

Education, Children & Families Committee

10.00 am, Tuesday, 8 October 2013

Schools Energy Report

Item number	7.13
Report number	
Wards	City wide

Links

Coalition pledges	P50
Council outcomes	CO18, CO25
Single Outcome Agreement	SO3, SO4

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Executive summary

Schools Energy Report

Summary

A report was submitted by Services for Communities to the Education, Children and Families Committee of 5 March 2013 detailing energy consumption for 2010-2011/12, outlining proposals for management and efficiency plans to reduce consumption and carbon emissions within the school estate.

The Committee decided to:

- 1) Note the Report.
- 2) Request a further report be submitted on progress made and future plans on energy management within schools through the Integrated Property and Facilities Management (iPFM) Programme.
- 3) Request that the further report give a clear profile of current energy consumption and use and that clear targets are set as well as preparing an action plan showing how targets will be met.

This report updates Committee on school energy consumption for 2012/13, advises that a school condition survey and energy audit programme has been carried out which has identified significant efficiency opportunities, particularly for Building Energy Management System (BEMS) upgrade, gives detail of school staff and Facilities Management engagement and support work being carried out. This report also includes an action plan and proposed reporting mechanism.

Recommendations

1. Committee is asked to note the content of this report, the significant data gathering, audit and analysis work to date and the proposed action plan to identify and deliver agreed targets; and
2. It is recommended that an annual report is submitted to committee on progress made against the agreed action plan.
3. It is recommended that an interim report is submitted to Committee in 6 months on the progress and outcomes of the Awareness and Good Housekeeping Campaign pilot.

Measures of success

The Council continues to meet legislative requirements as set out in the Energy Performance of Buildings Directive.

The Council continues to meet the reporting requirements as set out in the mandatory Carbon Reduction Commitment Energy Efficiency Scheme (CRC).

The Council maintains the improved energy data quality realised through the processes adopted to manage the CRC reporting requirements.

The Council demonstrates a reduction in energy consumption across the school estate.

Financial impact

Although condition focused, energy improvement works are included as within the £32.7m in Asset Management works over the period 2012-16.

Energy saving targets for the Council will be detailed in the Sustainability and Carbon Reduction work stream Business Case in iPFM.

Equalities impact

There are no negative equalities impacts arising as a result of this report.

Sustainability impact

There will be significant benefits arising directly from this report through investment in increased building efficiency.

Consultation and engagement

Consultation is regularly undertaken with our Sustainable Development Unit to collaborate on shared objectives.

Consultation with Eco-schools representatives is ongoing to develop ways to support the raising of energy awareness in the school curriculum.

Engagement has taken place with Business Managers through the introduction of a new Energy and Water Homepage on the Council's internal website and through the recently introduced Energy and Water Portal.

Consultation and engagement has taken place with Children and Families management representatives, Eco Schools representatives, school staff and Facilities Management representatives as part of an awareness and good housekeeping campaign programme.

Background reading / external references

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)-

www.decc.gov.uk/en/content/cms/emissions/crc_efficiency/crc_efficiency.aspx

This website provides guidance on the CRC scheme.

[Council Energy Policy](#)

Schools Energy Report

1. Background

- 1.1 Education, Children and Families Committee considered a detailed report on schools energy on 5 March 2013. This report provided details of energy consumption from 2010-2011/12 and also advised on current projects and proposals for management and efficiency plans to reduce consumption and carbon emissions within the school estate.

The Committee decided to:

- 1) Note the Report.
- 2) Request a further report be submitted on progress made and future plans on energy management within schools through the Integrated Property and Facilities Management (iPFM) Programme.
- 3) Request that the further report give a clear profile of current energy consumption and use and that clear targets are set as well as preparing an action plan showing how targets will be met.

2. Main report

- 2.1 Council wide monitoring of the energy efficiency of buildings, and energy usage and carbon emissions is undertaken by Services for Communities and the Sustainable Development Unit. The information presented in table 1 below details consumption for 2012/13 with the percentage changes shown against base consumption year of 2010/11. This list includes both Council and PPP2 properties but does not include the PPP1 properties. This is because the Council pays for the energy in PPP2 properties but not in PPP1 properties which are governed by separate contract arrangements.

