



## Electric Vehicles – The Harsh Realities – Charging & Breakdowns

In Britain there has been a massive push by the government and the vehicle manufacturers to get people into electric cars, vans and lorries. The driving force, if you will excuse the pun, has been climate change and the need for Britain to cut down on carbon emissions. Of course, the real agenda is consumerism – the requirement for the populace to spend money on electric vehicles. Today, stand in a petrol station and count the number of petrol and diesel vehicles that arrive for fuel and then imagine the massive number of electric charging points that will be required to support electric vehicles in the future. If it takes a certain amount of time to charge an electric vehicle, it is inevitable that motorway garages with electric charging stations will endure long queues. For sure, many people will charge their vehicle at home and overnight for internal city journeys but due to restrictive mileage during motorway extended travel, these vehicles will require to be re-charged at garages with electric charging points.

Perhaps the greatest obstacles to home charging points are relative to people who reside in tenements and high-rise flats and who park their vehicles in the street. However, there is a hidden obstacle and that is the cold. In countries with harsh winters and long-term minus temperatures, the range of the vehicle's battery is severely curtailed and, in many cases, by two thirds. A fully charged electric vehicle which has a range of 300 miles and which is left in a car park for a few hours without re-charging, and endures minus temperatures, will only have a range of around 100 miles, due to the impact of the freezing cold on the battery.

It seems that the politicians have chosen to forget just how much electricity will be required to charge millions of electric vehicles in the years ahead. It can only lead to a rise in nuclear power stations with all their toxic nuclear waste. The massive carbon footprint in the mining for lithium ore (for the electric batteries) is also conveniently forgotten about, and also that lithium will become a rare commodity and therefore more expensive in the long run. Nobody seems to consider that lithium has a reputation for degradation and an electric battery in a new electric car that can travel 120 miles between charges, could in 5 years' time, only achieve 80 miles – what then the cost of battery

replacement? Perhaps the greatest unseen obstacle is when an electric vehicle breaks down on a motorway (anywhere) it cannot be towed away, it has to be lifted onto the back of a flat bed lorry.

### **Electric Vehicles – Lithium Ore – The Irreversible Impact on Biodiversity**

The recent 2019 coup d'état in Bolivia which was orchestrated by the U.S. ensured that the American corporations expected to gain direct access to the world's richest supply of lithium ore. Fortunately, this will be reversed, thanks to the recent 2020 election in Bolivia where the socialist party regained power. Amnesty international challenged industry leaders to clean up their battery supply chains. Lithium is mined mostly in Bolivia, China, South Korea, Japan and its carbon footprint continues to grow as deposits diminish and demand increases. Amnesty also warned about the deep-sea mining taking place to farm lithium, which studies have predicted will have an irreversible impact on biodiversity. Prolonged exposure to lithium can cause fluid to build-up in the lungs, leading to pulmonary edema. The metal itself is a handling hazard because of the caustic hydroxide produced when it is in contact with water causing an explosion. Lithium mining carries high environmental costs but the British government refuses to face facts and carries on regardless.

### **Electric Vehicles – The Fire Hazard**

There is absolutely no doubt that the battery cells within electric vehicles can short, either during a trip or while on charge at a charging station – there are many recorded cases of this happening. The fire cannot be extinguished easily by hose and water because of the toxic gasses produced during the fire. Special methods of firefighting to extinguish a burning electric car will require to be created and special recycling places will require to be set-up to deal with the vehicles remains. Imagine leaving your dog in an electric vehicle, even for a short-time; no responsible owner will ever feel 100% that the vehicle is safe from bursting into flames.

### **Electric Vehicles – The Corporate & Government Financial Rewards – Job Losses**

The corporate car manufacturers are pushing ahead with electric vehicles. They see huge financial rewards and the British government politicians are wholly behind the agenda. I guess it will make the taxman happy if all the petrol and diesel vehicles in Britain are replaced. Huge ongoing financial return is the preferred option and the elite, not for one minute, consider the huge rate of unemployment this will generate by the advance in artificial intelligence. Electric vehicles require rare metals, including lithium in their manufacture and this will create a massive impact on the environment. Of course, it is not going to happen all at once, the technology will probably take another 10 years to fully develop. What then, massive unemployment? There has to be a balance between the advance of digital technology, the environmental and social impact, and consideration given to the jobs it will destroy.

Future generations cannot ALL be employed to work behind computer desks, monitoring and re-programming firmware and software to maintain a digital age but then the CEOs and their shareholders in those massive corporations do not care – as long as they are raking in the profits. Also, it is a win for the banks and financial institutions who receive printed money at almost zero interest from the government and distribute it through leases or as loans to the public to allow them to lease or purchase the electric vehicles, the latest smartphones and digital gadgets. Today, the vast majority of the public lease their vehicle rather than purchase it outright or through hire purchase.

