Biomass heating: a guide to feasibility studies

Forestry Commission

BIOMASS Energy Centre

DEPARTMENT OF ENERGY & CLIMATE CHANGE

REA RENEWABLE ENERGY ASSOCIATION

Introduction to feasibility studies

This guide provides a brief introduction to biomass boilers followed by a step–by-step guide to carrying out the technical aspects of a biomass feasibility study. The guide is concerned with the use of logs, wood chips and wood pellets only, these being the principal fuels used in biomass heating systems in the UK.

This, and the two accompanying guides, *Biomass heating: a guide to small log and wood pellet systems* and *Biomass heating: a guide to medium scale wood chip and wood pellet systems*, are concerned with low temperature hot water boilers of up to 5 MW operating at a maximum flow temperature of 95 °C.

What is biomass?

Biomass for burning as a fuel includes wood (Figure 1), energy crops, agricultural crop residues, wood manufacturing by-products and farm animal litter. Although burning biomass releases carbon dioxide (CO_2) to the atmosphere, this is principally offset by the CO_2 absorbed in the original growth of the biomass, or captured in the growth of new biomass which replaces the materials used when it is sustainably sourced. Using biomass for heating therefore results in very low net 'lifecycle' carbon emissions relative to conventional sources of heating, such as gas, heating oil or electricity.

The selection of the fuel to be used can be complex as it depends on many factors. While cost is a key driver for fuel selection, the space available for fuel storage, access for fuel deliveries and the method of delivery are all key considerations. The woodfuel heating system selection flowchart (Figure 4, page 4) provides guidance on choosing the type of heating system and the type of fuel to be used.

Figure 1
Wood suitable for harvesting as fuel (Forestry Commission).

Types of biomass boilers

Pellet boilers and stoves

Pellet boilers and stoves (Figure 2) range in size from a few kilowatts (kW), for houses or small commercial buildings, to megawatt (MW) size units for district heating systems. Pellet systems are generally the most responsive of the biomass boilers, have the simplest controls and are the closest to fossil fuelled boilers in terms of maintenance and operating intervention. Pellet stoves and small pellet boilers are covered in detail in ***Biomass heating: a guide to small log and wood pellet systems***, while larger boilers are covered in ***Biomass heating: a guide to medium scale wood chip and wood pellet systems.***

Figure 3
Log stove (Forestry Commission).

Figure 2
Pellet stove (RBAN).

Log stoves

Traditional log stoves (Figure 3) provide radiant heat to a room. They need to be manually fed with fuel as required to maintain the heat output, and achieve significantly higher efficiency (around 70%) than open fires. Some log stoves incorporate a boiler to provide hot water for domestic purposes or to heat radiators. Some may also incorporate a hob and/or oven for cooking. As mentioned, log stoves generate radiant heat into the room in which they stand and it is not possible to provide hot water without also heating this room.

Batch type log boilers

Log boilers also require wood to be manually loaded into the boiler, making them suitable for houses or small applications where labour is available. In contrast to a log stove, however, they are typically loaded just once or twice a day, and this batch of logs is then burned in one go, at high temperature and efficiency. This means that log boilers require a large water storage cylinder (a buffer tank, accumulator tank or thermal store) to capture the heat produced. Log stoves and boilers are covered in detail in ***Biomass heating: a guide to small log and wood pellet systems.***

Wood chip boilers

To date, wood chip boilers have dominated the commercial market in the UK. Fuelled by wood chips, these boilers can be configured to run on a wide range of different fuel specifications with moisture contents from 15% to 50%[1]. Boiler sizes range from ≈40 kW to power station sized boilers of 100 MW and more. Boiler responsiveness is determined by the fuel moisture content that the boiler is designed to accept; in general the wetter the fuel, the less responsive and efficient the boiler. Wood chip boilers are covered in ***Biomass heating: a guide to medium scale wood chip and wood pellet systems.***

[1] All moisture contents quoted in this publication are on a 'wet basis', that is $\frac{\text{Weight of water in a given sample}}{\text{Total weight of the sample}} \times 100 = \text{MC\% (wet basis)}$.

Heating system selection

The flowchart shown in Figure 4 is designed to assist with the selection of the most appropriate combination of woodfuel and heating boiler or stove.