Table 1 Electricity, gas and oil usage 2012/13

Property Type	2012/13					
	Electricity (MWh)	% Change Electricity	Gas (MWh)	% Change Gas	Oil (MWh)	% Change Oil
High Schools	13,024	-1.70%	49,681	8.89%		
Primary Schools	10,369	5.21%	39,897	14.53%	2,380	1.00%
Nursery Schools	892	4.81%	2,720	0.10%		
Special Schools	1279	-6.50%	4,964	27.25%	1,299	-4.77%
Total	25,564	0.95%	97,261	11.69%	3,679	-1.29%
Degree Days*	2908					6.35%

*Degree days are a measure of the difference between a baseline temperature and actual outdoor temperature multiplied by the number of days. In the UK the standard baseline temperature is 15.5°C.

- 2.2 Following the introduction of smart metering and the reporting requirements set out under the mandatory Carbon Reduction Commitment (CRC) there has been a significant improvement in data quality. The Council has invested resource in its energy data validation and reporting, resulting in a greater level of assurance over data quality. To reflect this, the baseline for the school energy report has been set at 2010/11 providing a full audit trail on which to monitor future consumption in school properties. An extended abstract showing consumption comparison for years 2010/11, 2011/12 and 2012/13 is included at Appendix 1 attached.
- 2.3 There was a significant increase in gas consumption during 2012/13 across all areas of the school estate. The vast majority of schools are heated by gas and weather has a major bearing on the amount of gas consumed within a property. The influence of weather on consumption will depend on how the heating is controlled and managed in individual buildings therefore it is not possible to derive a direct correlation across a wide range of sites.
- 2.4 Heating degree days are a measure of the severity and duration of cold weather and a good metric for assessing the influence of weather on consumption. The colder the weather is in a given month, the larger the degree-day values for that month will be in and consequently the requirement for space heating in

buildings. The number of degree days recorded in 2012/13 was 26% higher than in 2011/12 and 6% higher than in the base year of 2010/11. Therefore the need for heat during 2012/13 was significantly higher than on the previous 2 years. This variation is reflected in the gas figures presented (11.69% variation).

- 2.5 Electricity consumption is not influenced by weather conditions to the same extent as gas. If the weather is colder than average there will be a moderate increase in consumption due to increased running of mechanical plant and any electrical heating load. The proportion of electricity used by heating plant is generally around 20% unless electricity is the prime source of heat. There are three primary schools that are entirely heated by electricity as well as a number of Temporary Units (TUs), extensions and outbuildings which account for the increase in electricity consumption across the primary school estate.
- 2.6 Overall, electricity consumption appears to have stabilised but is much more difficult to draw specific conclusions from the gas data presented due to the large variation in weather. Oil consumption is subject to the same weather dependency as gas consumption.
- 2.7 The remainder of this report sets out the action that has been taken to identify efficiency opportunities and reduce energy usage across the Council's schools since the last report and details the further works planned.

Council Energy Policy

- 2.8 The Council's Transport and Environment Committee of 27 August 2013 approved a revised Council Energy Policy.
- 2.9 The document set out a clear policy supported by ten procedures for Council good practice for the key elements of effective energy management as it relates to the City of Edinburgh Council.
- 2.10 The implementation of the policy will have significant effect on the energy efficiency outcomes of projects and proposals. The requirement to consider and positively include energy efficiency, register energy consequences of projects and mandated reporting will be imbedded within all aspects of building design and management.
- 2.11 The policy also gives clear guidance on temperature ranges, employee responsibilities, measuring and monitoring and reporting structures.
- 2.12 Committee confirmed that the senior officer with lead responsibility for energy management Council wide is the Head of Corporate Property.
- 2.13 All proposals within this report sit within and comply with the structure and requirements of the Council Energy Policy.

