APPENDIX C

Briefing note on biomass

1) Biomass boilers and fuel

With the Renewable Heat Incentive (RHI), the use of biomass for heating in traditionally oil-dependent areas off the mains gas network is now a cost effective alternative. This operates by burning either wood chip or wood pellets to produce heat. The installation of a biomass boiler in place of an oil boiler does not require modifications to the heating system. The wood fuel is typically stored adjacent to the boiler and does not have the potentially expensive environmental costs associated with handling and storing heating oil or liquid petroleum fuels. Modern biomass boilers are advanced and highly efficient devices, typically avoiding many of the problems sometimes associated with early biomass boilers, such as manual ash removal, excessive tar deposits and low thermal efficiencies.

There are two main types of wood fuel that can be used in biomass boilers:

Wood chip typically comprises batches of seasoned wood that have been roughly cut into small pieces. This process is typically performed on whole sections of the original tree and contains bark, foliage, moss and other organic elements. The moisture content can be difficult to control and, combined with the quantity of bark and other impurities within the chip batch, defines the calorific value of the each batch of fuel. A key issue with the use of this fuel is that low cost fuels will tend to be wetter and contain more impurities. This can cause issues if chip is stored in an unsuitable facility where it will quickly compost. Wood chip takes up more space and is heavier per unit of stored energy and this equates to a larger storage facility and/or more frequent deliveries. It can be difficult to assess and prove the quality of wood chip and this is a consideration for long-term fuel management.

Wood pellets are small pieces of processed matter, potentially including virgin and waste wood, grasses and other organic matter. The feedstock is milled into dust which is then compressed under the appropriate conditions to form it into a pellet. These pellets have a high degree of consistency in terms of size, shape and other physical properties. The calorific value per tonne and per unit volume is greater than for wood chip and they can be stored and transported more easily. When filling a pellet store from a transport vehicle it is possible to blow the pellets up to 30m, avoiding logistical issues at sites with limited access to the likely wood store area. Pellets are typically more expensive than wood chip to procure, but may provide flexibility regarding the feedstock used to produce them and may see cost reductions as the biomass industry matures.

2 Benchmarking information on local authorities and biomass

A survey of councils located in the south of England was undertaken in November 2011 to understand what progress, if any, had been made in installing biomass boilers at their sites and how procurement issues (fuel and equipment) had been handled. Responses from 6 local authorities were received.

Due to the carbon savings associated with biomass, they all were following a policy of converting to this fuel source when existing oil fired boilers reached the end of their working lives. The availability of the Renewable Heat Incentive has stimulated interest in accelerating the replacement programme for oil boilers due to the income that can be received. The authorities who are operating the most boilers are Suffolk County Council (20) and Worcestershire County Council (10).

Operationally the boilers installed range in output from 25kW to 1.2mW, with the predominant size at the lower end of the range up to 200kWs (typically smaller sites in rural areas). The space requirement of biomass boilers compared with oil is around 4:1, due to the additional storage requirements. As a result this has meant that some oil dependant sites have not been able to switch due to a lack of space.

The procurement of wood for the boilers has been highlighted as a developing area. Authorities such as Cornwall and Suffolk County Council are developing capacity within their areas to source and produce this fuel. Suffolk estimates that the local biomass industry had already created around 40 jobs due to increasing demand from the council and other consumers.

Whilst work continues to build local supply chains, authorities currently rely on contracts with brokers or regional suppliers. Pellet is seen as preferable to chip due to greater consistency in the fuel source and greater bulk densities that can be achieved for transportation. However, fewer companies offer this option as there is a requirement to undertake more processing of the wood.

A key risk highlighted was regarding fuel security and concerns over what would happen if the biomass boilers failed. Establishing contracts with fuel suppliers in the short to medium term removes some of the risk surrounding fuel security. If some containerised biomass boiler units are installed then the existing oil infrastructure could remain in place as a fall back. However, as the business case allows scope for dedicated staff time to manage the boiler network the likelihood of failures arising should reduce and, if they do, a dedicated, knowledgeable person can work quickly to resolve any problems.