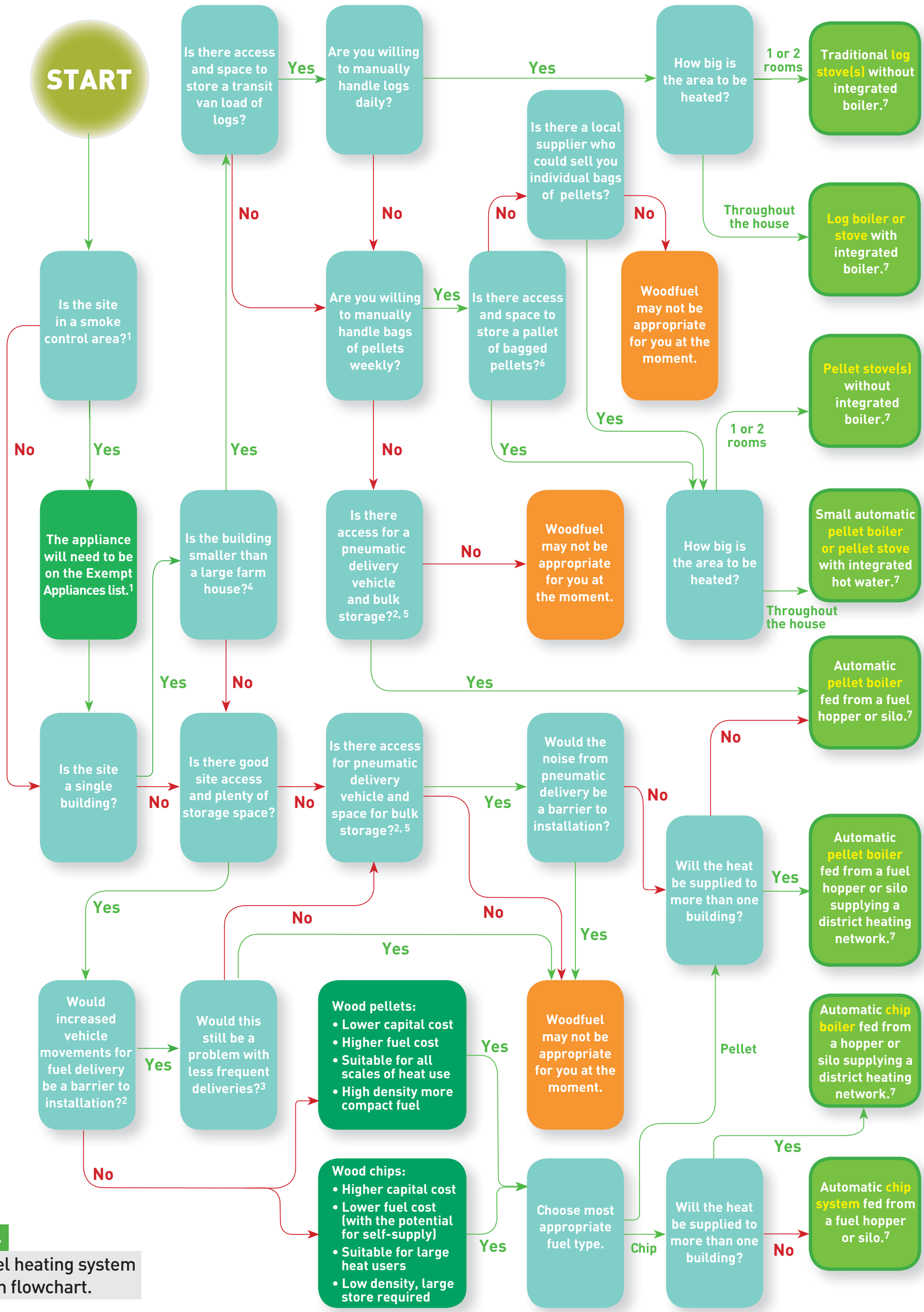


Figure 4
Woodfuel heating system selection flowchart.

1. Information on smoke control areas and exempt appliances is available at http://smokecontrol.defra.gov.uk/ (On larger systems grit and dust arrestors may be required by the local authority.)

2. A small pellet delivery vehicle is typically rigid, measuring 10 m long x 3 m wide x 3.5 m high. Pellets can also be transported in a 31 tonne articulated lorry. Pellets can be delivered pneumatically over a distance of around 20 m to inaccessible pellet stores. Chip is delivered in a variety of vehicles and trailer arrangements. Requirements for these are best discussed with fuel suppliers in your area.

3. Pellet deliveries require approximately 25% of the frequency of deliveries for chip.

4. Assumed to require a 40 kW boiler.

5. Pellet storage requirement is assumed to be 5 tonnes for a domestic setting (or approximately 7.5 m^3 at 670 kg/m^3). Wood chip bulk density and fuel storage requirement will vary with moisture content, however the bulk density of chip will always be much lower than that of pellet. See www.biomassenergycentre.org.uk for more details.

6. 10–12 bags.

7. A list of boiler suppliers is available at www.microgenerationcertification.org/Home+and+Business+Owners/Microgeneration+Installers/Biomass

Surveying a site for a biomass installation

The process of deciding whether it is possible to install a biomass boiler, and whether a biomass boiler is suitable, comprises 10 stages or steps. The 10-step process takes the reader through the technical stages of feasibility to the point where it is worthwhile proceeding with a full economic and environmental analysis of a project. Figure 5 is a summary of this 10-step technical feasibility process.

