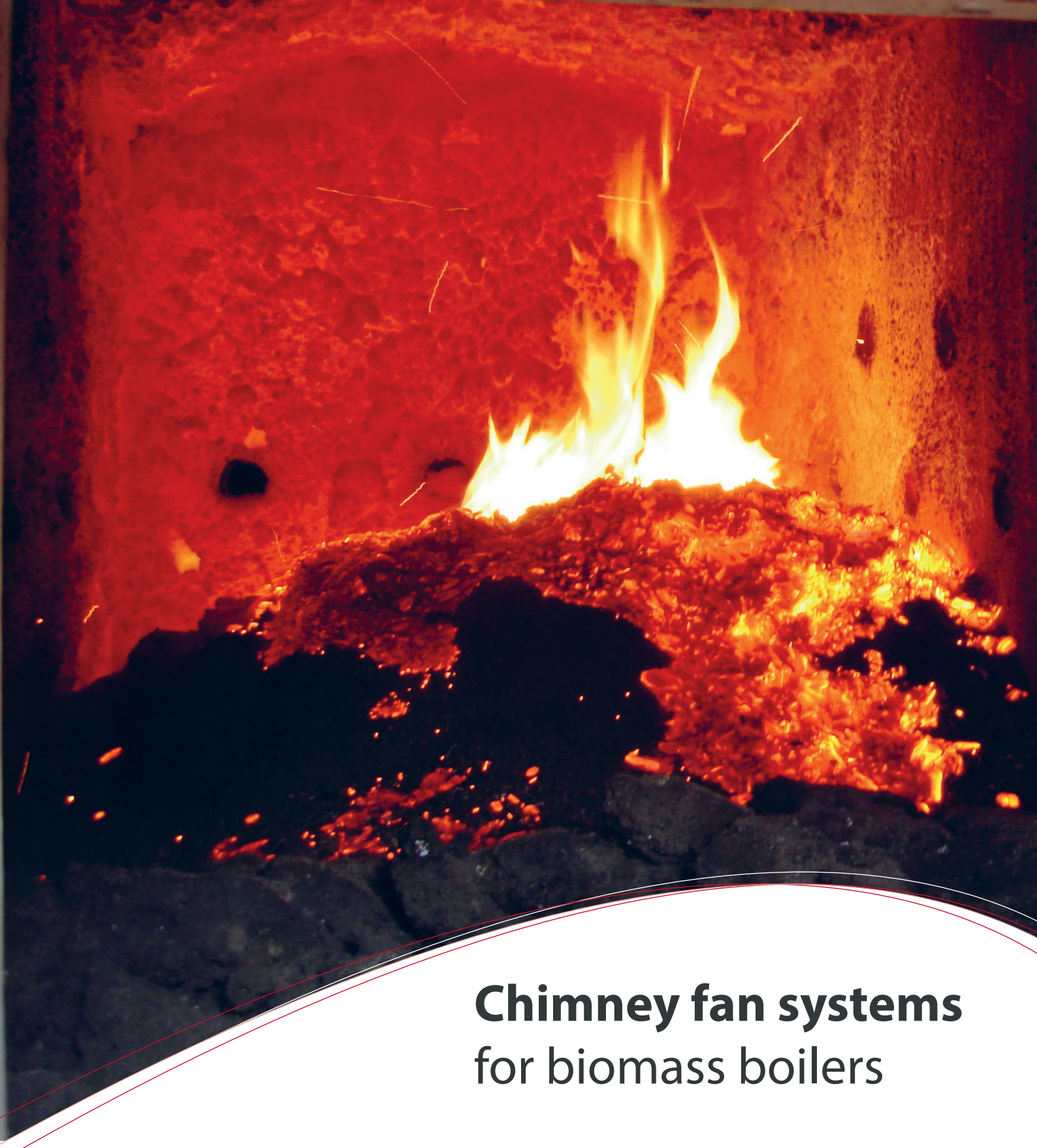


Chimney fan systems
for biomass boilers

exodraft

Biomass ... on route to 2020

The fight against climate change
In the spring of 2008 the EU member states agreed on a EU-wide target of 20 % renewable energy by 2020. The UK's proposed share would be to provide 15 % of the UK's energy from renewable. During the last couple of years, Biomass has become an increasingly important technology pursuing this challenging target.

