

**REPORT TO:** Planning committee  
**DATE:** 11<sup>th</sup> November 2009  
**SUBJECT:** Biomass  
**WARDS AFFECTED:** All  
**REPORT OF:** Environmental Protection Director  
**CONTACT OFFICER:** Gary Mahoney 4300  
**EXEMPT/CONFIDENTIAL:**

**PURPOSE/SUMMARY:** To advise committee of the air quality issues arising from the increasing use of biomass boilers in Sefton and to make recommendations for a policy approach to minimise their impact.

**REASON WHY DECISION REQUIRED:** There is a requirement for 10% of the energy of large developments (> 1000 m<sup>3</sup>) to be generated by on site renewables. This requirement is leading to a significant increase in the number of biomass boilers in the Borough. Biomass combustion can have an adverse effect on local air quality and it is therefore important for the Council to develop a policy to reconcile the need to reduce greenhouse gas emissions with the need to protect local air quality.

**RECOMMENDATION(S):** That Planning committee agrees the draft guidance proposed in Annex 2.

**KEY DECISION:** No

**FORWARD PLAN:** No

**IMPLEMENTATION DATE:** Immediately following the expiry date of the “call-in” period for the Minutes of this meeting.

**ALTERNATIVE OPTIONS:** The only alternative option would be to do nothing and allow the continued expansion in biomass capacity without introducing measures to protect local air quality. This has been rejected because failure to act could lead to deterioration in local air quality.

**IMPLICATIONS:**

**Budget/Policy Framework:** None.

**Financial:**

<b><u>CAPITAL EXPENDITURE</u></b>	<b>2006/ 2007 £</b>	<b>2007/ 2008 £</b>	<b>2008/ 2009 £</b>	<b>2009/ 2010 £</b>
Gross Increase in Capital Expenditure				
Funded by:				
Sefton Capital Resources				
Specific Capital Resources				
<b><u>REVENUE IMPLICATIONS</u></b>				
Gross Increase in Revenue Expenditure				
Funded by:				
Sefton funded Resources				
Funded from External Resources				
Does the External Funding have an expiry date? Y/N	When?			
How will the service be funded post expiry?				

N/A

**Legal:**

**Risk Assessment:** N/A

**Asset Management:** Some of the developments proposed may be Council facilities or schools.

<b>CONSULTATION UNDERTAKEN/VIEWS</b> Sustainable Energy Officer, Planning Department
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**CORPORATE OBJECTIVE MONITORING:**

<b><u>Corporate Objective</u></b>		<b><u>Positive Impact</u></b>	<b><u>Neutral Impact</u></b>	<b><u>Negative Impact</u></b>
1	Creating a Learning Community		✓	
2	Creating Safe Communities		✓	
3	Jobs and Prosperity		✓	
4	Improving Health and Well-Being	✓		
5	Environmental Sustainability	✓		
6	Creating Inclusive Communities		✓	
7	Improving the Quality of Council Services and Strengthening local Democracy	✓		
8	Children and Young People		✓	

**LIST OF BACKGROUND PAPERS RELIED UPON IN THE PREPARATION OF THIS REPORT**

Biomass and Air Quality Guidance for Local Authorities (England and Wales), EPUK & LACORS, 2009  
Minimising Greenhouse Gas Emissions from Biomass Energy Generation , Environment Agency, 2009  
Biomass Carbon sink or Carbon Sinner – Environment Agency 2009  
Technical Guidance Screening Assessment for Biomass Boilers, AEA Energy and Environment, 2008  
New Energy Focus may 2009

## **Background**

1. Burning biological material (biomass) is perhaps one of the oldest forms of generating heat. In the UK the use of wood as a fuel was largely superseded by fossil fuels, firstly coal and then electricity, generated from fossil fuel sources, and gas. The smogs of the 1950's highlighted the dangers of combustion in urban areas and led to the drive to control combustion processes or remove them from urban areas.
2. However the need to reduce greenhouse gas emissions and our dependence on fossil fuels has led an increased demand for alternative, renewable, sources of energy. Sefton, in common with many authorities throughout the country now requires that for all developments over 1000 m<sup>2</sup> at least 10% of the energy required is generated from on site renewables.
3. The search for new energy sources has led to a renewed interest in using biomass combustion to generate energy and the consequent reintroduction of combustion processes into urban areas.
4. Up to now the most common type of biomass combustion that is being sought for developments in Sefton is the use of wood fuelled boilers for space and water heating.

