

**LOCAL AIR QUALITY MANAGEMENT: POLICY ON THE INTRODUCTION OF BIOMASS  
INSTALLATIONS WITHIN GLASGOW**

## 1 Background to Biomass and Air Quality

- 1.1 Biomass combustion is a means of deriving energy from the burning of biological materials. These materials are most commonly chipped and pelletised wood fuels such as trees, forestry and sawmill residues, and waste wood from manufacturing and construction/demolition operations. Biomass also includes fuel crops such as grains and food industry residues. The energy provided may be heat, electricity or mechanical power.
- 1.2 The Scottish Government is currently committed to a target of 20% of total Scottish energy use coming from renewables by 2020. Biomass burning is perhaps the oldest method of providing heating and hot water, and in recent years pressure to reduce our reliance on fossil fuels has encouraged a large expansion in the use of biomass heat. Biomass is often one of the most cost effective and therefore attractive renewable energy technologies to use. The Scottish Government encourages the adoption of biomass combustion as a heat fuel source to reduce greenhouse gas emissions and mitigate against climate change effects.
- 1.3 However, concerns have emerged regarding potential impacts on human health from certain emissions associated with widespread uptake of wood biomass combustion. The emissions of key concern are fine particles (PM<sub>10</sub>/PM<sub>2.5</sub>). PM<sub>10</sub> air pollution is associated with respiratory and cardiovascular illness and mortality as well as other ill-health effects, and can result in an increase in hospital admissions for those with pre-existing lung or heart disease.
- 1.4 There are several environmental benefits associated with the utilisation of woody biomass for bioenergy and other bio-based products. In addition to being a sustainable renewable energy source, woody biomass can help to mitigate greenhouse gas emissions, to create healthier forests, and to reduce the risk of wildfires.
- 1.5 Glasgow City Council (GCC) is strategically committed to promote and develop renewable energy. In January 2007 GCC signed the Scottish Climate Change Declaration committing to the production and public declaration of a plan to achieve significant reduction in greenhouse gas emissions from their own operations.
- 1.6 There are a wide range of positive environmental impacts from this project. These include a likely reduction in the consumption levels of oil, gas and coal. There will be added public amenity value and enhanced biodiversity of the City's woodland resulting from more sustainable long term management. There will be positive impacts through increased environmental awareness through the promotion of biomass to GCC staff and residents of Glasgow. The use of interpretation boards at the locations where wood fuel boilers are installed and the areas of woodland management where the fuel is created will increase the understanding of visitors that wood fuel is a carbon neutral renewable resource.

## 2 Local Air Quality Management

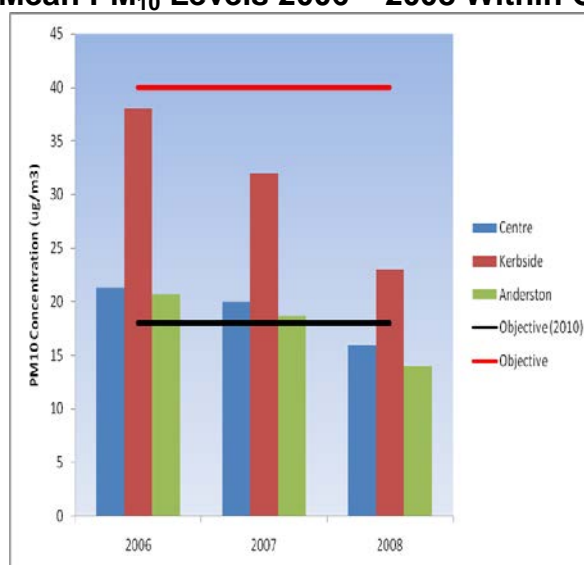
- 2.1 The Environment Act 1995 introduced the National Air Quality Strategy which placed statutory requirements on all local authorities to review and assess air quality within their areas. Eight pollutants require to be assessed against recognised health based standards. The Act also requires that if an assessment by a local authority indicates that a target level for any of these pollutants is unlikely to be achieved, then the local authority must designate these areas as Air Quality Management Areas (AQMA) by Order. It must then take any necessary action in order to reduce relevant pollutant levels by the set date within the Air Quality Management Area. This is achieved through the production of an Air Quality Action Plan, which sets out the actions which the local authority intends to take in pursuit of the air quality targets.
- 2.2 To date, Glasgow City Council has declared 3 AQMAs for Nitrogen Dioxide (NO<sub>2</sub>). These are the city centre, Byres Road/Dumbarton Road and Parkhead Cross. The city centre has also been declared an AQMA for PM<sub>10</sub>. Environmental Health has produced an Air Quality Action Plan to improve air quality in these 3 areas.
- 2.3 In Scotland a target of 18µgm<sup>-3</sup> by 31 December 2010 has been set for PM<sub>10</sub>. This has been reduced from the previous target of 40µgm<sup>-3</sup> in recent years. This is a more stringent target than for the rest of the UK. The introduction of this new target increases the likelihood that more AQMAs for PM<sub>10</sub> will be required in the future. As shown in figures 1 and 2 below, Glasgow is already struggling with the 18µgm<sup>-3</sup> target for PM<sub>10</sub> at various locations within the city, and Environmental Health has predicted that the target value will not be achieved by the end of 2010.

