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FORTUNES

Hydrogen Rollout Riches: How to make 10 times your money from the biggest energy story of 2020

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Registered in England and Wales No 9539630. VAT No GB629 7287 94. Registered Office: 2nd Floor, Crowne House, 56-58 Southwark Street, London, SE1 1UN.

ISSN 2516-7197

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Hydrogen Rollout Riches: How to make 10 times your money from the biggest energy story of 2020

By James Allen
Editor, *Exponential Energy Fortunes*

"The technology of the future."

That's how Prime Minister Boris Johnson once described hydrogen.

It's easy to see why.

Hydrogen is a superfuel. It is the universe's most abundant element. And it can be used to power almost anything you like. It can replace natural gas to heat the home. (In fact, the gas grid was originally built to use hydrogen.)

Hydrogen fuel cells can power cars, trucks and buses. (As the great-grandson of Henry Ford and executive chairman of Ford Motor Company said: "I believe (hydrogen) fuel cells will finally end the 100-year reign of the internal combustion engine.")

They can even fuel planes and rocket ships.

Wilhelm Ostwald, a Nobel Prize winner, said that the hydrogen fuel cell "is a larger invention for the civilisation than the steam machine."

And remember: so-called green hydrogen is 100% emissions free.

So why isn't hydrogen already the lifeblood of the world economy?

That's easy.

For decades, enormous amounts of cheap oil has outcompeted hydrogen.

But as you know… the world is turning against oil.

Greta Thunberg and the Extinction Rebellion is just one part of this. Yes, the world is moving away from fossil fuels to help combat climate change.

But global dependence on oil was never a good thing.

Oil is scarce. Some countries have it, others don't. It's volatile. It's dirty.

Hydrogen is none of those things. It is clean, abundant and versatile.

That's why the world is turning towards hydrogen in a BIG way.

Indeed, right now, before our very eyes "the new oil" – hydrogen – is being deployed at breakneck speed.

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Four months ago, Angela Merkel pinpointed it as playing a central role in "rebuilding" Germany's energy strategy.

Three months ago, the biggest pilot project in history went live in Austria.

Two months ago, Europe's biggest gas infrastructure firm announced it was ploughing one fifth of its revenues into hydrogen.

And in the last few weeks alone, we've seen the trend accelerate.

First off, a Fortune 100 company just placed what is to my knowledge the biggest commercial order in the history of the industry, worth $172 million.

Second, the world's richest oil company Saudi Aramco took the major step of joining the "Hydrogen Council". That isn't surprising – as a former Saudi Arabian oil minister put it, "The day they use hydrogen for transportation, this is the day that oil disappears."

Third, European Commission's upcoming vice president for the Green Deal said hydrogen has a "pivotal" role to play in meeting Europe's climate goals.

And perhaps most urgent of all for British investors, on 2 January 2020 hydrogen was deployed for the very first time in Britain, as part of a major government-backed project in Staffordshire.

Mark my words: the hydrogen revolution will hand early investors extraordinary profits.

Just consider this… In the second half of last year, a new index of hydrogen stocks made investors 5x more than gold… 6x more money than oil… and 12x more money than the FTSE 100.

But we're just at the beginning.

In fact, I think if you select the right hydrogen stocks, you can expect to make at least 10x your money as economies around the world move away from fossil fuels and towards clean, green hydrogen.

Expert forecasts predict hydrogen is set to grow globally into a new $2.5 trillion market as the so-called "hydrogen economy" develops.

All the stocks in this report are set for enormous growth as they become pivotal players in the new global hydrogen economy.

All four are already enjoying enormous headwinds. In fact, in some cases, this means that they have already risen above their buy limits. If that's the case, then fear not.

As still-small companies, prices are extremely volatile, so it's likely we'll see them drop back in due course, giving you the chance to snap up shares while they're still cheap. I certainly don't want you to overpay, after all.

But, of course, it could be that the stocks don't fall. If that's the case, then keep an eye out for your inbox in case I decide to raise the buy limits. Things are moving fast and it's an extremely fluid situation.

So, without further ado, let me introduce you to my first Must-Buy Hydrogen Pick…

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THIS RECOMMENDATION HAS NOW BEEN SOLD. Please check the portfolio for latest updates.

MUST-BUY HYDROGEN PICK #1: The UK company at the heart of the hydrogen boom

As soon as this year, the British government is going to be forced to take drastic action to address a national emergency.

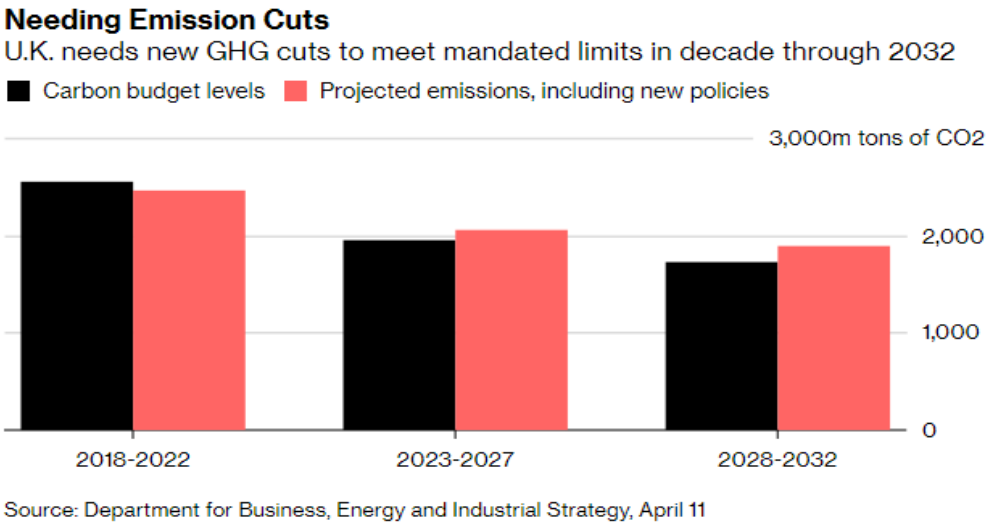
The emergency is not about Brexit, austerity or the NHS, or any of the other huge difficulties faced by our islands at the moment.

You could argue it's something potentially far more devastating and with even wider implications.

The emergency concerns climate change.

Specifically, how Britain is going to meet emission targets through 2032.

Quite simply, we're on track to miss the mandated limits in carbon emissions in the decade through 2032.



Last year, the government confirmed it not only remains on course to miss its carbon targets for the mid-2020s onwards, but the shortfall against the UK's legally binding carbon budgets has actually worsened.

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The report by the government's department for Business, Energy and Industrial Strategy (BEIS) revealed that while the UK is on track to comply with the current third carbon budget, which runs from 2018 to 2022, it is expected to miss the fourth and fifth carbon budgets by a wider margin than previously expected, based on current policies.

In fact, the BEIS said there were "projected shortfalls against the fourth and fifth carbon budgets of 139 and 245MtCO2e respectively", suggesting the country will miss carbon targets for the 2023 to 2027 period by 5.6% and then miss the budget for the 2028 to 2032 period by 9.6%.

For a government that has long talked up its green credentials, this is terrible news.

That's because, with the expected "emissions gap" worsening since last year's official update, it's clear that the government's current UK policies – which include the Renewable Transport Fuel Obligation, vehicle efficiency policies, F-Gas rules, the Renewable Heat Incentive, the Energy Company Obligation, and smart meters – aren't working, or at least not working fast enough.

What's more, the decarbonisation challenge faced by the government actually *increased* in the subsequent months, after the UK adopted a more ambitious net zero emission goal that's fully in line with the Paris Agreement.

Missing the targets is not an option

What all this means is that the government needs to find a way – or ways – to cut greenhouse gas emissions by a whole lot more than it's doing at the moment.

Let's be clear: missing the targets is not an option for the government.

No government will want that on its record, especially one that has talked such a good game on climate change.

But it's more than PR.

By missing the targets, the government will be at risk of legal action under the Climate Change Act 2008, which says ministers must plan to meet UK carbon budgets.

The act obliges ministers to set out how the UK will meet its goals. Section 13, below, says the government "… must prepare such proposals and policies as [it] considers will enable the carbon budgets… to be met."

Proposals and policies for meeting carbon budgets

13 Duty to prepare proposals and policies for meeting carbon budgets

(1) The Secretary of State must prepare such proposals and policies as the Secretary of State considers will enable the carbon budgets that have been set under this Act to be met.

(2) The proposals and policies must be prepared with a view to meeting—
  (a) the target in section 1 (the target for 2050), and
  (b) any target set under section 5(1)(c) (power to set targets for later years).

(3) The proposals and policies, taken as a whole, must be such as to contribute to sustainable development.

(4) In preparing the proposals and policies, the Secretary of State may take into account the proposals and policies the Secretary of State considers may be prepared by other national authorities.

Section 13 of the Climate Change Act 2008.

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So what will the government do?

To answer that, we need to delve back into the Climate Change Act 2008.

You see, tucked away in section 17 of the act is another interesting requirement, namely that it has to take obtain advice from the so-called Committee on Climate Change (CCC) and to take account of that advice (see paragraph 4, below).

17 Powers to carry amounts from one budgetary period to another

(1) The Secretary of State may decide to carry back part of the carbon budget for a budgetary period to the preceding budgetary period.
The carbon budget for the later period is reduced, and that for the earlier period increased, by the amount carried back.

(2) The amount carried back under subsection (1) must not exceed 1% of the carbon budget for the later period.

(3) The Secretary of State may decide to carry forward the whole or part of any amount by which the carbon budget for a budgetary period exceeds the net UK carbon account for the period.
The amount of the carbon budget for the next budgetary period is increased by the amount carried forward.

(4) Before deciding to carry an amount back or forward under this section, the Secretary of State must—
(a) consult the other national authorities, and
(b) obtain, and take into account, the advice of the Committee on Climate Change.

(5) Any such decision must be made no later than 31st May in the second year after the end of the earlier of the two budgetary periods affected.

Section 17 of the Climate Change Act 2008.

Established 11 years ago under the Climate Change Act, the CCC is a cross-party group of MPs that's right at the centre of UK climate policy.

In fact, in policy circles, its analysis defines the discussion.

In the decade or so since it was set up, the CCC's advice has been followed much more often than not. That's because the government runs a tangible risk of a judicial review if it does not follow the CCC's policy advice.

What this means is that it's worth closely following what the CCC says to get an early steer on likely governmental policy.

And it's here – on the paths the government should take to speed up the UK's emissions cuts – that the CCC has been clear.

In fact, according to the CCC, there's one particular gaseous substance that could form the backbone of any substantive efforts to cut emissions across energy generation, transportation, industry and heating.

That substance is hydrogen.

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Hydrogen offers climate change hope

In fact, in its last report in May 2019, the CCC mentioned "hydrogen" a total of 141 times, which was quite something considering the report was 270 pages long.

Hydrogen, in fact, was one of the central themes to emerge from the CCC report, which said it could contribute to the UK actually ending its contribution to global warming within 30 years by reducing national greenhouse gas emissions to zero by 2050.

Hitting the new stiffer target will require a "significant low-carbon hydrogen economy", the report said, as the gas is the one alternative energy solutions that cuts across all systems.

After all, hydrogen has the unique potential to change the way we use, store and balance energy.

Unlike natural gas, for example, hydrogen is a zero-emission fuel as it emits only water when burned. Either you convert natural gas into low-carbon hydrogen, or you convert excess renewable energy into a hydrogen gas.

For instance, as hydrogen-fuelled cars produce water vapour instead of greenhouse gases from their exhaust, the CCC said all new cars and vans should be electric or run on fuels such as hydrogen by 2035 at the latest.

The committee also suggested hydrogen as a potential alternative to natural gas that could be piped by adapting the current transmission network for use in periods of peak electricity and heating demand.

Indeed, studies have found that converting the UK to hydrogen gas could be £150 billion to £200 billion cheaper than rewiring British homes to use electric heating powered by lower-carbon sources.

What's more, hydrogen heating would be the least hassle for energy customers because very few appliances would need to be replaced.

In fact, the existing gas grid would need only minor upgrades because it was actually originally designed for hydrogen before the North Sea boom provided a flood of cheap natural gas to burn instead.

The plan is a crucial part of efforts to cut carbon from heating, which makes up almost a fifth of the UK's total carbon emissions, because hydrogen produces only water vapour and heat when burned – with no carbon emissions.

Although the government has already proposed a ban on gas boilers in all new-build homes from 2025 – a ban made at the response of the CCC, I might add – there's a much bigger problem of converting the 23.9 million existing properties heated by natural gas, meaning radical alternatives such as hydrogen are needed.

UK set to spend half a billion euros per year on the hydrogen economy

"By 2050, a new low-carbon industry is needed with UK hydrogen production capacity of comparable size to the UK's current fleet of gas-fired power stations," the CCC said in its May report.

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Digging deeper into the numbers, the technical report backing up the headline CCC report predicted that between 6 GW and 17 GW of electrolyser capacity (electrolysers produce hydrogen by using an electrical current to split water molecules into both hydrogen and oxygen) will be required in the UK by 2050, depending on energy demand and utilisation rates.

This prediction implies the country will need to build up to 567 MW of electrolysis per year for 30 years.

Considering each megawatt of electrolyser capacity costs about €1 million, that's over half a billion euros that will need to be spent in the UK per year on average for 30 years to get to zero emissions.

For the hydrogen economy in the UK, that's huge.

Although the CCC report was focused on 2050, the government will have its analysis at the forefront of its mind when it also considers how to meet its carbon budgets out to 2032.

Window of opportunity

The government is considering the CCC report and, with a history of respecting the advice from the independent body, is expected to adopt most or all of its recommendations. That could see it implement policy to back multi-billion pound investments in the hydrogen economy.

When it will do so is not clear, however. There is currently no policy framework for hydrogen in place and the timing of any decision-making is not known yet.

However, the CCC said the government "should legislate as soon as possible" and that its target is "only credible if policy to reduce emissions ramps up significantly".

What's more, MPs on the influential Business, Energy and Industrial Strategy Committee have said the rules should be changed as soon as 2020 to allow hydrogen into the natural gas grid.

In fact, it is now the most urgent task of any government to put in place the policies needed to rapidly decarbonise our economy over the coming decades.

Lawmakers from across the political spectrum are in agreement: hydrogen can significantly reduce the nation's greenhouse gas emissions and help transition to a low carbon system.

Quite simply, the UK is looking to replace natural gas sooner than many will expect, leaving us with a window of opportunity right now to take advantage before the government presses "go" on its plans.

Plans already taking shape

The good news is that the industry isn't moving from a standing start.

One pilot hydrogen project, named HyDeploy and run by Keele University in northern England, is already up and running, and aims to blend a volume of as much as 20% of hydrogen with normal gas supply. The project is currently serving 17 university faculty buildings and 100 domestic properties in the local area.

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If small scale testing is successful, this could then be rolled out with live public trials across 1,000 properties in northern England from summer 2020 before a larger commercial scale rollout in 2023, at the earliest.

Blending hydrogen across the whole of the UK could save 6 million tonnes of carbon every year, or the equivalent of removing 2.5 million cars from the roads.

Many of Britain's grids are already replacing metal pipes with plastic, which helps prevent leaks, improve safety and can also allow the transport of different gases including hydrogen.

In transport, too, progress is already well under way, with fleets of hydrogen-fuelled vehicles already on our roads. After all, hydrogen-powered cars are seen as being far better for the environment in terms of emissions than those running on petrol, as when you burn hydrogen, it produces steam, meaning only water is the by-product.

But with such a ramping up of hydrogen facilities across industry, energy and transport expected over the coming years, a huge pick-up for a range of UK-listed companies will take place.

But there is one stand-out hydrogen company that will, to my mind, benefit particularly.

It has been growing steadily for a few years, manages its finances well for a small growth stock, and is seeing deals increase in both number and size.

What's more, it's actually supplying the kit behind the ground-breaking project at Keele University, putting the firm in prime position as the project is scaled out.

Its name is ITM Power and it's listed on the AIM market in the UK.

ITM Power – the UK-listed hydrogen trailblazer

ITM Power is a leading supplier of hydrogen production plants, so-called electrolysers, including complete hydrogen refuelling stations. Its electrolyser technology is already being taken up in consumer and industrial applications. As said, it's supplying the electrolyser system to the HyDeploy project mentioned above.

The AIM-listed company's power-to-gas business provides proton-exchange membrane (PEM) storage systems that allow customers to convert excess electrical energy into hydrogen for injection into the gas grid or storage for vehicles.

The group's clean fuels solutions come in the form of modular hydrogen stations to recharge fuel cell electric vehicles (FCEVs).

It currently has eight hydrogen fuelling stations across the UK. Two more are under construction and it has planned and financed another three.

Having expanded over the last five years, it is currently developing a larger production facility in Sheffield. Once complete, it will have five times the manufacturing space as ITM's current home. Marry that with a decade of industry experience, an established expertise and a growing project pipeline, ITM looks set to ride the hydrogen wave.

Products and projects

ITM's projects range from hydrogen refuelling stations in fuel garages for cars, a civic project for Birmingham's bus network, a refining plant in Germany, energy storage for

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tidal energy and clean hydrogen supply. It is involved in so many parts of the hydrogen industry that, as hydrogen becomes a more popular choice, it will benefit across the board.

One of the best-looking things about ITM is the project pipeline it is building up.

It now has eight hydrogen "solutions" installed across the UK. Two more are under construction, including the largest one yet for the Birmingham bus fleet. Another three are financed and in the design and planning phase.

It generates revenue from multiple sources, including from consultancy, design, grants, fuel sales and – the biggest contributor – construction contracts, many of which are field leading.

For example, ITM has installed the first "under the canopy" charging station alongside normal petrol pumps. This is at the Beaconsfield service station on the M4, one of the busiest in the country.

It has also built and operates the largest PEM electrolyser in the world. Basically it's a 10 MW hydrogen refinery.

It was also the first company in the world to generate hydrogen using energy from tidal power.

This is crucial because one of the problems with current electric vehicles (EVs) is that they are actually quite carbon intensive to make. The batteries in particular need a lot of fossil-fuelled electricity to make.

If ITM can produce hydrogen from renewable sources like tidal, so-called "green hydrogen", it would accelerate the decarbonisation of road transport, with ITM leading the charge.

Gas blending project now fully operational

I said above that ITM Power is involved in the ground-breaking HyDeploy project at Keele University, the first live pilot project to inject zero carbon hydrogen into a gas network to heat homes and businesses.

HyDeploy is a £6.8 million project funded by UK energy regulator Ofgem and its ultimate goal is to "establish the potential for blending up to 20% hydrogen into the normal gas supply" in order to reduce carbon dioxide emissions.

Well, the hydrogen for the pilot project is being produced by an electrolyser – which uses an electrical current to split water molecules into hydrogen and oxygen – supplied by ITM.

As of early 2020, the pilot trial is fully operational, injecting up to 20% of hydrogen into Keele University's existing natural gas network, feeding 100 homes and 30 faculty buildings.

If a 20% hydrogen blend was rolled out across the country it could save around 6 million tonnes of carbon dioxide emissions every year, the equivalent of taking 2.5 million cars off the road. That's why this project is so exciting.

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No wonder that ITM Power CEO Graham Cooley described the HyDeploy's pilot project as a "very significant step.

"The increased use of hydrogen to decarbonise heat via the gas grid will perform a critical role in helping the UK to fulfil its ambitious climate change obligations," Cooley said.

"Indeed, the Committee for Climate Change has indicated that the UK will need between 6 GW and 17 GW of electrolysis in the next 30 years to store renewable power and provide renewable heat."

This prediction above implies the country will need to build up to 567 MW of electrolysis per year for 30 years.

As I explained above, considering each megawatt of electrolyser capacity costs about €1 million, that's over half a billion euros that will need to be spent in the UK per year on average for 30 years to get to zero emissions.

For the hydrogen economy in the UK generally, and ITM Power specifically, that's huge.

Remember, MPs on the influential Business, Energy and Industrial Strategy Committee have said the rules should be changed as soon as 2020 to allow hydrogen into the natural gas grid.

If the HyDeploy trial proves successful, then a positive outcome is that much more likely.

Shell partnership

What's more, the firm has also recently renewed its partnership with Shell for vehicle refuelling, which had been in place since 2015. So far, ITM has installed three refuelling stations in Shell garages in the UK. Three more are funded and planned: in Derby, as well as two in London. The new agreement will run until 2024 so we can expect to see more new projects like these in the UK.

But it doesn't stop there. Shell, with ITM power, is building the world's largest hydrogen electrolyser. The project, called "Refhyne", enables hydrogen to be made from electricity rather than natural gas. This facilitates the use of more renewable electricity, reducing the carbon footprint of the company, which is a key goal for obvious reasons.

This is obviously a big success in its own right, but will also serve as a reference point for future bids into the industry.

ITM is also in partnership as a fuel supplier to Green Tomato – a UK taxi company that uses environmentally friendly cars for its taxis – and London's Metropolitan Police.

Green Tomato is a leader in the green-taxi field in the UK. These relationships can tell us as much if not more than just balance sheets and income statements at this early stage in the company's growth.

But the company isn't just focused on the UK. In fact, it has also made its first sale of four 250 kW electrolyser systems to three different customers in Australia.

Australia is a clean tech leader and so a crucial market for hydrogen companies. It's a positive sign to see ITM making its first steps into that market.

In fact, around the world, ITM has built a reputation for excellence that is clearly carrying weight with major consumers.

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German chemicals giant Linde takes 20% stake

No wonder, then, that late last year it announced it would form a joint venture (JV) with German chemicals giant Linde, which – and here's the best bit – will also take a 20% stake in the firm.

Linde, ITM said, had made a firm commitment to buy £38 million of company shares as part of wider plans to raise at least £52 million. The rest of the fund-raise was placed with certain existing ITM shareholders and new institutional investors.

ITM shareholders were also offered the opportunity to acquire shares through an open offer that raised up to an additional £6.8 million.

The cash raised will be used to enhance the manufacturing capabilities of ITM, particularly for the development and production of large-scale 5 MW electrolysers; to facilitate product standardisation and manufacturing cost reduction; to fund its initial financial contribution to the JV and to provide working capital and balance sheet strength to support the delivery of the contract backlog and opportunity pipeline.

As for the 50/50 JV with Linde, that will focus on delivering green hydrogen to large-scale industrial projects, principally those with an installed electrolyser capacity of 10 MW and above, the company said.

Be clear: the investment and JV with Linde is brilliant news.

As well as a sign of the continued strength of ITM Power, it also shows an increased emphasis placed on hydrogen as part of the clean energy transition.

In fact, the chemicals firm is just the latest Tier One industrial gases major to move into the hydrogen energy sector. The two sectors are natural fits for each other and Linde, like all the other gas firms that have made similar investments, is just positioning itself today for tomorrow's growth.

Linde, of course, recognises that hydrogen is a massive part of the clean energy transition.

Financials

A look into the books reveals that ITM's revenue has grown steadily since 2014, from £1.13 million to £4.6 million. The year ending April 2019 saw a 40% increase from 2018 alone, when it was £3.3 million. That kind of revenue growth is incredibly exciting, and reflects ITM's unique position at the forefront of the UK electrolyser market.

Operating losses increased once again though, as the company invested to "significantly scale up facilities, resources and production capacity". Given how I feel about the hydrogen industry's trajectory, I'm happy to see ITM investing heavily for the future, even if current finances take a hit.

And since this announcement, the company has begun the retrofitting of its "world's largest" renewable hydrogen factory in Sheffield. It will be ITM's global manufacturing HQ, capable of manufacturing 1 GW (1,000 MW) of electrolyser capacity per year.

So it means what it says – it is investing wholeheartedly in the future growth of the company, and in the current investor climate, it's easy to see why this has been beneficial for the share price. Investors love growth, and hydrogen is the ultimate growth story.

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ITM's investments are an appropriate reflection of that.

On the commercial side of things, average project size is up from £3.5 million to £6 million on average, reflecting strong demand for larger systems as the hydrogen fuel and energy storage markets continue to grow worldwide. ITM expects to begin production in the spring of 2020.