## **Biomass as a low carbon fuel**

5. Biomass is often described as a carbon neutral fuel. This is because even though the combustion of biomass produces carbon dioxide it is considered only equivalent to the amount of carbon that is captured by the plants as they grow. However there are some important caveats to this.
6. The nature of the crop to be used for fuel is important. Growing crops requires energy inputs, usually in the form of fertiliser. Different crops require different amounts of energy inputs. This must be taken into account when assessing the overall greenhouse gas emissions of a particular fuel crop. For example, when compared to a combined cycle gas turbine power station using short rotation coppice chips to generate electricity can produce 35 to 85 per cent less greenhouse gas emissions, whereas using straw can produce over 35 per cent more emissions per unit of energy delivered<sup>1</sup>. Any changes in land use to produce the fuel crop will also have an impact. For example, using formerly fallow land to grow bioenergy crops can reduce emission savings from a fuel by up to 10 per cent. Planting on permanent grassland is worse, with emissions savings significantly reduced and in some cases reversed<sup>1</sup>.
7. There is a requirement for energy to be put into the processing of the material to bring it into a suitable form for combustion and this should be accounted for when assessing the overall carbon savings of a fuel. For example using wood pellets, as opposed to wood chips, has considerable advantages with regard to materials handling and fuel consistency; however there are more carbon emissions associated with the production of pellets than of chips<sup>1</sup>.

8. There is also the energy expended in transporting the material both to the processing plant and from the plant to an end user. Transporting fuels over long distances can reduce the emissions savings from a fuel<sup>1</sup>.

### **Sustainability and Biomass**

9. Concern has recently grown over the sustainability impacts of growing energy crops for biofuels. These same concerns could apply to the growing of biomass crops. There is currently no agreed sustainability standard for biomass crops such as woodchip, pellets and logs. The Department of Energy and climate Change (DECC) are currently working with the Renewable Energy Association on this issue.

### **Biomass and Local Air Quality**

10. In common with all forms of combustion burning biomass will produce pollutants that affect local air quality.
11. Emission levels of pollutants such as particulates (PM), polyaromatic hydrocarbons (PAHs) and carbon monoxide (CO) depend on the completeness of the combustion process and hence the design of the combustion equipment.
12. The temperatures achieved in conventional biomass combustion are considered not to be high enough to oxidise atmospheric nitrogen into oxides of nitrogen (NO<sub>x</sub>). Therefore NO<sub>x</sub> are almost exclusively formed from nitrogen contained within the fuel. Emission levels of NO<sub>x</sub> are therefore heavily dependent on the chemical composition of individual fuels, as are emissions of oxides of sulphur (SO<sub>x</sub>).
13. Overall emissions will therefore be dependent on the design of the combustion plant, the chemical and physical qualities of the fuel (fuel quality), and the presence of any emissions abatement equipment fitted to the plant.
14. The pollutants of most concern are oxides of nitrogen (NO<sub>x</sub>) and particulate matter as these relate to nitrogen dioxide (NO<sub>2</sub>) and PM<sub>10</sub> which are pollutants controlled under the Local Air Quality Management (LAQM) regime that have been identified as approaching or exceeding the National Air Quality Strategy (NAQS) Objectives in some parts of Sefton.
15. Most of the particulate matter generated by a biomass boiler will be in the smaller size range, known as PM<sub>2.5</sub>. This is a component of PM<sub>10</sub> and increases in PM<sub>2.5</sub> levels will increase measured PM<sub>10</sub> levels. However there is also a European Standard directly relating to PM<sub>2.5</sub> that requires a 15% reduction in PM<sub>2.5</sub> levels by 2015.
16. Although there are standards and objectives relating to particulate matter recent research has suggested that it is a 'no threshold' pollutant which means that there is no threshold below which health effects will not occur thus any increase in particulate matter levels will have health effects.

17. Another important consideration in determining the air quality effects of a proposed biomass combustion plant is whether the installation is new or if it will be replacing existing plant and what was the nature of the combustion technology and fuel replaced. For example the introduction of biomass combustion would lead to an increase in NO<sub>x</sub> and PM<sub>10</sub> emissions compared to an existing gas plant but may lead to a reduction if coal burning plant is replaced.
18. Whilst emissions from individual biomass plants may be low the popularity of biomass as a source of on site renewables could lead to considerable increases in the number of combustion sources in any given area. There would then be a cumulative effect that could affect local background levels of NO<sub>x</sub> and PM<sub>10</sub>.

### **Assessing the air quality impacts of proposed biomass installations**

19. Biomass boilers are sources of air pollutants that are designated for control under the Local Air Quality Management framework. As such proposed installations should be assessed for their impacts on local air quality. From the above report it can be seen that the key considerations to the control of emissions from biomass boilers are the nature of the equipment that is installed and the type of fuel used. To try to capture this information a 'Biomass Boiler Information Request Form' was developed (attached as Annex 1). Unfortunately, it has often proved difficult to obtain this information from developers. Applicants are often unwilling to specify the type of equipment that will be installed and, even when an indication of the boiler type is provided, often emissions information is not available in an easily accessible form. To try to improve this situation it is proposed to require developers to provide at the planning application stage details of an 'exemplar' boiler that is representative of the proposal. A new Biomass information form has been produced nationally, by LACORS, and Planning Conditions will be imposed requiring this form to be completed in full with the details of the actual installation. Boilers with higher emissions than the exemplar will not be permitted. A proposed policy for dealing with all non gas combustion boilers is given in Annex 2.

### **Legislative Controls Relating to Air Quality and Biomass Combustion**

The growth of biomass as an important fuel type has been relatively rapid and has not been matched by the provision of effective controlling legislation. The vast majority of legislation that applies to small appliances is designed to control pollution at ground level from smoke and sulphur dioxide emissions and to prevent nuisance. However, this legislation does not specifically control PM<sub>10</sub> or NO<sub>x</sub>. The majority of biomass boilers that have been proposed in Sefton fall into this category. More effective controls exist for larger installations.

20. The location of chimneys is controlled by building regulations.
21. For larger installations biomass energy proposals >50 MWe fall within Schedule 2 of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (the EIA Regulations) and are subject to an Environmental Impact Assessment (EIA) where they are considered likely to have significant effects on the environment. Any thermal biomass power stations with a heat output of at least 300MW would fall under Section 1 of the Environmental Impact Assessment (EIA) Regulations and an EIA would be mandatory.

22. To date all applications in Sefton have been for small biomass boilers for which only limited controls under the Clean Air Act and the Chimney Height Memorandum can be applied. LAQM Guidance has now been updated to include consideration of biomass, but this concentrates on assessing the impact of biomass boilers and whether the installation is likely to lead to the necessity to declare an AQMA. The LAQM guidance does not include any control measures. Controls can be placed on biomass boilers proposed for new developments through the planning system. However, where existing equipment is replaced there may not need to be a planning application. Pollution control legislation is very limited in these circumstances.

## **Recommendations**

23. All forms of energy extraction have environmental impacts. For example wind turbines can cause unacceptable levels of noise and geothermal energy installations can be problematic in areas where there are contaminated land issues. Biomass has a role to play in controlling emissions of greenhouse gases. However, potential impacts on local air quality cannot be overlooked. To this end a clear guidance on the information developers should supply to allow applications for biomass boilers to be assessed has been produced. The guidance includes criteria establishing where biomass boilers will be permitted. The suggested guidance is attached at Annex 2. Subject to approval this will be produced as a guidance note for developers
24. That Planning committee agrees the draft guidance proposed in Annex 2.

## Biomass Boiler Information Request Form

Commercial biomass boilers are a source of particulate matter (PM10/PM2.5) and nitrogen oxides (NOx) emissions. These pollution emissions can have an impact on local air quality and effect human health. It is essential that any new biomass boilers installed in Sefton meet certain emission control requirements in order to protect local air quality.

The information below must be supplied to the local authority for the biomass boiler to be approved. Submission prior to the planning application will allow discussions as to the suitability of the proposed boiler to taker place.

### 1 Development Details

- i. Planning Application Reference (if known).....
- ii. Name of Site.....
- iii. Address where boiler(s) will be located.....
- iv. Person completing form.....
- v. Date.....

### 2 Particulars of the Boiler

- i. Description of biomass boiler including make, model, manufacturer, thermal capacity (kW/MW).
- ii. Maximum rate of fuel consumption in kg/hr or m3/hr.
- iii. Identify efficiency of the boiler. Does the boiler comply with EN303-5; provide details.
- iv. Describe the boiler combustion system and grate design.
- v. Describe how combustion will be optimised and controlled in order to reduce pollution emissions.
- vi. Describe the fuel feed system.
- vii Provide details of the abatement equipment in place for controlling particulate matter (fly ash) emissions.
- viii If no abatement system for particulate matter is fitted, justify what boiler design features are in place to effectively reduce particle emissions.
- ix. How does the biomass boiler deal with variable heat loads - is the boiler linked to an accumulation tank?
- x. Is the biomass boiler an exempt appliance in accordance with the Clean Air Act 1993? If yes provide evidence to demonstrate the biomass boiler has been tested and certified as an exempt appliance.
- xi Provide details of the emissions in tones per year and grams per second to standard reference conditions (6% oxygen, 273K, 101.3kPa) of NOx, NO2 and PM10 associated with the proposed boiler. . Provide emissions test data as evidence of emissions rates from the boiler. This shall reference the test method used to determine emission concentrations.