**Figure 1 Results of PM<sub>10</sub> Automatic Monitoring: Comparison with Annual Mean Objective**

Location	Within AQMA?	Data Capture 2008 %	Annual mean concentrations (µg/m <sup>3</sup> )			
			2006	2007	2008	2010 <sup>+</sup>
Glasgow Kerbside	Y	98	38	32	23	22.0
Glasgow Centre	Y	94	21	20	16	15.7
Glasgow Anderston	Y	79	16	19	14	13.0
Glasgow Byres Rd	Y	99	27	25	18	16.4
Glasgow Battlefield Rd	N	86	23	23	15	14.7
Glasgow Abercromby St	N	94	-	-	19	18.6
Glasgow Broomhill	N	94	-	-	19	18.0
Glasgow Nithsdale Rd	N	94	-	-	21	20.4
Glasgow Waulkmillglen	N	81	15	15	11	11.0

+ Predicted from 2008 data using the methodology in Box 2.1 of LAQM.TG(09).

**Fig 2 Annual Mean PM<sub>10</sub> Levels 2006 – 2008 Within City Centre AQMA**



2.4 Figure 2 above shows PM<sub>10</sub> levels at 3 different categories of air quality monitoring stations within the city centre. The kerbside site (Hope Street) is located within 1 metre of the edge of a busy roadside and represents a worst case scenario. The urban centre site (St Enoch's) is representative of human exposure in city centres, eg pedestrian precincts, as is likely to be influenced by vehicle emissions and other urban sources of pollution. Glasgow's Anderston site is there to assist Environmental Health with the Air Quality Management Area data, and has been placed at a sensitive location (a school) next to the M8 motorway.

2.5 It is possible that, following further detailed assessment by Environmental Health, Glasgow City Council will require to declare new AQMAs for PM<sub>10</sub>. If this is the case, the production of another Action Plan to reduce levels of PM<sub>10</sub> across the city will be required. As Glasgow is already struggling to meet targets at certain locations, widespread introduction of biomass installations and the associated increase in PM<sub>10</sub> emissions would further impact on the City Council's ability to meet these targets in these areas.

### **3 Biomass Installation Design and Air Quality**

3.1 Although the Scottish Government is promoting renewable heat technologies, it also recognises that biomass combustion could contribute to increased levels of particulate matter, and, therefore, wants to ensure that the deployment of biomass heating does not cause an unacceptable deterioration in air quality. The use of biomass to generate energy should not have a detrimental impact on air quality, particularly where this would significantly affect public health or compromise our ability to meet legal obligations under air quality legislation.

The impact on ambient air quality is likely to be especially important where:

- the proposed development is inside or adjacent to an Air Quality Management Area;
- the development could result in designation of a new Air Quality Management Area; and
- the granting of planning permission would conflict with, or render unworkable, elements of a local authority's Air Quality Action Plan.

Hence in such areas the widespread introduction of biomass boilers needs to be carefully considered.