STEP 1	Make a preliminary estimate of whether space is available for a boiler and fuel store
STEP 2	Establish whether a fuel supply is available
STEP 3	Determine whether fuel delivery vehicle access is available
STEP 4	Determine whether the building or process is suitable for conversion to biomass
STEP 5	Determine the size of boiler required
STEP 6	Determine the size of fuel store required
STEP 7	Determine the exact space required for boiler and fuel store
STEP 8	Identify if the boiler is to be installed in a smoke control area
STEP 9	Determine the height of chimney required
STEP 10	Check that compliance with statutory requirements is possible

Figure 5
Ten-step technical feasibility process.

STEP 1
Do I have enough space: part 1?

While it is not possible to determine precisely whether sufficient space is available prior to carrying out a boiler and fuel sizing exercise, the first step must be to carry out a preliminary assessment of the physical space available. The following checklists should enable this decision to be made.

A biomass boiler:

- Will be physically much larger than a fossil fuel equivalent boiler.
- Will have a much larger footprint requiring clearances to allow for boiler tube cleaning and feed auger and ash auger extraction.
- Will usually be taller and may require access from above.
- May not fit into the space available in an existing boiler house.

It is also worth considering whether it is more effective to install a biomass boiler to deal with a base heat load, with a secondary boiler to provide backup and additional capacity for peak load. However, this will entail additional space requirements.

Figure 6
Fuel store for wood chips close to boiler house (Forestry Commission).

Space external to the boiler house will be required for a fuel store (for example Figure 6) and, if the biomass boiler cannot be installed in the existing boiler house, an extension or a new boiler house will be required. You should assess whether there is:

- Space to construct an extension to an existing boiler house or to construct a new boiler house if required.
- Space to construct a fuel store contiguous with the boiler house.
- Access for a delivery vehicle, or could the vehicle get to within 20 m of the fuel store?

STEP 2
Establish whether a fuel supply is available

A list of woodfuel suppliers is available on the Biomass Energy Centre website at: www.biomassenergycentre.org.uk It is important that the correct standard of fuel is used to ensure reliable and efficient operation of the boiler.

STEP 3
Fuel delivery and reception

Having previously established that a fuel delivery vehicle could access the site, the method of fuel delivery and reception into the fuel store needs to be considered. The following two checklists should assist with decisions on fuel delivery and reception.

If wood chip is the preferred fuel:

- The most economical method of delivery is by tipping into a silo below ground level or onto a walking floor.
- If sloping ground is available a semi-underground silo can be constructed with minimal excavation.
- If sloping ground is not available and excavation of an underground silo would be problematic or too expensive, it may be possible to build up a ramp so fuel can be tipped in from above; alternatively a walking floor in the fuel storage building may be the best option.
- The walking floor needs to be designed to take the weight of a delivery vehicle, or fuel can be tipped onto a concrete floor in the fuel storage building and loaded onto the walking floor using a mechanical shovel.
- The fuel storage building will need either a very tall roof to allow a tipping vehicle to tip within the building or a sliding roof.
- An alternative method of fuel delivery and storage is to use a hook lift bin system where fuel is delivered in a container by a hook lift delivery vehicle, and the container becomes the fuel silo connected directly to the fuel extraction system.
- Another method of wood chip delivery is for a delivery vehicle to tip into the reception trough of a wood chip blower which can deliver chips over a short distance by pneumatic conveying. Unfortunately, this method of fuel delivery is very noisy and may not be suitable for all locations. It is also slow which drives up fuel cost.
- In small quantities, delivery by bag is possible. However, this system usually requires a crane-equipped delivery vehicle to swing bags over an above-ground storage hopper. As this has undesirable safety implications for the operator, who has to untie the bottom of the bag to release fuel into the hopper, this method is not recommended.

If wood pellet is the preferred fuel:

- Bulk pellet delivery can be made by tipping or pneumatic conveying. For small installations pellets can also be bought bagged on a pallet.
- If pellets are delivered by tipping, the considerations described above for wood chip delivery by tipping also apply.
- For pneumatic delivery, specially equipped vehicles are used containing both fuel delivery and dust extraction fans.
- A pellet silo designed to accept fuel by pneumatic conveying will need to be equipped with two camlock connectors at high level attached to ductwork. One duct is used for pellet supply while the other extracts dusty air from the silo. Dust extraction is essential to prevent the concentration of dust forming an explosive atmosphere in the silo, and also to relieve pressure in the silo to enable the delivery fan to deliver pellets.
- A specialist pellet delivery vehicle can typically blow pellets over a distance of around 20 m horizontally, or up to 12 m vertically if a vertical grain-type silo is used.

