

PART 1 - PUBLIC

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**Decision Maker:** I&E Sub-committee

**Date:** 20 April 2011

**Decision Type:** Non-Urgent Non-Executive Non-Key

**Title:** ENERGY REDUCTION & RENEWABLE ENERGY GENERATION

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**Chief Officer:** Nigel Davies: Director Environmental Services

**Ward:** All

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1. Reason for report

- 1.1. In January 2011 (ES10189), the Executive resolved (minute 143) that:  
'IE&E sub-committee be requested to investigate further ways of reducing energy consumption and look at the benefits associated with renewable energy generation, Feed in Tariffs (FITs) and other similar measures.'
- 1.2. This report therefore identifies those energy efficiency and renewables projects which have most potential to address this resolution.
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2. **RECOMMENDATIONS**

That I&E sub-committee:

- 2.1 Considers this report and the projects set out in paragraphs 3.20 and 3.27 and identifies (on the basis of current capacity) one energy efficiency project and one renewable energy project for further investigation;
- 2.2 Receives a further report at its 26 October 2011 meeting to consider in greater detail the costs and benefits of the selected projects.

### Corporate Policy

1. Policy Status: N/A.
  2. BBB Priority: Quality Environment. Excellent Council
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### Financial

1. Cost of proposal: N/A
  2. Ongoing costs: N/A.
  3. Budget head/performance centre: Environmental Sustainability
  4. Total current budget for this head: £159k (staffing)
  5. Source of funding:
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### Staff

1. Number of staff (current and additional): <1fte
  2. If from existing staff resources, number of staff hours:
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### Legal

1. Legal Requirement: No statutory requirement or Government guidance.
  2. Call-in: Call-in is applicable
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### Customer Impact

1. Estimated number of users/beneficiaries (current and projected): N/A
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### Ward Councillor Views

1. Have Ward Councillors been asked for comments? N/A.
2. Summary of Ward Councillors comments: N/A

### 3. COMMENTARY

#### Background

- 3.1 Members will be aware that significant activity is already undertaken on energy efficiency through Property's planned and reactive works and the Council's Carbon Management Programme. These work streams use existing resources (both financial and staff) to maintain the integrity of the Council's buildings and to deliver reduced energy consumption and carbon emissions.
- 3.2 At its January 2011 meeting, the Executive resolved (minute 143) that 'IE&E sub-committee be requested to investigate further ways of reducing energy consumption and look at the benefits associated with renewable energy generation, Feed in Tariffs (FITs) and other similar measures.'
- 3.3 This Executive request to further reduce energy consumption and costs reflects:
- a need to take action to avoid unnecessary revenue costs in the current economic climate
  - the assumption that energy prices will continue to rise for the foreseeable future
  - an awareness that consumption (and therefore costs) will rise unless action is taken
  - the availability of newly emergent and increasingly efficient energy technologies
  - the availability of government financial incentives for both heat and electricity generation
  - a desire to show community leadership in addressing these issues
- 3.4 This report, therefore, examines how the Council can fast-track the installation and operation of energy efficiency and/or renewable energy technologies in its operational property, with a view to avoiding unnecessary revenue costs and carbon emissions.
- 3.5 Energy surveys have already been undertaken at Bromley Civic Centre and the Walnuts, Orpington which have identified potential projects. In addition, opportunities for solar photovoltaic installations could be identified if a mapping exercise were undertaken.
- 3.6 This desk-based scoping report identifies potential opportunities in both the energy efficiency and renewables sectors (see paragraphs 3.20 and 3.27) which would allow the Council to progress further and faster than currently planned in meeting this challenge.
- 3.7 The intention of this report is to identify the projects which have most potential. Officers will come back to committee to present more detailed and costed proposals in October 2011.
- 3.8 It should be noted that street lighting and schools have been excluded from the scope of this report – which is aimed at increasing the efficiency of the Council's operational property.
- 3.9 A number of issues will be addressed in the proposed October 2011 report and meeting including:
- which projects should be initiated
  - how to fund such projects
  - the future prospects for government energy incentive schemes
  - whether to involve third parties in delivery (e.g. an Energy Service Company or local businesses)
  - project management resources (the projects couldn't be delivered with current capacity).
  - integration with planned Property and Carbon Management activities
  - future occupancy of the Civic Centre and other sites

## Energy Efficiency versus Renewable Energy

- 3.10 Members should be aware that energy efficiency projects, such as condensing boilers or insulation, typically have a much better financial rate of return than renewable energy projects, such as solar power. For this reason, most Council investment (both property works and carbon management activity) has focussed on energy efficiency projects – especially those with a short payback period.
- 3.11 For instance, a solar photovoltaic installation might pay-back in, say, 10 years (assuming Feed-in-Tariff and electricity bill savings) while an efficiency project such as evaporative cooling of the server room might payback in less than one year: which is clearly a better investment proposition.
- 3.12 This remains true but the difference between the two sectors is becoming less marked as:
- the quick wins in the efficiency sector are achieved, leaving only projects with a longer payback
  - renewable technologies quickly become more efficient and attractive
  - the government financially rewards those who generate their own local heat and power (see Government Incentives below) and this has significantly improved the viability of renewable energy installations.
- 3.13 So, while the Council should continue to focus its efforts on energy efficiency projects because they are generally more cost-effective, renewables projects are becoming increasingly attractive and are therefore included in this report.

## Government Incentives

- 3.14 Feed in Tariffs (FITs) came into effect on 1 April 2010 and have been introduced to provide a financial incentive for homeowners, businesses and organisations to make use of small-scale electrical renewables (less than 5MWh), and help the Government meet its renewable energy targets. Eligible renewable energy generators are paid a fixed rate for any electricity they produce and use (generation tariff – see Table 1) by energy suppliers. Additional income is earned if any surplus energy is exported back to the national grid (export tariff – which is set at a lower rate).

Table 1: Subset of Generation Tariffs for Systems Installed before April 2012

Energy Source	Scale	Generation Tariff (p/kWh)	Duration (yrs)
Anaerobic digestion	≤500kW	11.5	20
Anaerobic digestion	>500kW	9.0	20
Hydro	≤15 kW	19.9	20
Hydro	>2MW - 5MW	4.5	20
Micro-CHP	<2 kW	10.0	10
Solar PV	≤4 kW new	36.1	25
Solar PV	≤4 kW retrofit	41.3	25
Solar PV	>100kW - 5MW	29.3	25
Wind	≤1.5kW	34.5	20
Wind	>1.5MW - 5MW	4.5	20
Existing generators transferred from RO		9.0	to 2027

*kW = kilowatt, MW = megawatt*

- 3.15 The FITs provide a long-term incentive – most technologies will receive support for 20-25 years, after which the technology will be re-assessed. Tariffs are set to deliver an approximate rate of return of 5-8% for each technology. The allocated tariff will increase in nominal terms to reflect inflation. The FITs scheme is intended to replace, not supplement, public grant schemes. To ensure value for money for consumers and compliance with EU law on state aid, it is generally not possible for a generator to benefit from both FITs and a grant from a public body.
- 3.16 On 7 February 2011, the Government announced the start of the first review of the FITs scheme. The review will be completed by the end of 2011, with tariffs remaining unchanged until April 2012 (unless the review reveals a need for greater urgency). Any installations made before the changes come into force should not be affected.
- 3.17 The Renewable Heat Incentive (RHI) was announced by the Government on 10 March 2011. It is the first financial support scheme for renewable heat in the world and will provide long-term financial support to renewable heat installations to encourage the uptake of renewable heat. The regulations which underpin this scheme should be approved by Parliament in summer 2011 and the scheme will be introduced shortly thereafter. The Gas and Electricity Market Authority (Ofgem) will administer the scheme.
- 3.18 The key aspects for the non-domestic sector are:
- Payments to be claimed by, and paid to, the heat installation owner (Table 2 for tariff levels)
  - Payments will be made quarterly over a 20-year period
  - For small and medium-sized installations (< 45kWth), both installers and equipment have to be certified under the Microgeneration Certification Scheme or equivalent standard
  - Tariff levels have been calculated to bridge the financial gap between the cost of conventional and renewable heat systems
  - Heat output to be metered and the support calculated from the amount of heat used for eligible purposes, multiplied by the tariff level
  - Biomass installations of >1 MWth capacity will have to report quarterly on the sustainability of their biomass feedstock for combustion and where they are used to produce biogas
  - Eligible non-domestic installations completed after 15 July 2009, but before the start of the RHI, will be eligible for support as if they had been installed on the date of its introduction

Table 2: RHI Tariff Levels Available at The Introduction of the Scheme

Tariff name	Eligible technology	Eligible sizes	Tariff rate (p/kwh)	Tariff duration (years)	Support calculation
Small biomass	Solid biomass; Municipal Solid Waste (incl. CHP)	Less than 200 kWth	Tier 1: 7.6 Tier 2: 1.9	20	Metering Tier 1 applies annually up to the Tier Break, Tier 2 above the Tier Break. The Tier Break is: installed capacity x 1,314 peak load hours, i.e.: kWth x 1,314
Medium biomass		200 kWth and above; less than	Tier 1: 4.7 Tier 2: 1.9		

		1,000 kWth			
Large biomass		1,000 kWth and above	2.6		Metering
Small ground source	Ground-source heat pumps; Water-source heat pumps; deep geothermal	Less than 100 kWth	4.3	20	Metering
Large ground source		100 kWth and above	3		
Solar thermal	Solar thermal	Less than 200 kWth	8.5	20	Metering
Biomethane	Biomethane injection and biogas combustion, except from landfill gas	Biomethane all scales, biogas combustion less than 200 kWth	6.5	20	Metering

*kWth = kilowatt thermal*

### Renewables Sector: Good Practice

3.19 Renewable technologies are becoming more cost effective and there are numerous examples of best practice in this field (see Appendix 1). From this, it would appear that solar photovoltaics and wind turbines are the main focus, with a lesser focus hydro-electric power and combined heat and power (CHP). The majority of the latest projects appear to be taking advantage of the FITs. Wrexham Council for example, are generating income from FITs with solar photovoltaic installations on 3,000 council houses. The Council has estimated the panels will generate a net income of £25.7m over 25 years through the FITs scheme.

### Renewable Energy Proposals

3.20 Five proposals are made in priority order for fast tracking possible renewable energy projects. Members are asked to select one for further investigation.

- Photovoltaic energy at the Civic Centre
- Photovoltaic energy at the Central Depot
- Small-scale Photovoltaic energy (e.g. BEECHE)
- Solar Farm
- Partnership for Renewables (PFR) - Carbon Trust

3.21 Photovoltaic Energy at the Civic Centre: A site inspection by a certified installer in October 2008 demonstrated the potential benefits of installing roof-mounted PV on North Block.

Table 3: North Block PV installation (estimated data)

System Size	9.46kWp (kilo watt peak)
Active Area	65m <sup>2</sup>
Cost per kWp	£3,800
Investment Cost	c.£36k
Annual energy generation	8,120 kWh
Annual CO <sub>2</sub> saving	4.2t
Annual FIT benefit	£3,353* <i>Can't claim FIT if claiming CRC allowances</i>
Annual Saving on electricity bill	£812 (10p/kWh x 8,120 kWh)
Annual Maximum benefit	£4,165 (FIT + Electricity cost saving)
Payback	8.64 years

*\*This only accounts for the Generation Tariff since it is highly unlikely that the Civic Centre will ever have a sufficiently low base load to attract the Export Tariff. It also assumes that electricity costs stay at 10p/kWh.*

- 3.22 Stockwell Building was also identified as having the potential for a slightly smaller, 20kWp system. The best opportunity on the Civic Centre site, however, remains the North Block, especially as it is currently being refurbished.
- 3.23 Photovoltaic energy at the Central Depot: Property Division are in the early stages of investigating the feasibility of installing roof-mounted PV panels to the main buildings at Central Depot. A detailed study on the building structure and costs is required, but early estimates suggest a potential to generate in excess 150,000 kWh of carbon neutral energy each year from the site. Since there are different roofs it is likely that this will emerge as several smaller projects.
- 3.24 Small-scale Photovoltaic energy (e.g. BEECHE): The [Budget Consultation Overview](#) / public meeting response [Our borough, our future 2010](#) referenced 'Developing the use of sustainable technologies through education'. BEECHE already has a Biomass Boiler. A variety of technologies could be installed to make the site carbon neutral and demonstrate to the public how the technologies work (to encourage domestic renewables uptake). Installations could be fitted to other public-facing buildings such as libraries. Calculations for a 3m<sup>2</sup> (1.1kWp) roof-mounted system, based on estimated data, show the following:

Table 4: Small-scale PV installation (estimated data)

Investment in 1.1kWp System:	£7,077	
Electricity Saving and FIT Benefits per annum:	£464	
Payback Time:	11yrs 11mths	
Total Avoided Spend & Income Over 25 years:	£13,005 7.35% per year (4.17% AER)	

- 3.25 Solar Farm: A Solar Farm is the term used for a large, usually floor-mounted, PV system. If the council has land available this might be an option. The current FITs review will have a large bearing on the estimated figures below. Several other councils have instigated such projects (see Best Practice Appendix 1).

Table 5: Solar Farm Installation (estimated data)

Investment in 250 kWp System:	£910,887	
Electricity Saving and FIT Benefits per annum:	£79,030	
Payback Time:	9yrs 6mths	
Total Avoided Spend & Income Over 25 years::	£2,655,863 11.66% per annum (5.46% AER)	

- 3.26 Partnership for Renewables (PFR) - Carbon Trust: 'Partnerships for Renewables' suggest that the public sector can play a significant part in the effort to increase renewables capacity in the UK as public sector bodies own around 10% of the land in the UK (over one million hectares) and thousands of buildings. 'Partnerships for Renewables' work in partnership with public sector bodies throughout the entire development process and covers all development costs. The Partnerships for Renewables package has been designed specifically for the public sector. It has been tailored to meet public procurement guidelines and to demonstrate best-value throughout the development process. Working with Partnerships for Renewables is the simplest and lowest risk way for public sector bodies to access the renewable energy potential of their land and to harness the economic and environmental benefits associated with renewable energy development. Although all renewables are considered, projects to date have always been wind energy, since this has the best economic case.

## Energy Efficiency Proposals

3.27 Four proposals are made in priority order for fast tracking possible energy efficiency projects. Members are asked to select one for further investigation.

- Walnuts Boiler Plant Upgrade Only
- Walnuts Boiler Plant Upgrade and Expansion
- Voltage Optimisation (Various)
- Lighting Upgrade (Stockwell)

3.28 Walnuts Boiler Plant Upgrade Only: An in depth study of replacement options for the 30 year old Walnuts' District Heating System is currently underway. Final figures on costs and savings are due by the end of the summer but provisional estimates indicate high capital investment coupled with attractive, though varying, energy-cost and carbon savings, depending on the option chosen. There are two options for replacing the boilers: to install gas-fired condensing boilers or to biomass-fuelled condensing boilers. The gas boiler is much more cost effective both compared with the existing plant and the biomass plant. However the biomass boiler would be better in carbon terms. Note that the biomass option would benefit from the Renewable Heat Incentive, making the avoided spend and payback far more attractive.

Table 6: Summary of Major Works at Walnuts options (estimated data)

Option	Investment Cost	Avoided spend p.a.	Avoided carbon t.p.a.	Renewable Heat Incentive	Payback (years)
Gas-fired condensing boiler	£189,750	£54,308	353	N/A	3.49
Biomass-fuelled condensing boiler*	£725,000	£54,308	1,014	£113,529	4.31

\* The higher costs for Biomass partially relate to site works which aren't necessary for gas. A full business case will include more in depth appraisal of on-costs such as the price of sourcing local biomass fuel.