- 3.2 Renewable heat technologies can in fact benefit air quality in some situations. An example of where biomass installations could help improve air quality is in situations where they replace oil and coal heating. Natural gas is still the cleanest fuel to use, but wood is generally cleaner than coal, and using modern wood fuel systems gives similar emission levels to that of fuel oil. Therefore where a modern purpose-designed wood fuelled boiler is replacing a coal or oil fired system, it would be expected that PM<sub>10</sub> emissions would decrease. However if the boiler being replaced is fired by gas, there is likely to be an increase in air pollutants.
- 3.3 Smaller biomass units (<20 mega watts) are regulated by the City Council and installations larger than this are regulated by Scottish Environment Protection Agency under the Pollution Prevention Control Act 1999. In general, the larger the combustion unit, the easier it is to control the combustion conditions and therefore to reduce emissions. A single large boiler will tend to produce lower emissions than a series of smaller units using the same fuel and for the same energy output. The smaller the boiler the more difficult and expensive it is to fit abatement equipment; therefore good boiler design, operation and maintenance are crucial in such situations.
- 3.4 In an urban area like Glasgow it is likely that the majority of new installations will be smaller units. The problem with this is that there is a lack of adequate mechanisms available for the proper regulation and control of particulate emissions from these small biomass installations. The Clean Air Act 1993 has been suggested as legislation which Environmental Health could use for the control of biomass emissions; however this legislation was originally intended to combat smoke and sulphur dioxide from coal burning in the 20<sup>th</sup> century, and it is not really suitable for addressing fine particulates. Another challenge faced by Environmental Health is that new biomass installations which replace existing systems may not require planning permission, and therefore may be introduced without the knowledge or involvement of Glasgow City Council. This could potentially have a detrimental effect on air quality in the city.

- 3.5 Abatement technologies for removing PM<sub>10</sub> and PM<sub>2.5</sub> emissions from smaller sized biomass installations are in the early stages of development. Emissions abatement equipment is expensive, and is therefore impractical on cost grounds for smaller biomass boilers. It is often the case that retrofitting will not be feasible for these systems. It is therefore expected that proven, cost-effective emission abatement technologies for biomass installations in urban areas will not be available for some time.

#### **4 Guidance for Local Authorities**

- 4.1 The UK Government, through DEFRA, has recently commissioned a study into the potential air quality and health impacts of a substantial increase in biomass uptake. This study showed that these impacts can be reduced to a manageable level, with no breaches of mandatory EU air quality limit values where local policy direction is in place and certain other conditions are met.
- 4.2 Environmental Protection UK has produced guidance for local authorities in England and Wales which aims to help local authorities understand and manage emissions from biomass combustion. The guidance focuses principally on emissions associated with individual wood-fuelled installations, and acknowledges concerns regarding the cumulative impacts of widespread deployment of biomass. Environmental Protection UK's Scottish division is currently drafting guidance for local authorities to assist them in considering biomass issues in relation to air quality. This is necessary to take account of the differences in Scottish legislation and tighter standards for particulate matter.

#### **5 Service Implications**

<b>Financial:</b>	None at the present time.
<b>Legal:</b>	Compliance will be achieved in terms of the Environment Act 1995 and associated Statutory Instruments
<b>Personnel:</b>	None
<b>Service Plan:</b>	None
<b>Environmental:</b>	The production of this biomass policy supports the Council's key objectives to 'Create a cleaner, safer city and a sustainable environment; improve health and well being; and sustain the environmental regeneration of Glasgow'.

## **6 Recommendations**

6.1 In line with all available guidance it is therefore proposed that Glasgow City Council adopts the following policies:

- all new biomass plant should be of high quality, corresponding to the best performing units currently on the market
- biomass heat uptake should generally be encouraged to replace or displace existing coal and oil fired heating
- uptake levels of new biomass installations should be substantially lower in AQMAs and areas of known poor air quality than in other locations.

6.2 Biomass installations <20 MW for sites in or in close proximity to AQMAs will require to be assessed for a range of potential environmental impacts, and only approved where a detailed environmental cost benefit analysis can demonstrate an overall net positive environmental benefit and no unacceptable deterioration in air quality.

6.3 Installations of >20MW will require to be assessed for the range of potential environmental impacts, and only approved where the deployment of biomass heating does not cause an unacceptable or significant deterioration in air quality.

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