

using local timber to **heat** your home

...a guide



Why change to wood energy?

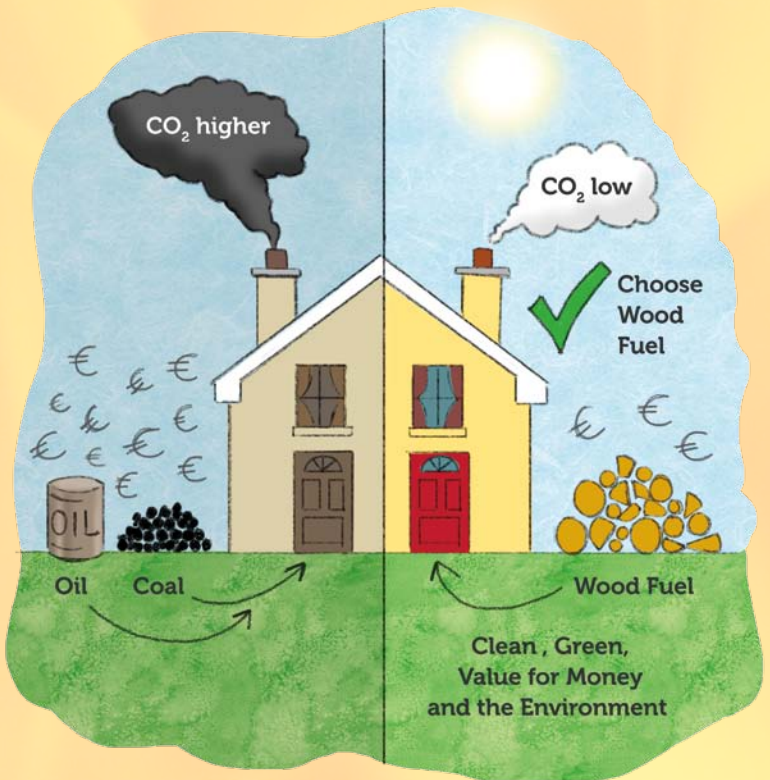
Firewood is readily available and generally cheaper than fossil fuels, up to 45% cheaper than oil. The supply of wood is sustainable, renewable and carbon neutral - meaning no carbon taxes!

Using wood energy will make Ireland less vulnerable to changes in international energy prices and reduces our dependence on imported fuels.

Carbon Tax is charged at a rate of €15 per tonne on fossil fuels since May 2010. This is in addition to other taxes and excise duty. Heating oil prices have increased by €43 per 1,000 litres since 2010.

Carbon Tax is set to double by 2014.

Wood fuel heating systems such as open fires, log stoves, log boilers and log gasification boilers offer the same level of comfort, convenience and reliability as oil or gas boilers.



Benefits of using local fuel

By choosing locally produced firewood you will support your local economy and provide income and employment to forest owners, roading, harvesting, haulage contractors, firewood merchants and many other ancillary businesses in your local community.



Market projections for wood fuel indicate that there is ample fuel supply available from privately and publicly owned woodlands. By 2020 the residential demand for wood energy in the Western Region of Ireland is expected to reach 105,000 oven dry tonnes of wood fuel (ODT); the potential supply from private and public woodlands is expected to be 270,000 ODT.

Further information on fuel supply is available at www.raslres.eu.

Oven Dried Tonnes (ODT): Moisture content is at 0% in the wood fuel. As wood fuel can be produced and supplied at different moisture contents it is usual to purchase fuel based on odt's.

Which system is best for me?

Before spending money on a new stove or boiler, it is important to review the current energy efficiency of your home. Taking steps, such as, fitting or upgrading your home insulation will result in permanent energy costs reductions. These improvements will reduce the size of stove or boiler required which will result in lower purchase and installation costs. The Sustainable Energy Authority of Ireland has useful information for homeowners on their website www.seai.ie

The following outlines your options for wood fuel systems...

