

# Education Children and Families Committee

10.00am, Tuesday, 12 December 2017

## Energy in Schools Annual Report

<b>Item number</b>	7.18
<b>Report number</b>	
<b>Executive/routine</b>	
<b>Wards</b>	
<b>Council Commitments</b>	18

### Executive Summary

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This report presents an overview of 2016/17 energy use across the Council's School estate and update on the significant investment in energy/carbon reduction initiatives across the School estate. The report follows on from the [Energy in Schools Report](#) in December 2016.

Due to the low wholesale cost of energy, there has been a reduction in overall energy spend in comparison to 2015/16. However, electricity costs continue to increase due to market changes. In line with previous trends, gas consumption has continued to decrease.

There are several active projects underway to improve the energy efficiency of the school estate and reduce associated energy spend. In addition, Property and Facilities Management plan to implement ISO50001; an Energy Management System focussed on delivering best practice across energy management.

## Energy in Schools Annual Report

### 1. Recommendations

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- 1.1 That Committee:-
- 1.1.1 Notes the content of this report and the positive outlook for the future energy efficiency strategy, and the significant progress made on key energy efficiency projects to date;
  - 1.1.2 Notes that the additional detail requested by Committee in December 2016 on energy consumption per unit floor area has been included within Appendix 2; and
  - 1.1.3 Notes that an annual progress report will be submitted to Committee in 2018 on Energy in Schools.

### 2. Background

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- 2.1 Council expenditure on energy across operational buildings in 2016/17 was just under £8.6m.
- 2.2 Due to the continued low wholesale cost of energy throughout 2016/17, gas prices have continued to remain low leading to a lower overall energy spend compared to 2015/16. Electricity costs have increased compared to 2015/16, predominantly due to increases in associated pass-through costs. These costs, which are set by market regulators and the UK government, will continue to form a significant part of electricity costs as regulators look to use charging structures to influence and incentivise change in electricity grid utilisation patterns.
- 2.3 Pass-through charges now form nearly 50% of the overall cost of electricity. This provides an opportunity for the Council to be increasingly efficient about how and when it uses its electricity to reduce costs or mitigate against cost increases.
- 2.4 There are several legislative drivers for carbon reduction across the Council's school estate. These include the Carbon Reduction Commitment Energy Efficiency Scheme (CRC) and the Energy Performance in Buildings Directive (EPBD). Energy Performance Certificates (EPCs) were initially produced for the school estate in 2008/09. These are valid for 10 years and therefore many are approaching expiry.

A programme for renewal will be instigated from 2018 to ensure the up to date position of each building and continued compliance.

- 2.5 The Council has a published [Energy Policy](#) which defines its approach to energy management.

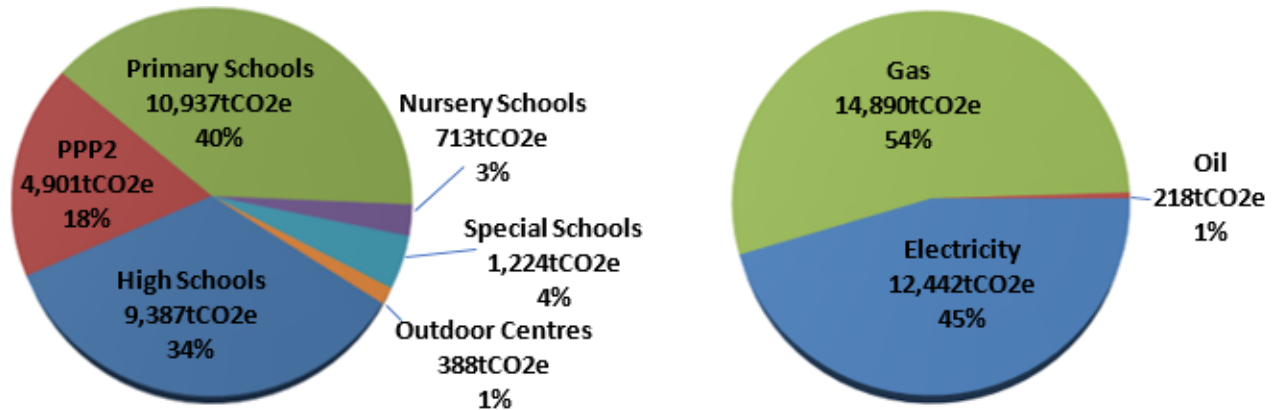
### 3. Main report

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#### Consumption Monitoring

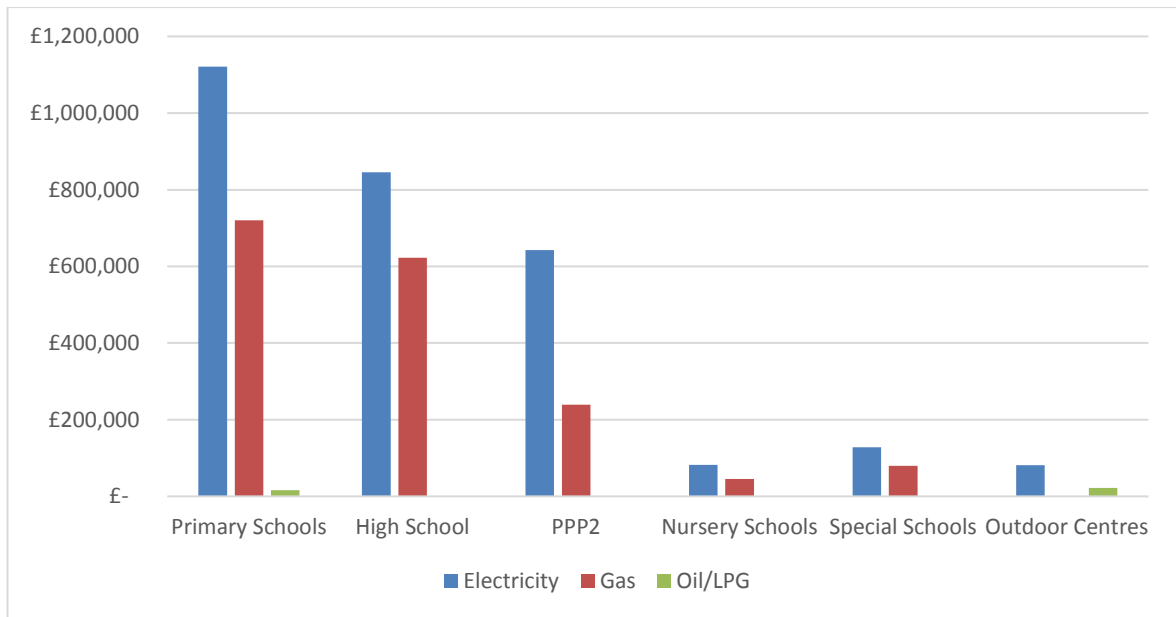
- 3.1 This section of the report gives an overview of energy consumption, and associated carbon emissions across the school estate in 2016/17. The data includes details on the Council’s PPP2 estate, where the Council pays directly for energy consumed, but excludes details from Edinburgh Partnership schools (PPP1), as energy costs are factored into the unitary charge.
- 3.2 Further detail on energy consumption across the school estate and benchmarking by floor area within specific schools can be found in Appendix 1 and Appendix 2.