- Both maximum and typical emissions levels shall be provided.
- Account shall be taken of the variable emissions rates associated with the biomass boiler operating on full and partial load and full details of the assumptions used in calculating the emissions provided.

### **3 Boiler Operation and Maintenance**

- Describe arrangements for cleaning and de-ashing the boiler.
- Who will be responsible for operating and maintaining the boiler?
- Provide details of the maintenance schedule associated with the boiler, abatement equipment and stack. This should include frequency of boiler inspection and servicing by a trained boiler engineer.
- Describe how incidences of boiler or abatement system failure are identified & mitigated.

### **4 Boiler Stack Details**

- Identify the height of the boiler exhaust stack above ground. The height should be such that predicted emission concentrations do not have a significant impact on the air quality objectives for NO<sub>2</sub> and PM10. Evidence shall be presented to demonstrate this.
  - Account shall be taken of the variable emissions rates associated with the biomass boiler operating on full and partial load.
  - Information should be submitted outlining all the factors and assumptions used in assessing the impact of the emissions.
- Identify stack internal diameter (m).
- Does the stack terminate vertically and is the stack insulated?
- Identify the exhaust gas efflux velocity (m/s).
- Is the boiler exhaust stack fitted with draft fans with adjustable speed control?
- Grid reference of boiler exhaust stack.

### **5 Fuel Details**

- Description of the fuel specification including origin, type of wood (chips, pellet, briquettes), particle size, nitrogen, moisture, ash content (%) and mechanical durability.
- Does the fuel comply with European or equivalent fuel quality standards such as CEN/TS 335 or ONORM?
- Describe what fuel quality control procedures will be adopted to guarantee constant fuel quality from your supplier.
- Provide evidence to demonstrate that the biomass boiler combustion system is applicable to the fuel specification.
- Location and distance of fuel supplier(s) from site.

- vi. Identify where and how fuel will be stored on site (e.g. bunker or silo).
- vii. Identify the capacity of the fuel store.
- viii. Will the biomass store be fitted with ventilation, provide details?
- ix. Describe how fuel will be unloaded from the delivery vehicle into the storage facility and what control measures will be in place to reduce particulate matter emissions to atmosphere.

## **6 Building Details**

- i. Distance of adjacent buildings from boiler exhaust stack.
- ii. Height of adjacent buildings from boiler exhaust stack.
- iii. Dimensions of building to which the boiler exhaust stack is attached.
- iv. Indicate the distance from the boiler exhaust stack to the nearest fan assisted intakes and openable windows.
- v. Provide a site plan showing the position of the boiler exhaust stack, fan assisted intake air vents and nearest openable windows.

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<sup>1</sup> Biomass Carbon sink or Carbon Sinner – Environment Agency 2009

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## **Non Gas Boilers Within or Affecting an Air Quality Management Area**

There will be a presumption against any non-gas combustion in an Air Quality Management Area (AQMA) or in other areas where emissions from the installation would adversely affect an AQMA.

## **Non Gas Boilers Outside of Air Quality Management Areas**

### **Information Requirements**

- For any non gas combustion equipment associated with any development applicants must provide details of an exemplar boiler that is representative of the boiler likely to be installed. Details should include emissions of NO<sub>x</sub> and PM<sub>10</sub>, a realistic assessment of the probable location of the boiler and of the height and diameter of the chimney.

### **Conditions**

- Conditions will be applied to ensure that only fuels complying with appropriate international certification schemes are used. In the case of wood burning biomass boilers this will require that only clean wood conforming to the CENT 335 be used in the boiler.
- Conditions will be imposed to ensure that no waste material of any kind will be permitted for use in non natural gas boilers.
- Conditions will be imposed requiring that an air quality impact assessment, using either the screening tool or dispersion modelling, must be undertaken where non natural gas boilers are proposed. The assessment must be undertaken using emissions data from the boiler that it is proposed to install under the operating conditions that will apply. If the boiler or operating conditions are subsequently changed then a further assessment will be required.
- Conditions will be imposed requiring that an assessment must be undertaken of the potential for dust emissions from the delivery, storage and on site transportation of the fuel and any necessary mitigation measures agreed.
- In the case of biomass boilers, conditions will be imposed requiring that the Biomass Boiler Information Form be completed. The form must be completed in full regardless of any additional supporting information the applicant may wish to provide and contain exact details of the boiler to be installed and its emissions, under the normal operating conditions of the boiler and with the proposed fuel, and full details of the proposed chimney. Should the information in the completed form show that emissions from the proposed boiler are worse than that of the exemplar boiler described at application stage the boiler will not be permitted. If the completed form shows that the proposed chimney is significantly different than that described for the exemplar then the boiler may not be permitted.