Heating a single room



Open Fire

Inefficient, as 60% to 70% of the heat is lost up the chimney causing draughts



Fireplace Insert

Improves efficiency up to 60%, reduces draughts and ash



Log Stove

Efficiency of 65% to 70%. Further reduction in draughts due to high degree of controls

Heating a number of rooms, apartment or small house



Large Log Stove

Fitted with air ducting to other rooms or linked to a back boiler and radiators in other rooms. There is a trade-off between heating the room space and the radiators.

Efficiency about 60%



Large Log Fired Cooker and Back Boiler

Linked to radiators in other rooms. Efficiency about 60%

Heating a Large House, Small Commercial Premises, Community Centre or Farm



Large Log Boiler

Requires a large room for the boiler and buffer tank and a good sized log store. Ideally suited for detached house, farm house etc. Particularly, well suited to those who own and can produce their own logs. Typical efficiency rates of 60% to 70%



Log Gasifier

Highly efficient wood heating system with rates 90%+. Produces very small amounts of ash. Requires a large room for the boiler and buffer tank and a good sized log store.

The wood heating system you choose will depend on a number of factors...

The most important one is the **space you wish to heat** – is it a **room, apartment, house, a small commercial building** or a **large community centre**?

To get an accurate answer seek professional advice. Most retailers offer advice regarding the size of stove or boiler best suited to your building and what modifications may be required to existing chimneys etc.

One rule of thumb to determine the kilowatt size of stove required is to calculate the volume of the space to be heated in cubic meters $(W \times D \times H) = m^3$ and divide the answer by 15.

The answer obtained is only an approximation and adjustments will need to be made for each situation. The quality of the insulation, age of the building, its aspect and usage patterns will also influence the system that will work best for you.

How to calculate the size of boiler for your home



Before investing in a new heating system, the first step is to ensure the house is well insulated. Remedial measures such as attic insulation, draught excluders, and radiator valve controls will ensure your fuel bills are permanently reduced from current levels.

The following example shows how to estimate the size of boiler required. **It is critical to get professional advice to ensure the new stove or boiler is sized correctly.**

House dimensions are $15\text{m} \times 11\text{m} \times 2.5\text{m} = 412\text{m}^3$,
and then 412m^3 divided by $15 = 27\text{kW}$

The space will need to be heated
for **6 hours per day for 160 days a year**;
the running hours are **160 days x 6 hours**
= 960 hours per year.

The heat required is **960hrs x 27kW**
= 25,920kWhr per annum.

If the boiler has an efficiency rating of **85%**, the required
energy input is given as **25,920kWhr**
divided by **0.85 = 30,500kWhr** (rounded up)

If the moisture content of the logs is **18%**, then there are
approximately **4.3kWh per kg** of logs.
Therefore **30,500kWhr** divided by **4.3kWh**
= 7,093 kg or **7 tonnes per year**

If the cost of loose softwood logs is **€180 per tonne**,
then annual fuel bill is **7 tonnes x €180 = €1,260**

**Then compare the annual cost of your oil
to the cost of wood fuel to calculate your savings!**

Watt (W): The unit, defined as one joule per second,
measures the rate of energy conversion.

Kilowatt (kW): A measure of electrical power equal to 1,000 watts.
 $1 \text{ kW} = 1.341 \text{ horsepower.}$

Kilowatt hour (kWh): A measure of energy equivalent to
the expenditure of one kilowatt for one hour.
For example, 1kWh will light a 100-watt light bulb for 10 hours.



Checklist for Buying an Appliance



Use this checklist to help you make the best decision in purchasing, installing and running your wood heating system. (Example answers have been provided to help you).

- ✓ **What size is the area you wish to heat - is it a single room or the whole house?**
*Example: Bungalow: Area – 15m x 11m = 165m² (1,775ft²)
Vol – 165m² x 2.5m = 412m³*
- ✓ **What year was the building constructed?** *Example: 1980*
- ✓ **What is the Building Energy Rating?**
Example: Don't have one. No insulation in attic or water pipes. Draughty doors. Could upgrade. Might save 20% to 25%
- ✓ **Do you currently have central heating?**
*Example: Yes radiators with on/off valves.
Could upgrade valves to temperature controlled.*
- ✓ **What type of heating fuel are you currently using?**
Example: Oil – 4,700 litres
- ✓ **How much do you spend a year on fuel?** *Example: €3,500*
- ✓ **If currently heating with oil, how many fills of oil do you purchase annually?**
Example: 3 or 4
- ✓ **What age is the boiler and what condition is it in?**
Example: 1980 – Worn out
- ✓ **How much storage space do you have for firewood?**
*Example: Small garden shed with good access
(2.5m x 3.5m x 2.0m = 17.5m³ »»» 17.5m³ x 0.6* = 10.5m³
– Can choose loose softwood logs. *to account for air space)*
- ✓ **Who will carry the firewood into the house?** *Example: Me*
- ✓ **What is your budget?** *Example: Undecided*
- ✓ **Consider how the chimney of the appliance you are considering buying will be cleaned: is it bottom up or top down? Is there sufficient access to chimney for cleaning? Is there a local chimney sweep familiar with servicing wood fuel systems?**
*Example: Currently cleaned from bottom.
Get names of cleaners from stove shop*
- ✓ **Ask the boiler or stove supplier to visit to ensure that the new appliance can be installed. If connecting to an existing heating system ensure that the heating systems, chimney and flue are compatible.**
Example: Will come next week, ring on Friday
- ✓ **Ask your boiler or stove supplier for the wood specification and to recommend 3 or 4 local firewood merchants. Check with the firewood merchant that the specified logs are a constant stock item and the delivery options available.**
Example: Ask stove shop.

Checklist for Buying Firewood



Before you visit the fuel merchant:

- ✓ Estimate the size of the storage space you have available.
- ✓ Is it covered or open?
- ✓ How wide is the access to your storage area?
- ✓ Decide which wood fuel is best suited to your storage space and system.

Before purchasing the fuel from the supplier:

- ✓ Check if the firewood is labelled and carries a quality mark. The label should include the processor's name, the source of the logs, moisture content, type of wood and weight.
- ✓ Ensure that the wood is locally sourced. Locally produced timber supplies the same heat per unit of weight as imported timber.
- ✓ Is it hardwood or softwood firewood?
- ✓ What is the moisture content? Check with a moisture meter that the moisture content is less than MC25%.
- ✓ How will it be delivered? Small Bags? Bulk Bags? Loose?
- ✓ What is the price per unit delivered?
- ✓ What size are the logs?
- ✓ How long will it take for a delivery?

What type of fuel will I need?

Firewood comes in four basic forms:

Logs are cut and split from the felled timber. There are two types of firewood logs: hardwoods (ash, oak and beech); and softwoods (spruce and pines).



Woodchip is made from logs which have been seasoned and then chipped into regular sized particles and are generally used in larger boilers (>80kW).

Briquettes and **pellets** are made from kiln-dried, compressed sawdust and have a higher energy yield than similarly sized logs or woodchips.



Moisture content

The amount of water in firewood is referred to as its Moisture Content (MC%). Freshly felled timber can have a moisture content of up to 60%. Wet wood burns slowly and releases low amounts of heat. Burning wet timber can potentially damage your chimney and cause pollution due to incomplete combustion. Firewood typically used in an open fire, closed stove or small domestic scale central heating system must be seasoned (i.e. dried) to a low moisture content, preferably less than MC25%.

Firewood is the easiest wood fuel market for farmers to get involved in as normal farm machinery such as tractors, trailers and chainsaws can be used.

Remember that the heaviest bag is not always the best value for money!

After felling, the wood should be cut and split as soon as possible to speed up the seasoning process.