*Graph 1: 2016/17 Carbon Emissions by Property Type and Fuel Type*



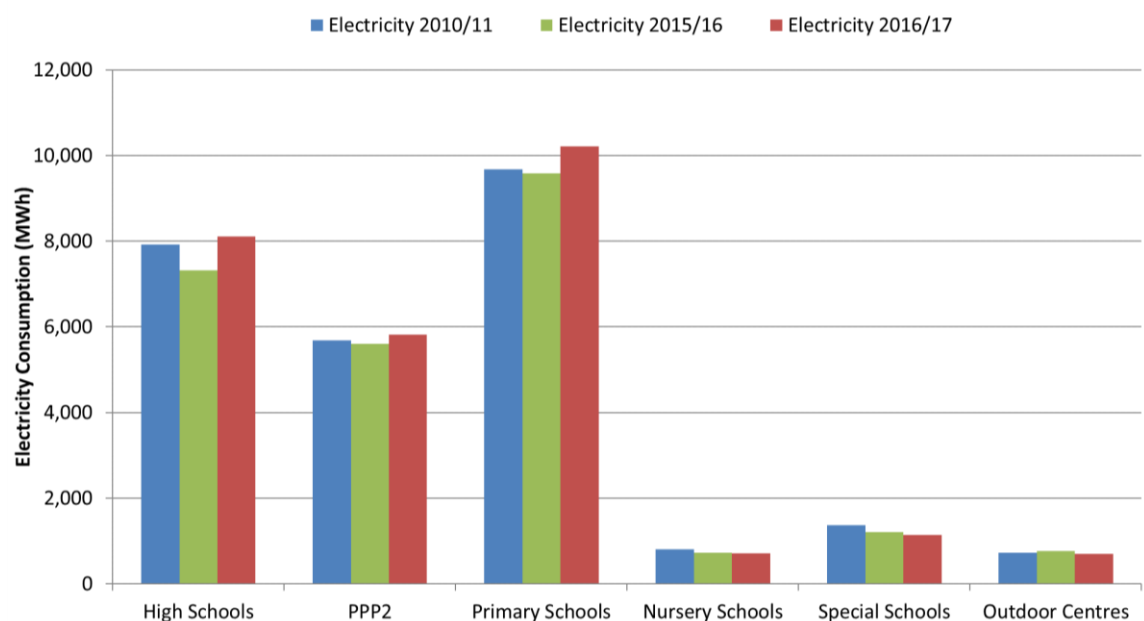
- 3.3 The charts above provide a breakdown of energy related carbon emissions across the Council’s school estate. In total, the school estate accounts for 27,550 tonnes of CO2 equivalent (CO2e). This is a reduction of 168 tonnes on 2015/16. Whilst the carbon emission factor for electricity has reduced by 10%, electricity consumption across the school estate has increased limiting the reduction in total carbon emissions.
- 3.4 Schools accounted for £4.7m of energy spend in 2016/17. An additional £0.43m was spent on the purchase of carbon allowances under the Carbon Reduction Commitment Energy Efficiency Scheme.

**Graph 2: Annual Energy Spend (in 2016/17) by Property Group**



3.5 The graph above highlights energy spend by property type. The Council spends significantly more on electricity (£2.9m) than gas (£1.7m). This contrasts with 2015/16, where spend was relatively even. This change can be attributed to two factors: the increasing cost of electricity; and, the decrease in gas costs. To date, increases in electricity costs have been absorbed by decreases in the cost of gas but with electricity prices expected to continue to rise and gas also increasing, this will ultimately place pressure on current budgets going forward.

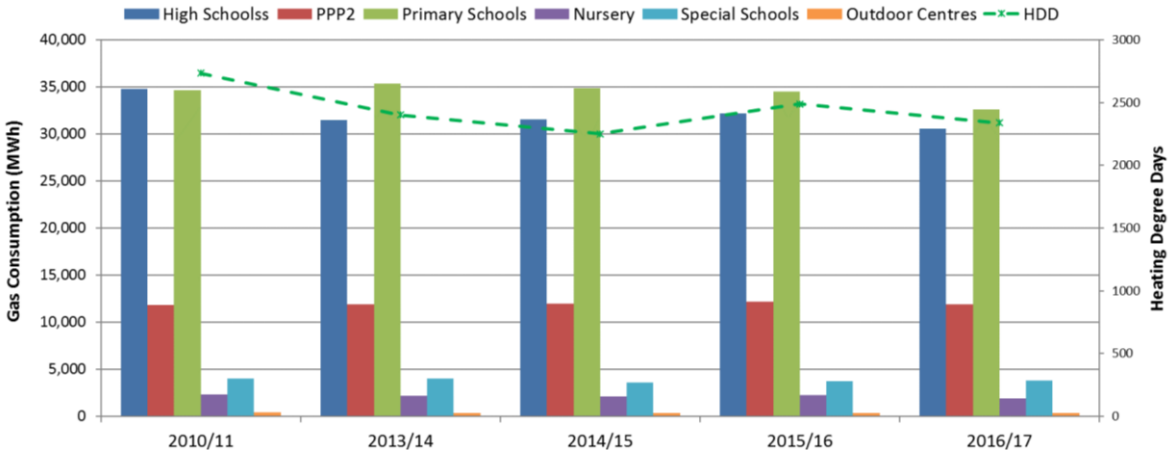
**Graph 3: 2016/17 Electricity Consumption against 2015/16 & 2010/11 Baseline**



3.6 The graph above compares 2016/17 electricity consumption against both the 2010/11 baseline and 2015/16. There has been a distinct increase in electricity consumption across the three main users: High Schools, Primary Schools and PPP2 Schools. There are a range of factors that have contributed towards this increase. Whilst new buildings are more thermally efficient, they generally contain more electrically powered plant and equipment and therefore have a greater demand for electricity. Between 2015/16 and 2016/17, there was 40,235 sq m of new floorspace added to the school estate primarily through rising school rolls extension and bigger replacement high schools. This places additional demand on electricity and the pattern will continue in 2017/18, with the opening of the new Boroughmuir High school and a further 3,000 sq m of floorspace either on site on planned.

3.7 Many new builds within the existing primary school estate are heated via air source heat pumps. Whilst considered ‘high efficiency’, air source heat pumps run on electricity therefore contributing the increase in energy use. As the electricity grid decarbonises, there will be increases in electricity as a low carbon source of heating. With natural gas more than five times cheaper than electricity there is a risk of conflict between cost and carbon reduction. It is important that the Council acts in a strategic manner to make the right long-term choices.

*Graph 4: 2010/11 to 2016/17 Gas Consumption correlated against Heating Degree Days*



3.8 Gas use across the school estate is predominantly used for space heating. In a well-controlled system, the requirement for space heating in a building is proportional to the severity of the weather. To allow for 2016/17 gas consumption to be reviewed in context, it has been presented alongside gas consumption from the previous three years and the 2010/11 baseline. Data has been correlated against heating degree days (HDD), which is a metric for quantifying the severity of weather conditions in relation to space heating requirements.

- 3.9 Over the last few years there has been a sustained reduction in gas consumption, which is now significantly lower than the 2010/11 baseline. There is major investment underway to improve the control of heating and plant across the school estate. This includes a clear strategy for control systems and a targeted upgrade programme. In addition, reductions have been realised through the replacement of old inefficient plant and from the disposal of older school buildings and replacement with newer more thermally efficient buildings.
- 3.10 There is now limited oil use across the school estate, with the last two big users within the Council school estate, Fox Covert Primary School and Sciennes Primary School, now converted to natural gas. This has reduced both carbon and running costs.