Integrated Property Facilities Management (iPFM)

- 2.14 Sustainability and carbon reduction is a key workstream under the Integrated Property and Facilities Management (iPFM) programme. The integration of services under the iPFM programme offers a tangible opportunity for Corporate Property to work with Children and Families to improve the energy efficiency of

the Council's school estate. Central to the iPFM programme, the delivery of a comprehensive computer aided facilities management (CAFM) system will allow greater data visibility and process management. As data on energy consumption, scheduling and controls, projects and maintenance will be available through a single database, this will enable a more strategic and targeted approach to energy management within the school estate.

- 2.15 Continuing to target investment in energy efficient technologies will be integral to reducing consumption. Greater collaborative working enabled by the new iPFM structure will facilitate the integration of energy efficiency into property improvements. This will include recognising and prioritising energy within our repairs and maintenance strategy. To support this, energy use across schools will be monitored against key performance indicators such as usage and consumption reduction.
- 2.16 The revised Council Energy Policy provides the framework within which iPFM develops and manages the work stream outcomes.

Building Energy Management Systems (BEMS)

- 2.17 The Council has an extensive portfolio of BEMS systems covering all the major properties in the Council operational portfolio. All high schools and the majority of primary schools have these systems. It is widely accepted within the building services industry that automated controls systems are the most effective way of controlling heating within buildings.
- 2.18 BEMS are an automated intelligent controls system pre programmed to manage the heating for an individual property. The system and controls are located within individual schools. BEMS systems are monitored remotely by an external contractor. As service delivery patterns change the control systems can be adjusted to reflect these changes. In a number of schools an element of local control is available through the application of thermostatic radiator valves (TRV's) though this is not suitable for all properties.
- 2.19 The Council's BEMS systems are in urgent need of upgrading as they aging, are not functioning correctly and also to reflect changes in technology, in particular a change to open protocol systems that can use a variety of components from different suppliers. Many systems are now obsolete making it difficult to source replacement components. Improving the communication links for BEMS from dial up phone lines to Ethernet connections, as part of a wider upgrade strategy, would offer greater resilience and monitoring capabilities. The Council does operate some modern systems within newer and refurbished schools within the estate. Going forward, there is a need to modernise and standardise the Council's approach to BEMS. A BEMS strategy is currently under development. This will give an over view on the best way forward for existing systems and outline requirements for new systems.
- 2.20 To that end, a survey and assessment, part-funded by The Carbon Trust, of the Council's BEMS systems has been carried out. This has identified significant opportunities across the estate for efficiencies, consumption and carbon

reduction. While all school properties with BEMS were included in the assessment, representative properties were surveyed in detail. These included the following schools:

- Craiglockhart Primary School
- Sciennes Primary School
- St Thomas of Aquin's RC High School
- Liberton High School

2.21 The report has recommended that the Council consolidate and upgrade its diverse BEMS systems and:

- Specify the BEMS Upgrade Systems.
- Develop a standardised comprehensive Low Carbon BEMS Specification.
- Performance – procure and develop a medium to long term partnership with a BEMS Contractor(s) to work collaboratively to optimise the performance of the BEMS and reduce energy consumption.
- Develop a prioritised implementation programme based on achieving the greatest impact, selecting sites with the shortest payback periods.

2.22 The Council-wide BEMS assessment has identified an average site cost and emissions reduction of 13.80% and 13.10% respectively and a pay-back period for investment of approximately 3.50-4.00 years. It should be noted that these estimated reductions are based on a Council wide BEMS strategy and upgrade being adopted.

2.23 The BEMS report is currently being assessed and peer reviewed. A delivery options appraisal with associated business case and funding proposals is being developed. A report will be submitted to the Council's Finance and Budget Committee for consideration on completion and implications for schools included within the next Schools Energy Report.

