
LEENDERS
SINCE 1979
STOVE
BUYERS GUIDE

INTRODUCTION

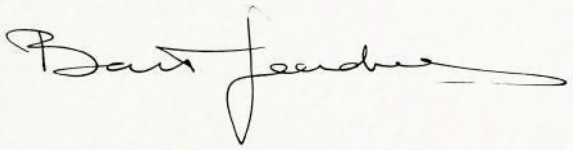
Dear Leenders-would-be stoker,

I do not think a house can do without a fire. After all, houses exist thanks to our life around the fire. You notice that especially if you are used to fire at home and you visit a house without one. Brrr.

Finding the right stove for your house is no easy task. There are lots to choose from and technology abounds. If it has been a while since you last bought a stove, you will notice that our industry has not stood idle.

I have written this guide to help you decide what to buy. The best guidance comes from a specialist in person, but perhaps this guide can help you get started.

Hopefully you will fall for a Leenders.



Front: the road to Applecross, Scotland

Time for tea in Fjorda, Norway

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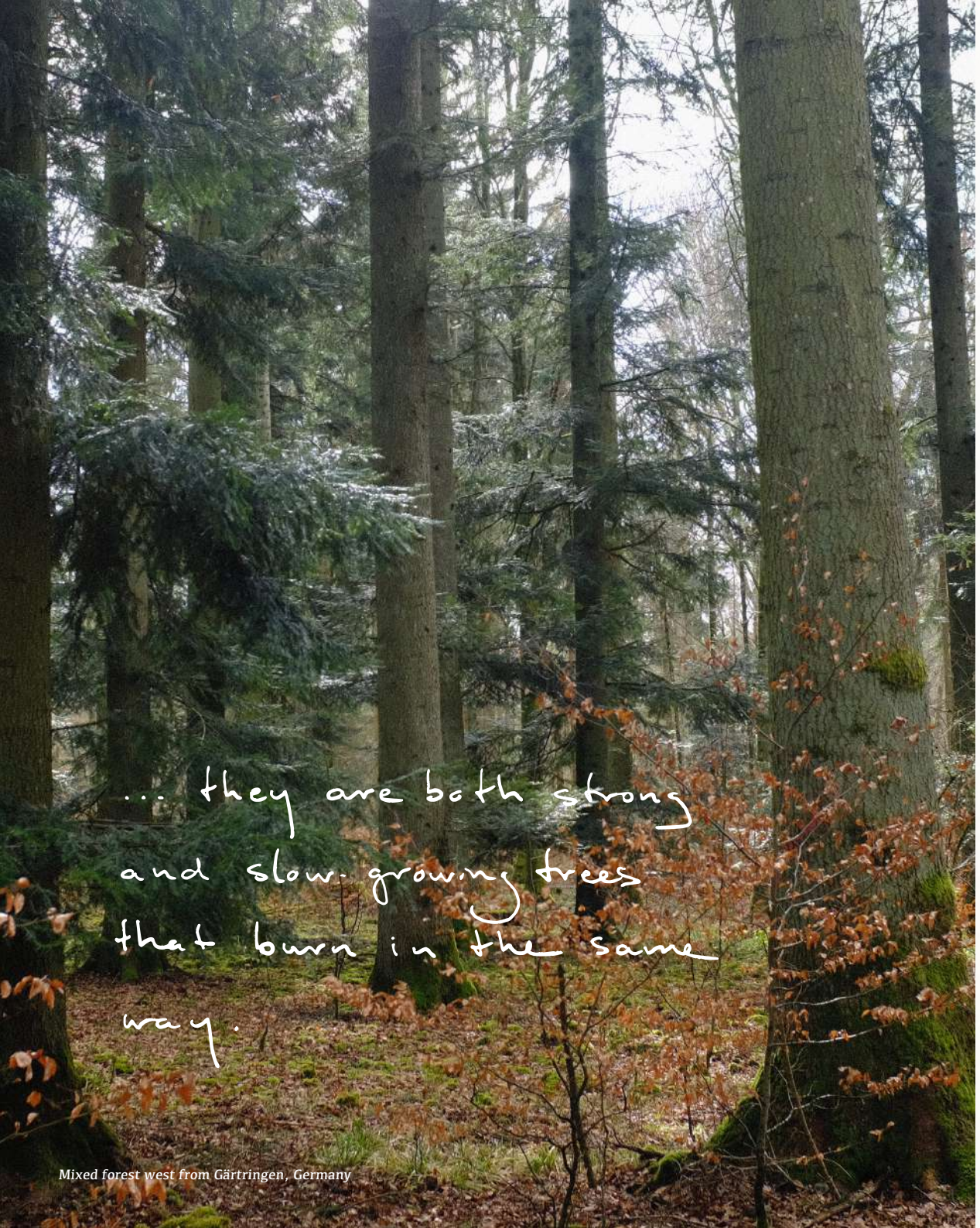