### **RE:FIT**

- 3.11 As reported in 2016, the Council has been running a £2.654m energy retrofit programme in 10 key Council buildings under the [London RE:FIT Framework](#). The RE:FIT scheme has been designed to help public sector organisations achieve substantial financial savings, improve the energy performance of their buildings and reduce their carbon footprint.
- 3.12 The project will deliver financial savings in excess of £300k and reduce CO2 emission by over 1,100 tonnes a year at current CO2 conversion rates. The savings from the project are guaranteed by the Contractor, [Matrix EOn](#).
- 3.13 Works commenced on site earlier this year, with handover of works across the school estate expected before the end of 2017. All the buildings included in the project are:
- Balerno High School
  - City Chambers
  - Currie Community High School
  - Leith Academy
  - St Thomas of Aquins R.C. High School
  - Sciennes Primary School
  - Trinity Academy
  - Trinity Primary School
  - Usher Hall
  - Wester Hailes Education Centre

Table 1: Main Energy Retrofit Measures by Property

	BEMS Upgrade	Boiler Replacement	Combined Heat and Power	Internal Lighting (LED) Upgrade	External Lighting (LED) Upgrade
Balerno High School	x	x	x	X	x
City Chambers				X	
Currie Community High School	x		x		x
Leith Academy	x		x		x
St Thomas of Aquins	x				x
Sciennes Primary School	x	x		X	x
Trinity Academy	x				
Trinity Primary School	x	x			
Usher Hall				X	
Wester Hailes Education Centre	x		x		x

3.14 A key focus of the RE:FIT programme was to improve energy efficiency across some of the major energy users in the school estate. The table above provides detail on energy conservation measures installed on each site.

3.15 £1.6m of funding for the project has been provided from the Council's SALIX recycling fund. The boiler upgrades at Sciennes Primary School and Balerno High School works have been funded via a mix of SALIX and capital funding (£0.469m) from Strategic Asset Management. This highlights the ability of projects such as RE:FIT to jointly fund works that improve both energy efficiency and asset condition. The remainder of the funding (£0.579m) has been secured from the Council's Spend to Save Fund.

3.16 The guarantee of energy savings makes the RE:FIT project distinct from standard works projects. As the completion of RE:FIT works on site approaches the focus will shift to the validation and delivery of savings. Savings will be assessed annually and will be carried out in line with a mutually agreed measurement and verification process. The delivery of the savings will remain a focus throughout the duration of the payback period.

### ***Building Energy Management Systems (BEMS)***

3.17 A Building Energy Management System (BEMS) is a computer-based system that controls the main mechanical and electrical services within a building. The Council has an extensive portfolio of BEMS, including all High Schools and Primary Schools. The successful implementation and operation of a BEMS allows improved building performance and can lead to substantial energy savings.

- 3.18 Property and Facilities Management are midway through a £3.2m BEMS upgrade programme across its operational estate. This will address longstanding issues with condition and functionality. To ensure consistent quality and resilience across the estate, upgrades are being carried out in accordance with a clear strategy and specification. This ensures the platform from which to deliver the fundamental benefits of an upgraded BEMS, including improved control of environmental conditions, energy efficiency savings and improved/targeted maintenance of key plant.
- 3.19 A critical objective of the upgrade programme is to create a reliable communication network between individual BEMS installations within buildings and the central BEMS control software. At present, 3G communication links have been installed on upgraded sites to allow visibility on the Council's central front end. Work is underway with CGI to roll out CEC network communications and provide a supported virtual server to host systems. The pilot phase was originally programmed for completion this summer but increased security concerns following recent cyberattacks have led to delay with delivery now expected in the next couple of months. Once delivered, this will reduce associated costs of communications and increase resilience and flexibility.
- 3.20 To date, 21 Primary Schools and one High School now have upgraded BEMS installed with touchscreens located on site for local staff and remote access available through the Council's front end. There are further upgrades currently underway across the school estate under the programme and upgrades to an additional five High Schools and two Primary School will be completed this year under the RE:FIT programme. Appendix 3 provides some sample graphics from the BEMS system and outline detail on functionality.

#### ***ISO50001 – Energy Management System Accreditation***

- 3.21 In recent years, the Council has made significant progress towards reducing the energy and carbon footprint of its operational estate through targeted investment, improved energy efficiency and better control of plant. Whilst this is an integral step in creating an efficient and modern school estate, it is essential that there are appropriate processes and procedures in place to review and manage performance.
- 3.22 ISO50001 defines a route for organisations to deliver energy efficiency and carbon reductions by focussing on achieving best practice in energy management. It follows the same management system of continual improvement as other standards such as ISO90001 and ISO140001. Property and Facilities Management intend to develop an ISO50001 Energy Management System for major energy consumers across the operational estate including schools. This will build on success achieved to date, and create a sound platform from which to deliver continued energy improvements. Implementing the standard will help ensure that there is a systematic approach to the



review of energy performance across the operational estate, with defined responsibilities and documented and managed processes.

- 3.23 Whilst projects such as the RE:FIT project and the BEMS Upgrade Programme have the potential to deliver significant savings, the delivery of savings relies on continued review. ISO50001 will help mitigate against risks posed as the organisation evolves or staff change. If properly managed, implementing ISO50001 will formalise the appropriate practices to ensure that performance, including the delivery of savings, is appropriately monitored and reported and provide a mechanism to identify and progress energy reduction opportunities. The requirement for both internal and external audit of ISO50001 creates a safety check for senior management to ensure that best practices are still in place and being adhered to.
- 3.24 Implementing ISO50001 will require a step change in current practices. The Council's Energy and Sustainability Team are currently carrying out work to set up the necessary systems and implement the required practices and processes. The intention is to have these in place for March 2018. To achieve the standard, 6 months of evidence of operating to the standard is required with a further 3 months for assessment. Therefore, the current plan is to apply for accreditation towards the end of 2018.

#### ***Edinburgh Community Solar Co-operative***

- 3.25 Last year's annual report provided detail on 18 community-owned solar PV installations installed across the school estate in 2016. Under the scheme, the Council pays Edinburgh Community Solar Co-operative for electricity generated by the panels and used on site. From installation in 2016 up to the end of September 2017, 998MWh of electricity had been generated by the panels with approximately two thirds of consumption used on site. Please refer to Appendix 4 for detail on PV generation by site.

#### ***Outlook***

- 3.26 Ensuring the delivery of the energy savings from key projects, such the Building Energy Management System Upgrade Programme and RE:FIT project, will be a key focus of Property and Facilities Management over the coming year. This will require access to accurate energy data and good communications with sites to ensure that any issues or changes are appropriately actioned or recorded.
- 3.27 The upgrade of Building Energy Management Systems will deliver far better functionality and it is important that the opportunity to fully utilise the platform to deliver improved energy management and targeted maintenance is progressed. This will require coordination to update current practice and provide training and guidance for appropriate staff.
- 3.28 As a large energy user, schools will remain a key focus for both Building Energy Management System upgrades and other energy related works. Whilst almost all of

the dedicated funding for energy efficiency projects has been committed to the RE:FIT programme, Property and Facilities Management will continue to seek other sources of funding, such as through [Scotland's Energy Efficiency Programme](#) or [SALIX](#), to continue to deliver energy efficiency works across the estate. It is anticipated that over £100k of SEEP grant money will be invested in the school estate during 2016/17.

- 3.29 Whilst the Council should be wary of being an early adopter of emerging technology due to the increased risk, it is important that the Council continues to maintain an innovative approach to energy and carbon reduction and remain aware and adaptive to market and technological changes.

