Hydrogen Hype: Balancing the Equation

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I recently read about the manner in which different people parse information, which has caused a seismic shift in my understanding of many issues: from politics, to economics, to religion. The author concludes that the majority of people "parse information through a consensus filter as a safety mechanism. They do not ask "is this true", they ask "will others be OK with me thinking this is true". This trait makes people very susceptible to perceived "consensus", with many never questioning the accuracy of the consensus position. Wanting to be an accepted part of the "tribe" is evolutionarily very sensible. It improves the chance of the individual's survival. However, where consensus is wrong, this can be catastrophic to the survival of the species. Fortunately, there is an in-built evolutionary mechanism to protect the tribe from universal collapse – a small percent of people that do actually parse information through a "true / false" prism. Following a recent discussion on this topic with Dr. Frans Cronje, he opened a BizNews talk with a related point – while analysts are regularly criticised for being "negative" (and very occasionally complimented for being "positive"), for us it's never been about "positive" or "negative", but about "true" or "false".

While the broad strokes of the consensus vs. true/false parsing of information can be seen globally, some societies specifically seem more susceptible to the consensus view than others. Societal consensus provides the framework of thinking, and only within that framework are consensus thinkers free to question and innovate.

For much of the western world, one of the consensuses of the day, the framework in which one can operate, is the idea that the survival of civilisations depends on reducing greenhouse gas emissions, and by extension (an actual non-sequitur) "green energy" is critical. This stems from a strange alliance. Firstly, environmentalists, who came to the broad consensus about 40 years ago that "global warming" was happening, man-made, largely driven by greenhouse gas emissions as a result of fossil fuel use, and dangerous. In the intervening years, "global warming" has been refocused as "climate change". Secondly, the renewable energy lobby that embraced the idea of climate change and dovetailed it with a proposed solution: renewable energy, primarily in the form of solar and wind. Thirdly, a facilitating lobby group, largely linked to the latter, which lobbied against the other low greenhouse gas emission energy source – the anti-nuclear lobby.

Thus came into being the framework: *"the climate is changing, it is because of our use of fossil fuels and the solution is reduced GHG emissions through solar and wind energy."* Within this framework, one can see enormous innovation and efficiency, especially from western Europe, where the framework has become most entrenched. Of western Europe, one of the epicentres of innovation and optimisation, as well as general adoption, is Germany. Within Germany, and amongst Germans, questioning the framework is frowned upon – almost verboten. Historically the nation too has been highly efficient and innovative within the framework of the day.

So, what of green hydrogen? Over the past half decade, green hydrogen has come into focus in a significant way in Namibia, driven largely through historical links to western Europe, particularly Germany. Until the announcement of oil discoveries by Shell and shortly, thereafter, Total, green hydrogen was painted as the country's "get-out-of-jail-free" card, and "post COVID recovery plan".

While the latter form of information parsers, those that assess information through a "true/false" lens have been generally sceptical of this space, until now there has been little reason to share this scepticism publicly. However, over the past month, that has changed.

The reason? Until now, there has been little harm from the hydrogen hype (beyond the fact is has been a distraction from the real grass-roots reform needed, as detailed in a Cirrus report in December 2021), and it has perhaps contributed positively to Namibia from a global optics and recognition perspective. Moreover, the space has created a few jobs, and while these are certainly not worthy of the hype that has surrounded them, in a massively job-deficient economy, every little helps. At the same time, some pilot activities, all subsidised by foreign governments or private companies have established, and may add some value to the local economy over coming years, albeit at small scale.

Moreover, while there's plenty of reason to be sceptical of hydrogen in general, green hydrogen specifically, green hydrogen produced in Namibia even more so, and green hydrogen produced in Namibia at scale in totality, there remains an outside chance that despite the shortcomings and reservations, the industry does develop. Thus, the benefits have likely outweighed the costs to date, and while official employment promises are absolute fiction, and the promises of enormous scale highly unlikely to materialise, the pursuit of this sector as a future focus for Namibia has been without material downside.