Today's biomass boilers burn wood chips or pellets extremely cleanly and do not produce smoke, if provided with the optimum working conditions and the correct quality of fuel.

However, many experience challenges when it comes to getting the planning consent for their environmentally friendly biomass boiler installation.

Difficulties in obtaining planning consent can also jeopardise the whole concept of environmentally friendly and highly efficient supplies of heat and hot water.

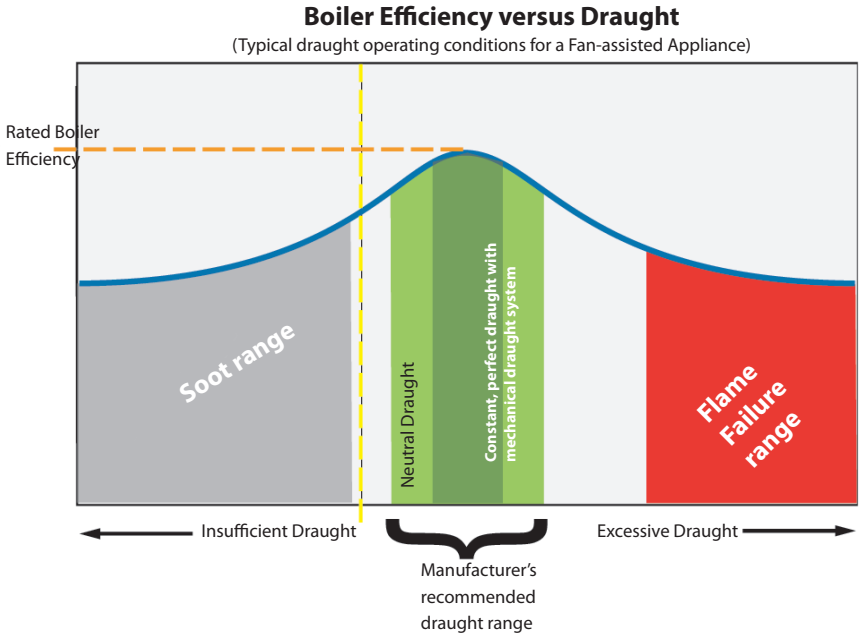
The guidance notes
Flue design for the cleaner, less toxin-laden effluent of biomass boilers is often treated in planning considerations in the same way as for the effluent from fossil fuel boilers. Planners use the Clean Air Act Memorandum and the D1 to determine the chimney height that would result in approval according to the Clean Air Act 1993.

The methods used in the Clean Air Act Memorandum and the D1 are considered by many to be mandatory requirements for chimney height, efflux velocity and the dimensions of the chimney, although in reality they have never been more than advisory guides.

It is important to note that it is becoming widely questioned if the D1 guide is actually suitable for biomass boiler designs.

Whilst these guidance notes do make it possible to determine chimney height based on the efflux velocity and dispersion height, the calculations are unfortunately based on assumed flue gas temperatures of older and less efficient technologies rather than those of today's highly efficient biomass appliances.

Jeopardising the objective



Boiler efficiency is dependent on the draught in the chimney. Insufficient or excessive draught will cause the biomass boiler to work inefficiently.

The consequences of the guidance notes
The biomass boilers of today are extremely efficient, resulting in dramatically reduced efflux velocities. In order to increase the efflux velocity to meet the requirements of outdated guidance notes planners decrease the chimney diameter to achieve velocity.

