

## Low Carbon Lifecycle Heating Replacements at Maintained Schools

To: Environment & Green Investment

Meeting Date: 1<sup>st</sup> July 2021

From: Steve Cox

Electoral division(s): All

Key decision: Yes

Forward Plan ref: 2021/39

Outcome: A finance mechanism for decarbonising heating in the Council's maintained schools to reduce the Council's carbon footprint.

Recommendation: The Committee is asked to agree:

- a) a new funding model and investment criteria for projects involving decarbonisation of heating at maintained schools as set out in para 2.6.2; and
- b) the facility to draw down £30k of development budget for such projects from the Environment Fund; and
- c) offering a paid for service to academy schools to draft applications for grants for them to decarbonise their heating.
- d) Learning and experience with this proposed approach is reported back to Committee in 12 months' time along with any recommendations for change.

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# 1. Background

- 1.1 To deliver net-zero carbon emissions by 2050, heating and hot water for all buildings will need to shift off fossil fuels and onto low carbon heating solutions such as air source and ground source heat pumps. When these solutions are designed into new buildings, they are more cost effective than when retrofitted into existing buildings. The challenge all areas face is how to shift existing buildings to low carbon solutions to deliver against climate emergency declarations and targets, ahead of the regulatory and policy environment being fully in place to support this.
- 1.2 The Council's Climate Change & Environment Strategy Action Plan commits to replacing end of life oil and gas heating systems in maintained schools with low carbon heating systems. Experience from initial surveys and proposals for replacing heating in schools and CCC buildings with Air Source Heat Pumps (ASHP) demonstrates that capital costs are higher, in a retrofit situation and that ASHPs seldom deliver an energy bill saving as electricity costs are so much higher than gas and oil.
- 1.3 The Council receives School Condition Allocation funding from Department for Education for all aspects of urgent planned maintenance works on maintained schools, including boiler replacement. This enables the Council to deliver its statutory duty to ensure sufficient school places and that those places remain open to children throughout the year i.e. it allows us to avoid school closures due to maintenance issues. This provides sufficient funding for like for like replacement of end of life boilers, but it does not allow for higher capital cost, low carbon solutions.
- 1.4 The Council's schools' energy efficiency retrofit programme provides loan funding for energy conservation projects that can pay back within 15 years, or 20 years in the case of smaller schools and/or deeper retrofits such as heating replacement. However, as ASHPs in retrofit situations are not reducing energy bills they do not pay back.
- 1.5 A new funding model and investment criteria are required to address these challenges and enable low carbon lifecycle replacement of heating at maintained schools.

# 2. Main Issues

## 2.1 Project Pipeline

- 2.1.1 There are around 100 maintained schools in the county. Based on a nominal 20 year boiler life we should expect 5 schools per annum on average requiring boiler replacement, preferably with ASHPs. From recent school condition reports Education Capital have identified 6 schools which are currently in need of urgent boiler replacement and a further 11 which have boilers nearing the end of their lives.

## 2.2 High Capital Costs

- 2.2.1 ASHP capital costs are higher than for boiler replacements. The table below shows the estimated costs for three schools, surveyed for replacement ASHPs, compared to the costs of like for like boiler replacement.

	School A	School B	School C
Replacement boiler cost (approx.)	£43,750	£62,000	£30,000
ASHP cost*	£73,000	£134,000	£58,000

\*Inclusive of design and project management, but excluding Measurement & Verification of operational performance

2.2.2 It should be noted that these sites were relatively straightforward for ASHP installation, requiring neither replacement of heat emitters (radiators or convector heaters) nor upgrades to the site's electrical connection capacity, which would increase costs substantially. ASHP costs are therefore at least twice as expensive as boilers.

## 2.3 Energy & Bill Impact

2.3.1 ASHP estimated energy savings and bill impacts for the same schools are summarised below. Negative figures represent an increase in energy consumption and energy bills.