2.24 As it is accepted that there will be a necessary period to allow the best option to be established, approved, financed, procured and put in place, Corporate Property have recruited a specialist BEMS Engineer to develop and manage a quick-wins programme of schedule management, ICT connectivity and upgrade that can be put in place now and that will not impact on any BMS strategy and overall upgrade. This will allow maximisation of efficiencies with the existing infrastructure during the upcoming heating season.

2.25 An exercise is currently underway within the existing BEMS infrastructure to identify and enable opportunities for greater energy efficiency. Specific measures under review include temperature set points, time schedules, holiday schedules and the programming of equipment failure alarms. In addition to this, individual schools with specific control problems are being surveyed and where possible appropriate action is being taken to repair equipment or control faults.

School Condition and Energy Surveys

- 2.26 A programme of condition surveys of the school estate has now been completed and work is ongoing to collate, prioritise and agree Asset Management projects for Children and Families in the Capital Investment Programme going forward. These will be subject to agreement with Children and Families and elected members.
- 2.27 High level energy audits for all schools have also been produced as part of the condition surveys. The audits review current energy consumption within the building as well as identifying areas for improvement through good housekeeping and investment in energy saving technologies.
- 2.28 Energy consumption within individual buildings is benchmarked against buildings of a similar age and use allowing for easy and relevant comparison of consumption data. An initial suitability assessment for renewable energy from Solar Panels is also included. The recommendations for investment identified in the audits will inform future investment programmes and energy efficiency drives. The audit has been designed to be a useful document for school staff and will be the main driver in, and be updated by, the awareness and housekeeping programme.

Awareness and Good Housekeeping Campaign

- 2.29 Engaging with all property users to raise awareness of energy use is a key strategy to support the delivery of energy savings. The Council has signed up to the Carbon Trust's Carbon Management Awareness Campaign to help support and guide our awareness campaign. To aid the campaign we will draw on support from across the Council. This will include aligning the campaign with the eco-schools programme.
- 2.30 An engagement process has been developed with a pilot group of schools to raise awareness, identify good housekeeping opportunities and how the Council's Corporate Property Service, and in particular Corporate Facilities Management, can assist and support users in their drive to reduce energy consumption and carbon emissions.
- 2.31 A pilot group, looking at ways in which schools can meet their energy saving targets, has been established with staff representatives from the following:
- Liberton High School
 - Liberton Primary School
 - Gilmerton Primary School
 - Prestonfield Primary School
 - St Thomas of Aquin's RC High School

- Sciennes Primary School

- 2.32 Following meetings in June and September 2013, a toolkit has been developed by the Communications Service which will assist and support schools in energy and carbon awareness activities. The toolkit and campaign aims to increase awareness and support positive energy behaviours amongst pupils and staff for six pilot schools. The toolkit includes materials to be used by students and teachers in lessons eg events, activities, lesson plans and guidance on using energy more efficiently and its impact, access to consumption data, activity and equipment energy usage data. Surveys are also planned to monitor awareness levels.
- 2.33 Similarly, an awareness and good housekeeping pilot is also being carried out with Facilities Management staff (FM Managers, Service Support Officers, Cleaning and Catering) for the same properties. Additional training is being developed and delivered dependant on the engagement process and pilot outcomes.
- 2.34 Site specific energy plans are being developed with the Facilities Management staff to identify efficiency opportunities and good practice, including protocols and procedures, incorporating input from staff representatives. A target reduction profile will be developed, monitored and reported both to the individual school occupiers and to Facilities Management. It is anticipated that an agreed 3%-5% consumption reduction target will be put in place for each property following the engagement process with both the school staff and Facilities Management staff groups.. The above process will be in place for the beginning of the heating season (1 October) and, after a trial and evaluation period, will be rolled out to all schools based on highest consumers and a greatest impact assessment.

Pipe, Valve and Flange Insulation

- 2.35 A programme of installing insulation to pipework, flange and valves within schools is being developed. A pilot property, Gracemount Primary School, has been identified and an insulation installation project taken forward by Edinburgh Building Services (EBS). This will provide data on installation costs, energy reductions, payback-periods, operative training, school integration etc and will be used to develop a business case to validate a rolling city-wide programme of insulation installation. Funding will be provided from the Central Energy Efficiency Fund (CEEF) as it meets the criteria of improvement works with a payback period of less than 5 years.