However, in a recent document produced by GH2Namibia titled "Namibia Green Hydrogen Sector Development: Frequently Asked Questions", a question was asked and responded to as follows: *Q: "Will GRN debt increase due to investments in GreenH2 projects?"*; *A: "Depending on the nature of the funding received/utilised, government debt may increase. If funding from donor sources is tapped into then the debt is not growing, however when concessionary capital, backed by government guarantees are used, then the size of the debt will grow. However, the critical factor is the cost of the debt, if the government taps into normal loan facilities at the current cost of capital, then the debt burden grows however when cheaper and concessionary capital sources are used, the debt burden is smaller."*

Despite the answer both dodging the question and being factually incorrect in places, a highly concerning change was seen – the answer was not a resounding "no". Thus, it seems the sentiment is now shifting from "we will use donor funds" to "we might use Namibian tax-payers funds" to develop this industry, be these the tax funds of todays or tomorrow's taxpayers. This is deeply concerning, and thus it is now time to raise alarm bells.

So why be sceptical of hydrogen? First and foremost, the global demand for hydrogen as a fuel source is low. Very low. The vast majority of global use of hydrogen (currently around 85Mt/annum) is for industrial use, with growth in this space forecast at just 2% per year over the next three decades. Thus, almost all of the forecast 5-fold increase in demand for hydrogen touted for the next decade is linked to heating and transport – largely replacing fossil fuels. However, there is no guarantee of this, and hydrogen as a fuel source suffers from a very fundamental issue of physics – it has low volumetric energy density. It is inefficient. Converting the world from fossil fuels to a low volumetric energy density alternative is going to be cripplingly expensive, and deliver a less optimal outcome than the status quo. In addition, for a vast number of touted uses for hydrogen, there are a number of other options, many of which are more commercially viable. This is especially true if one considers on-going technological development (which is always assumed for hydrogen production and use). Thus the problem – hydrogen in general fails the physics viability test.

The second challenge, should one somehow address or ignore the physics, is the issue of "green" hydrogen. First and foremost, we need to be clear that green hydrogen is not commercially viable at present, and – at best - won't be for a while to come . Hydrogen, irrespective of "colour" is a homogenous molecule. In its "green" form, it is still many years, at best, away from being cost competitive with other forms of the same. In order to conduct a like-for-like comparison, one needs to consider other low-or-no GHG emission alternatives. Two such alternatives exist. Firstly, a low-GHG option, being hydrogen from fossil fuels with carbon capture, and secondly, a no-GHG option; hydrogen from nuclear energy. According to the US Department of Energy "With carbon capture and storage, hydrogen can be produced directly from coal with near-zero greenhouse gas emissions." Given that brown/gray/black hydrogen can be produced at 50-60% of the cost of green hydrogen, and that emissions can be brought close

to zero (and with technology development constantly improving carbon capture), the cost difference between green and gray/brown/black hydrogen (converted into "blue hydrogen" through carbon capture) in terms of cost-per-unit of GHG, becomes extreme. However, while low GHG options are potentially more viable than green hydrogen on a cost-per-unit of GHG basis, nuclear is zero GHG, and can be produced at 60% of the cost of green hydrogen. Moreover, with nuclear, there is a fallback option – if the hydrogen hype dies, as it may, one is left with useful baseload energy, not hectares of intermittent energy supply to complement existing middle-of-day energy surpluses. So, the second problem is one of commercial viability. Green hydrogen fails this test.

So why does this lack of viability matter? Firstly, it means that the production and/or use of hydrogen must be subsidised in order for the world to move to this energy source at scale. Conceptually, there are a few ways in which this could be done. Firstly, a straight subsidy on the production or use of the product. Secondly, public provision of specific infrastructure for the sector, ensuring that not all of the sector costs are born by the industry itself. Thirdly through taxes and disincentives to use alternative energy sources, for example carbon taxes and similar.

So, who will pay these subsidies? The western part of the northern hemisphere, most specifically western Europe, is the primary envisaged market for green hydrogen by 2030 and 2045, as the economies of Europe push to get to "net-zero" emissions as quickly as possible in a desperate attempt to reduce climate change. Thus, the expectation from Namibia seems to be that Europeans and other westerners will thus be willing to pay almost any price in order to source clean fuels, such as green hydrogen. Thus, the zeitgeist assumes that they will be the ones to subsidize the non-viable GH2 production.

However, great caution needs to be exercised here. After a multi-decade foray into solar and wind energy in Europe, the fundamental challenges associated with overreliance on these forms of energy are becoming increasingly clear to the general public, despite being obvious to technical persons for decades. Firstly, they are not base load and are, at best, complimentary to baseload. As a result, system availability and stability require complimentary base-load generation and spinning reserve, most of which isn't strictly "green". This includes coal and nuclear, or more "green" options like hydro or "transition" fuels like gas. Secondly, while solar and wind may be relatively cheap per unit of energy produced, when combined with the additional baseload capacity and spinning reserves needed, these become relatively expensive. Other options, such as nuclear and coal, can be materially cheaper. The eastern section of the northern hemisphere understands this well, so while places like China produce vast inputs for the world's solar and wind energy industry, relatively little is installed locally with, just 8% of China's total energy coming from solar and wind, compared to over double this in Germany according to Our World in Data. Because energy is so central to human development, productivity and growth, relative energy costs are fundamental to national politics, geo-politics, global trade balances and beyond.

Because of the economic problems with overreliance on large-scale solar and wind, and because of the geo-political complexities of reliance on external suppliers of inputs fuels for many forms of baseload energy, particularly gas, energy prices and energy availability in western Europe, Germany specifically, seem to have started a political shift away from "green" and the Green parties, towards more centre right parties with, generally, more economically sound energy policies. Of course, this is not to say that the move will disregard environmental concerns, but more likely see a pivot to the other form of low/no-GHG emission energy, namely nuclear. The idea of "green" at any price, may well be shifting.

As we often explain, bad economics tends to be high latency. One can get away with bad policy for a while before it comes back to haunt you, however, at the end of the day, the old adage runs true: "economics is to politics as gravity is to jumping – it brings you back to earth". The political shift being seen across western Europe certainly suggests that policy that has driven up living costs, especially for necessities, that has dampened per-capita growth to little more than stagnation, and that has seen a material shift in the manufacturing base (and the delta in the manufacturing base) to the east where input costs are lower, does drive dissatisfaction amongst the populous, and will drive political change. The big risk here is that this trend, or one similar, will engulf

the green hydrogen (and perhaps hydrogen in general) movement, before it really gets started. Because of the relative cost of hydrogen vis-à-vis fossil fuels, the ultimate question is "what extra cost are the electorates of the world willing to pay, directly or indirectly, if at all, for the movement away from fossil fuels to a homogenous molecule produced in one of the manners that results in low GHG emissions?" As the zeitgeist on solar and wind as the solution to the world's environmental problems crumbles (in favour of the likes of nuclear), and as the public starts to declare en masse that the emperor is unadorned, the answer to this question is inevitably going to move towards "zero".

So herein lies the risk. Firstly, hydrogen in general is uncertain as significant fuel source of the future – thus, large scale infrastructure may well be a white elephant; secondly, should hydrogen somehow find large scale adoption, green hydrogen is highly uncertain to be the hydrogen of the future – if I had to bet, I would put my money on pink hydrogen from nuclear power; thirdly consumers are likely to be price sensitive, even those in Europe, meaning that 1. lower cost hydrogen will be preferred over higher cost – once again, pink hydrogen is likely to win out; 2. Hydrogen produced closer to market, where infrastructure already exists, will win out over hydrogen produced in far-flung places; and 3. hydrogen from coal and hydrogen from nuclear can both be produced closer to market, without the same space needs as solar and wind, and with reduced transport costs.

