

**BODY:** CABINET

**DATE:** 31 March 2010

**SUBJECT:** 1 Grove Road – building improvements to cut carbon emissions

**REPORT OF:** Henry Branson, Head of Infrastructure

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**Purpose:** To obtain Cabinet approval for investment in 1 Grove Road to:

- Address outstanding repairs and maintenance issues with the building
- Significantly reduce the carbon footprint of the building and make major progress towards the Council's 10:10 carbon reduction target
- Improve the external appearance to the building
- Improve working conditions for staff

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**Recommendation:** Cabinet is recommended to:

- Choose Option 3 as laid out in paragraph 3.2 of this report.
- Approve the funding for the chosen option.
- Delegate the exact mix of capital and revenue funding required to meet the chosen option to the Chief Finance Officer in consultation with the Cabinet portfolio holder for Finance.
- Acknowledge the critical dependencies between the workstreams identified in this report and the Agile Working Project.
- Delegate authority to the Agile Working Strategic Board to deliver the workstreams identified in this report in line with the timescales laid out for agile working implementation.

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## **1.0 Background**

### **1.1 Cabinet Decision May 2009**

In May 2009 Cabinet endorsed the next stage of the council's Accommodation Strategy, namely to end the Council's occupation of

Nos. 66 and 68 Grove Road and steps be taken to accommodate the services provided within these premises in other locations.

In making this decision the Council has identified 1 Grove Road as its principle office building, which will accommodate 60%+ of the workforce via a blend of fixed and agile working.

## 1.2 **Cabinet Decision February 2010**

In February 2010 Cabinet noted that investment was required to address pre-existing issues with 1 Grove Road in terms of ongoing accommodation of staff, and approved a budget to engage consultants to develop options.

## 1.3 **Full Council February 2010**

At Full Council on 24 February 2010 the Council approved a motion to back the 10:10 campaign by working towards a 10% reduction in corporate CO2 emissions.

## **2.0 Investment in 1 Grove Road**

2.1 The Council owns the parts of 1 Grove Road that it occupies, the remainder of the building (the library and some additional office space) being owned by East Sussex County Council.

The Accommodation Strategy identifies 1 Grove Road as a building the Council wishes to retain and, in effect, become its 'flagship' corporate building, providing accommodation for 60%+ of staff as well as the main point of face-to-face customer contact.

## 2.2 **Condition of 1 Grove Road**

An external condition survey conducted by the Estates and Property Manager in September 2008 identified a range of issues, including a generally poor state of external decoration and that the windows at 1 Grove Road are in poor condition, specifically:

*"It was noted a large proportion of the opening sections do not fit very well with the more badly fitting units becoming twisted or distorted. Because the openers are not weather stripped the majority allow considerable draft and occasional leakage from wind driven rain. Internally a considerable number of opening mechanisms, handles and accessories have become defective.*

*The timber sub-frames are generally becoming wet rot affected as a result of poor maintenance. Whilst the majority of frames could be salvaged by piecing in replacements for the most severely rotted sections and cutting out and replacing localized rot with appropriate filler some components have deteriorated to a stage where replacement of the frame is likely to be necessary...*

*It is likely that replacing the windows will be most cost effective in the long term both in regards to lower maintenance needs and improved thermal qualities."*

The practical result of these faults is that the building is inefficient to heat and uncomfortable for staff during cold and wet weather.

### 2.3 **Solar Gain in 1 Grove Road**

An additional limitation of 1 Grove Road is the lack of any form of temperature management system. The building is not air conditioned and in hot weather the south side of the building in particular gets extremely hot.

### 2.4 **Environmental and Financial Cost of 1 Grove Road**

During 2008/09 1 Grove Road consumed 141,173 kwh of electricity and 486,126 kwh of gas. The carbon emitted from this consumption is 74 and 90 tonnes respectively – a total of 164 tonnes.

We currently pay 9.76p per kwh of electricity and 2.63p per kwh of gas. Using the 2008/09 consumption rates this would cost us £13,778 for electricity and £12,766 for gas – a total of £26,544.

It should be noted that between 2007/08 to 2008/09 the electricity consumption fell and gas consumption increased– the Briar report referred to below quotes 2007/08 figures.

### 2.5 **Briar Associates report on Energy Saving Opportunities for 1 Grove Road**

Shortly before the above condition survey was conducted, the Council received a report from Briar Associates on Energy Saving Opportunities for 1 Grove Road. This report also highlighted the temperature issues in the building:

*"One major concern is overheating within the offices spaces. Should nothing be done to rectify this situation it is inevitable that some form of air conditioning will need to be installed. This can be extremely energy intensive..."* Briar Associate's report, page 4.