Energy Efficiency Projects

- 2.36 The school condition surveys and the various noted energy audits have also identified site specific upgrade or intervention works that can be taken forward as individual projects which do not impact on the proposed BMS strategy. These have both energy efficiency and maintenance efficiency benefits and these are currently being scoped to identify feasibility, cost and priority and are being

cross-referenced with Asset Management proposals to maximise benefits and funding opportunities.

- 2.37 The main investment opportunities identified across the school estate includes, lighting upgrades, BMS upgrades, heating upgrades, fabric and pipe work insulation, draught-proofing and variable speed drives. Payback on investment ranges from 3-10 years depending on the technology and application.

Solar Photovoltaic Scoping Study

- 2.38 A study has been conducted to outline the potential for installing solar photovoltaic (PV) panels across a selection of representative school properties. The study has identified that there are potential suitable properties, associated high-level outline costs and payback periods.
- 2.39 Additional work is ongoing to access site specific requirements, maintenance, procurement and financial options and benefits appraisal to allow a detailed business case to be developed and considered.

3. Recommendations

- 3.1 Committee is asked to note the content of this report, the significant data gathering, audit and analysis work to date and the proposed action plan to identify and deliver agreed targets; and
- 3.2 It is recommended that an annual report is submitted to Committee on progress made against the agreed action plan.
- 3.3 It is recommended that an interim report is submitted to Committee in 6 months on the progress and outcomes of the Awareness and Good Housekeeping Campaign pilot.

Mark Turley

Director of Services for Communities

Links

Coalition pledges	P50. Meet greenhouse gas targets, including the national target of 42% by 2020
Council outcomes	CO18. Green – We reduce the local environmental impact of our consumption and production CO25. The Council has efficient and effective services that deliver on objectives
Single Outcome Agreement	SO3. Edinburgh's children and young people enjoy their childhood and fulfil their potential

SO4. Edinburgh's communities are safer and have improved physical and social fabric

Appendices

- 1 Consumption comparison abstract 2010-2012/13
- 2 Action plan

Appendix 1 to School Energy Report – October 2013.

Property Type	2010/11			2011/12						2012/13									
	Electricity (MWh)	Gas (MWh)	Oil (MWh)	Electricity (MWh)	% Change Electricity	Gas (MWh)	% Change Gas	Oil (MWh)	% Change Oil	Electricity (MWh)	% Change Electricity	Gas (MWh)	% Change Gas	Oil (MWh)	% Change Oil				
High Schools	13,249	45,627		12,811	-3.31%	41,619	-8.78%			13,024	-1.70%	49,681	8.89%						
Primary Schools	9,856	34,835	2,363	9,736	-1.22%	31,028	-10.93%	1,750	-26%	10,369	5.21%	39,897	14.53%	2,380	1.00%				
Nursery Schools	851	2,722		912	7.11%	2,169	-20.30%			892	4.81%	2,720	0.10%						
Special Schools	1368	3,901	1,364	1331	-3.10%	3,709	-27.20%	1,070	-22%	1279	-6.50%	4,964	27.25%	1,299	-4.77%				
Total	25,324	87,085	3,727	24,790	-2.11%	78,525	-9.83%	2,820	-24%	25,564	0.95%	97,261	11.69%	3,679	-1.29%				
Degree Days*	2735			2308						-15.60%						2908			6.35%