3.29 Walnuts Boiler Plant CHP: The option to generate electricity and provide local heating using a Combined Heat and Power Plant is under investigation. There are two options:

- to install a single 500kW electrical unit which would provide heat and electricity for the properties currently served by the boiler plant
- to install a second boiler to allow the network to be extended to local businesses and community users as a district heating scheme (with electricity being used by existing users).

Table 7: Combined Heat & Power (estimated data)

Option	Investment Cost	Avoided spend p.a.	Avoided carbon t.p.a.	Renewable Heat Incentive	Payback
Single Unit	£1,101,000	£140,378	737.3	N/A	7.8

- The second unit would have similar costs and would potentially have further monetary benefits such as being able to sell heat to others in the areas.
- Combined Heat and Power Plants are not eligible for the Renewable Heat Incentive but biomass powered CHP Plants would benefit and could be investigated further.

3.30 Voltage Optimisation projects (small scale): Just as the Civic Centre avoids around £40k p.a. energy spend through having voltage optimisation units, other smaller sites such as libraries could benefit. Provisional estimates, based only on annual energy consumption and site size show:

Table 8: Voltage Optimisation Opportunities (estimated data)

Building	Cost	Energy Cost Saving	Carbon Saving	Payback
Princes Plain EDC	£4,468	£1,217	7	3.7
Anerley Town Hall	£4,468	£1,024	6	4.1



3.31 Upgraded Lighting (Stockwell Building): North Block is due to have replacement lighting as part of the office refurbishment and other opportunities exist around the Civic centre for significant improvements. Upgrading Stockwell Building, for example, would yield large savings with a payback in the region of five years. Such a project would involve disruption to staff working which would need to be addressed.

#### 4. POLICY IMPLICATIONS

- 4.1 The Quality Environment section of the Council's 'Building a Better Bromley 2020 Vision' states that: 'we are also determined to work together in reducing energy consumption' and 'reducing energy use' is also identified as an issue to be tackled and how we will judge success.
- 4.2 This report also accords with Executive-approved policy set out in the Council's Carbon Management Programme, which states: "In support of Building a Better Bromley, our vision is for the Council to lead the local community by significantly reducing our carbon footprint to become a low carbon council over time. This vision will be achieved by developing energy efficient technical solutions to council operations and engendering a low carbon culture among all staff."
- 4.3 Undertaking energy efficiency activity will place the Council in an improved position with regard to complying with, and reducing liabilities under, the Carbon Reduction Commitment Energy Efficiency Scheme (Executive Reports ES09101 December 2009, and ES10189 January 2011).

#### 5. FINANCIAL IMPLICATIONS

- 5.1 This report does not ask Members to make any financial decisions: this will be addressed in the proposed October 2011 report. However, Members will wish to note that a number of factors make energy efficiency and renewable initiatives increasingly financially attractive including:
- their value of combating increasing energy prices and controlling revenue costs
  - the rate of return on energy investment, which is currently better than bank interest rates
  - the income from government incentives for electricity and heat generation (FITS & RHI)
- 5.2 Officers use the term 'avoided spend' rather than 'savings' in relation to energy efficiency activities. Such initiatives certainly generate 'savings' insofar as they avoid costs which would otherwise have incurred had we not taken action. However, they would only deliver savings against budget if there had been no overall increase in consumption (due to other factors) or an increase in energy prices.
- 5.3 Consideration will need to be given to both the investment and operational cost of any proposal and also to any staff costs associated with managing such projects.

<b>Non-Applicable Sections:</b>	Legal Implications & Personnel Implications
Background Documents: (Access via Contact Officer)	Executive Report ES10188: Carbon Management Programme Progress Report 2009/10 Executive Report ES10189: Carbon Reduction Commitment Scheme 2010 Annual Report IE&E Report ES08185: Carbon Management Programme: First Tranche Projects IE&E Report ES09102: Carbon Management Fund: Progress Report 2009 IE&E Report ES10102: Carbon Management Fund: Progress Report 2010