*"For office buildings, studies have shown that the optimum temperature range for a comfortable environment is 24°C, with a range of +/- 4°C. However, direct solar radiation onto un-shaded windows can give temperatures as high as 35-40°C. These high temperatures result in an uncomfortable working environment and can adversely affect productivity and concentration levels of occupants."* Briar Associate's report, page 8

The report proposed a range of solutions to improve the working conditions in the building at the same time as reducing energy costs and lowering CO2 emissions. Briar Associates reviewed the report in February 2010 to re-affirm the recommendations and update the

costs.

## 2.6 **Solution 1: Solar Shading**

Solar shading is designed to reduce glare and solar heat gain on a building whilst maintaining good visibility through the windows. It does this by fixing a series of horizontal blades (louvers) to the external wall.

From the calculations and analysis carried out by Briar Associates solar shading will give a 78% reduction in solar heat gain if installed on the South East and South West Facing facades of the building.

An example of fixed solar shading is given below:



## 2.7 **Solution 2: Window Replacement**

There are various types of window on the market that can not only dramatically improve a building's thermal properties but can also help to enhance the aesthetic presence and modernise the general look of the building

The replacement of the windows will reduce heat loss through glazed areas by over 50%.

## 2.8 **Solution 3: Mechanical Ventilation**

The above mentioned solar shading and window replacement solutions should drastically improve the internal environment within the office spaces of 1 Grove Road. In the majority of instances, natural cross-flow ventilation will be obtained by opening windows at opposite ends of each office space. However within the central or 'core' areas and their surrounding vicinities no cross flow is available, as such these areas will continue to overheat and will remain an uncomfortable working environment unless some form of mechanical extraction is provided, ensuring stagnant air is replaced by fresh air from outside.

Natural ventilation through a stack effect has been considered, however due to the required locations of outlets this does not appear practical. Therefore, consideration has been given for the

installation of a minimal degree of forced, mechanical ventilation within the building using existing voids.

Forced ventilation is still a low carbon option for circulating and replacing air when compared to a standard air conditioning system as it has low running costs and will utilise natural variations i.e. cooler night air to cool down the building.

## 2.9 **Solution 4: Installation of Biomass Boiler**

Biomass heating generally refers to the use of solid biomass materials to produce heat for space or process heating applications. It is viewed as a renewable energy as the carbon dioxide emitted when the renewable material is combusted is no more than that absorbed by it in its lifetime as living biomass.

Biomass heating works in a similar way to conventional, fossil fuel heating systems and could provide all the heating needs for 1 Grove Road. Systems can also be automated.

Fuel can come in highly processed formats (such as wood pellets), through to almost freshly felled wood logs. Wood pellets have a much higher energy density so will take less room to store but they are the most expensive. Wood chips are cheaper but have a lower energy density so will require more space to store. Logs would not be practical for 1 Grove Road.

The choice of fuel will be clarified at the design stage as we will know then how much fuel will be required to be stored. If wood pellets are used there will be an increase in fuel costs (approx £4k per annum) as they are more expensive than gas.

It should be noted that in the 'Potential for Renewable Energy Study' recently carried out by AECOM identified areas in Eastbourne that could be used to grow biomass. If this potential was realised we would be able to grow our own fuel. It is recognised though that this is only a concept but it is possible that fuel could come on stream during the lifetime of a biomass boiler.

## 2.10 **Solution 5: Installation of Photovoltaic Cells**

Solar PV cells convert sunlight to electricity. The stronger the sunshine, the more electricity is produced. The strength of a PV cell is measured in kilowatt peak (kWp) which is the amount of electricity that would be created in full sunlight. In Eastbourne we could expect 900kwh to be generated for each kWp.

In addition to the Briar report a separate survey was carried out by a PV installer. With the roof space available in 1 Grove Road we would expect a 20kWp installation which could generate 18,000 kwh. This is enough electricity to provide 10% of our current usage. This percentage figure will drop as the increased headcount in 1 Grove Road will see electricity consumption increase and the

efficiency of the panels will degrade over time. The panels have a projected lifespan of 25 years.

### 2.11 **Feed in tariffs and payback periods**

Last month the Government introduced electricity feed in tariffs to accelerate the implementation of technologies that create on-site renewable electricity. These rates are generous and reward investment in renewable technologies and have brought down the payback periods to a competitive level.