Note that % change comparisons are with the base year of 2010/11

Appendix 2 to Schools Energy Report – October 2013

No.	PROJECT	ACTION	TIMESCALE	LEAD RESPONSIBILITY	OTHER LINKED PROGRAMMES, PROJECTS OR ACTIONS
1	Council Energy Policy: Project Register Procedure	Record, update and validate all energy consumption and carbon impacts of building projects.	Ongoing	Corporate Property	Energy Policy All Projects
2	BEMS Upgrade	Quick wins programme	Sep - 13 Ongoing	Corporate Facilities Management	BEMS Strategy Repairs & Maintenance
		Options appraisal, business case and report to Finance & Budget Committee	Mar - 14	Corporate Property	Energy Policy ICT Solutions iPFM Asset Management capital programme.
		BEMS upgrade strategy implementation	Apr -14 (2-3 year programme dependant on option chosen)	Corporate Property	As above Project 1 Project 2 Project 3 Project 4
3	Property Specific energy consumption and target reduction plans.	Site validation of energy audits	Ongoing	Corporate Facilities Management	Project 1 Project 2 Project 3 Project 4 Project 5 Asset Management capital programme Repairs and Maintenance
		Pilot group of 6 schools (2 x High Schools) (6 x Primary Schools)	Oct - 13	Corporate Facilities Management	
		Phase 2 (High Schools)	Feb - 14	Corporate Facilities Management	
		Phase 3 (Roll out across School Estate)	Aug – 14	Corporate Facilities Management	
4	Awareness and Good Housekeeping	Pilot school-staff engagement	Jun – 13	Corporate Facilities Management	All Projects

				Corporate Communications	
		Pilot FM staff-engagement	Jun – 13	Corporate Facilities Management Corporate Communications	
		Draft proposals and Toolkit to pilot group (School staff and FM staff) for review	Sep – 13	Corporate Facilities Management Corporate Communications	
		Implementation of training and action programme, site-specific monitoring, recording, reporting	Oct – 13 Ongoing	Corporate Facilities Management	
		Phase 2 engagement with school staff and FM	Jan & Feb – 14	Corporate Facilities Management Corporate Communications	
		Phase 2 implementation	Mar – 14 Ongoing	Corporate Facilities Management	
		Phase 3 engagement with school staff and FM	Aug - 14	Corporate Facilities Management Corporate Communications	
		Phase 3 implementation	Oct - 14	Corporate Facilities Management	
5	Efficiency projects	Analysis of energy audits and identification of projects	Jul-Oct - 13	Technical Support Team	Project 1 Project 2 Project 5 Project 6
		Scope, specify and submit business cases to iPFM Board	Sept – Dec 13	Technical Support Team Building Programme Team (BPT)	In consultation with Asset Management, BPT and Children and Families.
		Tender & procurement process (overlapping projects but may be bundled into small number of packages)	Oct 13 – Mar 14	Technical Support Team Building Programme Team	

				(BPT)	
		Projects site works. Note programme and timescales are dependent on size, ability to carry out during heating and school terms.	Dec 13 Ongoing	Technical Support Team Building Programme Team (BPT)	In consultation with Asset Management, BPT and Children and Families.
6	Insulation programme (Pipe-work, valves and flanges)	Identification of pilot and phase 1 group (12 initial schools.)	Jul-Aug – 13	Technical Support Team	Project 1 Project 2 Project 3
		Pilot school project	Sept - 13	Technical Support Team	
		Phase 1 Group	Oct 13 - Mar 14	Technical Support Team	
		Phase 2 Group	April – Oct 14	Technical Support Team	
		Phase 3 Group	Oct 14 – Mar 15	Technical Support Team	
7	Design options for replacement of Electric Heating in Schools. To be used as pilot for similar properties and projects	Scoping, specification and options appraisal taking holistic and whole-life costing approach to school heating requirements	Mar 14	Asset Management Building Programme Team (BPT)	All projects In consultation with Children and Families.
		Outcomes to develop a template and be taken into account in future similar projects.	Apr – 14	Asset Management	In consultation with Children and Families.
8	Solar Photovoltaic (PV) installation to identified school properties allowing reduced energy costs and carbon emissions.	High level study to identify potential properties, costs and payback periods	Aug – 13	Corporate Property	Project 1 Project 2 Project 3
		Detailed analysis and business case development	Mar - 14	Corporate Property	In consultation with Children and Families and Corporate Governance.