	School A (kWh)	School A (£)	School B (kWh)	School B (£)	School C (kWh)	School C (£)
Gas savings	67,223	£2,117	77,599	£2,444	33,310	£1,049
Electricity consumption	-20,499	-£2,961	-27,510	-£3,973	-10,707	-£1,546
TOTAL	46,724	-£843 (-9%)	50,090	-£1,529 (-9%)	22,603	-£497 (-3%)

2.3.2 Despite the substantial (kWh) energy savings and carbon emissions reductions, bills are increased due to the relative prices of gas versus electricity. In this situation ASHPs alone can clearly not repay their capital costs. This is particularly pronounced in retrofit situations. In new build situations ASHPs will be specified with low surface temperature radiators or underfloor heating enabling them to operate at higher Coefficients of Performance and consume less electricity.

## 2.4 Complementary & Offsetting Measures

2.4.1 Our engineering partner Bouygues proposed a range of additional energy conservation measures at each example school to offset the above bill increase and move this to an overall net energy bill saving. These savings, at year 1 energy prices, and the capital cost breakdown (including Measurement & Verification of operational performance) are given below. It should be noted that the scope for complementary measures is site specific and they may not be viable in all cases.

	School A	School B	School C
Complementary energy conservation measures (ECMs)	<ul style="list-style-type: none"> <li>• LED lighting,</li> <li>• Building Energy Management System,</li> <li>• 10 kW solar PV array</li> </ul>	<ul style="list-style-type: none"> <li>• LED lighting,</li> <li>• Building Energy Management System,</li> <li>• 10 kW solar PV array</li> <li>• Pipework lagging</li> </ul>	<ul style="list-style-type: none"> <li>• Building Energy Management System,</li> <li>• 10 kW solar PV array</li> <li>• Pipework lagging</li> </ul>

Net energy bill saving	£1,700 (18%)	£1,500 (9%)	£2,200 (12%)
ASHP cost	£73,000	£134,000	£58,000
Other ECM cost	£38,500	£41,000	£39,000
M&V cost	£8,500	£10,000	£10,000
<b>Total Capital Cost</b>	<b>£120,000</b>	<b>£185,000</b>	<b>£107,000</b>

## 2.5 Current Financing Arrangements & Payback

- 2.5.1 It can be seen from the above table, that although the complementary energy conservation measures deliver a net bill saving (and this will rise year on year as energy prices increase in real terms), the magnitude of the bill savings is small relative to the total capital cost. The result is that project payback periods are far in excess of the lifetime of the equipment (approximately 20 years).
- 2.5.2 The Conservative party's 2019 manifesto included £2.9bn over the term of the current Parliament for a Public Sector Decarbonisation Scheme (PSDS). The first round of this was launched in September 2020 awarding grant funding to public bodies for decarbonising heating in their own buildings. £1bn of funding was awarded in the first round, which was reportedly over-subscribed by 20%. The Council was successful in securing funding for decarbonising some of its own office buildings, but not in applications for funding for the above three schools due to the scheme being over-subscribed.
- 2.5.3 The Government's November 2020 Spending Review announced £475 million of funding in the 2021/22 financial year for "greening public buildings". However, Phase 2 of the PSDS, launched on 7<sup>th</sup> April 2021, only allocated £75m of grant funding. There has been no announcement about subsequent phases of the Scheme, although the manifesto commitment and Spending Review imply that there will be further rounds in this and future years. We were successful at Phase 2 in securing grant funding (totalling £2.2m) for three maintained schools and for a large academy project.
- 2.5.4 PSDS Phase 2 was over-subscribed within 29 hours of launching. To secure grant funding in future phases we will need to have projects at Outline Business Case stage of development ready to submit as soon as the application window opens. The lack of explicit commitment to future phases of PSDS means that this Outline Business Case development will therefore be at risk. Fortunately initial development costs for these projects are relatively low and can be recovered for projects that proceed to works. The ability to draw down up to £30,000 of development budget from the Environment Fund would enable us to commission initial development work on a portfolio of schools in order to prepare for future phases of Public Sector Decarbonisation Scheme.
- 2.5.5 If grant funding is secured for projects this will obviously bring down the payback period for any residual loan funding. However, in some cases paybacks still exceed 20 years, which is the ASHP lifetime and the maximum payback that the Council will currently accept on loans for school projects. The additional capital contribution that would be required to bring the loan element within a 20 year payback was substantial in two cases and this is likely to be reproduced across other schools. An alternative approach to funding and investment criteria for decarbonising heating in maintained schools is therefore required.