Mixed forest west from Gärtringen, Germany

WOOD BURNS AS IT GROWS

I have spent a few hours in the company of a wood fire and, just through staring at the flames, I have learned a lot about trees.

To see a tree growing, you need great patience. A tremendous amount. Perhaps you can discern changes in the beginning, when the seedling unfolds its first leaves. But it takes decades before a tree has matured, and to observe the entire process, you need to really take your time. I have found an easier way: through watching the flames in a wood fire, you can see how the tree has grown. The flames reveal the progression of growth in a tree.

It takes literally years for an oak tree to become a strong and majestic tree, and oak burns in much the same way: the fire burns with powerful flames and hot embers. Oak provides warmth for a long time. The ideal fire for heating your home.

The same is true for beech. Beech and Oak are both strong and slow-growing trees that burn and radiate warmth in exactly the same way. Spruce trees are fast-growing trees and do not grow so old. A spruce log burns quickly and fiercely, providing short and very hot fire. Ideal for lighting the fire, but less practical for heating the house. This requires a huge supply of fire wood.

For me, another fascinating aspect of wood as a source of energy. Watch for yourself how pine, ash and birch burn, and you will know how these trees grew.

WOOD DOES NOT BURN; THE FIRE TRIANGLE

I always thought that wood burnt in a fire, but that is not actually the case. Let me explain.

The fire triangle is the best way of explaining how a fire works. Fire is a reaction between a gas (i.e. fuel) and oxygen at a specific temperature. Gas, oxygen and temperature. If all three are present in the right proportions, there is fire. Which explains why this is called the fire triangle.

So it is not the wood that burns, but a gas. A gas stored in the wood. When you look closely at a fire, you can see this phenomenon very clearly. The flame hovers just above the wood. The gas is burning.

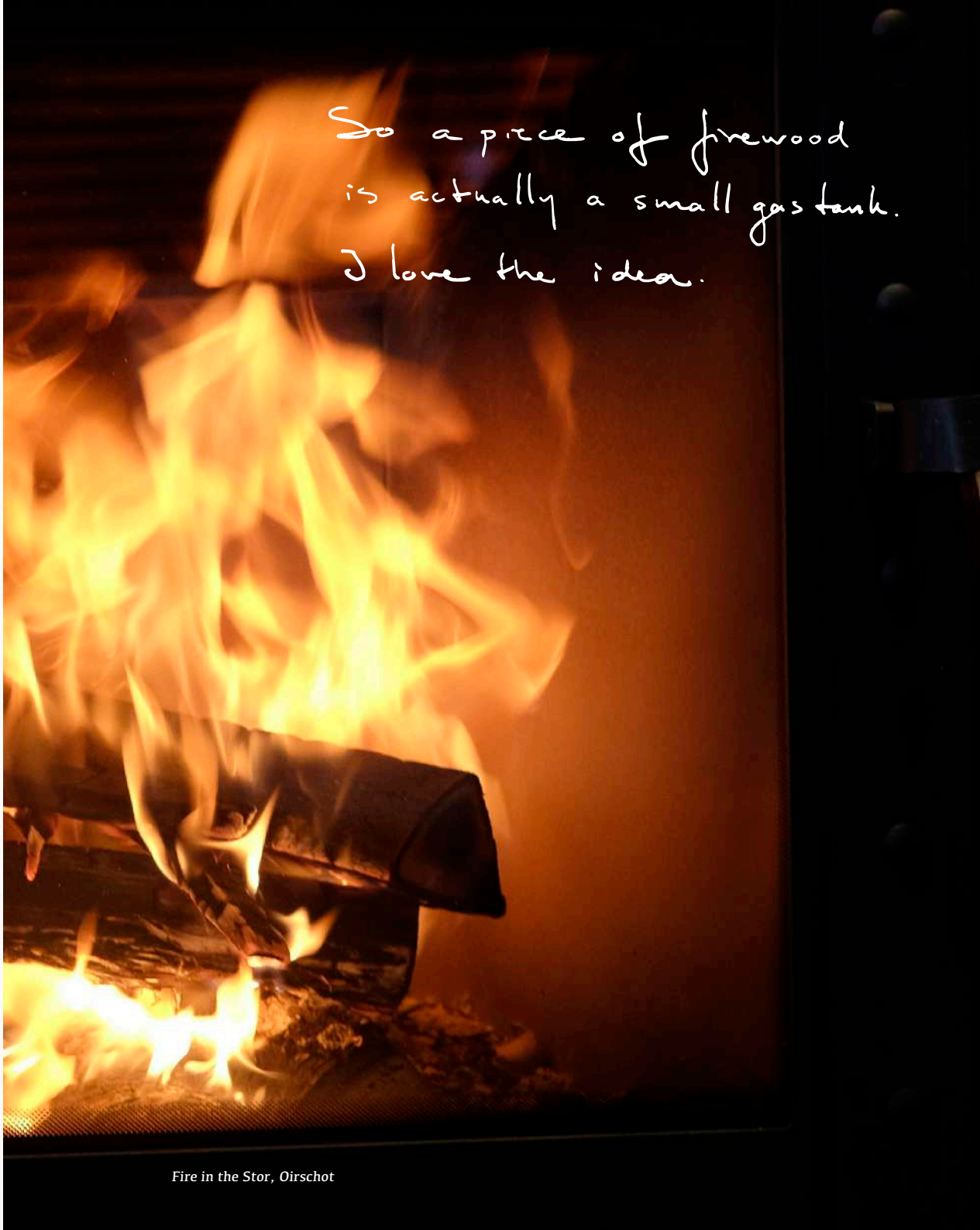
So a piece of firewood is actually a small gas tank. I love the idea. A combustible gas stored in a piece of wood. But there is no valve on this gas tank. So how do I get the gas out?

The wood has to be heated to allow the gas to escape. This starts to happen at about 150°C. You can test it yourself by putting a piece of firewood in your kitchen oven at 150°C. The wood slowly turns brown and then blackens. It chars as the flammable carbon is released as gas. If the gas does not burn, it disappears as smoke.

So be careful not to set your oven too high. You may damage it and you will certainly fill the kitchen with smoke. It would be pointless anyway, because your oven would have to be set at about 400°C to start a fire. The reaction between the gas and oxygen starts at 400°C. So the fire triangle is complete at 400°C, which is when the flames appear.

That's quite a difference, isn't it? A difference of 250°C (400°C - 150°C). It takes quite a while before the fire starts, and smoke always appears before the flames.

So the old saying - "where there's smoke, there's fire" - is not completely true. A more accurate version would be: "Where there's smoke, the temperature is at least 150°C, but still lower than 400°C". Come to think of it, that would look good printed on a tile.



Fire in the Stor, Oirschot

ECO WOOD

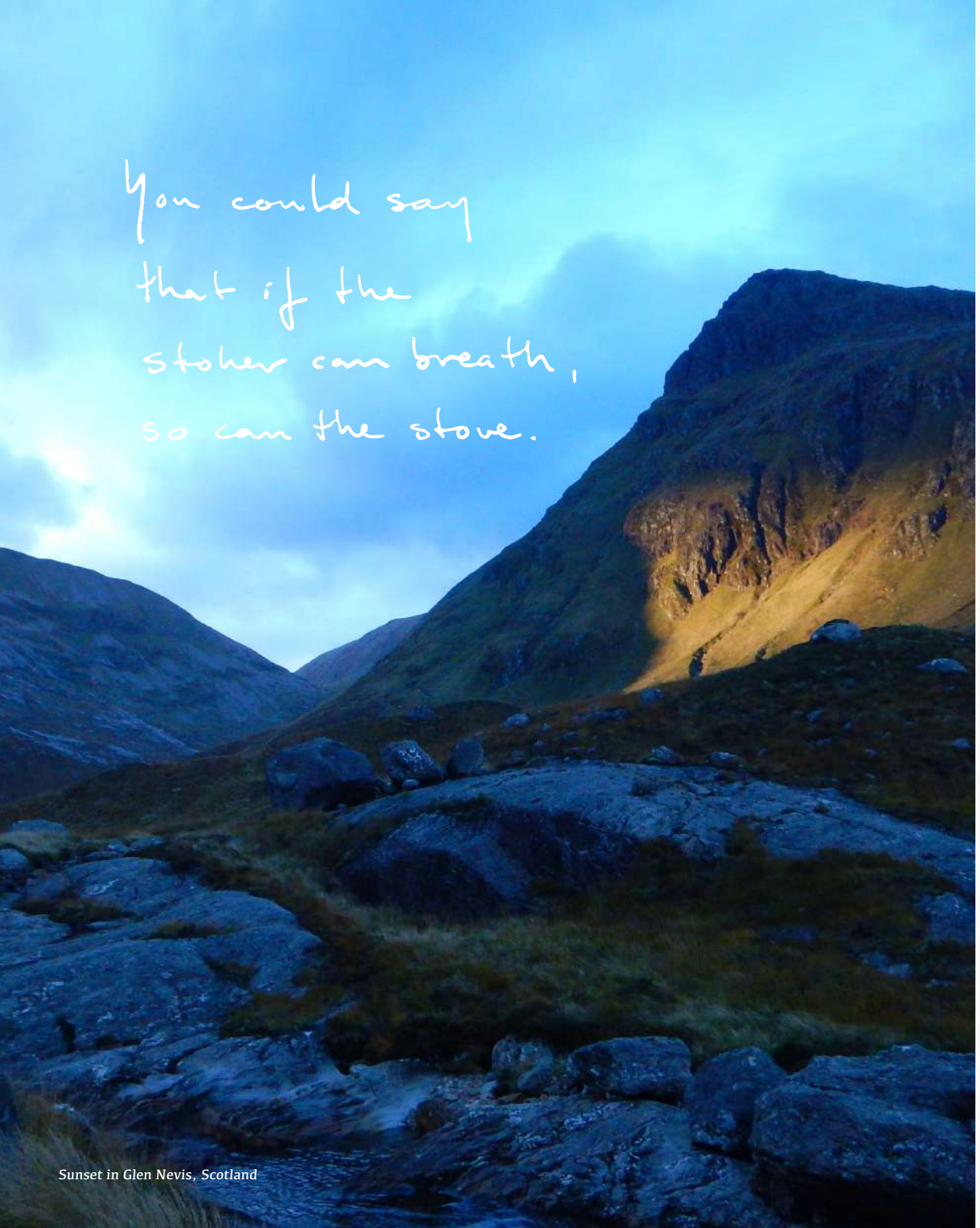
Recently rediscovered in our woodland and acreages: Eco Wood. Completely natural and available locally. It grows for free, is maintenance-free and needs no assistance with propagation. Of all fuels, Eco Wood replenishes itself the fastest.

Eco Wood uses solar energy and produces its own solar cells each year, which can later be used as compost. It feeds on the surrounding air and emits pure oxygen.

Eco Wood is completely circular and can be reused in the chain at any given moment. No waste products are left after processing. Eco Wood is extremely green, gluten-free and it can be recognised from the label with the green leaf.

Is there nothing troublesome about Eco Wood? I suppose, a splinter in your finger.

Mark and Cuddles on the Klarälven, Sweden



Sunset in Glen Nevis, Scotland

FRESH AIR

Fire needs air, fresh air. Because there is oxygen in fresh air that reacts with the flammable gases in the wood. Without air, the fire suffocates.

Fire also sucks in air that it does not even need. This happens most commonly with an open fire, like an open hearth. The excess volume of air that sails up the chimney is ballast air and it has a cooling effect. "Burnt to the front, frozen to the rear", was a popular comment in the middle ages if someone stood in front of the open hearth. Frozen to the rear, because the flow of ballast air can be as much as 1000m^3 per hour for an open fireplace.

Fire burning in a stove does not consume that much air. As a stove is closed, the air supply can be dosed, so that burning 1kg of wood only requires 10m^3 of fresh air. This volume of air is usually available in and around the stove. Providing everything is in order, because we, the stokers, need fresh air too. Even more so than the stove.

An adult stoker needs about 30m^3 of fresh air per hour. This is because the CO_2 we exhale has to be diluted. You could say that if the stoker can breathe, so can the stove. But with almost 1000m^3 per hour, this is not a matter of course for an open hearth.

The air consumption for an open hearth is so great that a separate supply is necessary. Unless your house has not been renovated since the middle ages. A separate supply is not necessary for a stove, but in some cases the house is sealed so hermetically that a little extra air is a good idea. Most stoves are constructed to accommodate this with their own fresh air supply. Through a hose, directly from outside.

So that the fire keeps burning.

POWER RANGE VERSUS CAPACITY

Your ideal stove makes it comfortably warm indoors. Not too hot, not too cold, just right. When it is icy cold outside, your stove will need to work harder. If it is warm outside, it can ease off. This is why it is important that your stove has the right power to match the room it is heating. That might sound obvious, but it is not that simple. Let us explain how it works.

