

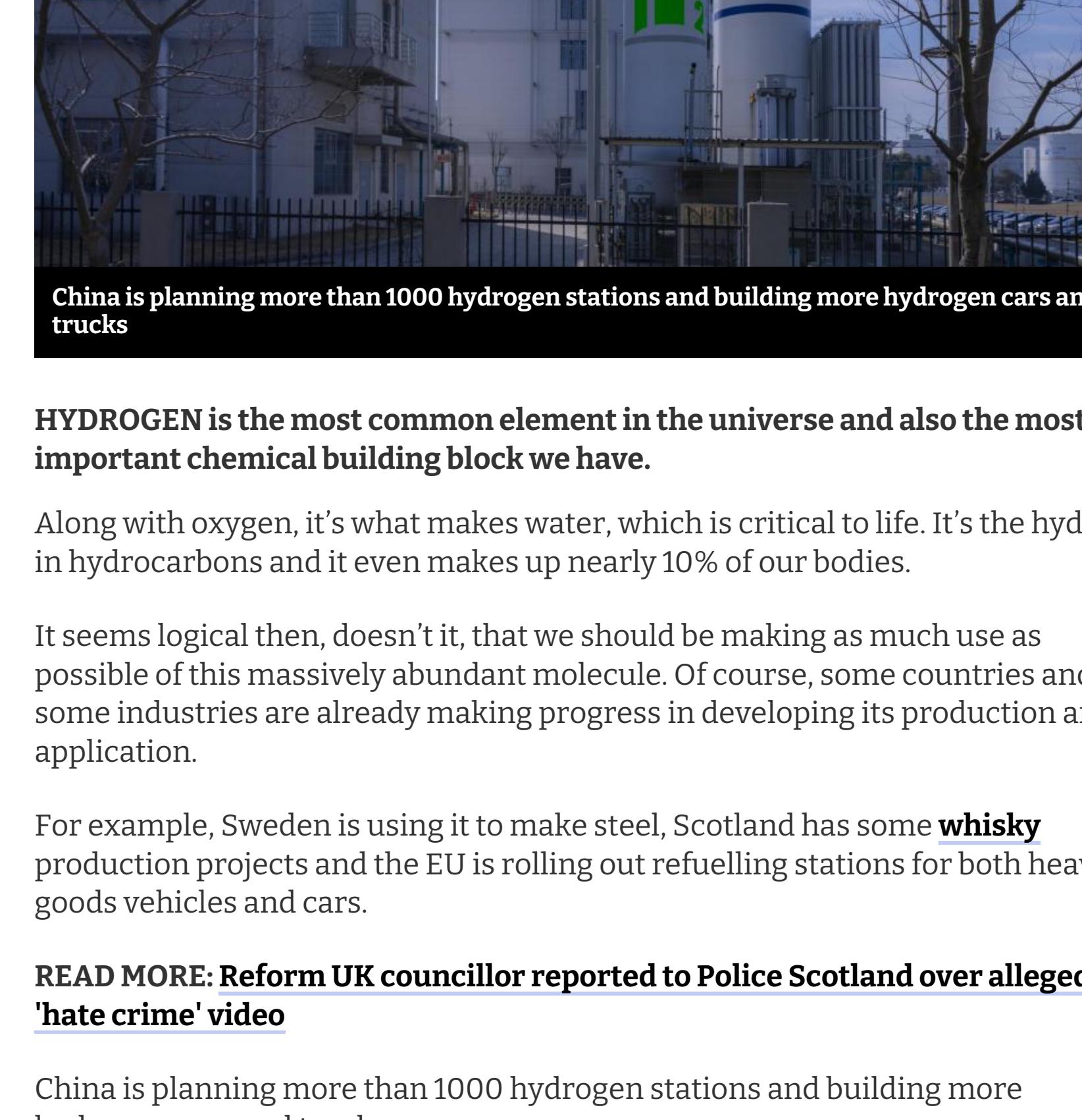
THE THREE ENGINEERS

Scotland's energy future will be hydrogen based

14TH MARCH HYDROGEN RENEWABLE ENERGY RENEWABLES ENVIRONMENT INDUSTRY SCOTLAND

By Dick Winchester

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China is planning more than 1000 hydrogen stations and building more hydrogen cars and trucks

HYDROGEN is the most common element in the universe and also the most important chemical building block we have.

Along with oxygen, it's what makes water, which is critical to life. It's the hydro in hydrocarbons and it even makes up nearly 10% of our bodies.

It seems logical then, doesn't it, that we should be making as much use as possible of this massively abundant molecule. Of course, some countries and some industries are already making progress in developing its production and application.

For example, Sweden is using it to make steel, Scotland has some **whisky** production projects and the EU is rolling out refuelling stations for both heavy goods vehicles and cars.**READ MORE: Reform UK councillor reported to Police Scotland over alleged 'hate crime' video**

China is planning more than 1000 hydrogen stations and building more hydrogen cars and trucks.

In fact, they've just delivered the first 100 of a batch of hydrogen HGVs. The Japanese company Toyota has developed a more efficient fuel cell engine.

The German company BMW is introducing a new fuel-cell vehicle. Hydrogen fuel cell-powered ferries and even a fishing boat have been built by Norway.

Marine energy is potentially a huge market. Fortescue Green Pioneer, the world's first dual-fuelled ammonia-powered vessel, has arrived in London. You need hydrogen to make ammonia.

There are now a few companies building hydrogen fuel-powered drive train units for small to medium size propeller-driven aircraft. It's quite reasonable to claim that all internal flights could now use similar technology.

The use of liquid hydrogen for long-distance flights using jet engines is also progressing, although this sector may be better served by so-called SAF (sustainable aviation fuel) which has hydrogen as one component. New Zealand already has a company manufacturing small-scale liquid hydrogen systems.

The iconic English company JCB has developed a hydrogen-fuelled internal combustion engine which it is using in its excavators and other vehicles. In Germany, they've even started using it to make glass and in Austria, it's used in a major supermarket bakery and for powering their delivery trucks.

In Wales, Panasonic is using hydrogen fuel cells to power its new microwave factory. It produces hydrogen using solar energy and stores the excess for when the sun isn't shining.



(Image: Canva)

It's not a new idea. A kindergarten in Sweden has been doing it for a while. It works like a dream. In Germany, France and Italy there are already companies building similar systems for domestic use. This means they are not connected to the electricity supply system.

"Off-Grid" living like this means no more electricity bills and as close to 100% energy security and resilience as you can get.

They're not cheap, of course, but as a long-term investment added onto the mortgage for a new build, they make perfect sense and of course, their costs will go down as production builds and technology improves as it is now almost daily.

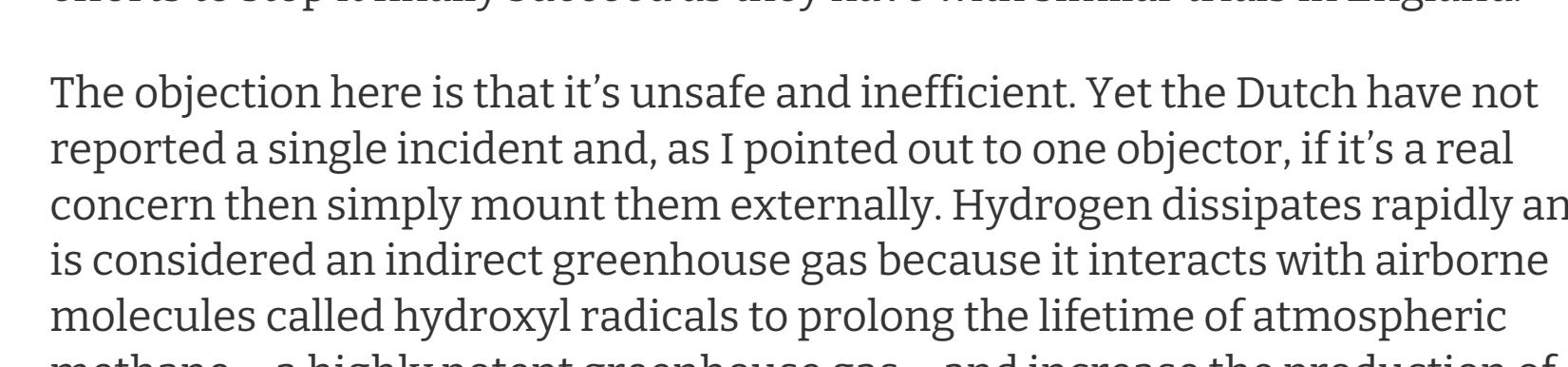
The electricity industry hates the idea as would any enemies because it's almost impossible to target.

I love it.

The key advantage here for both domestic and industrial off-grid applications is hydrogen's long-term and relatively compact storage capability.

So, what are the issues with hydrogen and why is there such opposition to its adoption?

Well, you don't make hydrogen as such, but "liberate" it from other substances, including but not limited to natural gas, water, and even plastic waste. It's not the easiest of molecules to liberate though and the process requires a fair amount of energy.



That said, natural hydrogen also exists. In 2023, France announced the discovery of a massive natural hydrogen reserve in the Moselle region's Lorraine mining basin.

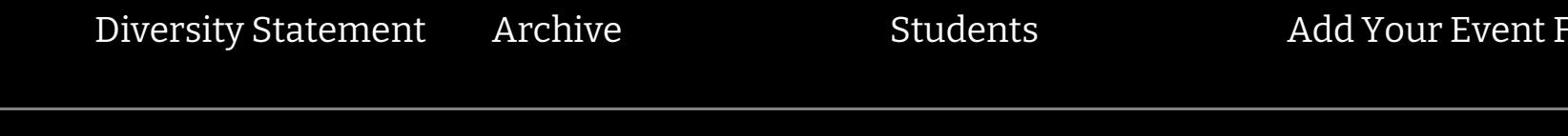
We'll watch that closely.

Reforming natural gas is the dominant method of production today. It has big drawbacks, not least of which is that it produces carbon dioxide and many see it as a way for the oil and gas industry to keep on producing hydrocarbons.

Slowly, though, production is shifting to electrolysis in order to produce "green hydrogen" which is when the electrolyser is powered by wind, solar or some other sustainable energy source such as tidal.

The anti-hydrogen argument here is that such systems are inefficient in that it takes around three times the amount of electricity to produce the hydrogen you need to achieve the same result as you would if you used the electricity directly.

It's a good academic point but I like to point out that the reality is that it doesn't really matter how much electricity you use if it's from a renewable source because nobody will send you an invoice for the solar or wind energy you've used.



(Image: NQ)

The capital cost will be higher, but this can be justified provided it achieves the objective which, for example, in the case of cars, is no need to change your behaviour and ensure the fuel is available to everyone in the same way petrol and diesel are now and refuelling speeds are also the same. Everyone could access a hydrogen dispensing vehicle but only a limited number can have a home charge point. Hydrogen supports equally a characteristic of Scottish society as supports.

The Netherlands have a number of trials running on the use of hydrogen for domestic heating and for energy storage using green hydrogen.

Hopefully, Scotland will have a similar trial running later this year unless the efforts to stop it finally succeed as they have with similar trials in England.

The objection here is that it's unsafe and inefficient. Yet the Dutch have not reported a single incident and, as I pointed out to one objector, if it's a real concern then consider an indirect greenhouse gas because it interacts with airborne molecules called hydroxyl radicals to prolong the lifetime of atmospheric methane – a highly potent greenhouse gas – and increase the production of ozone, another highly potent greenhouse gas, and increase the production of

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