the readings on the meter reading pro forma in a separate file. From these readings add up the energy consumption for each end use for the year and log these in the building performance section. See GPG 348 for an example.

12 Building energy performance records

Overall energy performance

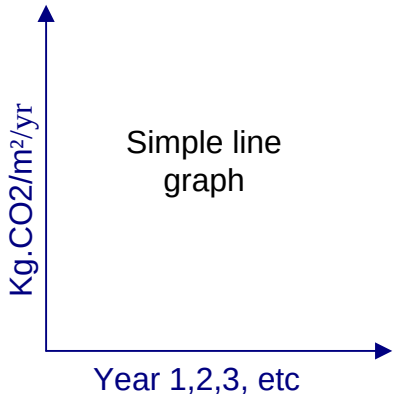
Summary of overall annual electricity, fossil fuel consumption and CO_2 against simple benchmarks. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building log books – a user's guide*. A copy is included on the CD-ROM associated with CIBSE TM31; printed copies are available from (www.energyaction.org.uk).

Building energy performance for period from *date to date* Based on a gross floor area of 14,027 m²							
Fuel	Quantity	A - (kW.h)	B - CO_2 Ratio	C - (kg CO_2)	D - Actual (kg CO_2/m²)	E - Design Estimates (kg CO2/m²)	F - Good Practice Benchmark (kg CO2/m²)
Gas	*Insert*	*Insert*	0.19	*Insert*	*Insert*	27.11	25.84
Electricity	*Insert*	*Insert*	0.43*	*Insert*	*Insert*	17.14	10.32
TOTAL					*Insert*	44.25	36.16

* This value may change year to year due to changes in the mix of electricity generation plant. Current figures are available from the Energy and Environment Helpline (0800 585 794) or www.actionenergy.org.uk
Ensure that actual consumption figures do not include estimated bills and ensure they relate to a full exact 12 month period. (If not then record actual and adjust by number of days missing/extra). Use the total gross floor area shown in section 5. Multiply column (A) by column (B) to get (C) then divide by treated total building floor area to get (D) for comparison with benchmarks in columns (E) and (F). One overall performance indicator can be established by totaling column (D). Avoid adding column (A) as the fuels have different costs and CO_2 factors.

Historical building performance graph

Facilities manager to insert a graph of the above figures over time to track performance against a benchmark and original design estimates. Paste graph over the following example.



CIBSE TM22: *Energy assessment and reporting methodology* provides software to help assess building energy performance using either a simple or a detailed approach. This includes benchmarks for a variety of buildings. A wider range of benchmarks is available in the series of Energy Consumption Guides produced by Action Energy (www.actionenergy.org.uk), e.g. ECG19: *Energy use in offices*, and CIBSE Guide F: *Energy efficiency in buildings*.

Energy end use comparison

Annual summary of actual metered consumption per square metre and the design team's estimates versus benchmarks broken down by main end-uses. Examples of these calculations and tables are shown in Good Practice Guide GPG 348: *Building log books – a user's guide*. A copy is included on the CD-ROM associated with CIBSE TM31; printed copies are available from (www.energyaction.org.uk).

Building energy performance for period from *date* to *date*

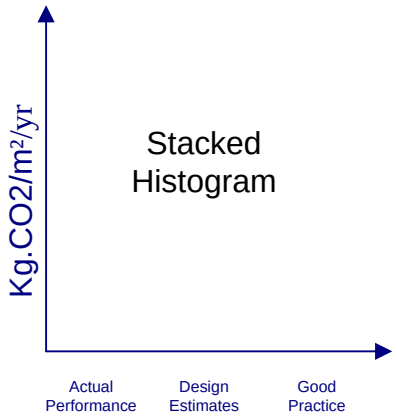
Based on a gross floor area of 14027 m²

Fuel type	**Main end use**	**Actual** Metered incoming consumption ((kW·h)/yr)	**Actual** Sub-metered main end use energy consumption ((kW·h/m2)/yr)	**Design estimates** Main end use energy consumption (kW·h/m2)/yr	**Good practice benchmark** Main end use energy consumption ((kW·h/m2)/yr)
Gas	INCOMING	*Insert*	*Insert*	142.70 kWh/m²	136 kWh/m²
Electricity	INCOMING	*Insert*	*Insert*	39.85 kWh/m²	24 kWh/m²

