Open fires and solid fuel stoves

These single room, point source heating units are commonly used in rural villages like Barningham. *Are you getting the best out of yours?*

❖ Burn Better Campaign: make changes for cleaner air and improve your heating efficiency

The 'Burn Better' campaign is a joint initiative by **Defra**[1], the **Solid Fuel Association** and **HETAS**[2] to help reduce emissions and improve people's health.

- Poor quality fuels release harmful particles. Moreover, coal smoke is classified as a carcinogen by the World Health Organisation.
- From May 2021, the sale of wet wood, bagged house coal and some manufactured fuels is banned, with deliveries of loose house coal banned from May 2023.[3]
- You can 'Burn Better' by choosing fuels that are dry and cleaner to burn.
- Dry, **Ready to Burn** wood, logs and briquettes burn more efficiently, produce less smoke and pollution and are better for your appliance and chimney.
- Only burn wood that is dried to less than 20% moisture. Freshly cut wood should be air dried for a minimum of 2 years.
- Look for the DEFRA 'Ready to Burn' logo on bagged fuel and where possible, source wood from Woodsure certified suppliers.
- Never burn painted, stained or chemically treated wood as this produces hazardous fumes which pose a serious health risk.
- Have your chimney swept at least once a year to reduce emissions and minimise the risk of a chimney fire. If appropriate, have your appliance cleaned and maintained by a skilled tradesperson.

[1] UK Department for Environment, Food and Rural Affairs

[2] Heating Equipment Testing and Approvals Scheme

[3] Under the Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020

The Rural Community Energy Fund

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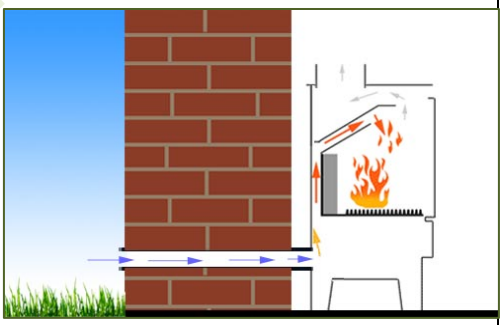
❖ How do open fires compare to solid fuel stoves?

	Open Fires	**Stoves**
Fuel	Coal (until supply is phased out), any solid fuel, logs	Coal (until supply is phased out), any solid fuel, logs. Some designs are only suitable for wood burning.
Heating type	Radiative, feels warm close to fire but may result in cold spots away from the fire	Convective, warms large rooms more evenly
Source of combustion air	Room air	Room air (open combustion) OR External air (closed combustion)
Air flow draw	Uncontrolled, most heat goes up chimney	Controlled (see further details below)
Heating efficiency	10% to 30% Can be negative on cold days, i.e., can make the house colder overall due to volume of fresh air drawn to maintain combustion	65% to over 80% The best heating efficiencies are achieved by the new 'Ecodesign Compliant' stoves which use a tertiary combustion system to minimise emissions
		 *Closed combustion stove* *Reproduced from:* *www.stovesonline.co.uk/external-air-stove.html*

- Ecodesign stoves offer significant improvement in heating efficiency and substantially lower emissions. Typically, emissions of particulates are 90% lower than from an open fire and 80% lower than from an old (10-year old) stove.
- Ecodesign stoves are also cheaper to run as they burn significantly less logs for the same amount of heat.

❖ From January 2022, all new heating appliances sold or installed must meet the Ecodesign requirements for efficiency and emissions control

- When purchasing a new heating appliance, look out for the key certification schemes:
  - HETAS "Ecodesign Compliant" marking for appliances that fully meet Ecodesign requirements. Search for HETAS certified products here: www.hetas.co.uk/find-appliance/
  - clearSkies[4] certification indicates that the appliance meets the Ecodesign efficiency and emissions standards. There are four levels of certification, the highest (Level 5) applies to stoves with the highest efficiency performance and lowest emissions (significantly exceeding the Ecodesign requirements). Search for clearSkies certified products here: www.clearskiesmark.org/product-search/
  - "Defra Exempt" indicates that the stove is approved for use in a Smoke Control Area. This requirement does not apply in Barningham, nor any areas within the former Teesdale Council district. However, emissions from Defra Exempt stoves are likely to be lower than those which are only Ecodesign Compliant.
- Use a HETAS registered installer, who will provide a Building Regulation Compliance Certificate. Search for HETAS installers nearby at: www.hetas.co.uk/find-installer/

❖ Improving efficiency

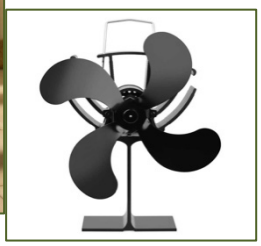
- Install a flue liner to improve efficiency and reduce chimney fire risk. This is recommended for both open fires and stoves.
  - Open fires were originally designed to be lit all the time, so the flue stayed warm, and the excess air movement ensured there wasn't a build-up of damp.
  - In most homes, the open fire or stove is no longer lit permanently, so the stone chimney chills, meaning that large amounts of condensation can build up as the hot air condenses. This can lead to damp problems which a flue liner would prevent.

[4] clearSkies is an independent, not-for-profit organisation established out of the Stove Industry Alliance to provide certification for stoves and fireplaces.