Making the chimney narrower normally means that the chimney needs to be taller to overcome the pressure loss from the reduced cross section of the chimney. This has a huge negative impact on the performance of the biomass boilers, increasing running costs and maintenance significantly - all in all an unfortunate solution for the building owner.

This means that, in many instances, to gain the approval for the chimney an otherwise efficient biomass boiler becomes very inefficient. Not being able to take advantage of the efficiency of the biomass boiler means that the whole concept of green energy is jeopardised.

There is a solution
Even if the CAAM, D1 and the highly efficient biomass boilers do not seem to "work well together", there is a solution to achieving the optimum efflux velocity, whilst optimising the efficiency of the boiler, and even reducing the height of the stack to improve the appearance of the building.

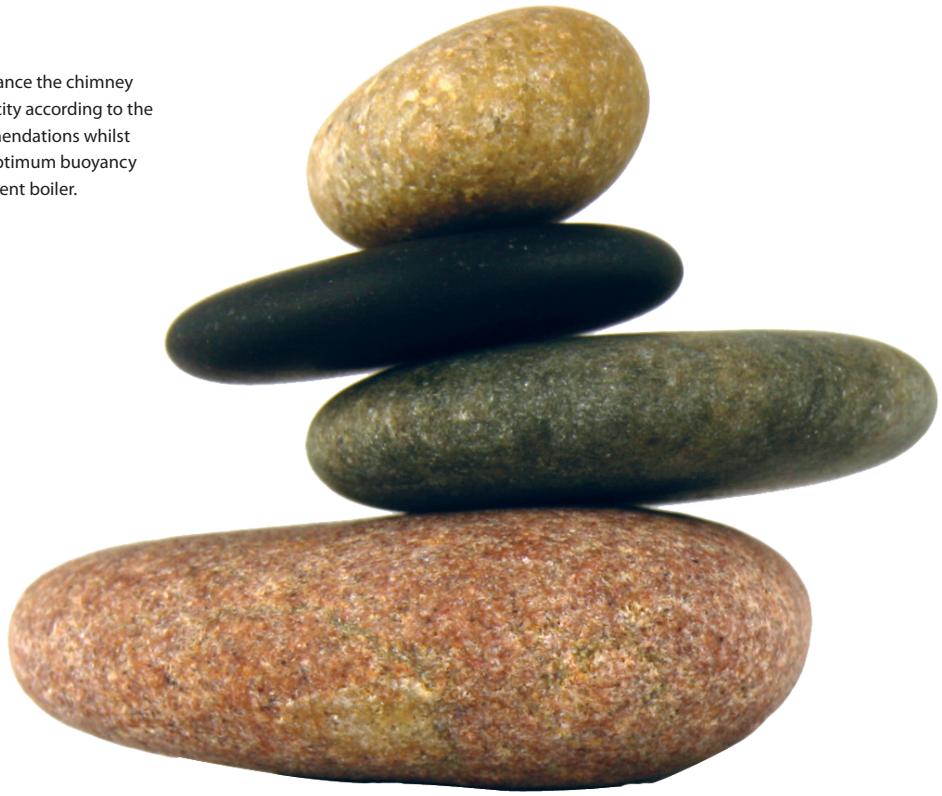
The **exodraft** chimney fan system not only guarantees the efflux velocity, it also ensures that the optimum level of chimney draught is maintained at all times.

By controlling and optimising the rate at which exhaust gases are dispersed, the system also directly helps to maintain high fuel efficiency of the boiler served by the flue.

An advanced electronic control ensures that exactly the right amount of draught is applied to move the exhaust gases up the flue.

Balancing the impossible

It is very hard to balance the chimney height & efflux velocity according to the CAAM & D1 recommendations whilst still achieving the optimum buoyancy required for an efficient boiler.



The challenges of designing biomass
The CAAM and the D1 guidance notes were published to help the authorities determine the chimney height to make flue gases disperse. The guides suggest a minimum discharge velocity that, according to the guides, should "prevent the discharged plume suffering from aerodynamic down-wash and flowing down the outside of the discharge stack".

The recommended efflux velocities are in the region of 7.5 – 15 m/s depending on the output and the guidance note.

The guides also include suggestions for minimum height based on the obstacles in the surrounding area, plus a calculation of the advised chimney discharge height based on the maximum rated input of the plant, types of fuel and other factors.

As the efflux velocity is not achievable with the calculated stack height, the actual chimney height is increased and the chimney diameter is reduced to increase the efflux velocity.

Why is this a challenge for the biomass boiler
There is a strong possibility that the local authority planning department might not give permission for a very tall chimney that is out of proportion with the building and the local landscape.

Furthermore, the height and dimensions of a chimney significantly influence the efficiency and performance of the biomass boiler. Designing a chimney stack to provide optimum performance under changing weather conditions and heat loads is in itself extremely difficult - if not impossible.

Changing the physical properties of the chimney stack to meet CAAM/D1 will definitely make the operation of the biomass boilers even less efficient.

An **exodraft** chimney fan system can provide the necessary optimum and constant draught conditions for the biomass boiler irrespectively of any external influences, whilst achieving the desired efflux velocity.

The benefits of the chimney fan system
for biomass applications

Aesthetics

- No need for tall chimneys – down sizing possible while still complying with the CAA
- Flexibility of design provides alternative flue termination points
- The height of the chimney can be reduced if needed (provided that the termination point still meets local regulations)
- The diameter can be reduced whilst guaranteeing efflux velocity

Design it your way

- Long horizontal flue runs are possible
- Placement of boilers where you want them
- Placement of chimneys where you want them
- Minimal flue size = optimum utilization of floor space

The operating costs are reduced

- The only system that guarantees the energy efficiency of heating appliances
- Guaranteed boiler efficiency through optimised boiler output
- Savings of up to 30 % on heating costs
- Modulating fan speed keeps running costs very low
- Cast aluminium fans ensure long life and low maintenance cost

Keeping people safe and buildings operational

- The only system that guarantees safe evacuation of combustion products
- Fail-safe operation in accordance with all relevant British Standards
- Constantly controlled pressure in entire flue system
- The only purpose-designed system
- 3-year warranty against mechanical failure
- 10-year warranty against corrosion

Control the draught

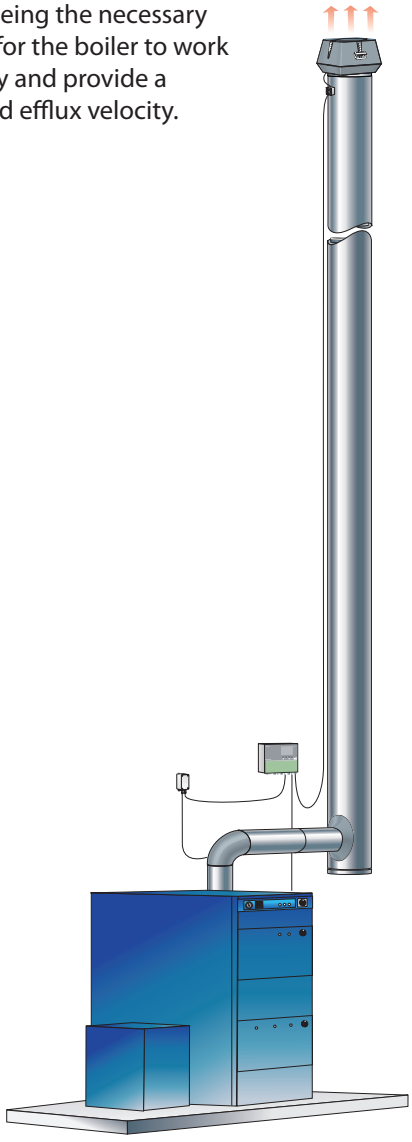
- Creating optimum working conditions for boilers continuously all year round
- Prevents aerodynamic down-wash and flue gases or smoke flowing down the outside of the chimney stack
- Dilution of the flue gases/smoke is possible

The chimney fan system

One solution, two options
An **exodraft** chimney fan system can provide the necessary optimum constant draught conditions for the biomass boiler irrespective of any external influences, whilst achieving the desired efflux velocity

The **exodraft** chimney fan system can be used in two different configurations for biomass systems:

- To provide the correct chimney height whilst also guaranteeing the efflux velocity and providing the necessary draught for the boiler to work efficiently.
- To make possible reduced chimney height whilst still guaranteeing the necessary draught for the boiler to work efficiently and provide a controlled efflux velocity.

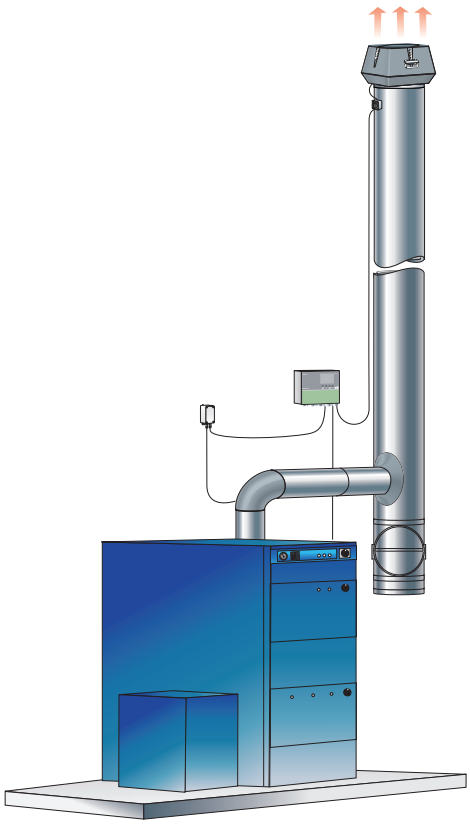


The **exodraft** chimney fan system consists of an **exodraft** chimney fan installed on the discharge point of the chimney. The fan speed is controlled by an **exodraft** EBC24 controller, developed for controlling modulating boiler operations.

The EBC24 is installed between the chimney fan and the biomass boiler. The controller monitors the draught inside the flue and chimney and modulates the speed of the fan to maintain a constant draught at any given time - irrespective of heat load or external conditions.

The system is guaranteed fail-safe according BS EN15287-1.

The design of the optimum system components for each individual chimney fan system is calculated using design software developed by **exodraft** in accordance with BS EN13384.



The components of the chimney fan system

Chimney fans RSV
exodraft chimney fans are specially designed and manufactured to withstand flue gas temperatures of up to 250º continuously and to operate in a dirty environment. The unit is made in die-cast aluminium with a grey paint finish, which makes it light, mechanically strong and extremely resistant to corrosion. The motor is a temperature-resistant, sealed asynchronous unit with lifetime-lubricated ball bearings. This ensures a long service life, high efficiency and low noise levels. The fan unit is hinged and can be opened for service and inspection of the flue.

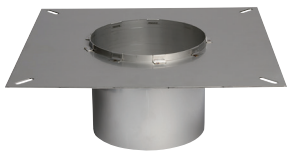
The chimney fans are installed on the discharge point of the chimney. The vertical discharge column provides a good efflux velocity away from the building.

EBC24 control unit
The **exodraft** automatic control unit EBC24 has an XTP sensor which monitors the chimney draught and supervises the fail-safe function. The unit is easy to install and commission. The display indicates the actual chimney draught as well as the value pre-set during commissioning, and the unit provides a variety of variable settings for the control of the system.

