**During the time I’ve been running this channel, I’ve made quite a few videos looking at various aspects of hydrogen as a fuel source, from hydrogen fuel cells, to aviation fuel, hydrogen storage in ammonia, hydrogen for heating homes, and even the suggestion of hydrogen for gas cookers, although even I might draw the line at that one! Cooking on gas is one thing. Cooking on hydrogen...? meh..not so much.**

**Since the early part of 2020 though, the print and online media have got themselves into a bit of a kerfuffle about whether hydrogen can really contribute to a genuinely sustainable future or whether its just a massive ruse by the fossil fuel industry to allow them to continue extracting methane gas. And that’s because there are two main ways to make hydrogen – you can either get it from water via electrolysis, like I did in my own back garden in 2019, and like industrial scale electrolyser plants are beginning to do in many parts of the world, creating what’s known as Green Hydrogen. Or you can bombard methane gas with high pressure steam to separate the CH4 molecule out into its constituent parts, creating what’s known as grey hydrogen, plus the not insignificant by-product of carbon dioxide. And there’s a variation called blue hydrogen where some sort of CO2 capture is attempted, The overall process is called Steam Methane Reforming, and right now, at the start of 2021, about 95% of all the world’s hydrogen is made that way, all neatly controlled by the fossil fuel corporations. And just to put the icing on the double tiered sponge cake of irony, the process requires more energy input from fossil fuels than it gets out in the hydrogen at the end. You really couldn’t make it up.**

**So, the strong suggestion by many campaigners and journalists is that unless there’s a shift towards green hydrogen in the next few years that it so dramatic it borders on revolutionary, hydrogen will just become another back door for methane gas producers to continue plying their trade.**

**But that revolution has already started in some parts of world, most notably in Australia. And now a new Australian start up company has launched a fridge-sized green hydrogen home energy storage system, that could prove to be a serious competitor for the industry leading Tesla Powerwall.**

**Hello and welcome to Just Have a Think**

**I’m sure you’ve seen all the hype around hydrogen in the press over recent months. Some commentators are going as far as to suggest it’s the fossil fuel industry’s last big scam. Its final last-ditch attempt to remain commercially viable in the 21st Century now that the concept of natural gas as a transition fuel is being rapidly outpaced by increasingly inexpensive wind and solar coupled with grid scale battery energy storage.**

**And it’s certainly fair to say that some policymakers around the world have shown an alarming level of ignorance and naivety in their gushing enthusiasm for extracting hydrogen from natural gas, having been seduced and convinced by the highly talented PR people at fossil fuel HQ.**

**When it comes to the question of our sustainable energy future, there are few countries in the world where the debate rages more fiercely than Australia.**

**Prime Minister Scott Morrison said last year that**

**“there is no credible energy transition plan, for an economy like Australia in particular, that does not involve the greater use of gas as an important transition fuel”**

**A claim which was fairly comprehensively debunked in this article by Simon Holmes a Court, citing studies by all these academic organisations, all of which conclude that the unexpectedly rapid rise of wind and solar coupled with battery storage, plus the resurgence of pumped hydro, means that Australia can in fact radically reduce gas and coal use in the coming years and still keep the lights on with electricity at low prices.**

**A big part of that green transition will be millions of solar panels on the roofs of homes, offices, factories and public buildings, most of which will be hooked up to some sort of energy storage system to ensure a power supply right around the clock.**

**That’s where this new home hydrogen battery system comes in.**

**The company that created it is called LAVO, and they launched both the business and the product back in October 2020.**

**Hydrogen is very good at storing energy, in fact it’s got the highest energy density per kilogram of any non-nuclear fuel, but it’s volume is enormous at normal temperature and pressure, so it generally has to be cryogenically cooled to minus two hundred and fifty degrees Celsius, or highly pressurised to get it into its denser liquid form. Both those processes require a lot of energy and could be hazardous or even explosive if handled incorrectly.**

**Not a great set of criteria for use in a domestic setting.**

**But LAVOs system differs from those two methods.**

**Designed to be hooked up to a conventional water main and a rooftop solar PV system, the LAVO unit first runs the water through a purifier, and then it uses the solar power to run an electrolyser to separate the water into hydrogen and oxygen, just like the large grid scale electrolysers I mentioned earlier. The oxygen is released back into the atmosphere, but instead of freezing or pressurising the hydrogen, the folks at LAVO have developed a system that can store it completely safely as a solid material.**

**They achieve that little bit of magic by combining the hydrogen with a metal which is capable of absorbing it into its structure, a bit like a sponge absorbs water. LAVO are keeping the specific composition of that metal fairly close to their chest as part of their patented system, but the resultant combination is a stable metal hydride. The pressure required to force the hydrogen into the metal lattice is no more than the force applied by the electrolyser itself. As soon as that pressure is removed the hydrogen starts leaking back out of the metal and it can then be diverted into a fuel cell to produce electrical energy.**

**The hydrogen hydride is stored in four removable modules, each of which contains the equivalent of 5000 litres of hydrogen gas and holds enough energy to run a small home for a full day.**

**The overall capacity of the system is forty kilowatt-hours and LAVO reckon its good for 20,000 cycles, which compares very favourably to something like the Tesla Powerwall, which is warrantied for about three thousand cycles.**

**The round-trip efficiency of the LAVO system, which is essentially the energy produced via solar or wind versus the energy released out of the fuel cell, is about fifty percent. That is significantly lower than the ninety five percent conversion rate for lithium-ion batteries, and unsurprisingly, in these very early stages of commercial production, the cost is comparatively high too at about thirty thousand Australian dollars compared to just over thirteen thousand for the Tesla Powerwall, but if you crunch the numbers, even at fifty percent efficiency, you’re potentially getting far more bang for your buck during the lifetime of the LAVO system.**

**Despite ScoMo’s insistence on cosying up to the Australian coal industry, there are increasingly favourable regulations at state and federal level in that country, including the National Hydrogen Strategy, and companies like LAVO look to be quite well-placed to take advantage of the current environment to bring these sorts of technologies to market.**

**As well installations in domestic homes, LAVO will be going after commercial units, and energy hungry centres like telecommunication towers. They also plan to disrupt the dominance of off-grid/back up diesel generators. The company reckons there’s a potential two billion dollar market just in Australia, and as much as forty billion worldwide.**

**Whether or not the LAVO system is the right one for you will depend on your geographic location, your domestic energy use and whether you’re on grid or off grid. And your budget of course.**

**In some cases, Lithium Ion batteries may be a preferable option, and there are others too like this Redox Flow battery from Australian company Redflow.**

**But the really encouraging thing from the consumer point of view is that there is now some genuine competition in the residential energy storage market.**

**That will inevitably drive innovation and efficiency in the design and manufacturing process which ultimately translates into keener prices for you and me. And that will hopefully achieve the ultimate aim of encouraging more and more people to dive into the green energy revolution.**

**If you’ve got views, or direct experience of the new green hydrogen industry, then jump down to the comments section below and leave your thoughts there.**

**That’s it for this week though.**

**We’re taking a week off for the Easter break now, so there’ll be no Just Have a Think video on Easter Sunday, but the fifth of the Just Have ANOTHER Think videos will be published this Wednesday, and normal service will of course be resumed on Sunday the 11th of April.**

**Before I go, I must just give a quick shout out the folks who’ve joined since last time with pledges of ten dollars or more a month.**

**They are**

**Samuel Douglass**

**Alessandra Pizzo**

**Mark Durbin**

**Dion MacIntyre**

**Larry Tomlin**

**Chris Lancaster**

**Andrew Green**

**Damien Seery**

**Zachary Semke**

**Dave Malich**

**Henning Hollatz**

**Rick Rys**

**Karl Callwood**

**Dennis Dennis**

**Josh de Roos**

**Karamjeet Pandher**

**Keith Dun**

**And Ben Burmeister**

**And of course, a big thank you to everyone else who’s joined since last time too.**

**You can get involved in that and get the opportunity to exchange ideas and information, plus watch exclusive monthly news updates from me and have your say on future programs in monthly content polls by visiting**

[**www.patreon.com/justhaveathink**](http://www.patreon.com/justhaveathink)

**And you can hugely support the channel absolutely for free by subscribing and hitting that like button and notification bell.**

**It’s dead easy to do all that, you just need to click down there or on that icon there.**

**As always, thanks very much for watching, have a great couple of weeks, and remember to Just Have a Think.
See you next time.**