- Optimise the installation arrangement of your stove.
  - Stoves are often installed in a recessed fireplace which is inefficient for convection heating.
  - Seal the flue off immediately below the mantlepiece, ideally with an angled or curved surface, rising from the outer wall at the back of the fireplace up towards the mantlepiece, encouraging the rising hot air to convect outwards into the room rather than up the chimney. Approved fire-retardant material *must* be used.

Typical recessed setting for wood-burning stove
Reproduced from: *www.directstoves.com/*

- Use a stove-top fan.
  - Available at less than £30, the fans are Peltier motors that generate electricity from a heat differential, so they don't need batteries.
  - As the stove heats, the fan starts spinning and creates a gentle draft pushing warm air out from the recess into the room.
  - The effect is relatively modest, but it will improve heat distribution and create a pleasant feeling of warm air drifting into the room.



Stove-top fans
Reproduced from:
https://valiantfireside.com/

❖ Lighting a fire

- Lighting a fire can sometimes be difficult and generate excessive smoke both inside and outside due to inefficient combustion, particularly on a cold day.
- An alternative method that works well when lighting a stove is:
  - The Upside Down or Top Down Method[5]
  - This method heats the flue up more quickly, minimises the risk of smoke blow back into the room and removes the need to open the door to add fuel to the kindling until the well ignited initial load is burnt through.

[5] www.hetas.co.uk/lighting-a-fire/ Also see: www.youtube.com/watch?v=433myBuH18g&t=33s

- Instructions for Top Down lighting:
  - Place two small logs across the fire bed.
  - Place pieces of kindling across the two logs in layers at 90° angles, with firelighters or loosely crumpled paper in between the gaps.
  - Set the controls of the appliance to the lighting position (i.e., primary air is open).
  - Light the firelighters and close the door of the appliance. The fire will slowly increase, warming the flue gradually without producing copious amounts of smoke and pollutants to the atmosphere.

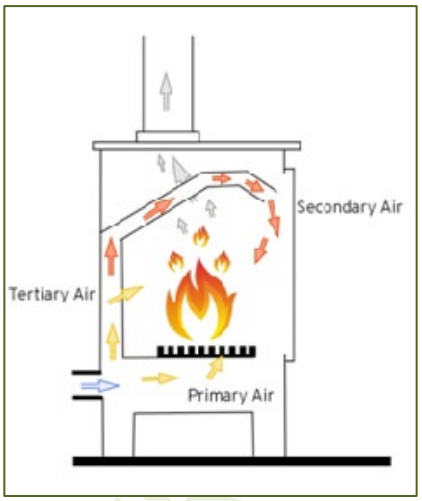
Upside-down lighting
Reproduced from:
www.hetas.co.uk/lighting-a-fire/

  - Leave the kindling well alone until the top of the appliance is warm and then close the primary air control. The kindling will fall between the logs as it burns. Once the logs are burning well the burn rate of the appliance can be adjusted and more logs applied to the fire as required.

❖ Understand wood combustion

- Wood burns in a different way to coal based fuels, and requires a higher burn temperature. Combustion occurs in three stages:
  - primary stage: ignition of the surface of the logs
  - second stage: heating drives off volatile gases within the wood, which can then be burned – over half the energy from wood is released in this stage, which requires a consistent high combustion temperature
  - final combustion: once the gases are driven off and burned, charcoal is left, which can burn for a long time.
- This pattern of burning is the reason that good quality modern wood burning stoves have additional air vents, allowing combustion air to mix freely with the volatile gases to create an effective second burn. A handy tip: a magnetic thermometer attached to the flue gives a good indication of efficient burning.
- You should not leave the doors open after the stove is lit and you also should not continually feed small amounts of wood into the stove. Because of the stages of combustion, a single charge should be followed by as complete a burn cycle as possible, with a further stoking of the fire as required.
- Open fires cannot achieve this controlled second burn, which is why they are not as efficient with wood fuel.

- Ecodesign stoves have up to 3 air intakes: primary, secondary and tertiary.
  - The primary intake is used ONLY to get the fire going, otherwise it drives too much air through the stove and the temperature in the flue increases, which means heat is being lost. This leads to the vivid flame, which many consumers associate with a "good" fire, however it is very inefficient and not clean burning. In fact, the chamber temperature will actually decrease as the flow of air is too fast.
  - The secondary air intake, which comes in at the top, is the main air source, for use once the fire is properly alight. Primary air at this stage impedes the flow of secondary air, meaning particles that would normally be burnt off will blow up the chimney, increasing pollution.
  - The tertiary air intake at the back is pre-warmed air injected into the combustion chamber at force to re-combust gas from the second combustion stage, giving the cleanest, most efficient, burn possible.



Ecodesign stove air supplies
Reproduced from:
www.fireplace.co.uk/brands/Eurostove/166

- In addition, a DEFRA-approved stove has a constant air supply by preventing air controls from closing fully. This ensures a cleaner burn of the wood and significantly reduces particulate emissions.

❖ Chimney sweeping and house insurance

- Sweeping your chimney is important to reduce emissions and fire risk. Many insurance companies require you to sweep it on at least an annual basis and have the proof that this has been done.
- The Solid Fuel Association recommend that chimneys are swept:
  - once a year if you're burning smokeless solid fuel
  - twice a year if you're burning bituminous coal
  - up to every three months if you're burning wood.
- Notify your insurance company if you're installing a real fire or stove for the first time, because you're adding to the risk and that may alter your policy – you might not be covered for it.

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