Solar PV panels should pay for themselves within 11 years. As the feed in tariffs are guaranteed by the Government for 25 years the PV panels will then start to generate income for the Council from year 12 – approximately £7k a year. Over the 25 year period it is expected that the Council will make return on investment of approximately £100k.

The assumptions used to make these calculations are given in Annex 1.

Similar feed in tariffs will be introduced in February 2011 for renewable heat. Heat feed in tariffs were used to calculate the payback for the biomass boiler. The rates that have been published are currently out for consultation so are liable to change however it is worth noting that the electricity feed in tariff rates that were finally agreed were higher than what was published in the preceding consultation.

If we used woodchip to feed the biomass boiler indicative return on investment over a 15 year period would be £280k (subject to final agreed feed in price). If we used wood pellets then this would drop to £185k as they are more expensive to buy.

We have assumed that we will be able to obtain a grant from the Government's Low Carbon Building Programme to pay for 50% of the capital costs of the biomass boiler. Profits for woodchip option would drop to £105k if we were not successful in obtaining a grant for wood pellet this would drop to £10k – just about break even.

The assumptions used to make these calculations are given in Annex 2.

## 3.0 **Costs and Options**

3.1 The outline costs detailed in 2.11 above have been based on estimates provided in February 2010 by Briar Associates. Briar Associates' estimates for replacement windows are consistent with at least two other estimates received in the last two years.

There are existing capital allocations for improving energy efficiency and asset management.

In addition, the council has a revenue repairs and maintenance

reserve of approximately £400,000 which could be used to support these works.

Any amount that requires financing in addition to existing capital and revenue budgets would need to be met from prudential borrowing. The cost of borrowing would be met from the additional savings.

3.2 Looking at the solutions available (paragraphs 2.6 to 2.10) we have considered three options as a way forward:

**Option 1** – Just install solar shading

**Option 2** – Adopt three of the solutions; solar shading, replace the windows and install mechanical ventilation

**Option 3** – Adopt all five solutions; solar shading, replace the windows, install mechanical ventilation, biomass boiler and solar PV.

The costs and benefits of each solution are considered in Annex 3. Costs for each option include a fees estimate of 15%, as indicated by Briar Associates.

**It is worth noting that if all five solutions were implemented – Option 3 - the council could deliver close to a 9% reduction of carbon emissions for the entire organisation, just 1% off the 10:10 target.** The table below shows the ‘green savings’ that we have estimated will accrue from each option.

	Option	Tonnes saved	% saved compared to total EBC emissions
	Doing nothing (just utilise energy saved from closing 68 Grove Road)	151	5.4
1	Install solar shading	151	5.4
2	Adopt three of the solutions; solar shading, replace the windows and install mechanical ventilation	196	7.0
3	Adopt all five solutions; solar shading, replace the windows, install mechanical ventilation, biomass boiler and solar PV.	250	8.9

### 3.3 Next Steps

Whichever option is adopted, the next steps would be:

1. Move quickly to pre-design stage to carry out structural

- investigations and refine costs.
2. Submit a planning application for the works.
  3. Whilst the planning application is considered, complete the full design, specification and tender of the works, such that work can commence as soon as planning permission is granted.

If it was agreed a biomass boiler should be installed then the additional steps would be:

4. Submit an application to the Low Carbon Building Fund before the grants run out.
5. Consider issues of fuel type and storage before making decision to proceed.

The goal would be to align these works with the wider Agile Working Programme and aim to deliver any external improvements before the internal refurbishment of 1 Grove Road commences. Due to the critical dependencies between the Agile Working Programme and the external improvement to 1 Grove Road, the Agile Working Strategic Board would be responsible for overseeing delivery of these works.

#### **4.0 Consultations**

- 4.1 Planning permission would be required before these works could commence. Initial discussions with the Planning section have been positive, as these works are likely to improve the appearance of the building as well as reducing emissions.

#### **5.0 Conclusions**

##### **5.1 Addressing the poor condition of the building**

Paragraphs 2.2 to 2.5 above describe the poor current condition of 1 Grove Road and the impact on staff working in the building. The combination of deteriorating windows and lack of temperature management systems means that 1 Grove Road is:

- a) unsightly,
- b) inefficient to heat, and
- c) provides a poor quality working environment, particularly during spells of extreme hot, cold, wet or windy weather.

#### **Increasing importance of 1 Grove Road**

The continuing importance of 1 Grove Road to the Council in terms of providing a customer contact centre, and the increasing criticality of the building as the Council's principle site for office accommodation under the agile working programme means that improvements to the condition of the building are even more vital.

