

ABERDEEN CITY COUNCIL

COMMITTEE : Housing and Environment 16 February 2010

CORPORATE DIRECTOR: Pete Leonard

TITLE OF REPORT: Biomass heating at Duthie Park Winter Gardens

REPORT NUMBER: H&E/10/012

1. PURPOSE OF REPORT

To propose to Committee that the existing oil and gas heating systems at Duthie Park Winter Gardens are replaced with a biomass system, and, to include in the biomass fuel supply contract the use of surplus wood from our local parks, with a view to developing in the future a woodfuel production base in Aberdeen, as an income generating project, managed by our Arboricultural Service.

2. RECOMMENDATION(S)

That the Committee:

- a) approves a tender being issued for the installation of a biomass heating system at Duthie Park Winter Gardens at an estimated capital cost of £423,000, based on the recommendations in the Feasibility Report, subject to the full capital funding having been secured;
- b) instructs the Director of Housing and Environment Services to arrange for the preparation of a non-housing capital bid for £125,000 in respect of the biomass heating system;
- c) instructs the Director of Housing and Environment Services to submit the aforesaid non-housing capital bid to the next appropriate meeting of the Finance and Resources Committee with a recommendation that they approve said bid; and
- d) approves a tender being issued for the supply of biomass fuel at an estimated annual cost of £58,340, subject to the full capital funding having been secured for the biomass heating system, and include in the tender a requirement that surplus wood from the Council's parks will be purchased by the successful company for inclusion in the biomass supply chain.

3. FINANCIAL IMPLICATIONS

The capital cost of £423,000 would be covered through a combination of external grant, non-housing capital grant funding of £125,000 and Central Energy Efficiency Fund (CEEF) funding.

Revenue savings of £65,090 per annum are expected. The savings would be repaid to the CEEF over the first 3 years, after which this annual saving would accrue to the Council as a result of reduced fuel costs.

4. SERVICE & COMMUNITY IMPACT

This report supports the following National Outcomes from the Single Outcome Agreement (SOA) 2008-2011 and Aberdeen City's Community Plan. Specifically from the SOA:

- **12.** We value and enjoy our built and natural environment and protect it and enhance it for future generations;
- **14.** We reduce the local and global environmental impact of our consumption and production;

and it also links generally to the Council's policy statement, Vibrant, Dynamic and Forward Looking, in terms of its declared intention to be an efficient Council.

5. OTHER IMPLICATIONS

Development of a woodfuel production base in Aberdeen will require the direct involvement of the Council's Arboricultural Officer.

The CO2 saving, estimated to be 697.9 tonnes per annum, will contribute to our future Carbon Reduction Commitment targets as required to be monitored and reported under UK legislation.

6. REPORT

6.1. Background and Feasibility Report

The Duthie Park Winter Gardens are currently heated by a combination of two boilers, one oil and the other gas. A detailed Feasibility Study was carried out in November 2009 to determine:

- Whether the two existing heat circuits could be combined into one, fuelled by a biomass boiler
- The optimum size of a biomass boiler and related heat store
- Whether a wood boiler should be used for base load, with the peaks taken by the existing fossil fuel boilers, or whether to retain the existing oil and gas boilers for back up only
- The controls implications of having 2 or 3 systems (biomass, oil and gas) on the same heating circuit.
- Whether a wood boiler, plus heat store, could cope with the fast changing heat demand as the level of solar insolation changes
- The type of fuel to be used: wood chip or wood pellet
- Location of a wood boiler
- Specification and location of associated biomass store
- Number of fuel deliveries required per month
- A specification for wood supply and quantity to be used in a future tender for the fuel supply
- Availability of local suppliers and indicative prices for the wood fuel
- Capital costs; indicative running costs; payback period; likely access to grants.

The Feasibility Study was carried out by David Palmer of The Campbell Palmer Partnership Ltd, an acknowledged expert in the biomass field, and was arranged and funded by The Carbon Trust. The Executive Summary is attached at Appendix One. A copy of the full report is available by contacting the author of this report.

6.2 Findings and recommendations:

Technically there are no constraints on changing the heating system at Duthie Park Winter Gardens to biomass.

The estimated total capital cost would be £423,000. The estimated annual savings on running costs would be £65,090. It is recommended that the capital costs are covered through a combination of grant, expected to be around £126,700, a non-housing capital contribution of £125,000 from the Council, plus funding from the Central Energy Efficiency Fund (CEEF) of the balance which would be expected to be around £171,300.

CEEF is a revolving loan fund provided by the Scottish Government to public bodies to assist in funding the capital costs of carbon saving measures. Savings on running costs are used to repay CEEF so ensuring that value of the loan fund is retained for other energy saving measures in future. We have sufficient CEEF funding available for this recommended project. The payback period would be less than 3 years, after which the annual savings to the Council would be the estimated £65,090 per annum.

6.3 If the recommendations are approved, the following actions will be taken:

- Apply for grant funding, with an initial application to the Community and Renewable Energy Scotland (CARES) scheme, and with the fall back position of applying to the Scottish Biomass Support Grant or a Low Carbon Buildings Fund
- Tender for the supply and installation of the biomass boiler; the necessary works to link the two exiting heat circuits into one; the required changes and additions to the control systems; supply and installation of the biomass store. The successful company would be responsible for applying for Planning Permission and Building Warrant.
- Tender for the supply of woodchip for a five year period, with performance reviews built in to enable the contract to be ended earlier performance standards are not met.