	School A	School B	School C
Total Capex	£120,000	£185,000	£107,000
PSDS grant eligibility	£70,000	£116,000	£65,000
Capital contribution required to achieve 20 year payback	£19,000	£44,000	0

## 2.6 Proposed Financing Arrangements

2.6.1 Delivering carbon savings in support of the Council's objective of a net zero carbon Cambridgeshire by 2050 is a key driver for these projects. The social value of the carbon savings delivered by these projects over the 20 year lifetime of the ASHP, calculated using HM Treasury's Green Book Greenhouse Gas appraisal toolkit, is significant.

	School A	School B	School C
Social value of carbon saved (£ PV)	£18,100	£21,500	£19,300

2.6.2 If the Council were prepared to:

- i) make a capital contribution equivalent to the monetised carbon savings; and
- ii) make a contribution from Education Capital's (School Condition Allowance) funding equivalent to the cost of like for like boiler replacement; and
- iii) provide loan funding with no markup on the Council's own borrowing rates; and
- iv) assess the investment criterion across a portfolio of school projects rather than on a school by school basis; and
- v) (if necessary) take a longer term view for investment criteria where this helps e.g. seek a positive NPV over 40 years.

This is likely to make decarbonising heating in maintained schools viable, at least where grant funding can be secured. The longer assessment period (point (v)) may allow a broader range of technologies to be considered e.g. Ground Source Heat Pumps, upgrading heat emitters to low surface temperature emitters (enabling more efficient operation of heat pumps), insulation and improved glazing. This may in turn allow better long term management of energy costs.

2.6.3 The size of capital contribution from points (i) and (ii) would need to be sufficient to bring the balance of loan funding required down to a level that could be repaid from the net energy bill savings within 20 years. Taking a portfolio approach would allow any surplus capital contribution from (i) and (ii) to be banked and used to subsidise a larger capital contribution for other schools which have more challenging business cases.

2.6.4 The capital contribution described in point (i) above could initially come from the £12.5 m Environment Fund set up for reducing the Council's carbon footprint and tackling climate change. There is at present around £10m of this unallocated. If the carbon savings in 2.6.1 prove typical, an average pipeline of 5 schools per annum implies around a £100k per annum drawdown on the Environment Fund for replacing end of life boilers with ASHPs.

2.6.5 It should be noted that this funding approach still leaves the choice on whether to proceed with ASHP installation, rather than like for like boiler replacement, with the school. This requires the school/governors to be willing to sign up to a 20 year loan repayment (possibly longer in some cases) for a project which has a projected net neutral impact on cashflow. With no net financial benefit to the school this may seem like too much of a risk to some schools, unless they have a commitment to carbon reduction.

2.6.6 An alternative approach would be to exclude the repayable loan element (2.6.2 (iii)) and increase the Council's capital contribution (2.6.2 (i)) by a corresponding amount. This would be more attractive to schools, but would increase costs to the Council, with operational energy savings accruing as a benefit to the schools rather than being used to repay a portion of the Council's borrowing. If this approach is preferred we may want a mechanism to recover some of the Council's investment if the schools voluntarily academise.

## 2.7 End of life replacements, summer 2021 and Non-viable Projects

2.7.1 Education Capital have identified six schools which require urgent boiler replacement before this winter and for which no PSDS grant funding has been secured. To prevent risk of school closures due to loss of heating (and avoid the Council failing in its statutory duty to provide open school places), Education Capital plan to replace boilers with gas boilers, in these schools this summer.

2.7.2 In the absence of grant funding, a Council capital contribution in the region of £940,000 is estimated to be required to deliver ASHPs at these schools. This is likely to be several times higher than the monetised carbon savings of these projects. Development time and extended leadtimes for equipment (due to global supply shortages on electronic components) also mean that ASHPs cannot be delivered for these six projects ahead of next spring, which would create a significant risk of school closure if their boilers fail this winter. Temporary boiler hire might be viable to keep schools open in this instance. However, the schools would need to hire temporary boilers themselves, as the Council does not have suitable frameworks for this. We have seen temporary boiler hire costs in the range from £1k per week for a 20 week period up to a £26k deployment cost plus £1,000 per week thereafter. Schools are likely to struggle to cover such costs. It is also likely to take at least a week with the school closed before temporary boilers could be deployed. Delaying boiler replacement in these six schools does pose a high risk of school closure, and thus a failure of the Council in its statutory duty to keep schools open.