To date the roll out of boilers has been progressive which has meant that procurement has not needed to go through OJEU procedures. However, it is

recognised that this approach could achieve financial efficiencies through bulk buying.

3 Benefits to the council associated of using biomass boilers

3.1 Carbon reduction potential

Oil has the highest carbon content of all stored fuels and a typical primary school would emit in the region of 20-40 tonnes of CO_2 per annum from its oil consumption. The Carbon Reduction Commitment recognises biomass as a zero-carbon technology. If **all** oil consumption in the corporate estate and schools at sites that have not recently been fitted with new oil plant was replaced by biomass, the resulting total reduction in carbon emissions is estimated to be approximately 2,213 tCO_2 (18 % of the corporate target for carbon reduction). If the programme of works recommended were undertaken this is estimated to achieve a reduction of 1,641 tCO_2 (14 % of the corporate target for carbon reduction).

3.2 Cost reduction potential

Wiltshire Council currently pays the CRC costs for all corporate emissions and those of all schools, including Academies and Special Schools. However, a proposal is currently out to consultation with schools for the council to charge individual schools for their CRC costs.

The current CRC payment of £ 12 per tCO_2 does not apply to the output of any biomass boiler and a conversion from oil to biomass would therefore realise a first-year cost saving under the CRC in the order of £ 200-300 for a small primary school. For a large secondary school this figure could be in the region of £2,000. The cost of CRC is expected to rise steadily in a manner similar to the landfill tax escalator so that the savings to schools will increase proportionately.

The unit cost of oil varies from site to site and order to order. It is not uncommon for prices to fluctuate dramatically throughout the year and the price available on one day might vary from that available a few days later by as much as 20%. There is currently no corporate contract for oil and each site procures oil independently. A guideline unit price for oil is £ 0.055 per kWh, which is equivalent to £ 0.56 per litre of a common type of heating oil. This can only be an illustrative value as a consolidated data set of all oil consumption and prices is not currently available. The typical unit cost of natural gas is around £ 0.021, with most sites supplied via a corporate contract through the Office of Government Commerce. Wood pellet unit prices may vary between £ 0.030 and £ 0.045. When subsidised by the Renewable Heat Incentive payments, the equivalent unit rate for a typical boiler suitable for a primary school would represent a net income per unit of fuel consumed. For a large school the tariff is lower due to the larger boiler size required, but the equivalent heating cost is approximately halved, making it roughly equivalent to the cost of natural gas.

The impact of the RHI scheme on the cost effectiveness of this technology cannot be overstated and the availability of this long-term subsidy represents an opportunity to bring forward some or all of the works already expected as part of an inevitable gradual shift away from oil to a sustainable alternative.

3.3 Overlaps with planned maintenance programme

Boilers age during their service life and the maintenance costs increases significantly towards the end of their useful life. Boiler lifetime is not fixed, but an expectation would be that a boiler should be serviceable at a reasonable level of performance for 20 years. Some of the facilities in the scope of the proposed programme are of an age where the expectation is that they will need replacing within the next five years. This programme therefore represents an opportunity to deal cost effectively with an existing liability, realising additional cost savings by undertaking the work while there is an additional financial incentive through the Renewable Heat Incentive. The expectation is that over £ 250,000 of liabilities will be resolved through this programme, reducing the real cost of the programme accordingly.

3.3 Value added benefits

In addition to the direct financial benefits there is a highly cost-effective opportunity to incorporate additional networked metering and controls solutions that could;

1. Reduce existing demands on officer resources for data gathering
2. Provide curriculum-based educational tools
3. Reduce the risk of sites closing due to lack of heating fuel
4. Realise cost savings through optimising heating and raising awareness of consumption levels
5. Permit increasingly detailed analysis of site operation to identify further cost-saving opportunities
6. Allow the authority to realise procurement cost savings

These include the collection and monitoring of energy consumption data, especially with respect to statutory requirements such as CRC and other UK and European directives[1]. Detailed consumption data would enable Wiltshire Council to offer cost-effective energy management services, including the procurement and distribution of biomass and other fuels.