6.4 Feeding surplus wood from local parks into biomass supply chain

The parks in Aberdeen produce wood from fallen trees, thinning, cuttings and brush. At present some of this wood is sold as logs at Hazlehead Park, and some of the remaining wood is chipped to top-dress park pathways. The amount of such wood is expected to increase in future as the Council owned woods are more actively managed.

It is proposed that we use our purchasing power to enter into a contract with a biomass supplier for Duthie Park to ensure the surplus woody material from our parks is fed into the biomass supply chain. This would involve the successful biomass supply company agreeing to buy this surplus woody material from the Council, chip it within a location in Aberdeen such as the Hazlehead Nursery, and sell it locally, potentially as part of their supply to Duthie Park.

Such a development could be used to pump prime the establishment of a woodfuel production base within Aberdeen, initially using woody materials from Council land and forests, but with the potential of developing this into a wider scheme to make use of surplus and waste wood from throughout the City. It is proposed this could be built up to become an income generating scheme, managed by the Council's Arboricultural Service. A separate report on this proposed development of a woodfuel production base in the City will be submitted for Committee's consideration at a later date.

7. REPORT AUTHORS DETAILS

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8. BACKGROUND PAPERS

- Carbon Management Energy Efficiency Report: Assessment Of Energy Saving Opportunities For Duthie Park Winter Gardens, Aberdeen City Council 2009
- Best Practice Case Study – Pentland Plants, Loanhead, Midlothian. Forestry Commission Scotland (May 2009)

Appendix 1

Carbon Management Energy Efficiency Report: Assessment Of Energy Saving Opportunities For Duthie Park Winter Gardens, Aberdeen City Council - Feasibility Study, by The Campbell Palmer Partnership Ltd, Funded by The Carbon Trust. (2009)

Executive Summary

This report presents the results of a CMEE Single survey of the Winter Gardens, Duthie Park, Aberdeen carried out by The Campbell Palmer Partnership Ltd. This survey and report are provided by the Carbon Trust, whose activities are grant funded by the Department for Environment, Food and Rural Affairs, the Department for Business, Enterprise and Regulatory Reform, the Scottish Government, the Welsh Assembly Government and Invest Northern Ireland.

The agreed scope of work was to carry out a feasibility study to answer key questions about the conversion of the oil and gas heating systems for the Winter Gardens to a biomass heating system. All of the specific objectives agreed with the Carbon Trust and the Manager of the Winter Gardens were addressed with positive outcomes for all of them.

The study identified that it would be feasible to operate the heating for all the glasshouses, including those currently heated by the gas boiler, from a biomass boiler which should be rated at 500kW. A 13,000 litre thermal store is required to enable this boiler to provide up to 94% of the annual heat energy required. It is possible to interconnect a biomass system with both the existing gas-oil and gas boilerhouses, and to configure the entire system so that the existing boilers would provide both peak load lopping and 100% back-up without major hydraulic or control system changes. The remaining 6% of annual energy required would be supplied by the existing oil and gas boilers.

It is proposed that a new biomass boilerhouse be constructed on the north edge of the site adjacent to the recently constructed storage sheds. An underground fuel silo could be located next to the boilerhouse taking advantage of the higher ground level at this point to minimise the amount of excavation required for the fuel store. A new ramp for a fuel delivery vehicle would be required up to the fuel store. Both planning permission and a building warrant would be required; as Duthie Park is not located in an air quality management area no issues with air quality should arise from the proposed installation.

Three local fuel suppliers were contacted and quotations for woodchip fuel at 30% moisture content of £88 per tonne and £90 per tonne were obtained. Fuel would be delivered by articulated vehicle at 140m³ (or 25 tonnes) a time. A delivery of this size would provide 7 days' fuel supply when the boiler is operating continuously in cold weather. As there are a number of suppliers able to supply reasonably dry woodchip the use of wood pellets was not considered. A maximum of 4 fuel deliveries per month would be required in winter, with one delivery or less per month in the summer. A total of 660 tonnes of woodchip at 30% moisture content per year would be required. The recommended fuel specification is woodchips with a moisture content of 30% and the majority of chips not exceeding a 35mm dimension.

Currently, the Winter Gardens spend an estimated £131,200 per year on gas-oil and gas for heating the glasshouses. The estimated future cost of heating by biomass is £58,340 which together with residual fossil fuel costs of £7,770 makes a future fuel cost of £66,110 and an annual fuel cost saving of £65,090. The Renewable Heat Incentive (RHI) is likely to come into force in 2011, and an incentive of 1p/kWh would increase the effective annual saving by £22,860 to £83,540.

The estimated capital cost for the system is £422,310 which includes the biomass equipment, new boilerhouse and fuel store, and district heating connections to the existing boilerhouses together with minor pipework and control changes. This site should be eligible for a Community and Renewable Energy Scotland (CARES) grant of about 30% which would reduce the capital outlay to just below £300,000. Without a grant or the RHI taken into account the simple payback on the project would be 6.9 years, but this would fall to 3.5 years if both the CARES grant and the RHI are taken into account.