## Hydrogen – Perpetual Energy



If the world is to abandon fossil fuels and nuclear power it will have to diversify to other sources of power other than wind farms which are incapable of supplying the required energy for a human race that is rapidly expanding and converging.

Hydrogen is a suitable source of energy and it can be produced through –

- Steam Methane Reforming (SMR)
- Electrolysis

Hydrogen gas is difficult to liquify, due to the minus zero freezing (33 Kelvins: - 8,980.95 degrees centigrade) required to convert it into liquid form and maintain it as a liquid. In gas form it is highly explosive and requires to be stored in tanks that can contain a 5,000 to 10,000 PSI pressure, but consider this - to drive a hydrogen electric fuel cell in a vehicle, hydrogen would be stored in gas form in hydrogen gas stations and pumped into the hydrogen gas tanks of vehicles. These stations and vehicles are already in development.

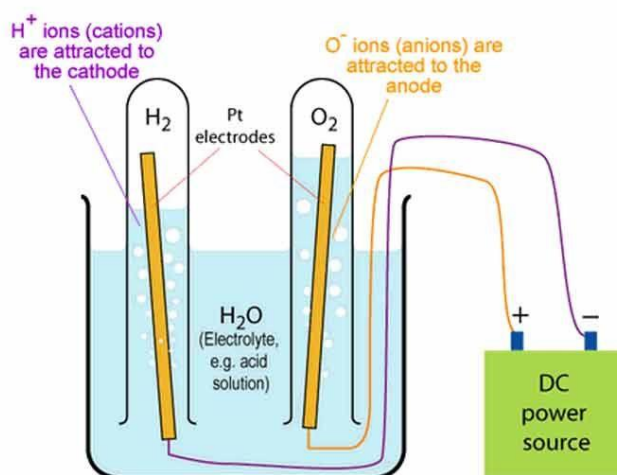
**Steam Methane Reforming (SMR)** - Today, hydrogen is mainly produced from fossil fuels: steam reforming, partial oxidation, or autothermal reforming are the traditional technologies to convert gas, oil or coal into hydrogen. In other words, a chemical reaction using fossil fuels which defeats the purpose of mining for fossil fuels.

**Electrolysis** – A far greater challenge is to produce hydrogen from the electrolysis of water on an industrial scale and to develop the tanks that can contain up to 1,000 PSI and hydrogen gas injection systems that can drive a hydrogen combustion engine or heat water to drive steam turbine generators at a power station. The greatest obstacle to overcome is to upscale electrolyzers to generate via an electricity supply, the electrolysis of water and create hydrogen gas. In simple terms, electrical power is used to split water into hydrogen and oxygen which is accomplished in an electrolyser.

Imagine a massive hydrogen power station that produces hydrogen gas and oxygen by using electricity to push a 'high voltage' current through stainless steel metal plates in an electrolyte solution. Similar, but on a massive scale, to the basic science 'electrolysis' experiment (see attached image below) that most kids experience in a school laboratory.

Of course, in a hydrogen power station, this is on a gigantic scale. The hydrogen gas produced is stored and distributed to hydrogen gas stations on the roads and motorways to be injected into high pressure tanks in motor vehicles to propel conventional combustion engines that have been mechanically modified or manufactured to run on hydrogen gas. It is well known that hydrogen gas cannot be liquified, due to the extreme minus centigrade temperatures required. The hydrogen power station is of course, perpetual, thanks to some of the hydrogen gas it produces being used to drive its combustion engines or heat water boilers to drive steam turbines that drive the electric generators that produce the electricity for the stainless-steel plate 'electrolysis' reaction. Some of this electricity is fed onto the national electricity grid for the needs of consumers.

The basic science experiment to produce hydrogen that we used to get in school -



Well, it seems that the UK is (as usual) way behind the curve, because Germany is one country that is leading the way. Together with energy supplier Vulkan Energiewirtschaft Oderbrucke (VEO), and plant supplier McPhy Energy, steel and mining group ArcelorMittal will set up a pilot electrolysis plant and a hydrogen filling station at its Eisenhüttenstadt site in Germany. Announced by subsidiary ArcelorMittal Eisenhüttenstadt, the plant will feature a total power capacity of 2MW (megawatt) which will be provided by two electrolyzers to be supplied by McPhy. The electrolyzers will be used to produce hydrogen to be used in steel production, a sector that is responsible for around 8% of global carbon dioxide (CO<sub>2</sub>) emissions.

**Hydrogen Power Stations - Electrolysis Electrolyzers & Perpetual Energy** – If upscaling electrolysis electrolyzers can be achieved whereby hydrogen gas can be used to heat water to drive steam turbines to drive electrical generators (hydrogen power stations) to power homes and factories, the next step is to syphon some electricity off in the hydrogen power stations to power the power station's own electrolysis electrolyzers and you have perpetual energy.

**Fusion Power Stations – For Powering Electrolysis Electrolyzers** – An alternative route to a Hydrogen Power Station is a Fusion Power Station. Once powered up, this fusion reaction heats water to drive steam turbines which drive electrical generators which create electrical power to power homes and factories with electricity. Some of the electricity is syphoned off to create hydrogen gas through powering electrolysis electrolyzers. In simple and conceptual terms, the greatest impediment to creating fusion is the ability to generate enough power to start the reaction and the means to contain it. Once the fusion reaction is started, there is a power source of heat, equal or greater than the sun. The by-product of fusion is the fusion torch concept which can be used to incinerate garbage and solid wastes, whereby the atoms and small molecules that are produced can be used as raw materials for industry.

**Developing Hydrogen Powered Combustion Engine Vehicles (JCB Have Already Achieved This)** - Once you have developed either Hydrogen Power Stations and/or Fusion Power Stations to produce hydrogen gas on an industrial scale (as above) then converting existing combustion motor vehicles or manufacturing new hydrogen gas powered combustion engines is not impossible (JCB has already manufactured one). Existing motor cars and lorries have already been converted to use LPG gas, so why not hydrogen gas? It only requires a government with a social and environmental conscience to invest in the development. Converting existing petrol and diesel stations is achieved by removing the fuel storage tanks and replacing them with high pressure hydrogen storage tanks. The petrol/diesel pumps would require to be changed to hydrogen gas injectors.

**The Case for a Hydrogen Combustion Engine Rather than an Electric Car Battery** - Amnesty international challenged industry leaders to clean up their battery supply chains. Lithium for manufacturing electric batteries for powering electric cars is mined mostly in Bolivia, China, South Korea, Japan and its carbon footprint continues to grow as deposits diminish and demand increases. Amnesty also warned about the deep-sea mining taking place to farm lithium, which studies have predicted will have an irreversible impact on biodiversity. Prolonged exposure to lithium can cause fluid to build-up in the lungs, leading to pulmonary edema. The metal itself is a handling hazard because of the caustic hydroxide produced when it is in contact with water causing an explosion. Lithium mining carries high environmental costs but the British government refuses to face facts and carries on regardless.

**The Case for a Hydrogen Combustion Engine Rather than a Hydrogen Electric Fuel Cell** – A hydrogen gas powered fuel cell generates electricity to power a vehicle's electric motor to drive the wheels using a chemical reaction. A fuel cell has two electrodes; a negative anode and a positive cathode. The reaction to produce the electricity happens at these electrodes, with an electrolyte carrying electrically charged particles between them and a catalyst to speed up the reactions. Materials, such as Lanthanum strontium manganite (LSM or LSMO) and Ytria-stabilized zirconia (YSZ) are used in the manufacture of a hydrogen fuel cell which delivers a detrimental impact on the environment and the wildlife. LSM nanoparticles are spherical high surface metal particles that appear as a brown or black crystalline powder. Numerous studies on LSM's mechanical and electrical properties have been conducted, but very little research has concentrated on its biological effects. Nanoparticles have illustrated tendencies to promote mucus secretion and accumulation, and are linked to respiratory illnesses and mitochondrial disease - poor cell growth, muscle weakness, neurological problems, autism and hearing problems.

**Existing Battery & Hydrogen Fuel Cell Electric Vehicles** – These are the white elephants of the future, due to the mining of the metals required to manufacture the batteries and the disposal of the depleted batteries and fuel cells. The long-term impact on the environment and the human race is not being properly analysed and to compound the problem, consider the amount of electricity and roadway charging points to re-charge electric vehicles. Given time, the technology will fail. There is no doubt that the route is not being driven by global warming but by new electric vehicle sales and tax returns which far outweigh any logical reasoning. Likewise, the production of hydrogen driven fuel cells outweigh any logical reasoning as the fuel cell manufacturing and their depleted disposal, place the same impact on the environment and the human race as the batteries in electrical vehicles. If we are going to install hydrogen fuel stations for refilling vehicle hydrogen tanks to power their fuel cells, then why not develop hydrogen driven combustion engines?

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