2.7.3 Looking beyond these six urgent boiler replacement projects, the portfolio approach described in 2.6.2 (iv) will help for schools where grant funding has not been secured or where costs are particularly high, as any surplus from monetised carbon savings and like for like boiler costs from other projects can subsidise more challenging business cases. We suggest that only where it has not been possible to create a viable project under the portfolio approach and boiler replacement is essential in order to keep the school open, like for like boiler replacement should be implemented.

## 2.8 Evaluation and Review

2.8.1 If the Committee approve the above approach set out in section 2.6 there will be considerable learning over the early projects and there may be a need to revise the

approach on the basis of this learning and/or as grant fund opportunities change over time. It is, therefore, recommended that experience over the next 12 months is reported back to Committee along with any recommendations for change.

2.8.2 Changes to the regulatory and funding landscape will also be reported. It is expected that Government will, at some point regulate to phase out fossil fuel boiler installation. It is possible that, at this time, Department for Education School Condition Allocation funding will be increased to reflect the higher capital costs of low carbon heating. The funding mechanism in this paper may therefore only need to be a transitional arrangement to bridge the gap until regulation and increased School Condition Allocation funding are implemented.

## 2.9 Supporting Academy Schools

2.9.1 Academy schools are eligible to apply direct for Public Sector Decarbonisation Scheme grant funding. They are unlikely to have the expertise and resource to do this themselves. Some are working with consultants to develop applications. With our experience and success from the first two phases of the Public Sector Decarbonisation Scheme, and with our access to Bouygues and SSE resource for technical development work, we could offer a similar, costed service to academies. Successful bids could then be delivered via our existing Managed Service Agreement offer to academies. This may require future Public Sector Decarbonisation Scheme phases to have longer deadlines in order to allow time for planning permission to be secured after grant award. If the academies have the balance of capital costs to invest themselves they could commission the works directly from Bouygues/SSE via our Framework Agreement after paying an access fee.

## 3. Alignment with corporate priorities

### 3.1 Communities at the heart of everything we do

The following bullet points set out details of implications identified by officers:

- The proposed financial contribution from the Council will help support communities in decarbonising heating: directly by decarbonising the school's heating; indirectly by raising awareness amongst pupils, parents and community users of school buildings of low carbon heating options.

### 3.2 A good quality of life for everyone

There are no significant implications for this priority.

### 3.3 Helping our children learn, develop and live life to the full

The following bullet points set out details of implications identified by officers:

- Low carbon replacement heating projects will replace end of life heating systems helping avoid temporary school closures due to failed heating. The complementary energy saving measures help manage energy costs, avoiding undue pressure on school budgets, helping improve educational delivery.
- The projects have the potential to help children at the schools learn about tackling climate change.

### 3.4 Cambridgeshire: a well-connected, safe, clean, green environment

The following bullet points set out details of implications identified by officers:

- Achieving net zero carbon emissions requires fully decarbonising heating in buildings by 2050. Low carbon replacement heating projects will make a significant reduction in the direct carbon emissions from the schools.
- Fossil fuel heating systems have 20+ year lifetimes, so capturing the opportunity to replace these with low carbon systems as they reach the end of their lives is important to ensure none are still operating in 2050.

### 3.5 Protecting and caring for those who need us

There are no significant implications for this priority.

## 4. Significant Implications

### 4.1 Resource Implications

The following bullet points set out details of significant implications identified by officers:

- There is a risk of sunk costs for developing projects which are unable to progress to works. These costs are small (£30k see paragraph 2.5.4) and could be offset from revenue from the existing schools' energy efficiency retrofit programme.
- The Environment Fund capital contribution proposed under paragraph 2.6.2 (i) is from borrowing and will need to be repaid from other Council income streams. However, no overall increase in the Environment Fund is being sought, so the recommendations in this report do not create a new or increased resource pressure.

### 4.2 Procurement/Contractual/Council Contract Procedure Rules Implications

The following bullet points set out details of significant implications identified by officers:

- Project development and installation will be delivered under the Energy Performance Services Framework Agreement with Bouygues Energies & Services and SSE Enterprise Energy Solutions signed in March 2021.