#### **4. Measures of success**

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- 4.1 The Council continues to meet legislative requirements as set out in the [Energy Performance of the Buildings Directive](#) and reporting requirements as set out in the mandatory [Carbon Reduction Commitment Energy Efficiency Scheme](#).
- 4.2 The Council continues to maintain an accurate record of energy consumption across the school estate.
- 4.3 The Council demonstrates a reduction in energy consumption and related carbon emissions across the school estate.
- 4.4 The Council achieves ISO50001 accreditation, an Energy Management System targeting continual improvement in energy management/reduction.
- 4.5 The Council takes advantage of the opportunities presented by operating a modern Building Energy Management Systems across the school estate.

#### **5. Financial impact**

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- 5.1 The cost of energy across the school estate is significant accounting for around half of the Council's total building related energy spend. The effective management of energy across the school estate is critical to the prudent management of Council energy budgets.
- 5.2 With changes to electricity pricing structures and overall high cost of electricity, it is important that the Council remains aware and responsive to the changing market to manage exposure to increasing costs.
- 5.3 Improving technology and the decarbonisation of the electricity grid will lead to electrically powered sources of heating being lower carbon than gas equivalents. Given the high cost of electricity compared to gas, this will lead to dichotomy between low carbon and low cost for heating buildings.

- 5.4 The projects and activities detailed within this report have the potential to make a significant contribution to the reduction of energy consumption and corresponding spend across the Council's school estate
- 5.5 Since 2013/14, there have been a range of projects and interventions carried out across the school estate to reduce consumption. Taken in isolation, these projects can be presented to demonstrate tangible savings. However, in aggregate across the school estate, savings are less visible. This can be attributed to factors such as increased use of buildings, increased floor area, plant/control failures or increased use of electrical equipment. The result is that overall expenditure remains largely static once changes to utility tariffs have been accounted for.

## **6. Risk, policy, compliance and governance impact**

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- 6.1 The introduction of ISO50001 would provide resilience around energy management activities and support compliance with obligations under the [Climate Change Act \(Scotland\)](#).
- 6.2 Legislation has been used to drive forward change to reflect EU targets on emission reduction. Increasingly legislators are looking towards public bodies adopting a planned response for energy efficiency and carbon reduction. It is important that the Council is receptive and reactive to the likelihood of increased legislation, and develops plans and strategies to improve the efficiency of its built environment.
- 6.3 Whilst the Council benefits from a competitive energy contract it remains subject to energy price trends and changes to energy charging structures.

## **7. Equalities impact**

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- 7.1 Appropriate energy management of school buildings will have a direct enhancement of rights. For example, appropriate management of indoor temperature will aid education and learning through improved thermal comfort.
- 7.2 Energy management within schools will focus on delivering environments that meet best practice guidelines as set out in the Council's Energy Policy. Thermal comfort is not a defined state. Some people will feel comfortable at certain temperatures whilst others may not.

## **8. Sustainability impact**

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- 8.1 There is significant potential for sustainability benefits through appropriate energy management within the schools estate, including reduced consumption and associated carbon reduction.

- 8.2 The introduction of an Energy Management System provides a platform from which to build and improve on sustainability objectives delivered to date.

## 9. Consultation and engagement

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- 9.1 Consultation is regularly undertaken with the Sustainable Development Unit and other Council colleagues to collaborate on shared objectives and work on joint funding opportunities.
- 9.2 The Energy and Sustainability Team within Property and Facilities Management works with a wide range of stakeholders, suppliers and organisations to ensure that the Council's practices are focussed toward delivering best practice.
- 9.3 The Energy and Sustainability Team is working on the redevelopment of its web presence and associated communication strategy to ensure that staff have access to appropriate materials and guidance to support energy reduction.

## 10. Background reading/external references

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[Energy Performance in Buildings Directive \(Scotland\) Amendment Regulations 2012](#) – This directive covers the requirements for Energy Performance Certificates in Scotland.

[Carbon Reduction Commitment Energy Efficiency Scheme \(CRC\)](#) – This website provides guidance on the CRC scheme.

City of Edinburgh Council's [Energy Policy](#)

### Stephen S. Moir

Executive Director of Resources

Contact: Paul Jones, Energy and Sustainability Manager

E-mail: [paul.jones@edinburgh.gov.uk](mailto:paul.jones@edinburgh.gov.uk) | Tel: 0131 469 3607

## 11. Appendices

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Appendix 1. Energy Consumption and Baseline Data

Appendix 2. Energy Benchmark Data

Appendix 3. Building Energy Management System Front End Graphics

Appendix 4. Edinburgh Community Solar Co-operative Sites

## Appendix 1 – Energy Consumption and Baseline Data

Property Type	2016/17						Heating Degree Days	
	Electricity		Gas		Oil			
	MWh	% Change (Baseline)	MWh	% Change (Baseline)	MWh	% Change (Baseline)		
High School	8,110	2%	30,524	-12%	0	0%	2010/11	2735
PPP2	5,815	2%	11,924	1%	0	0%	2016/17	2339
Primary Schools	10,210	5%	32,605	-6%	401	-83%	% Change	-14%
Nursery Schools	714	-12%	1,920	-18%	103	14%		
Special Schools	1,143	-16%	3,761	-7%	0	-100%		
Outdoor Centres	695	-4%	348	-14%	0	0%		
<b>TOTAL</b>	<b>26,688</b>	<b>2%</b>	<b>81,082</b>	<b>-8%</b>	<b>504</b>	<b>-87%</b>		

## Appendix 2 – Energy Benchmark Data 2016/17

This appendix includes detail on property benchmarks. Whilst these are a good metric for evaluating energy performance it is important to note that benchmarking is a continual process used to identify both poor energy performance and inaccurate utilities or property data.

Within any given year, there will be schools that have experienced maintenance issues which have led to an artificial increase in consumption, which may belie an otherwise well operated school.

Some properties have unique set ups, such as Tynecastle High School which receive heat from the nearby distillery, or Trinity Primary School which receives heat from Trinity Academy.

Overall, benchmarks are useful tool to assess performance and identify where best to focus attention. They are a precursor to more detailed evaluation of consumption profiles.

High Schools	Electricity (kWh/m <sup>2</sup> )	Gas (kWh/m <sup>2</sup> )
BALERNO HIGH SCHOOL	64	284
BOROUGHMUIR HIGH SCHOOL	53	228
CASTLEBRAE HIGH SCHOOL	36	166
CURRIE HIGH SCHOOL	45	249
JAMES GILLESPIE'S HIGH SCHOOL	65	301
LEITH ACADEMY	69	247
LIBERTON HIGH SCHOOL	29	135
PORTOBELLO HIGH SCHOOL (OLD)	44	210
PORTOBELLO HIGH SCHOOL (NEW)	58	125
SOUTH QUEENSFERRY HIGH SCHOOL	47	182
ST THOMAS OF AQUINS(NEW)	45	158
TRINITY ACADEMY	34	171
WESTER HAILES EDUCATION CENTRE	89	286

PPP2	Electricity (kWh/m <sup>2</sup> )	Gas (kWh/m <sup>2</sup> )
BONALY PRIMARY SCHOOL (NEW)	48	150
JUNIPER GREEN PRIMARY SCHOOL - NEW	58	122
BROUGHTON HIGH SCHOOL (NEW)	54	111
CRAIGROYSTON HIGH SCHOOL (NEW)	68	154
FORRESTER/ST AUGUSTINE'S HIGH SCHOOL - NEW	61	159
HOLYROOD HIGH SCHOOL (NEW)	61	112