The Carbon Trust publication, ***Biomass heating: a practical guide for potential users,*** contains comprehensive information on fuel delivery and storage (see Sources of further information, page 12).

STEP 4
Is my building suitable for conversion to biomass?

A number of factors dispose a building or process towards the use of a biomass boiler to provide heat.

For buildings these include:

- The building has an existing low temperature hot water heating system. The existing boilers are life expired or in need of replacement in the near future. The existing boilers are of the single-pass or atmospheric gas type. The building is not on mains gas.
- Large carbon savings are required to meet targets. The building is old and of heavyweight construction, e.g. listed buildings, most historic buildings, solid sandstone or limestone buildings, or buildings which would otherwise be difficult to insulate. The building is a new build and the opportunity exists to integrate biomass into the building from the outset.

Reasons for not installing biomass in a building are the opposite of many of the factors listed above. In particular, if a building does not have an existing wet heating system or an air heating system based on air handling units with hot water feeding the heating coils, it may not be suitable for conversion or the conversion may be very expensive.

With respect to industrial processes, the reasons for installing a biomass boiler include:

- The industrial process uses low temperature hot water.
- The installation of a biomass boiler would displace steam use for hot water generation.
- Mains gas is not available.

STEPS 5 and 6

Sizing a biomass boiler and biomass fuel store

The sizing of a biomass boiler is a complex task even for an experienced building services engineer, and it will be different for every boiler, based on the heat load demand pattern and the winter peak load. The sizing of boilers, buffer vessels and fuel stores is best left to experienced designers and boiler system installers, and a suitably qualified design engineer or contractor should be engaged for this purpose.

BEC has a number of downloadable tools written by Forest Research's Technical Development unit to provide support in a number of different biomass calculations. This includes a simple spreadsheet-based tool designed to help calculate boiler sizes[2].

The Carbon Trust has also published biomass system design software available as a free download from their website[3]. This software has been designed specifically to address the issue of oversized boilers and undersized buffer vessels. It allows the designer to input data on the building or process to create a winter design day load curve, and then to size a boiler and buffer combination accurately while minimising capital cost and maximising carbon savings. It also allows for the sizing of a biomass fuel store and a complete energy, CO_2 and financial analysis. This software is designed to be used by a competent engineer.

STEP 7

Do I have enough space: part 2?

Once the rating of the biomass boiler has been established, the size of the buffer vessel calculated, and a decision made on the number of days' fuel storage required, it is possible to determine the size of boiler house and fuel store needed. Connecting a biomass boiler into an existing heating system can be either directly into the system or via a heat exchanger. If directly connected, pressurisation and expansion for the biomass boiler will be provided by the existing system, modified as required. However, if you intend to operate the biomass boiler as a separate hydraulic system, a heat exchanger (usually a plate heat exchanger) will need to be installed in the existing boiler house. The simplest way to do this is to remove an existing boiler and put the heat exchanger in its place.

Bear in mind that it may also be desirable to retain an existing fossil fuel boiler to provide peaking capacity to allow the biomass boiler to be specified to meet base load. This will allow it to operate within its modulation range for a greater part of the year, spending more time operating at higher output and efficiencies. It may also be used to supply domestic hot water in summer. This decision will influence the space required in the existing boiler house, and potentially which of these options to adopt.

Figure 7
Boiler house with biomass boiler (Forestry Commission).

Boiler house space

There are a number of points that you need to consider when calculating the space required for a biomass boiler house (Figure 7):

- The orientation of the biomass boiler house relative to the fuel store.
- The footprint of the biomass boiler.
- The footprint of any additional boiler.
- The clearance required to remove the fuel feed system, frequently an auger.
- The clearance required to take out the ash removal auger.
- The clearance required to clean the boiler flueways if an automatic flue cleaning system is not installed.
- Where to install a plate heat exchanger (if required).
- The significant space required for a buffer vessel: this includes vertical space for a large stratified water store.
- The space required for expansion vessels.
- Whether the existing heating system hydraulic configuration needs to be changed to accept a biomass system, e.g. if headers need to be extended or replaced.
- How the biomass boiler flue is to be configured, and whether the space occupied by an existing or redundant flue could be utilised.
- Adequate access to allow the installation or removal of the boiler from the boiler house.

[2] www.biomassenergycentre.org.uk/portal/page?_pageid=74,373197&_dad=portal&_schema=PORTAL

[3] www.carbontrust.co.uk/emerging-technologies/current-focus-areas/biomass/pages/biomass-tool.aspx (login required)

Fuel store space

The size of fuel store required will depend on the fuel chosen and the number of days' fuel storage required. In general, the storage of wood chip requires around four times as much space as for the equivalent energy content of wood pellets. The Carbon Trust biomass design software will assist with exact calculation of the size of fuel store required (see steps 5 and 6 on page 7 and Sources of further information, page 12).

Biomass heating: a guide to medium scale wood chip and wood pellet systems contains more information about system pressurisation, hydraulic isolation and expansion vessel capacity, and the reasons for directly connecting or isolating the biomass system from an existing heating system.

STEP 8
The Clean Air Act, emissions and emissions abatement

The Clean Air Act

Currently there is a significant level of concern within the UK about the introduction of biomass boilers. This is because even when burning with complete combustion, they produce more emissions than an equivalent gas boiler, though less than other solid fuel systems and about the same as oil fired systems. Exposure to wood smoke can have serious consequences for health and is potentially detrimental to air quality. The Clean Air Act (1993) regulates particulate emissions from residential and industrial combustion sources, and allows areas to be designated as smoke control areas. While under the Environment Act 2005, local authorities throughout the UK have a statutory duty to review and assess air quality in their council area against the objectives set for nitrogen dioxide (NO_2), particles measuring 10 µm or less (PM_{10}), sulphur dioxide (SO_2) and other gases, and are required to identify any likely incidents of these Air Quality Objectives being exceeded.

In common with other combustion appliances, biomass boilers emit both NO_2 and PM_{10} (see page 9), the limits for which derive from the European Air Quality Directive. $PM_{2.5}$ (see page 9), which are also of concern, are not currently regulated but voluntary targets have been set for their control. Under the Clean Air Act the emission of dark smoke is not generally permitted, and grit/dust arrestment technology is required if the rate of biomass combustion is 45.4 kg/hour or more. In the case of biomass boilers this represents a boiler with a power input of ≈100 kW if the fuel has a moisture content of 50%, and 220 kW for a dry fuel such as wood pellets. Some manufacturers have boilers approved for operation in designated smoke control areas (SCA) and, subject to the maximum concentrations of particulate matters and NO_2 not being exceeded in a given area, approval for a biomass installation should be possible.

Emissions

The complete combustion of wood produces emissions of fine particulates, NO_2 and carbon dioxide (CO_2), whereas the incomplete combustion of wood results in the release of carbon monoxide (CO), volatile organic gases, benzene and other undesirable substances some of which are carcinogenic. The emission of black smoke from a chimney is a good visible indicator of incomplete combustion.

In order to ensure the complete combustion of woodfuel, biomass boilers require the following features:

- An adaptive fuel feed mechanism which adjusts the amount of fuel fed into the boiler in real time depending on the instantaneous load on the boiler.
- The monitoring of boiler flow and return temperatures, and their use via a control system to regulate the fuel feed rate and the speed of combustion air fans.
- Separately controllable primary and secondary combustion air (also tertiary air control on boilers above about 5 MW).
- A lambda sensor to monitor the oxygen content of the flue gas to ensure sufficient excess oxygen is supplied for complete combustion by regulating secondary (and tertiary) air fans.

NO_2 is of particular concern because it is an irritant in the lungs. The overall air pollution index for a site or region is calculated from the highest concentration of the five pollutants: NO_2, SO_2, ozone (O_3), CO_2 and particles <10 µm (PM_{10}). Some particles are emitted directly into the air, and some form in the air from chemical reactions of nitrogen oxides, ammonia (NH_3), SO_2 and volatile organic compounds. Particles can cling to moisture droplets or simply drift in the air, and are referred to as 'particulate matter', abbreviated to PM.

Regulators generally divide particulate matter into two categories: PM_{10} and $PM_{2.5}$:

- PM_{10} are particles that are 10 micrometres or less in size. (For comparison, the width of a human hair is about 30-200 micrometres.) The larger of these particles are deposited in the upper airways before they reach the lungs and most do not travel further into the body. PM_{10} are released by biomass combustion but also from a wide variety of other sources such as crushing and grinding operations, road dust, pollen, and mould spores.
- $PM_{2.5}$, or fine particles, are up to 2.5 micrometres in diameter. These particles come mainly from combustion sources, including vehicles that burn petrol or diesel, power plants and factories that burn coal, oil, gas or biomass. These particles also occur naturally through forest or grass fires, and as organic molecules from vegetation. This category concerns scientists the most, because these tiny particles can slip past our bodies' defences and end up deep in our lungs.

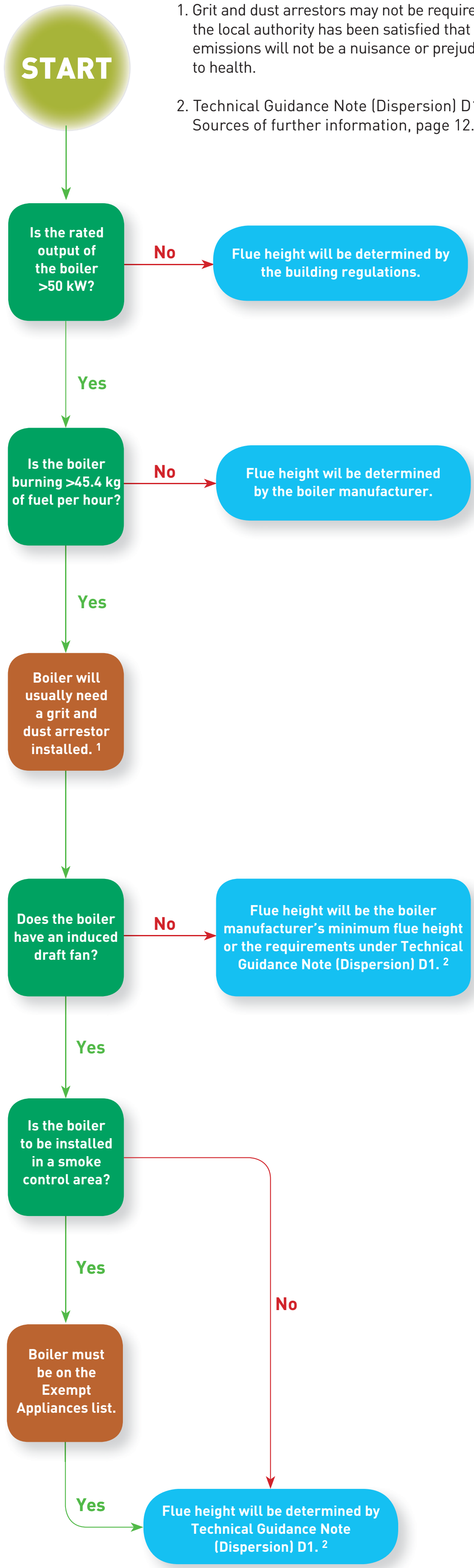
To avoid the production of black smoke from a biomass boiler chimney the following conditions must be met:

- The boiler must operate within its turndown band, e.g. a 300 kW boiler with a 3:1 turndown ratio must not operate if the load falls below 100 kW. Either the boiler must switch off, must enter a slumber mode, or it must operate with a buffer vessel in parallel to accept the excess energy produced.
- The moisture content of the fuel must be within the range the boiler can accept. In particular, fuel with a moisture content above the acceptable range will smoulder and invariably produce black smoke.

STEP 9

Chimney heights and the dispersion of pollutants

The Clean Air Act requires the chimney height of a biomass boiler burning more than 45.4 kg/hour of biomass fuel to be approved by the local authority. The local authority will need to be satisfied that the Guidelines on Discharge Stack Heights for Polluting Emissions have been followed (Technical Guidance Note (Dispersion) D1: see Sources of further information, page 12). The flowchart in Figure 8 shows the process of flue selection.



1. Grit and dust arrestors may not be required if the local authority has been satisfied that the emissions will not be a nuisance or prejudicial to health.
2. Technical Guidance Note (Dispersion) D1: see Sources of further information, page 12.

Figure 8
Flue selection flowchart.

STEP 10

Planning consent and other regulations

The Building Regulations

The Building Regulations contain provisions for solid fuel boilers and stoves with a rated output up to 50 kW. The detail for the countries in the UK can be found in:

England & Wales: Part J: ***Combustion appliances and fuel storage systems***

Scotland: Sections 3 and 6 of the ***Technical Handbook - Domestic Handbook***

Northern Ireland: DFP Technical Booklet L: 2006 – ***Combustion appliances and fuel storage systems***

The regulations cover air supplies to appliances, the size and height of flues, permissible flue outlet positions, the separation of combustible materials, flue linings, fireplaces, hearths and fuel storage. The content of the England, Wales and Northern Ireland Regulations is essentially the same while that for Scotland is different in some respects; at the time of writing, the Scottish Government are developing guidelines on low carbon equipment and building regulations.

The planning flowchart (Figure 9) is a guide to the planning and permitting process in the different countries of the UK. Guidance documents are listed in Sources of further information, page 12.

Waste wood, the Waste Incineration Directive and Environmental Permitting

The Environment Agency has issued the following definition of waste wood: Waste is any wood that is not a forestry material, tree surgery residual, or a by-product of processing clean virgin timber (clean sawdust and offcuts).

Depending on the type of fuel used, and if the boiler is over 400 kW, the Environmental Permitting Regulations 2011 have to be taken into account. A key factor is whether the fuel to be used is considered a waste and, if so, is it waste wood exempt from the Waste Incineration Directive (WID)? Boilers rated between approximately 400 kW and 3 MW can burn waste wood such as MDF, chipboard and clean pallet waste, however the local authority environmental health officer should be consulted on what conditions need to be applied, and it is advisable to consult the relevant environmental agency.

The local authority will require further information on the technical details and likely environmental impacts. They may also stipulate continuous monitoring of flue gases, but this may simply mean handing over data to them at regular intervals. If the boiler is over 3 MW the relevant environmental agency must be consulted.

1. See 'Waste wood and the Waste Incineration Directive (WID)', page 10.
2. England and Wales: EA, Scotland: SEPA, Northern Ireland: NIEA.
3. See 'What is an Air Quality Management Area?', page 11.
4. See 'What is a smoke control area?', page 11.
5. See 'What is the Exempt Appliances list?', page 11.

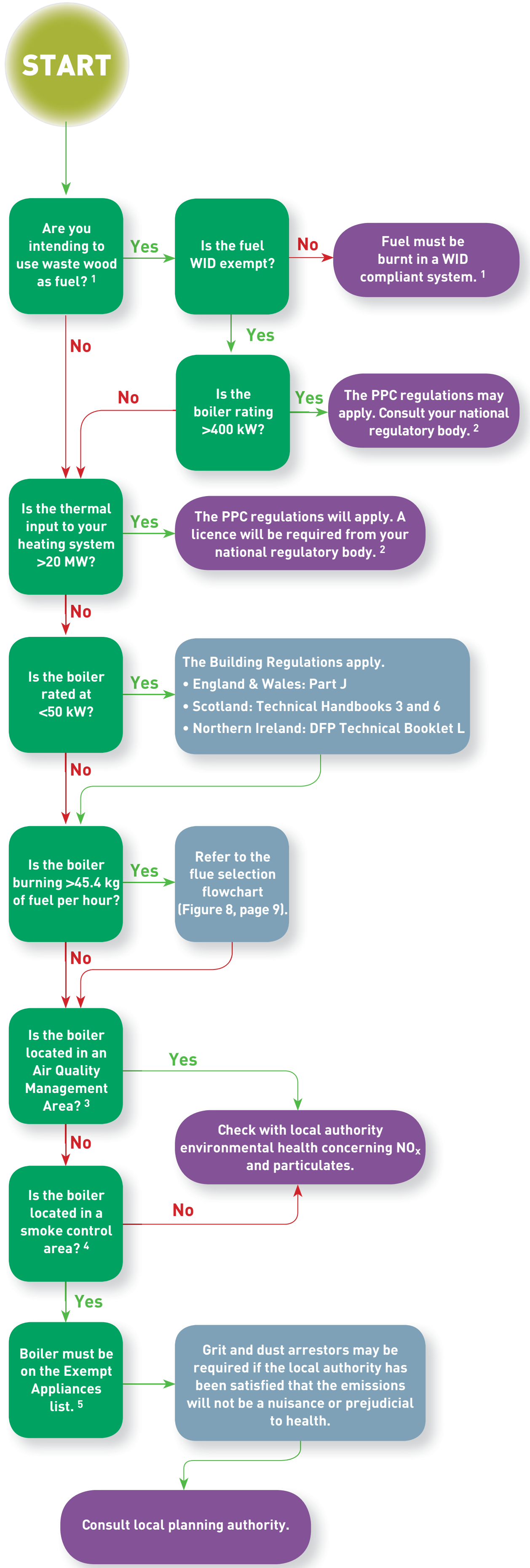


Figure 9
Planning flowchart.

Under no circumstance can waste wood be burnt if it contains halogenated organic compounds (such as some timber treatments or chlorine-based plastics) or heavy metals that formed part of a treatment or coating such as CCA timber treatment or lead-based paint, except in a fully licensed, WID approved, waste incineration facility. The likely source of this material would be construction and demolition waste, or pallets used to convey substances containing these materials, e.g. sheep dip. A WID guidance document is available from the Department for Environment, Food and Rural Affairs (Defra), or through the BEC website, setting out what material is exempted from WID and what is subject to it (see Sources of further information, page 12).

Defra and the Welsh Assembly Government have prepared additional guidance to clarify the interface between the Clean Air Act and Pollution Prevention and Control (PPC). This guidance indicates that any exemptions under the Clean Air Act 1993 for small-scale incinerators or combustion plant burning waste material do not apply if the activity comes under PPC regulation. It also indicates that it is not possible for Defra to consider any new Clean Air Act applications for exemptions relating to appliances which require a PPC permit. Therefore, for example, an application for exemption for an appliance for burning waste wood will only be considered if the wood waste to be burned will not contain halogenated organic compounds or heavy metals as a result of treatment with wood preservatives or coating, including, in particular, wood waste originating from construction and demolition waste. The guidance relating to the interface between the Clean Air Act and PPC is listed in Sources of further information, page 12.

What is an Air Quality Management Area?

Since December 1997 each local authority in the UK has been carrying out a review and assessment of air quality in their area. This involves measuring air pollution and trying to predict how it will change in the next few years. The aim of the review is to make sure that the national air quality objectives will be achieved throughout the UK by the relevant deadlines (see Figure 10). If a local authority finds any places where the objectives are not likely to be achieved, it must declare them an Air Quality Management Area (AQMA); this could be just one or two streets or much bigger. Then the local authority will put together a Local Air Quality Action Plan to improve the air quality.

What is a smoke control area?

Under the Clean Air Act 1993 local authorities may declare the whole or part of the district of the authority to be a smoke control area. It is an offence to emit smoke from a chimney of a building,

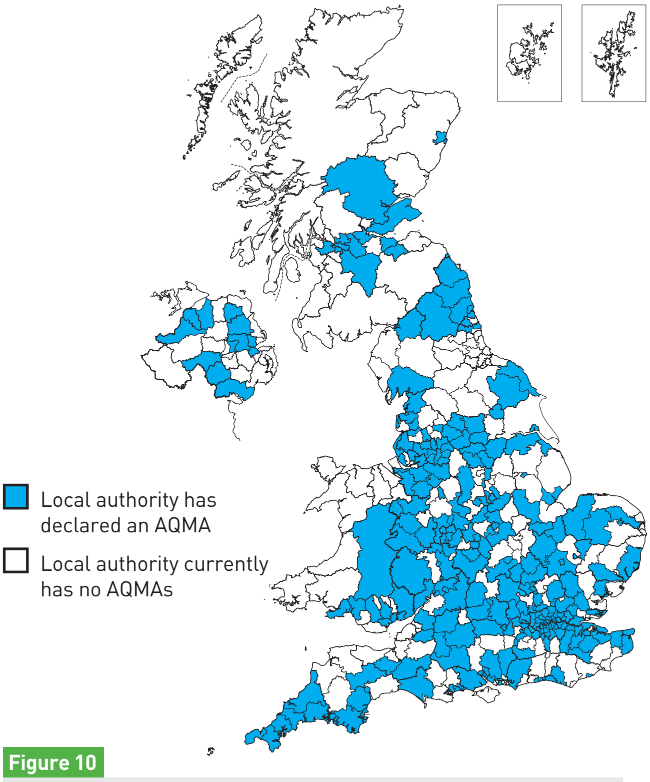


Figure 10

Approximate distribution of Air Quality Management Areas at time of writing. For more detailed maps and up-to-date data see http://aqma.defra.gov.uk/maps.php

from a furnace or from any fixed boiler if located in a designated smoke control area. It is also an offence to acquire a fuel other than an 'authorised fuel' for use within a smoke control area unless it is for use in an 'exempt appliance'. The Secretary of State for Environment, Food and Rural Affairs has powers under the Act to authorise fuels or exempt appliances for use in smoke control areas in England. In Scotland and Wales this power rests with Ministers in the devolved administrations for those countries. Separate legislation, the Clean Air (Northern Ireland) Order 1981, applies in Northern Ireland. Therefore it is a requirement that fuels burnt or obtained for use in smoke control areas have been 'authorised', or that appliances used in accordance with their instructions to burn specified solid fuel in those areas have been exempted by an Order made and signed by the Secretary of State or Minister in the devolved administrations.

The local authority is responsible for enforcing the legislation in smoke control areas and they should be contacted for details of any smoke control areas in their area. They should also have details of the fuels and appliances which may be used.

What is the Exempt Appliances list?

The Exempt Appliances list shows appliances (ovens, wood burners and stoves) which have been exempted under the Clean Air Act 1993 or Clean Air (Northern Ireland) Order 1981. These have passed tests to confirm that they are capable of burning an unauthorised or inherently smoky solid fuel without emitting smoke when used with certain fuels in accordance with their instructions.

Sources of further information

- The Carbon Trust publication ***Biomass heating: a practical guide for potential users*** can be downloaded from: www.carbontrust.co.uk/publications/publicationdetail.htm?productid=CTG012
- The guidance relating to the interface between the Clean Air Act and PPC is at: www.environment-agency.gov.uk/subjects/waste/1019330/1334884/1721340
- ***HMIP Technical Guidance Note (Dispersion) D1: Guidelines on discharge stack heights for polluting emissions*** is available from the Environment Agency, Tel: 08708 506 506 www.environmentagency.go.uk
- The WID guidance document can be obtained from: http://archive.defra.gov.uk/environment/policy/permits/documents/ep2010wasteincineration.pdf
- For details of Air Quality Management Areas see: www.airquality.co.uk/archive/laqm/laqm.php
- For details of exempt appliances see: http://smokecontrol.defra.gov.uk/appliances.php

Biomass heating guides series

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Other guides in this series:
Biomass heating: a guide to small log and wood pellet systems
Biomass heating: a guide to medium scale wood chip and wood pellet systems

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