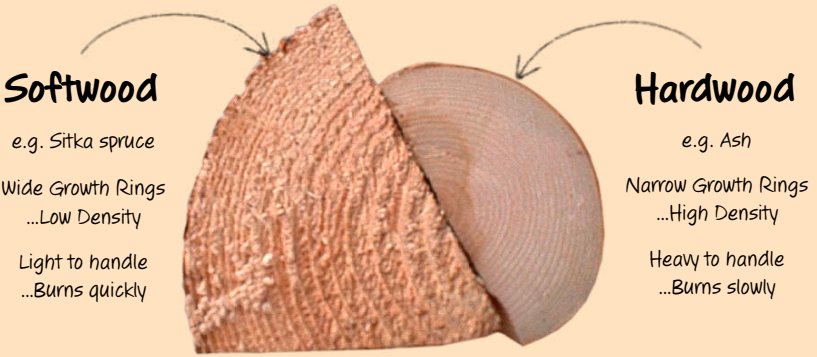
You can cut and split the wood yourself, or ask a firewood contractor to do it for you



What space and conditions will I need to store my wood fuel?

Logs and briquettes must be stored in a dry, ventilated shed or weather-proof bag. Wood will re-absorb moisture if it is left unprotected; this will reduce the energy given off when burnt. If pellets or briquettes get damp, they will disintegrate.

At the same moisture content and at equal weights, softwood logs will yield slightly more energy than hardwood logs. A tonne of softwood will require considerable more storage space than a tonne of hardwood because softwood has a lower density than hardwood. As illustrated in photo below.



Storage space required for high, medium and low density wood fuels of equal energy content



Timber Briquettes

Storage Space Required: **0.5m³**

Density: **High**

Energy Content: **4,230KWh**



Hardwood Logs

Storage Space Required: **2m³**

Density: **Medium**

Energy Content: **4,230KWh**



Softwood Logs

Storage Space Required: **3.8m³**

Density: **Low**

Energy Content: **4,230KWh**

A general rule of thumb is that the space required for wood fuels with a high energy density is low, while a large amount of storage space is required for wood fuels with a low energy density.

If you have **less than 1m³** of storage space, it would be best to purchase **timber briquettes**.

If you have a storage area **larger than 3m³**, you can consider **softwood logs**.

Logs can be delivered in a number of ways and it is important to select a method which suits the size and location of your storage area.



To estimate your available storage area for logs use the following calculation:

$$\begin{aligned} &(\text{Height} \times \text{Width} \times \text{Depth}) \times 0.6 \\ &(\text{allowance for air space between the logs}) \\ &= \text{storage area in m}^3. \end{aligned}$$

Timber Storage Options



Box Storage – Loose Logs

Loose logs are the cheapest form of delivery ideally suited to a large shed into which a trailer can be reversed. Otherwise, the logs will have to be moved from the unloading point to the store.



Weather Proof Bulk Bags

Bulk bags are ideal where space is limited. They can be stored outside provided the bags are waterproof and breathable. Unloading and moving to the storage area might require a forklift or mini-lift. Ensure that there is sufficient room for a forklift or mini-lift to fit down any passageway and the surface is suitable.



Small Bags or Briquettes

Where storage is limited or difficult to access then small bags are most suitable.

Essential Tips...

- Buy seasoned timber only. To ensure a good supply, purchase a small moisture meter (€25) (typically available from hardware or building providers) to test the logs prior to purchase. The moisture content should be less than MC25%.
- Don't buy logs if the bags have condensation inside them. Remember a heavy bag is rarely good value for money.
- Try a few suppliers for delivered prices and then decide.
- Look for the wood fuels quality assurance mark WFQA. This scheme gives the purchaser confidence in the supplier and that the wood fuel meets a high specification. Please see www.wfqa.org for more information.
- Obtain references for installers and check out other systems they have installed.
- Purchase a small moisture meter to measure and monitor the moisture content of your fire wood.
- As with all fuels, when timber combusts it produces various gases. One of these is Carbon Monoxide which is normally broken down to produce heat. However, Carbon Monoxide can be lethal and any room with a solid fuel fireplace or stove, or house with a boiler should have a Carbon Monoxide alarm fitted. These are available from as little as €25. For further information on Carbon Monoxide phone: 1850 79 79 79 or visit the website: www.carbonmonoxide.ie



This brochure was a joint project between RASLRES www.raslres.eu, Teagasc Forestry www.teagasc.ie and the County Clare Wood Energy Project www.ccwep.ie.

For further information please visit the project partners websites.



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