#### **Meeting the 10:10 Challenge – the Council as an environmental leader**

- The Council has made the commitment to back the 10:10 campaign to reduce carbon emissions by 10% in 2010.
- The Council has drafted an Environment Strategy which, subject to public consultation, will be adopted by the Eastbourne Strategic Partnership and sets out the town's environmental priorities, one of which is to create a low carbon town.
- The Council is required under the Audit Commission's Key Lines of Enquiry (KLOE) 3.1 Natural Resources to know what natural resources it consumes and adopt a strategy for reducing its use of natural resources.
- The Council is required to report on CO2 reduction under National Indicator 185

For all the reasons above, the Council has a clear role as an environmental leader within the local community.

### **Financial return**

As Annex 3 shows, due to the income that can be generated from the feed-in tariffs described under paragraph 2.11, the annual return improves as the investment increases, with the combination of a biomass boiler and photovoltaic cells having the potential to generate a return of up to £380,000 over 25 years.

- 5.2 On the basis of the reasons summarised in 5.1 above, Cabinet is recommended to:
- Choose Option 3 as laid out in paragraph 3.2 of this report.
  - Approve the funding for the chosen option.
  - Delegate the exact mix of capital and revenue funding required to meet the chosen option to the Chief Finance Officer in consultation with the Cabinet portfolio holder for Finance.
  - Acknowledge the critical dependencies between the workstreams identified in this report and the Agile Working Project.
  - Delegate authority to the Agile Working Strategic Board to deliver the workstreams identified in this report in line with the timescales laid out for agile working implementation.

### **Henry Branson Head of Infrastructure**

March 2010

Background Papers: Accommodation Strategy, Report to Cabinet, 27 May 2009; Agile Working Programme, Report to Cabinet, 10 February 2010, General Report Into The External Condition Of 1 Grove Road, 19<sup>th</sup> September 2008, Detailed Survey Report, Assessment Of Energy Saving Opportunities For Eastbourne Borough Council by Briar Associates, August 2008, updated February 2010.



## Annex 1 – Assumptions and costings for installing Solar PV

<b>Inputs</b>						
Size of system (KWp)		20				
Price per KWp (£)		4,000				
System price (£)		80,000				
Annual yield in kWh per kWp		900				
Orientation efficiency		100%				
Final annual yield in kWh per kWp		900				
Total annual yield for size of system		18,000				
Degradation of PV pa		0.5%				
Maintanance, insurance and admin (£)		90				
Generation tariff YR 0 & 1 (p/kwh)		36.10				
Generation tariff post YR 1 (p/kwh)		33.00				
Export tariff (p/kwh)		0.00				
Unit price of grid electricity purchased (p/kwh)		9.76				
Assumed increase in electricity prices every 3 years		3%				
% generation used in building		100				
Assumed inflation		3%				
Amount of electricity used in building (kwh)		141,173				
Assumed increase in consumption with merger		50%				
Expected amount of electricity used in building (kwh)		211,760				
<b>Cash Flow</b>	Year 0 (2010/11)	Year 1	Year 2	Year 10	Year 11	Year 25
kwh generated		18,000	17,910	17,206	17,120	15,960
Revenue from generation tariff (£)		6,498	5,910	5,678	5,650	5,267
tariff for grid electricity	9.76	9.76	9.76	10.67	10.67	12.36
Value of electricity saved		1,757	1,748	1,835	1,826	1,973
Reveue from export tariff		-	-	-	-	-
Maintenance		90	93	117	121	183
Cost of system	- 80,000					
<b>Yearly totals</b>	- 80,000	8,165	7,566	7,396	7,354	7,057
<b>Year on year total</b>		- 71,835	- 64,270	- 4,435	2,919	103,776

Generation tariff income over 25 years	140,480
Saving in grid purchase over 25 years	46,577
Cost of system	80,000
Profit over 25 years	103,776

## Annex 2 – Assumptions and costings for installing a biomass boiler

<b>Inputs</b>	
System price (£)	350,000
Current grant available	50%
Final system price	175,000
Annual yield (kWh)	450,000
Annual cost of fuel (woodchip)	9,900
Annual cost of fuel (pellet)	15,750
Maintenance, insurance and admin (£)	600
Generation tariff (p/kwh)	6.50
Export tariff (p/kwh)	0.00
Unit price of grid gas purchased (p/kwh)	2.63
Assumed increase in energy prices every 3 years	3%
% generation used in building	100
Assumed inflation	3%
Amount of electricity used in building (kwh)	486,126

<b>Cash Flow for Woodpellet</b>	Year 0 (2010/11)	Year 1	Year 2	Year 5	Year 6	Year 7	Year 8	Year 15
kwh generated		450,000	450,000	450,000	450,000	450,000	450,000	450,000
Revenue from generation tariff (£)		29,250	29,250	29,250	29,250	29,250	29,250	29,250
Tariff for grid gas	2.63	2.63	2.63	2.70	2.79	2.79	2.79	3.04
Value of gas saved		11,817	11,817	12,172	12,537	12,537	12,537	13,699
Costs of woodpellet		15,750	15,750	16,223	16,709	17,210	17,210	18,806
Difference between gas and woodpellet costs		- 3,933	- 3,933	- 4,051	- 4,173	- 4,674	- 4,674	- 5,107
Revenue from export tariff		-	-	-	-	-	-	-
Maintenance		600	618	675	696	716	738	908
Cost of system	- 175,000							
<b>Yearly totals</b>	- 175,000	24,717	24,699	24,524	24,382	23,860	23,838	23,235
<b>Year on year total</b>		- 150,283	- 125,584	- 51,954	- 27,573	- 3,713	20,126	184,064

Generation tariff income over 15 years	438,750
Fuel cost saving over 15 years	-68,527
Cost of system	175,000
Profit over 15 years	184,064

<b>Cash Flow for Woodchip</b>	Year 0 (2010/11)	Year 1	Year 2	Year 5	Year 6	Year 7	Year 8	Year 15
kwh generated		450,000	450,000	450,000	450,000	450,000	450,000	450,000
Revenue from generation tariff (£)		29,250	29,250	29,250	29,250	29,250	29,250	29,250
Tariff for grid gas	2.63	2.63	2.63	2.70	2.79	2.79	2.79	3.04
Value of gas saved		11,817	11,817	12,172	12,537	12,537	12,537	13,699
Costs of woodchip		9,900	9,900	10,197	10,503	10,818	10,818	11,821
Difference between gas and woodchip costs		1,917	1,917	1,975	2,034	1,719	1,719	1,878
Revenue from export tariff		-	-	-	-	-	-	-
Maintenance		600	618	675	696	716	738	908
Cost of system	- 175,000							
<b>Yearly totals</b>	- 175,000	30,567	30,549	30,549	30,588	30,252	30,231	30,220
<b>Year on year total</b>		- 144,433	- 113,884	- 22,178	8,410	38,662	68,893	280,124

Generation tariff income over 15 years	438,750
Fuel cost saving over 15 years	27,533
Cost of system	175,000
Profit over 15 years	280,124



### Annex 3 – Summary of options

Option	Solutions	Pros	Cons	Investment	Aggregate Annual Saving	Additional Funding	Source	Annual Return on Additional Funding	Overall Net Annual Return
1	Solar Shading	<ul style="list-style-type: none"> <li>Relatively cheap solution</li> <li>Slightly improves the visual aspect of the building</li> <li>Reduces solar gain by 78% and goes a long way to maintaining comfortable working temperatures</li> </ul>	<ul style="list-style-type: none"> <li>Does not improve energy efficiency or condition of the building</li> </ul>	£89,700	£0	£89,700	Existing Capital Programme	0	0
2	Solar shading Window replacement Forced ventilation	<ul style="list-style-type: none"> <li>Improves energy efficiency of building</li> <li>Provides a comfortable working environment</li> <li>Improves the visual aspect of the building</li> <li>Enables some progress towards 10:10 target to be made</li> </ul>	<ul style="list-style-type: none"> <li>Starts to become costly</li> <li>Still reliant on fossil fuels to heat the building</li> </ul>	£470,925	£6,389	£381,225	Existing Capital Programme + Existing R&M Budgets	1.7%	1.4%
3i (no grant)	Solar shading Window replacement	<ul style="list-style-type: none"> <li>Provides a comfortable working environment</li> <li>Improves the visual aspect of the building</li> <li>Would be an exemplar low carbon building</li> <li>Reduces overall EBC emissions by 8.9% thus almost meeting 10:10 target</li> <li>Highest return due to feed in tariffs</li> <li>Grants available</li> <li>Potential to save nearly £10k a year on our energy bills</li> </ul>	<ul style="list-style-type: none"> <li>Highest cost</li> </ul>	£965,425	£45,000	£494,500	As above + borrowing	9.1%	4.7%
3ii (grant)	Forced ventilation Biomass boiler Solar PV			£790,425	£45,000	£319,500	As above - grant	14.1%	5.7%