Given that demand for green hydrogen is largely linked to the north-western sub-hemisphere, and that the sector needs to be subsidized, there is no conceivable reason that Namibia should be providing these subsidies. Indeed, if there is a need for subsidisation, and this is not forthcoming from those who most want the transition, it should raise some red flags as to the actual commitment to this space from the governments of Europe. Were Namibia to use public funds to fund infrastructure specifically for hydrogen, or to invest in hydrogen projects without an expectation of commercial return, or to tax other forms of energy production, this would clearly constitute a form of subsidy as the costs of the production of hydrogen, thus Namibian tax-payers would be on the hook for the GHG targets of western Europe. This at the very time that the target market, driven by its populus, seems to be shifting away from "green" in its current form. Moreover, given the relative sizes of the economies of western Europe and Namibia, the relative risk for Namibia of undertaking such subsidies is disproportionally large – a dangerous gamble at a time when northern governments are doing little more than contributing relative pocket-change for what is in effect an option to remain involved should the sector develop. Thus, the risk is not insignificant that Namibia will be left with the bill after the party comes to a close.

There is one further Namibian "green" hydrogen concern that should not be ignored. Because the local green hydrogen push was never established with a long-term strategy and robust process, its soft underbelly has been left open to obvious criticism – the mega projects that underpin the general GH2 drive involve turning large segments of a national park into a solar farm. This raises a very clear contradiction once again: to assuage Europe's GHG emission guilt, turning national parks into solar farms might meet a vague definition of "green" in that it is (directly) low GHG emitting, but it is certainly not "green" in a more holistic environmentally friendly sense, particularly as it pertains to the prevention of loss of biodiversity and ecosystems. Thus, should they proceed, Namibia's hydrogen plans, particularly the mega-projects, may well produce hydrogen using solar and wind, that cannot truly be classified as green. Thus, the market for Namibia's "green" hydrogen, produced well above the alternative production process costs for the same molecule, may suddenly vanish, as the classification crumbles under the weight of its own contradictions. Indeed, genuine well-meaning "green" persons in target markets would likely only be comfortable with this hydrogen from Namibia if they are ill-informed of its true environmental impacts. The "green" coating is fickle at present, and yet another great risk. Large scale Namibian hydrogen thus may well fail the "green" test.

Certainly, a counter argument could, and likely will, be that Namibia needs jobs and industrialisation, and that this industry will provide the same. It may be argued that putting some public funds into the mix could thus enable the unlocking of great long-term benefit. Unfortunately, this argument holds up poorly when exposed to light. Firstly, the employment figures touted by relevant public officials are effectively impossible to replicate – we have tried and don't get close. Generous modelling suggests that these are an order of magnitude too ambitious, so hardly worth spending time on, and certainly not worth basing policy on.

From an GDP perspective, taking tax-payer funds and ploughing them into a loss-making space, that needs perpetual subsidies, is not good for an economy per-se. Namibia learned this lesson on AirNamibia the hard way. That said, there may be justification in a handful of instances, where the loss-making activity drives material macro multiplier effects through the economy. However, the reality is that hydrogen production in Namibia is unlikely to have this impact. The space is low employment, with limited Namibian inputs, limited Namibian uses for the output product (yes, we will be told about green steel, green tomatoes and green fertilisers but these face their own sets of challenges, including price competitiveness) and similar, making multiplier arguments tenuous.

The bottom line here is that Namibia and our policy makers should never get in the way of private endeavour, including those that make little commercial sense, however, extraordinary caution should be exercised when using public funds to enable specific endeavour, specifically where there are so many, so obvious, risks of failure. Frankly, any sane Namibian should hope that the hydrogen hype delivers, and that solutions are found to all the aforementioned problems. Certainly, it is possible that much like large-scale solar and wind, the hydrogen revolution, despite its shortcomings, could enjoy the religion-like support that drives funding into the space long beyond its sell-by date. However, using Namibian public funds for this dream is nothing short of reckless, especially given the ample other, very real, demands on the public purse. Using Namibian tax-payers funds, whether from the revenue of today, or through borrowing from the future, should be an absolute red-line.

Of course, having a contrarian view about hydrogen, and green hydrogen specifically, is somewhat like walking into place of worship and questioning the gospel of the day. Sacrilege. However, before we borrow from future generations, perhaps we should assess if there is any technical veracity to these green hydrogen claims. Perhaps it is time for more people to assess this space through a “true or false” filter, and set aside, at least for a moment, the safety of the consensus.

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