The control unit EBC24 also offers an external input option from a pressure switch or alarm sensor as well as having an alarm contact that can be connected to facility management systems or similar. A built-in alarm log makes it easy to recognize the location of any problems in the system. All electrical inputs and outputs are connected to amber LEDs, which make commissioning and fault-finding straightforward. The fail-safe system of the EBC24 conforms with BS EN15287-1.

The frequency converter FRK is used for variable speed control of 3-phase motors in connection with EBC24.

EBC24EU01	Controls for indoor installation.
EBC24EU02	Controls for outdoor installation.



Accessories
It is legally required that an isolation switch is fitted in the immediate vicinity of the fan, so that the fan can be disconnected for servicing or cleaning of the flue.

If the chimney fan is to be installed on a steel chimney, stainless steel flanges can be used. The spigot of flange FR is inserted into the flue and the fan and flange assembly is located on the top of the chimney. The range includes flanges to suit any model of fan and most flue IDs. For multiple fan installations a plenum box can be used.

For further information on **exodraft** chimney fan systems, please contact **exodraft** Ltd.

exodraft's extensive product range is based on more than 50 years of experience and knowledge in the field of combustion and chimney draft technology.
Our products are known for high safety and quality and we're helping to set the standards and requirements for draft technology.

exodraft products are all fully documented in accordance with current national and international standards and are sold in more than 40 countries – to small domestic fireplaces in private homes to larger commercial and industrial boiler installations.

How do you ensure that the system is safe?
The system constantly measures the draught in the chimney system and will always modulate according to the heat load and external conditions that normally affect draught. Should it not be possible to maintain the commissioned level of draught in the system, the **exodraft** controller will automatically cut off the supply to the appliance in accordance with BS EN15287-1.

What if the power to the fan is cut off?
With the fan not running, the system will be unable to maintain adequate flue draught and the controller will automatically either cut off the fuel supply or shut down the boilers, as described above.

Does the system require specific makes of boilers?
No. The **exodraft** system will operate with any make or specification of boiler.

What is the energy consumption of the system?
It varies according to the model of fan installed but the energy requirement is always very limited. If the fan was running constantly at full speed, which it very rarely is, the consumption would be between 40W and 160W.

How does the system affect the energy efficiency of the boilers?
The **exodraft** system constantly maintains optimum draught in the flue, which guarantees, other things being equal, that the efficiency of the individual boilers will always be at its highest. The **exodraft** system actually keeps boiler efficiency at its peak, day after day.

Can the system help me achieve planning consent?
Yes! Normally our design programme helps developers/specifiers achieve planning approval... often first time. This we do by providing the efflux velocity required with an acceptable chimney height. By ensuring the efflux velocity you will not need to oversize the height of the chimney stack.

What happens to the fan in very windy weather?
Nothing. The fan will definitely stay in place and the effect that the wind would otherwise have on the draught in the flue is cancelled out by the modulation of the fan.

Is the fan noisy?
No. The high engineering quality, perfect balance and top-quality bearings of the fan ensure that it is extremely quiet when operating and it is, in any case, at the top of the flue, well away from living areas.

What is the investment?
The exact cost varies slightly according to the design of the duct, but the investment will normally be between £3,000-8,000 per system, installed and commissioned.

What about maintenance?
As with any abatement technology for biomass there is a certain level of maintenance, in this case cleaning of the fan. Provided a consistent and good quality fuel is used, a quarterly or half yearly cleaning should be sufficient. The costs definitely outweighs costs of other abatement technologies, such as filters.

Do you guarantee that it will work for us?
Yes. We guarantee that any system designed by **exodraft** or our **exodraft** Technology Centres will work. We offer a six-month money-back guarantee should the system not meet your exact requirements. We also offer a 3-year warranty against mechanical failure.

Do you offer chimney fan solutions for other types of heating applications?
Yes. We have system solutions for fireplaces and stoves, single and multiple boilers, bakeries and many other applications.

Check out our website for more information on system solutions or to attend one of our CPD seminars.
For more information visit www.exodraft.co.uk

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