TYNECASTLE HIGH SCHOOL (NEW)	61	41
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Primary Schools	Electricity (kWh/m <sup>2</sup> )	Gas (kWh/m <sup>2</sup> )
ABBEYHILL PRIMARY SCHOOL	46	181
BALGREEN PRIMARY SCHOOL	45	206
BLACKHALL PRIMARY SCHOOL	93	53
BROUGHTON PRIMARY SCHOOL	41	206
BRUNTSFIELD PRIMARY SCHOOL	32	217
BRUNSTANE PRIMARY SCHOOL	52	113
BUCKSTONE PRIMARY SCHOOL	43	159
CANAL VIEW PRIMARY SCHOOL	48	151
CARRICKNOWE PRIMARY SCHOOL	56	155
CLERMISTON PRIMARY SCHOOL	43	198
CLOVENSTONE PRIMARY SCHOOL	46	139
COLINTON PRIMARY SCHOOL	31	120
CORSTORPHINE PRIMARY SCHOOL	45	145
CRAIGENTINNY PRIMARY SCHOOL	37	139
CRAIGLOCKHART PRIMARY SCHOOL	40	157
CRAMOND PRIMARY SCHOOL	49	280
CURRIE PRIMARY SCHOOL	45	166
DALMENY PRIMARY SCHOOL	50	107
DALRY PRIMARY SCHOOL	43	152
DAVIDSONS MAINS PRIMARY SCHOOL	44	149
DEAN PARK PRIMARY SCHOOL	54	200
DUDDINGSTON PRIMARY SCHOOL	51	193
EAST CRAIGS PRIMARY SCHOOL	52	159
ECHLINE PRIMARY SCHOOL	73	155
FERRYHILL PRIMARY SCHOOL	54	160
FLORA STEVENSON PRIMARY SCHOOL	47	124
FORT PRIMARY SCHOOL	45	207
FOX COVERT ND & RC PRIMARY SCHOOLS	75	70
GILMERTON PRIMARY SCHOOL	44	150
GRACEMOUNT PRIMARY SCHOOL	42	202
GRANTON PRIMARY SCHOOL	49	159
GYLEMUIR PRIMARY SCHOOL	39	200
HERMITAGE PARK PRIMARY SCHOOL	51	136
HILLWOOD PRIMARY SCHOOL	30	271
HOLY CROSS PRIMARY SCHOOL	26	101
JAMES GILLESPIE'S PRIMARY SCHOOL	79	165
KIRKLISTON PRIMARY SCHOOL	85	140

LORNE PRIMARY SCHOOL	30	133
LEITH PRIMARY SCHOOL	32	137
LEITH WALK PRIMARY SCHOOL	28	175
LONGSTONE PRIMARY SCHOOL	40	260
LIBERTON PRIMARY SCHOOL	25	208
MURRAYBURN PRIMARY SCHOOL	23	196
NETHER CURRIE PRIMARY SCHOOL	90	0
NEWCRAIGHALL PRIMARY SCHOOL	36	183
NIDDRIE/ST FRANCIS COMBINED PRIMARY SCHOOL	56	121
PARSONS GREEN PRIMARY SCHOOL	170	10
PENTLAND PRIMARY SCHOOL (NEW)	53	120
PRESTONFIELD PRIMARY SCHOOL	70	47
PRESTON STREET PRIMARY SCHOOL	34	107
SOUTH QUEENSFERRY PRIMARY SCHOOL	33	133
RATHO PRIMARY SCHOOL	53	184
ROSEBURN PRIMARY SCHOOL	42	208
ROYAL HIGH PRIMARY SCHOOL	28	161
ROYAL MILE PRIMARY SCHOOL	24	188
SCIENNES PRIMARY SCHOOL	54	137
SIGHTHILL PRIMARY SCHOOL	26	185
SOUTH MORNINGSIDE PRIMARY SCHOOL	47	157
STENHOUSE PRIMARY SCHOOL	17	147
STOCKBRIDGE PRIMARY SCHOOL	180	0
ST CATHERINE'S PRIMARY SCHOOL	41	139
ST CUTHBERTS PRIMARY SCHOOL	54	162
ST JOHNS RC PRIMARY SCHOOL	33	119
ST JOHN VIANNEY PRIMARY SCHOOL	38	205
ST MARGARET'S PRIMARY SCHOOL	24	188
ST MARK'S RC PRIMARY SCHOOL	45	155
ST MARYS PRIMARY SCHOOL (LEITH)	28	148
ST MARY'S PRIMARY SCHOOL-ELONDON	47	184
ST NINIANS PRIMARY SCHOOL	36	176
TOLLCROSS PRIMARY SCHOOL	28	180
TOWERBANK PRIMARY SCHOOL	41	121
TRINITY PRIMARY SCHOOL	45	9
VICTORIA PRIMARY SCHOOL	32	168
WARDIE PRIMARY SCHOOL	87	165

Special Schools	Electricity (kWh/m <sup>2</sup> )	Gas (kWh/m <sup>2</sup> )
GORGIE MILLS SCHOOL	63	139



KAIMES SPECIAL SCHOOL	55	154
OAKLANDS SPECIAL SCHOOL (NEW)	85	237
PILRIG PARK SPECIAL SCHOOL	51	172
PROSPECT BANK SPECIAL SCHOOL	37	217
REDHALL MLD PRIMARY SCHOOL	60	253
WELLINGTON RESIDENTIAL SCHOOL	1	0
ST CRISPINS SPECIAL SCHOOL	91	333
WOODLANDS SCHOOL MLD	53	132

Nursery	Electricity (kWh/m <sup>2</sup> )	Gas (kWh/m <sup>2</sup> )
BALGREEN NURSERY SCHOOL	30	122
CALDERGLEN NURSERY SCHOOL	59	240
CAMERON HOUSE NURSERY	33	249
CARRICKNOWE NURSERY SCHOOL	90	0
CHILDREN'S HOUSE NURSERY SCHOOL	39	293
COWGATE UNDER 5 CENTRE	37	265
CRAIGMILLAR CHILDRENS CENTRE	108	137
GRANTON CHILD & FAMILY CENTRE	55	273
GREENDYKES CHILD AND FAMILY CENTRE	68	149
GREENGABLES FAMILY CENTRE (NURSERY SCHOOL)	40	135
HAILESLAND C&F CENTRE	41	242
HOPE COTTAGE NURSERY SCHOOL	14	322
JAMES GILLESPIES NURSERY	23	142
KIRKLISTON NURSERY SCHOOL	296	0
LIBERTON NURSERY SCHOOL	40	237
LOCHRIN NURSERY SCHOOL	30	385
SPINNEY LANE NURSERY SCHOOL	83	0
ST LEONARDS NURSERY SCHOOL	25	258
STANWELL NURSERY (DR BELL'S)	30	154
STENHOUSE CHILD & FAMILY CENTRE	30	328
TYNECASTLE NURSERY SCHOOL	32	309
VIEWFORTH CHILD & FAMILY CENTRE	109	72

Outdoor Centres	Electricity (kWh/m <sup>2</sup> )	Oil (kWh/m <sup>2</sup> )
BENMORE OUTDOOR CENTRE	161	0
LAGGANLIA OUTDOOR CENTRE	124	178

## Appendix 3 – Building Energy Management System Graphics

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Over the last year, the Council has invested time and resource to develop a Building Energy Management System Front End. This is the interface that the Council uses to monitor operation and performance of key plant across its estate. Up until recently the Council was operating without the ability to monitor sites remotely and relied on their BEMS Contractor to monitor sites via dial up connections, where available, or through site attendance. The purpose of this appendix is to provide some high-level background on the functionality of a BEMS Front End and highlight some of the potential opportunities for improved energy management and targeted maintenance. A description of graphics is provided below with the corresponding screen shots of graphics provided on subsequent pages.

### **Graphic 1 - Boilers**

This graphic provides detail on the operation of the boilers. This page will tell you how many boilers are operating, what the flow temperatures are for the heating system and highlight any faults. The page also provides details on key set points.

### **Graphic 2 – Floor Plans**

This graphic provides detail on the temperature across different areas of the building. It allows you to identify areas that may be under or overheating and can help pinpoint localised failure of equipment such as valves or actuators.

### **Graphic 3 – Kitchen Extract**

This graphic highlights the operation of a kitchen extract system. Having quick access to this level of detail allows quick fault finding and can avoid or limit downtime to kitchen activities.

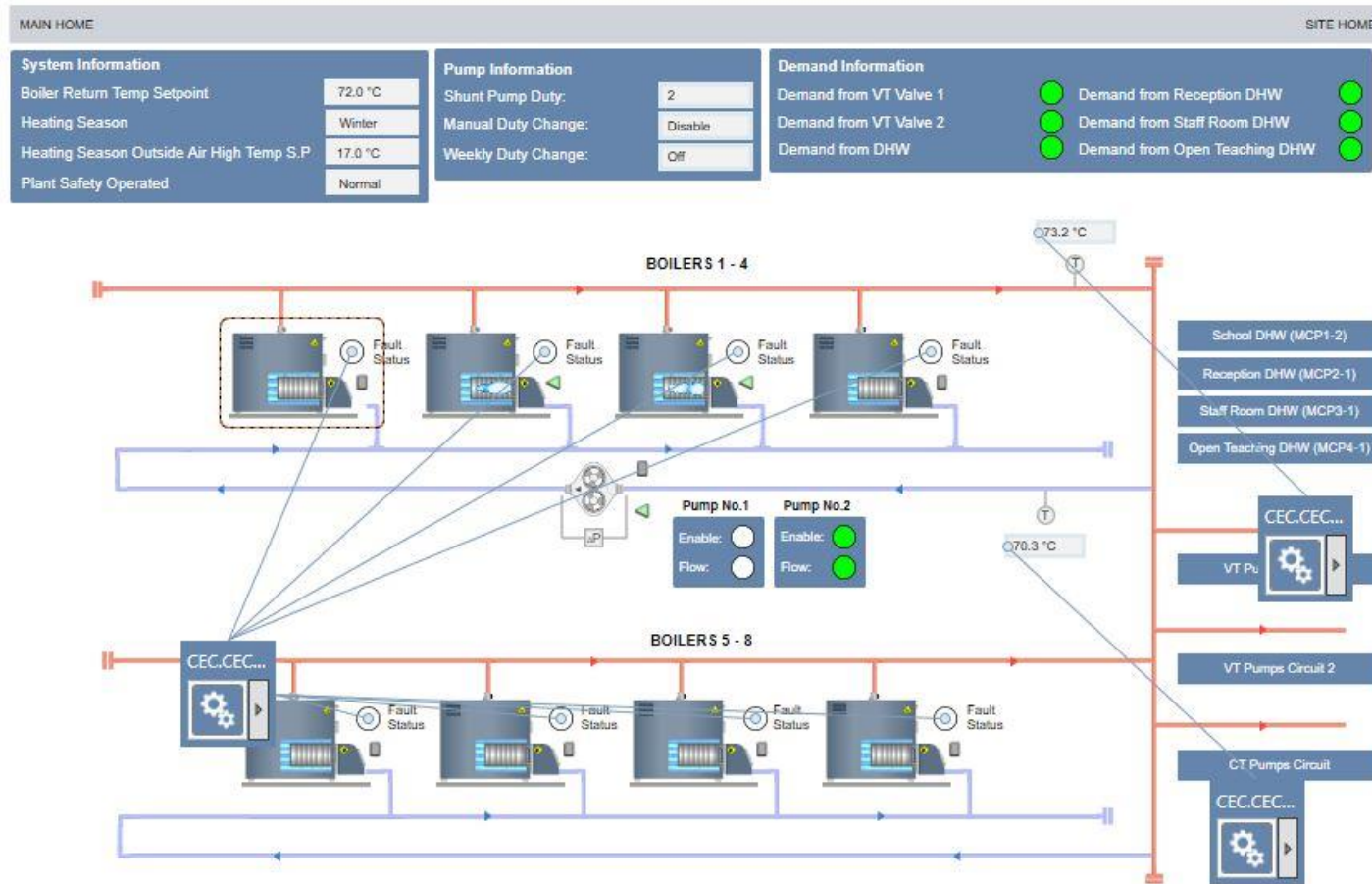
### **Graphic 4 - Alarms**

Once complete, the Council will monitor around 180 Building Energy Management Systems through its front end interface. The front end allows alarms on plant or performance failures to be priorities and rationalised to focus attention on critical areas.

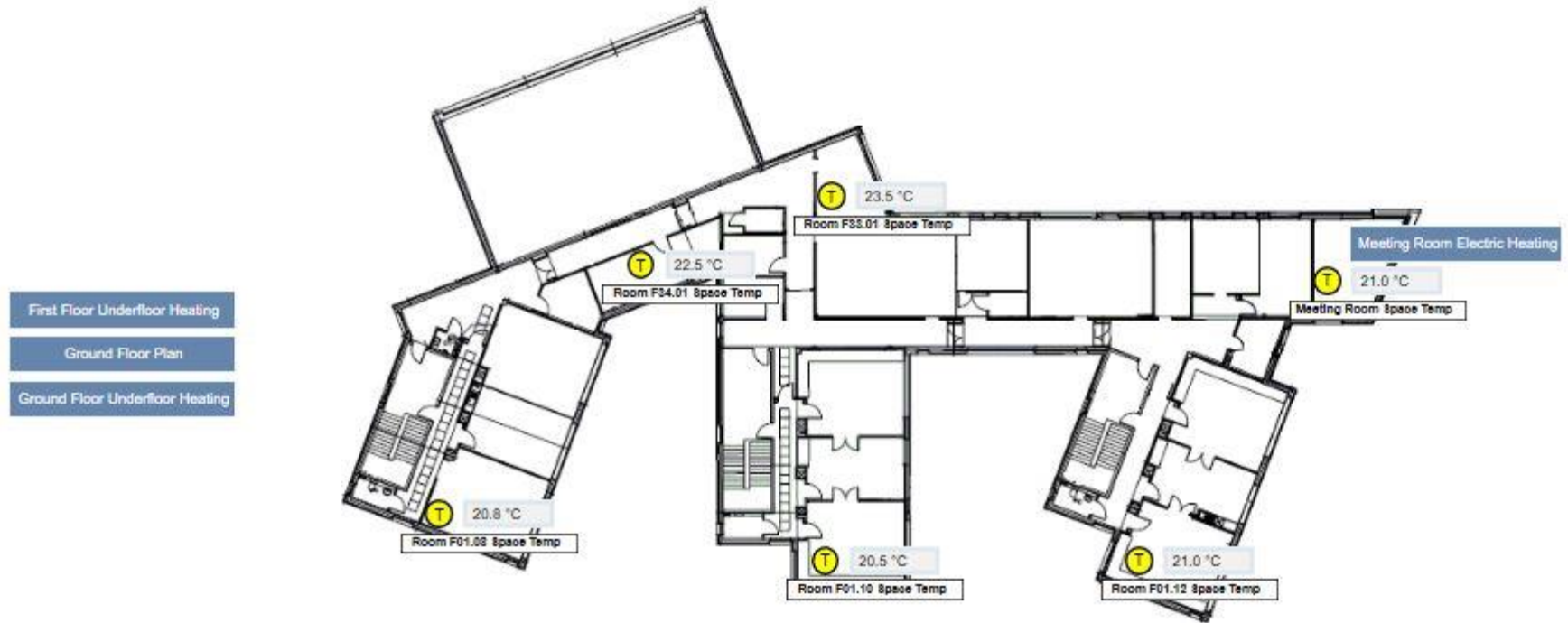
### **Graphic 5 – Reporting**

The ability to retrieve detail on settings and performance of a control system is critical for effective energy management. Reporting functions help identify where improvements could be made to increase efficiency, or identify where maintenance issues or anomalies in the controls software are leading to increased energy consumption

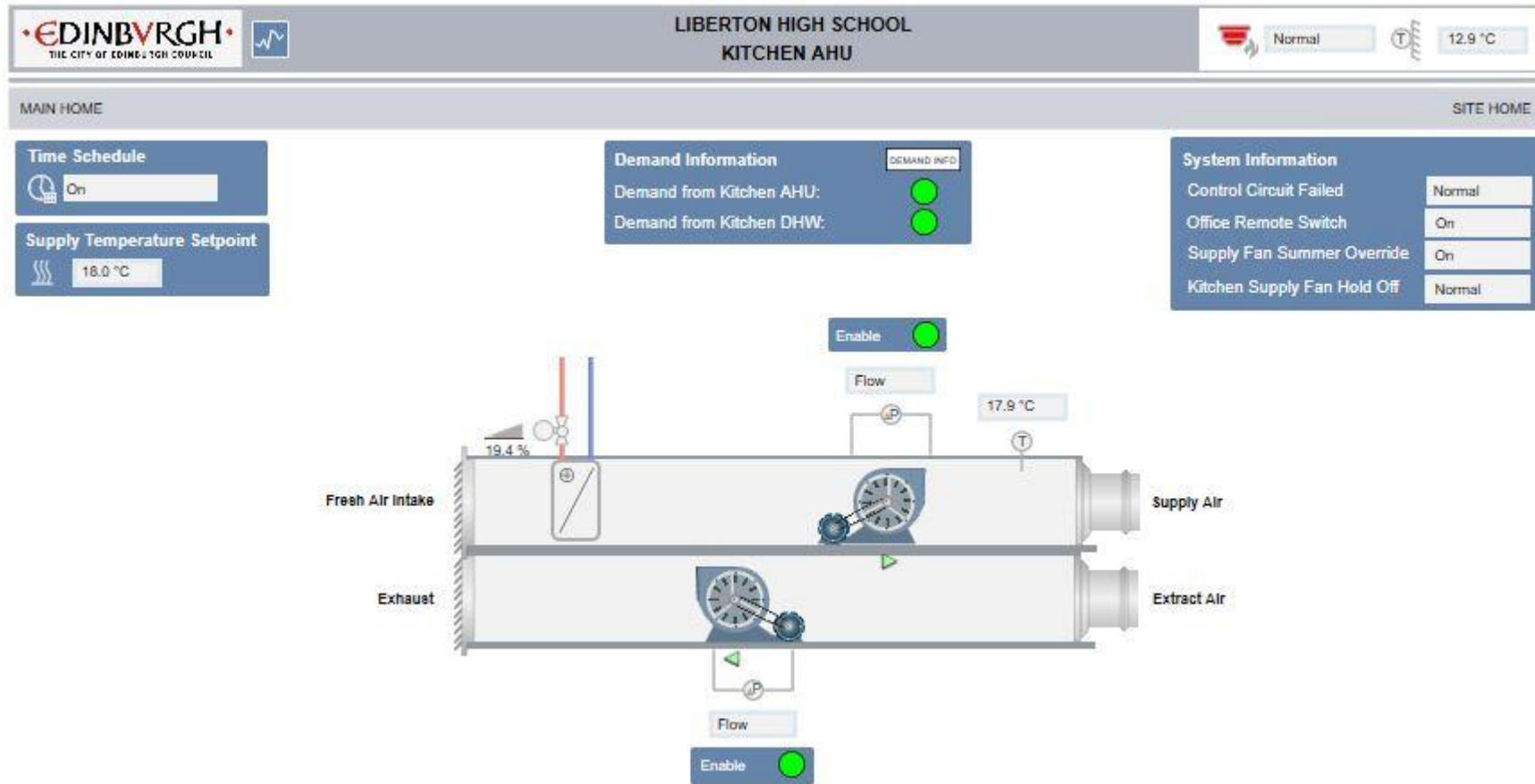
# Graphic 1 – Boilers



Graphic 2 – Floor Plans



Graphic 3 – Kitchen Extract





## Graphic 4 – Alarms

SIEMENS Steve Granger 01/11/2017 09:10 | Menu

52/54 High    77/80 Medium    184/190 Low    191/383 Status

Event List - Filter By: Categories = <High>



	Cause	Location	Source	Counter	Commands	Information	Event Status	Source Status	Date/Time
	Off Normal (Normal)	Logical. BACnetNetwork(EdiBusStation). MCP2. DHWCtrl. PmpMon3	PmpFlt [DHW Charge Pump Flow Failure]		✓		Unprocessed	Quiet	01/11 09:08
	Low Limit (54 °C)	CECUserView. FieldDevices. BacnetNetwork (LibertonHigh). HVCnP. Mod2In	DHWcylTp [DHW Cylinder Temp]		✓		Unprocessed	Active	01/11 08:32
	Off Normal (Alarm)	CECUserView. FieldDevices. BACnetNetwork (WaverleyCourt). Chillers. Inputs	LT01FLT [LT Chiller Fault]		✓		Unprocessed	Active	01/11 08:18
	Off Normal (Alarm)	Logical. BACnetNetwork(EdiBusStation). MCP2. TltEF. FanMon1	FanFlt [Toilet Extract Fan Flow Failure]		✓		Unprocessed	Active	01/11 08:01
	Off Normal (Alarm)	Logical. BACnetNetwork(EdiBusStation). MCP2. LiftEF. FanMon1	FanFlt [Lift Room Fan Flow Failure]		✓		Unprocessed	Active	01/11 08:01
	Off Normal (Normal)	CECUserView. FieldDevices. BACnetNetwork (GrindlayCourt). Plt1. 13. 03	16 [Boiler Flow Temp Deviation Alarm]		✓		Unprocessed	Quiet	01/11 07:30
	Low Limit (56.3 °C)	CECUserView. FieldDevices. BACnetNetwork (GylemuirPS). MCP2C1. Inputs	DhwTp [DHW Calorifier Temp]		✓		Unprocessed	Quiet	01/11 07:30
	Low Limit (60.8 °C)	CECUserView. FieldDevices. BACnetNetwork (GylemuirPS). MCP4C1. Inputs	DhwTp [DHW Calorifier Temp]		✓		Unprocessed	Quiet	01/11 07:30
	Off Normal (Normal)	CECUserView. FieldDevices. BACnetNetwork (GorgieMillsSchool). Plt1. 22. 02	16 [UFH Zone 2 Temp Deviation Alarm]		✓		Unprocessed	Quiet	01/11 00:41
	Low Limit (49.8 °C)	CECUserView. FieldDevices. BACnetNetwork (GylemuirPS). MCP1C2. Inputs	DhwTp [DHW Calorifier Temp]		✓		Unprocessed	Quiet	31/10 20:39
	Off Normal (Normal)	CECUserView. FieldDevices. BACnetNetwork (GorgieMillsSchool). Plt1. 22. 01	16 [UFH Zone 1 Temp Deviation Alarm]		✓		Unprocessed	Quiet	31/10 18:07
	Low Limit (50.8 °C)	CECUserView. FieldDevices. BACnetNetwork (GylemuirPS). MCP3C1. Inputs	DhwTp [DHW Calorifier Temp]		✓		Unprocessed	Quiet	31/10 17:50
	Low Limit (67.8)	CECUserView. FieldDevices. BacnetNetwork (LibertonHigh). HVCnP. BlrDmd	BlrRtnTmp [Boiler Return Temp Low]		✓		Unprocessed	Quiet	31/10 10:58
	High Limit (69.9 °C)	CECUserView. FieldDevices. BacnetNetwork (LibertonHigh). SECnP. Mod1In	DhwFloTe [DHW Flow Temperature]		✓		Unprocessed	Quiet	31/10 10:08
	Off Normal (Off)	CECUserView. FieldDevices. BACnetNetwork (Queensferry). Local_IO	Gym/Dining_Htg_VT_Valve_Alarm [Gym/Dining Htg VT Valv...		✓		Unprocessed	Quiet	31/10 09:02
	Low Limit (70.2)	CECUserView. FieldDevices. BacnetNetwork (LibertonHigh). BRcnP. BlrDmd	BlrRtnTmp [Boiler Return Temp Low]		✓		Unprocessed	Quiet	31/10 07:37
	Off Normal (Off)	CECUserView. FieldDevices. BACnetNetwork (Queensferry). Local_IO	School_Htg_VT_Valve_Alarm [School Htg VT Valve Alarm] (S...		✓		Unprocessed	Quiet	31/10 07:02
	Low Limit (59.5 °C)	CECUserView. FieldDevices. BACnetNetwork (GylemuirPS). MCP1C1. Inputs	BlrFloTp [Boiler Common Flow Temperature]		✓		Unprocessed	Quiet	30/10 05:32
	Low Limit (57.8 °C)	CECUserView. FieldDevices. BacnetNetwork (LibertonHigh). KitCnP. Inputs	DhwCylTe [DHW Cylinder Temp]		✓		Unprocessed	Quiet	30/10 05:14

Graphic 5 – Reporting


**Broughton Primary School  
Report Menu**

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*\*\*\* TO EXECUTE & EXPORT REPORT, SINGLE-LEFT CLICK ON REPORT BUTTON BELOW, THEN USE EXTENDED OPERATION TAB TO EXECUTE \*\*\**

CLICK HERE TO OPEN REPORTS EXPORT FOLDER  

SITE LEVEL REPORTS

Building Time Schedule Report 

CONTROLLER LEVEL REPORTS

	<u>Alarm</u> <u>History</u>	<u>Setpoint</u> <u>Summary</u>	<u>I/O</u> <u>Summary</u>	<u>Active</u> <u>Overrides</u>	<u>User</u> <u>Actions</u>
AS01 - Main Boiler Room					

## Appendix 4 – Edinburgh Community Co-operative Sites

The table below presents detail on the electricity generated from the Edinburgh Community Solar Co-operative from installation up until the end of September 2017.

Site	Size kWp	Commissioning Date	Days Operational 30/09/2017	Total Generation (kWh) 30/09/2017	Export (kWh)	Used on Site (kWh)	Unit Cost (p/kWh)	Paid to ECSC
AINSLIE PARK LEISURE CENTRE	99.84	09/09/2016	386	<b>85,790</b>	0	<b>85,790</b>	8.86	£7,599.28
BLACKHALL PRIMARY SCHOOL	14.82	27/07/2016	430	<b>13,872</b>	6,936	<b>6,936</b>	10.68	£741.04
BUCKSTONE PRIMARY SCHOOL	99.84	29/08/2016	397	<b>85,160</b>	29,806	<b>55,354</b>	10.65	£5,896.29
CAMERON HOUSE COMMUNITY CENTRE	19.76	30/08/2016	396	<b>20,073</b>	10,036	<b>10,036</b>	9.58	£961.48
CANAL VIEW PRIMARY SCHOOL	99.84	23/07/2016	434	<b>96,001</b>	32,291	<b>63,710</b>	9.38	£5,977.87
CARRICKNOWE PRIMARY SCHOOL	49.92	08/07/2016	449	<b>46,244</b>	12,450	<b>33,794</b>	10.67	£3,605.80
CARRICKVALE COMMUNITY CENTRE	29.9	13/07/2016	444	<b>33,774</b>	16,887	<b>16,887</b>	10.65	£1,798.78
CLERMISTON PRIMARY SCHOOL	20.8	18/08/2016	408	<b>21,440</b>	10,720	<b>10,720</b>	10.65	£1,141.90
CRAIGHALL DAY	29.8	29/07/2016	428	<b>28,134</b>	14,067	<b>14,067</b>	10.36	£1,457.90
CURRIE HIGH SCHOOL	133.38	22/09/2016	373	<b>98,406</b>	9,841	<b>88,566</b>	9.14	£8,094.91
CURRIE PRIMARY SCHOOL	44.98	19/08/2016	407	<b>41,662</b>	26,782	<b>14,879</b>	10.66	£1,586.56
DAVIDSONS MAINS PRIMARY SCHOOL	34.84	30/06/2016	457	<b>40,323</b>	<b>37,904</b>	<b>2,419</b>	10.67	£258.20
DEAN PARK PRIMARY SCHOOL	83.2	31/08/2016	395	<b>75,771</b>	31,445	<b>44,326</b>	10.65	£4,721.63
DRUMBRAE LEISURE CENTRE	49.92	16/06/2016	471	<b>42,067</b>	15,024	<b>27,043</b>	8.59	£2,323.01
EAST CRAIGS PRIMARY SCHOOL	49.92	25/07/2016	432	<b>52,473</b>	13,868	<b>38,605</b>	10.68	£4,124.57
GYLEMUIR PRIMARY SCHOOL	29.9	04/08/2016	422	<b>31,628</b>	15,814	<b>15,814</b>	9.60	£1,518.16
LIBERTON PRIMARY SCHOOL	44.98	30/08/2016	396	<b>42,200</b>	12,750	<b>29,450</b>	10.66	£3,140.21



<b>OAKLANDS SPECIAL SCHOOL (NEW)</b>	124.8	24/06/2016	463	<b>146,670</b>	57,620	<b>89,050</b>	9.22	£8,210.38
<b>PROSPECT BANK SCHOOL</b>	34.84	14/07/2016	443	<b>37,458</b>	7,492	<b>29,966</b>	10.68	£3,201.58
<b>RATHO PRIMARY SCHOOL</b>	69.94	15/09/2016	380	<b>57,296</b>	28,648	<b>28,648</b>	10.66	£3,053.90
<b>REDHALL MLD PRIMARY SCHOOL</b>	49.92	05/08/2016	421	<b>45,640</b>	8,150	<b>37,490</b>	9.18	£3,439.71
<b>TUMBLES AT PORTOBELLO</b>	124.8	22/09/2016	373	<b>108,614</b>	0	<b>108,614</b>	10.27	£11,157.88
<b>WARDIE PRIMARY SCHOOL</b>	29.9	19/08/2016	407	<b>26,951</b>	13,475	<b>13,475</b>	10.65	£1,435.40
<b>WOODLANDS SCHOOL MLD</b>	19.76	29/07/2016	428	<b>18,811</b>	9,406	<b>9,406</b>	9.63	£905.95

Oaklands School has one of the largest PV installations across Council buildings. The graphs below outlines use of grid electricity before and after the installation of PV for the month of May.