### 4.3 Statutory, Legal and Risk Implications

The following bullet points set out details of significant implications identified by officers:

- Schedule 2 Part 12 A(a) of the Town and Country Planning (General Permitted Development) Order 2015 grants Local Authorities permitted development rights to install equipment required for functions it exercises. This covers installation of low carbon heating in maintained schools, subject to the limitations in Part 12 A (a), namely that the volume of the installation is less than 200 m<sup>3</sup> and that their height above ground level does not exceed 4 m. If these limitations were not met planning consent would be required which is unlikely to be achievable within the delivery window allowed by PSDS grants (8-12 months in Phases 1 and 2).



#### 4.4 Equality and Diversity Implications

There are no significant implications within this category. An Equality Impact Screening undertaken for the proposals has shown no potential negative impact.

#### 4.5 Engagement and Communications Implications

There are no significant implications within this category.

#### 4.6 Localism and Local Member Involvement

There are no significant implications within this category.

#### 4.7 Public Health Implications

The following bullet point sets out details of implications identified by officers:

There will be a small positive impact in reducing air pollutant emissions as a result of moving away from combustion-based heating to heat pumps.

#### 4.8 Environment and Climate Change Implications on Priority Areas:

##### 4.8.1 Implication 1: Energy efficient, low carbon buildings.

Positive:

Explanation: Low carbon lifecycle heating projects will reduce carbon emissions from maintained schools and improve their energy efficiency.

##### 4.8.2 Implication 2: Low carbon transport.

Neutral:

Explanation: No impact on transport.

##### 4.8.3 Implication 3: Green spaces, peatland, afforestation, habitats and land management.

Neutral:

Explanation: No impact on land use.

##### 4.8.4 Implication 4: Waste Management and Tackling Plastic Pollution.

Neutral:

Explanation: Packaging waste associated with delivery of materials will be managed by supply chain procurement conditions which Bouygues and SSE are required to apply via our contract with them.

##### 4.8.5 Implication 5: Water use, availability and management:

Neutral:

Explanation: No impact on water use or drainage.

##### 4.8.6 Implication 6: Air Pollution.

Positive:

Explanation: In principle the reduction in gas and oil consumption reduces production of air pollutants in particular NO<sub>x</sub>, although the impact on air pollutant concentrations in areas of air quality exceedance will be immeasurably small.

4.8.7 Implication 7: Resilience of our services and infrastructure, and supporting vulnerable people to cope with climate change.

Positive:

Explanation: Schools with low carbon heating installed will no longer rely on global supply chains for oil and gas providing both cost certainty and supply resilience.

Have the resource implications been cleared by Finance? Yes

Name of Financial Officer: Sarah Heywood

Have the procurement/contractual/ Council Contract Procedure Rules implications been cleared by the LGSS Head of Procurement? Yes

Name of Officer: Henry Swan

Has the impact on statutory, legal and risk implications been cleared by the Council's Monitoring Officer or LGSS Law? Yes

Name of Legal Officer: Fiona McMillan

Have the equality and diversity implications been cleared by your Service Contact?

Yes

Name of Officer: Elsa Evans

Have any engagement and communication implications been cleared by Communications?

Yes

Name of Officer: Simon Cobby

Have any localism and Local Member involvement issues been cleared by your Service Contact? Yes

Name of Officer: Emma Fitch

Have any Public Health implications been cleared by Public Health?

Yes

Name of Officer: Iain Green

If a Key decision, have any Environment and Climate Change implications been cleared by the Climate Change Officer?

Yes

Name of Officer: Emily Bolton

## 5. Source documents guidance

### 5.1 Source documents

- i) Conservative Party 2019 Manifesto Costings Document
- ii) Spending Review 2020
- iii) HM Treasury Green Book Greenhouse Gas Appraisal Toolkit

### 5.2 Location

- i) [5ddaa257967a3b50273283c4 Conservative 2019 Costings.pdf \(website-files.com\)](#)

- ii) [Spending Review 2020 documents - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/collections/spending-review-2020)
- iii) [Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/collections/green-book-supplementary-guidance-valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal)