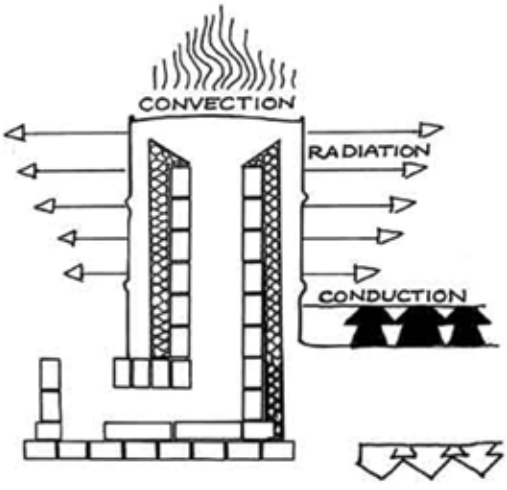
The rocket mass heater

Heat your (h)earth with rocket mass instead of fracked gas, says Rhyddian Knight

I am giving thanks for the presence of fire in my life. Since toddling round my parents' grate or wrapping dough round sticks at a cub-scout campfire, flames have pretty much always been at the centre of my community. There have been moments where fire has been a luxury; a romantic addition to a grid-warmed house. There have been times where I could not meet the price of electricity and gas, and stove heat has not been adequate to the task. The vivid memories are the 'off-grid' ones, where wood burning has been the sole form of fuel for heat, hot water and cooking.

I observe my elders who have lived a life with fire. Some are out there still stacking or filling the Rayburn, others have opted for wood pellet or chip systems; some pay others to take on the task. Some have had children, others have become more debilitated; all have the primary need to heat kith, kin and cooker. Slow down and let's face it, not everybody is cut out for swinging a maul into their eighties.



Reflecting on these things, I have come to the conclusion that heating home and family with wood is a part-time job. Time spent sourcing, chopping, splitting, drying or, worse still, working to generate cash to buy fossil fuel, soon adds up. The sheer volume of wood required astounds me. What may have been common place for our distant ancestors in terms of available, regenerating fuel sources is far from the truth these days. Even if out of sight and mind, all fuel is sourced from someplace. I have had need to fell, cut, scavenge, buy and burn home-grown, barrel-oak, sawmill-scant, coppiced-wood, pallet-wood, drift-wood and skip-wood.

Keeping it (arbo)real

These days, given the available wood resource in my community, the cost of time and/or money in processing, and ergonomic pressures that life presents people, should I advocate wood-burning as a viable and sustainable lifestyle choice? Or is it just a penchant for the pyro, privileged, rugged or rich? You see, I am for a solution to fuel poverty for those of us in rural areas; preferably one that promotes regeneration of the marginal land where we live. I have met many people living frugally at the ends of tracks, lanes, and lochs who would live like kings if only they had sufficient fuel or funds to adequately heat themselves.

Given our understanding of woodland decline in the UK, it is hard to believe that 'all of us' can benefit from the qualities and attributes of self-determination that arise from a healthy and sustainable relationship with one's own fuel needs. In the summer of 2008, I sought an edge-dwelling, Welsh ex-pat in rural Cork; a man by the name of Ianto Evans. His experiential teachings changed my relationship to fuel in a way that comprehensive school physics did not. Through appreciating the difference between conductive, radiant and convective heat, I understood that homes do not need warming; occupants do. Since meeting 'The Cobfather', I have been obsessed with his invention of the rocket mass heater (RMH). This nifty 'commonweal' *kakeloven* seems to offer a way out of the fuel trap.

Inside the rocket stove

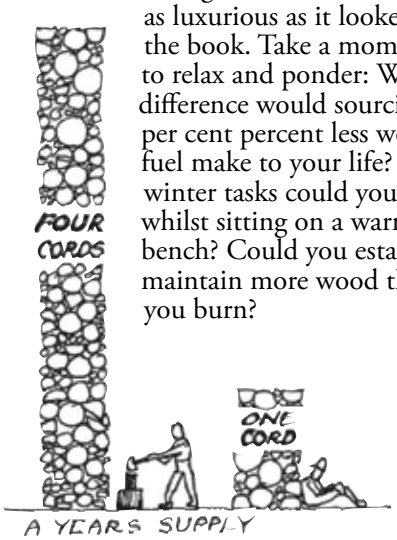
At first counter-intuitive, this remarkable device satisfies both rhyme and reason. The combustion chamber is fashioned from brick and insulated. It consists of a vertical feed tube, a horizontal burn tunnel and a tall heat-riser, with the latter surrounded by a metal barrel; closed

top uppermost. The chamber burns small-diameter wood in a remarkably efficient way; the barrel contains and channels the combusted gases whilst the surfaces radiate and conduct heat into the room. Wood gases, after burning forcefully in the burn tunnel and riser, are then 'pushed' down the inside of the barrel and channeled into a duct made from metal or brick. This duct can run to lengths of 30 feet before a chimney vents to outside. Sounds impossible? I assure you it's true!

Any heat normally wasted 'up the chimney' is captured, stored and slowly released into the room by surrounding the ducting in an earthen mass 'bench', sculpted from cob. Thus, the combustion chamber is effectively connected to a thermal battery. The heated bench makes for excellent conductive heat. Where space is short, a bench can be replaced by series of 'bells' - vertical voids surrounded by bricks. For a working RMH burning dry wood, all that exits via chimney is CO_2 and steam, with the chimney commonly being cold enough to touch. Everything else is combusted and its energy captured within the home.

'Stick another twig on the fire!'

My experience so far is that RMHs are achievable to build, affordable to assemble and inexpensive to run; and relaxing on a heated bench is as luxurious as it looked in the book. Take a moment to relax and ponder: What difference would sourcing 75 per cent percent less wood fuel make to your life? What winter tasks could you do whilst sitting on a warm bench? Could you establish/ maintain more wood than you burn?



Clockwise from top left: Rhyddian at work building the stove; Looking down into the combustion chamber; Plastered firechamber complete; The build in progress; The build complete. Photos: Rhuddian Knight. Diagrams copyright Ianto Evans/Leslie Jackson, Rocket Mass Heaters Third Edition.

As I write, I am listening to the satisfying roar in the burn tunnel; leaning left to stoke when it quietens, the radiant heat from the barrel is taking the chill out the air and warming my face. The bright flame in the combustion chamber is reflecting on the ceiling above. In an hour, when guests duly arrive through the snow for hot chocolate, I will host safe in the knowledge that they can sit or recline on the contact heat from the bench. The room will be evenly warm, not 'cooked'. Outside, save a faint perfume on the night air, there is no indication of me being resident. I estimate this space will benefit from the burn for the next 24 hours.

What's the catch?

There are so many benefits to recount, I wanted to think of reasons why not to use RMHs:

- A significant pro/con is that your RMH will require tending for two hours a day if you want to keep the bench fully 'charged'. This requires supervising the stove and 'feeding the dragon' till the burn is complete.
- The firebox is small so fuel is 'finger to forearm' sized. This requires more skilful preparation than regular stoves; lots of splitting and drying.
- Building regulations - whilst the technology is old enough to be tried and tested, RMHs are yet to be recognised. Fortunately, we have a stove-mason in Scotland who is championing this.
- RMHs are heavy. You will need a reinforced floor which is tricky if you live up a flight of stairs.

By choosing metal in place of brick ducting, I spent about £450 on my first build. It required about a 100 hours of time. With all materials sourced, prepared and brought on site with volunteer labour, assembly could be considerably quicker. For a self-build, everything you need to get going can be found in Ianto Evans and Leslie Jackson's book (see www.rocketstoves.com). If it is experience you are after, I hope demand will afford some introductory and some longer self-build courses. I am up for mentoring folk to make and learn from mistakes!

Rockets won't change the world (yet)

I would love to think a dynamic governance would install RMHs in

council houses throughout Scotland; planting short-rotation coppice on the tenants' verges for fuel and faggots for sale at the petrol station! The reality is that the masses may not yet need RMHs but the time is ripe for rural folk who seek a low cost, ecologically realistic and appropriate technology, especially those who have aspirations to be self-reliant in fuel from a small amount of land. That said, I see the GalGael in Glasgow, are selling hardwood for £60 a tonne; a manageable Winter's heating bill for anyone making a go of it in a downstairs tenement! Stay Warm!

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