Keep the fuels separate as they have different costs and CO_2 emissions

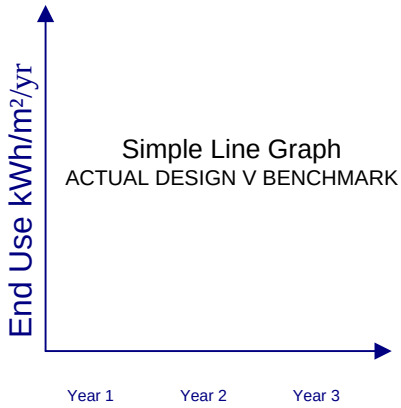
Annual graph of end use breakdown

Facilities manager to insert a graph of the above figures as per Energy Consumption Guide ECG19(1) or CIBSE TM22(2) to compare end use performance with end use benchmarks etc. See Good Practice Guide GPG 348(3) for examples. Paste graph over the following example.



Historical graph of end use performance

Facilities managers to insert a graph of the above end use figures over time to track performance against end use benchmarks etc. See Good Practice Guide GPG 348(3) for examples. Paste graph over the following example.



References

(1) *Energy efficiency in offices* Energy Consumption Guide ECG19 (Action Energy) (2000) (www.actionenergy.org.uk)
(2) *Energy Assessment and Reporting Methodology – Office Assessment Method* CIBSE TM22 (London: Chartered Institution of Building Services Engineers) (2003)
(3) *Building log books — a user's guide* GPG 348 (Action Energy) (2000) (www.actionenergy.org.uk)

12 Summary of maintenance

Emergency maintenance action

Emergency contact name 1 *Address* *Address* *Postcode* *Tel. no. and e-mail*	***Emergency contact name 2*** ***(Maintenance Contractor)*** *Address* *Address* *Postcode* *Tel. no. and e-mail*

Insert a summary of the general arrangement for maintenance including any maintenance contracts and who is responsible for which main systems.

Maintenance review

Review Period …… **Signed** ……	**1. Are you reasonably satisfied with the maintenance on this system? (Yes/No)**	**2. Is this system capable of working in all the required modes? (Yes/No)**	**3. If not, is this due to poor maintenance? (Yes/No)**	**Comments/problems?** e.g. maintenance not carried out (give reason) Indicate any major changes to the general arrangement for maintenance including any changes in maintenance regimes or contracts
Lighting	*Insert*	*Insert*	*Insert*	*Insert*
Fans	*Insert*	*Insert*	*Insert*	*Insert*
Pumps	*Insert*	*Insert*	*Insert*	*Insert*
Cooling	*Insert*	*Insert*	*Insert*	*Insert*
Space heating	*Insert*	*Insert*	*Insert*	*Insert*
DHW	*Insert*	*Insert*	*Insert*	*Insert*
	Insert	*Insert*	*Insert*	*Insert*
etc.	*Insert*	*Insert*	*Insert*	*Insert*

Maintenance/plant failures

Facilities manager to insert a summary of any major plant failures and how these relate to the maintenance regimes or contracts. This should describe what happened, when, why and what action was taken to overcome the problem.

13 Major alterations

Any major alterations made to the building, its services, its operation or management should be logged below, e.g. boiler replacement, BMS upgrade, changes in use, new management regime etc. Each change should be signed and dated by the facilities manager alongside the other page numbers of the log-book that have been updated/added to reflect the alteration.

Description of alteration	Other log book pages updated or added	Signed	Date

14 Results of in-use investigations

Defects liability work

Facilities manager to insert a summary of any major remedial work in the period between practical completion (handover) and the end of the defects liability period

'Sea trials'

Facilities manager to insert a summary of any initial 'sea trials' which involve members of the design team monitoring and fine-tuning the building after practical completion (handover).

Post occupancy evaluations

Facilities manager to insert a summary of any post occupancy evaluations, e.g. investigations of energy performance and/or occupant satisfaction.

Surveys

Facilities manager to insert a summary of results from any maintenance, condition or energy surveys.