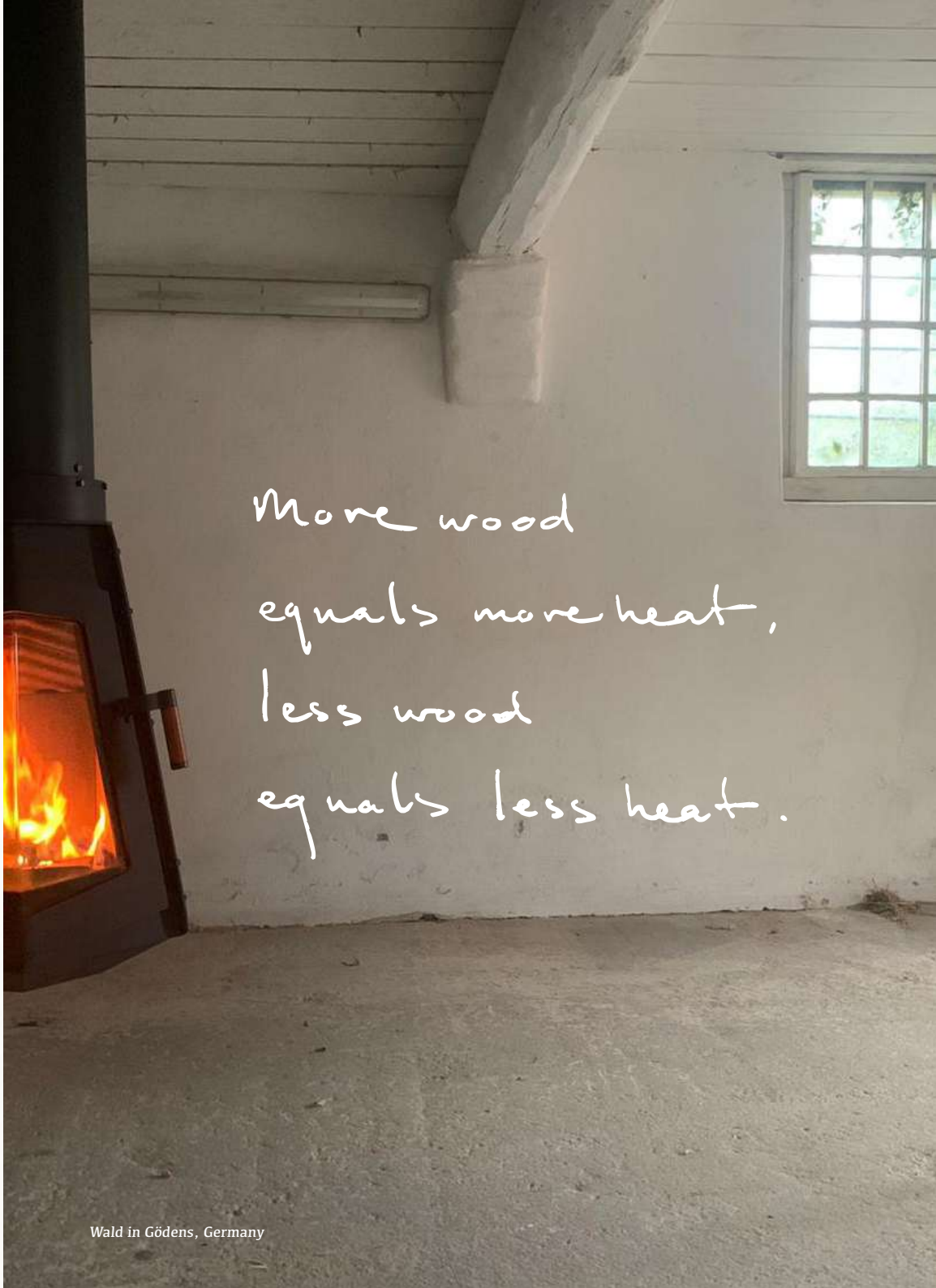
Heating things up with wood
The heat that a stove can radiate is determined by the amount of wood you put in to burn. In other words, the stove can never produce more energy than the energy you put into it. More wood equals more heat, less wood equals less heat. Logical really, because the wood burns, not the stove.

Minimum
A stove needs a minimum amount of energy to maintain its operating temperature. In brief, with too little wood, it cannot really get going. Its like a car, give too little gas and the engine will stutter or stall. This is true for every stove and each model of stove in turn has different requirements, which has to do with the design. If you stoke a stove to burn too low, all the technology incorporated in the stove will fail to ensure a good fire.

Maximum
You can also overburden a stove, burn it to pieces. You will usually notice this because you can hardly cram any more wood in it. A manufacturer always indicates the maximum amount, but some people just cannot help themselves. Fire is so captivating!

Power range versus capacity
We call the minimum and maximum amount of heat the power range. Not to be confused with capacity, which the manufacture often indicates on the stove. The capacity is the power in kilowatts (kW) that the stove is tested for in a laboratory. This tells you something about the stove, but often not a lot about working practice. An 8kW stove may work well run at 3kW and can be fired up to reach 15kW.

Power range
It is important that the power range of a stove matches your room. The power range is usually based on heating experience with the stove. Both the manufacturer and the stove specialist have stoked the stove in different ways, using different types of wood. Lots, little, in well and poorly insulated houses, in the middle of winter and in the spring. But even so, you decide how to stoke it in your home.



Wald in Gödens, Germany

WARMTH VERSUS MOOD

Gathered around a blazing stove, it quickly feels cosy. And wonderfully warm too. Even so, it is important to know if you will be stoking your ideal stove for warmth or to set the mood. Where do you want to place the emphasis?

Just setting the mood
Just suppose your ideal stove is only there to make the room feel cosy. In that case a stove should not make the room too hot and it also should be able to burn when it is not freezing cold outside. In spring, at the weekend, because you are entertaining. The stove must be built to suit this wish, otherwise it will get much too hot indoors and cause more discomfort than anything else. Above all, it is likely that you will want to see the fire, which radiates even more direct heat. Even if you are not stoking for heat, it is in the nature of fire that it gives off heat. So practical questions need to be answered when choosing a mood-setting stove. But not forgetting you also have to like the look of it.

Only heat
If you are looking for a stove for the heat, then suddenly other things are important. It is important to know which room you want to warm. Just the living room or perhaps the entire ground floor. And would you like the stove to stay warm right through until the next morning? This can be ideal during the busy breakfast dash. It could even be the case that the most practical stove is not the most beautiful.

The perfect combination
Fortunately, it is possible to combine both warmth and style in a single stove. A wood fire creates a lovely cosy warmth, beyond compare. It would be great if the most practical stove for you was also the most beautiful one.

Bart in the Cufercalhütte, Switzerland

RADIATION VERSUS CONVECTION

When the fire in the stove burns, it distributes its heat in three distinct ways. The different ways are easy to observe, so you can simply determine for yourself which heat suits you and your room the best.

The type of heat transmission is immediately noticeable when you touch a hot stove. This is called **conductive heat**, and it is actually best not to touch the stove. Ouch.

You can feel the second type when standing in front of the stove, wonderful **radiant heat**. The type of heat that seems to go right through you and warms you up inside.

The third is **convection heat**. This is the displacement of warm air and it is needed to disperse the heat quickly.

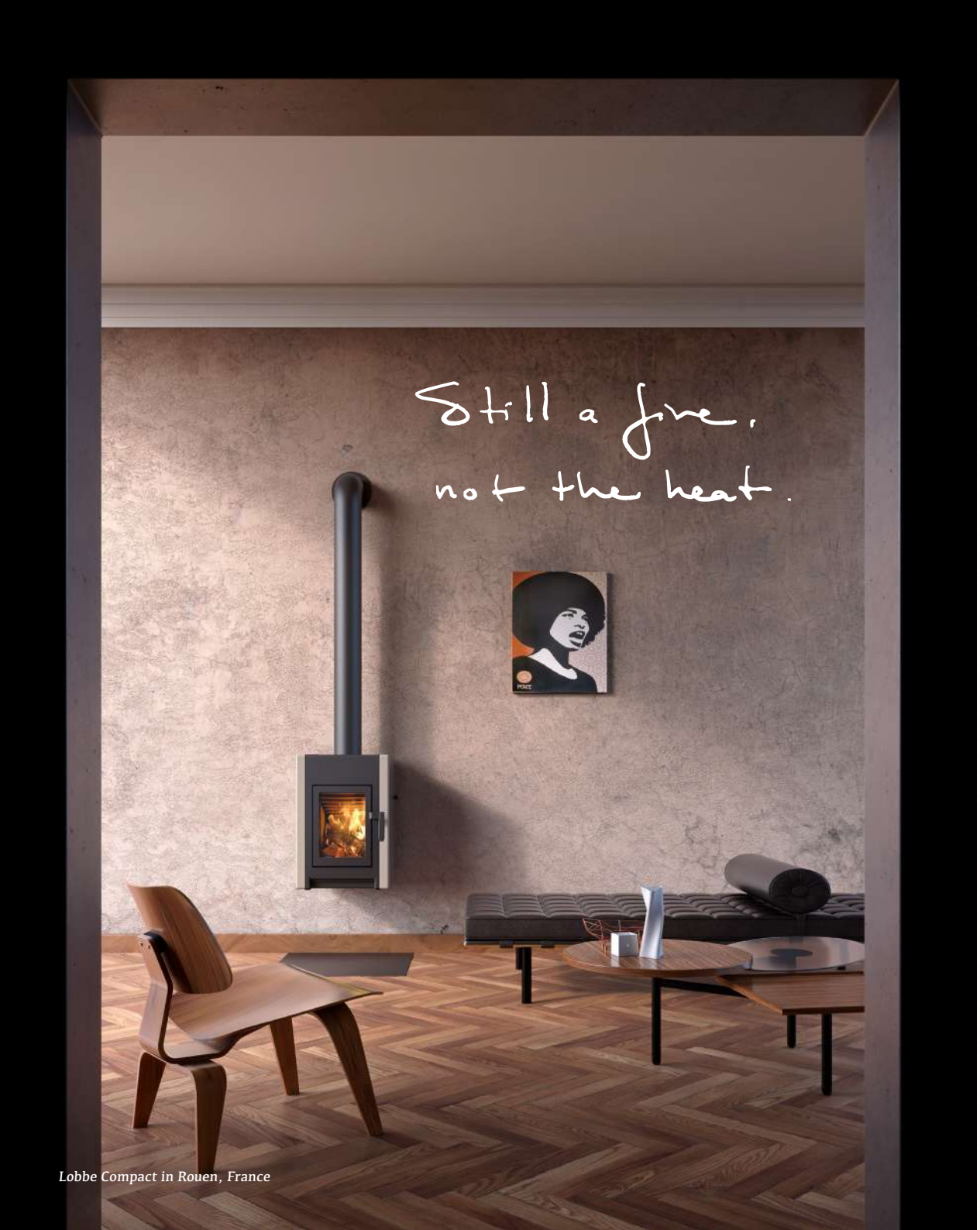
Radiant heat feels pleasant immediately. It is a wonderful natural form of heat, like the rays from the sun. Radiant heat does not just seem to warm you inside, it does. This has something to do with the wavelength of the infrared radiation from a wood fire. Radiant heat also lasts longer, because it heats objects or the body and not the air.

Convection heat heats the air. Which is handy for getting the heat to go around corners, so that it also warms the kitchen for example. This heat does not last as long and feels different from radiant heat. This is because passing air also has a slight cooling effect.

Radiant heat is felt immediately when you are not too far away from the stove and it takes a while before the heat spreads across the room. And it takes a bit longer to get around the corner. This can be a very practical solution for a room with a high ceiling or a stairwell, as the heat does not rise immediately.

In brief, radiant heat is lovely and slow, convection heat is convenient and faster. Luck would have it that there are wood-burning stoves that combine lovely radiant heat with the convenience of convection heat.

Dayna in Bevergem, Belgium



Lobbe Compact in Rouen, France

SLOW HEAT

A house without a fireplace is a rather chilly affair. But what if you live in an extremely well-insulated house? Where the heating hardly needs to be turned on and it is swelteringly hot in no time. We have a solution for this: slow heat, a stove that slowly releases the heat. Still a fire, not the heat.

It works simply: you light the fire in one of these stoves and the energy is transferred via a turbulence chamber to thick stones made of a material that can absorb heat for a very long time. Not soapstone, because that is not efficient enough, but a special kind of ceramic concrete. We call this concrete Prisolith, it can absorb a lot of energy and retain it for a very long time. This means that the same amount of heat is distributed over a longer period and does not escape all at once.

An extra advantage is that it can still be warm the next morning. Because none of the energy from the fire is lost, it is only slowed down.

Due to changes, April 2020

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