Its fuel contracts number 33 now, up from 20 in the previous year. This has resulted in increased revenue from fuel sales – £370,000 up from £160,000.

This stat more than any other perhaps, shows the reality of the growth in the hydrogen story last year.

Over 100% growth in hydrogen fuel used from ITM's refuelling stations for road-based vehicles gives an indication of how quickly FCEVs are becoming mainstream, as long as the vehicle manufacturers can produce enough cars to keep up.

At the end of the 2019 financial year (in April), its pipeline stood at £379 million, a dramatic increase from £240 million the previous year.

Growth in the business is strong, and the increased spending reflects that.

I fully expect the investment in new projects and manufacturing capabilities to pay off over the next few years.

In any case, the fact that ITM power is loss-making is far more the result of being in a very young industry than any product or business failures of the company.

With momentum increasing in the hydrogen market, that should be the start of a great period when ITM can finally capitalise on all its hard work over the last decade.

Risks

There are a few main risks and factors mitigating against widespread hydrogen adoption, which could affect the share price of ITM moving forward.

Firstly, the main risk affecting all green energy companies is that regulation doesn't move quickly enough to give businesses the confidence they need to invest. We don't know exactly when the UK will firm up its policies on hydrogen and although I expect this will take place in 2020, there's a chance it might not happen until the early or mid-2020s.

Secondly, Brexit is a key risk. If trade relations with the continent fray and worsen, ITM could lose out to European competitors. Or EU funding could fall away. At this stage, it's anyone's guess what will happen.

There is also a risk that in the event of a wider global downturn, the financing on which the company still relies could be less forthcoming. If interest rates go up, its indebtedness will become more of a problem.

It also has a few competitors, including Hydrogenics and McPhy Energy, while Siemens and Thyssenkrupp are two of the larger global players.

However, in my eyes none of these other companies are as well positioned to capitalise on the hydrogen boom as ITM.

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On a wider level, the hydrogen sector will be hit if battery EVs become significantly more competitive. Hydrogen-fuelled cars are competing for market share with EVs as petrol vehicle usage fades. There looks to be plenty out there for both hydrogen and battery EVs, but should an unforeseen super-development occur in battery EVs, they could become by far the better option.

What's more, more testing is needed to ensure hydrogen is viable on a commercial scale, while questions remain on the cost of switching to the fuel. Renewable energy and batteries may even curb the need for green gas.

A plan by distributor Cadent Gas Ltd to build a hydrogen network across about 20% of Britain to heat homes and supply industry would require about £20 billion. Costly but not that costly, especially not set against the alternatives.

Buy now before the government presses go

The stock is on somewhat of a tear right now, rising from 50p in late October to a latest price of around 105p. It's up 46% so far this year alone.

But I think it is on the verge of a move to £2 and beyond, potentially even above £10 one day.

After all, the forces are beginning to align for hydrogen, which will spur huge demand for ITM's products in all manner of applications from industrial settings – in refineries or steelmaking plants, for example – to renewable energy sites and from the petrochemicals industry.

Based on the CCC report, ITM expects spending on electrolyser technology in Britain alone will be roughly £500 million a year every year for the next 30 years.

That's 100x more than its current revenue, meaning tapping just 10% of the UK market would increase revenues by 10x.

But it gets better…

Expert forecasts predict hydrogen is set to grow globally into a new $2.5 trillion market.

To do so, it will need companies like our innovative developer from Sheffield.

If ITM tapped even 1% of that revenue, it'd grow its revenue by more 500x from where it is today.

Remember, ITM looks set to be a prime beneficiary of rising demand for low carbon hydrogen.

These are exciting times for ITM, make no mistake. It is seeing good progress from its flagship 10 MW refinery project and is set to reap the benefits of the CCC aspirations to make the UK zero emissions by 2050 and its recognition that PEM electrolysis will be an integral part of the new energy mix.

The firm is also set to open a much larger new factory over the next year.

Remember, the UK's influential CCC has already made clear the UK is going to need millions and millions of pounds worth of the equipment that ITM makes.

Invest now before the government confirms it.

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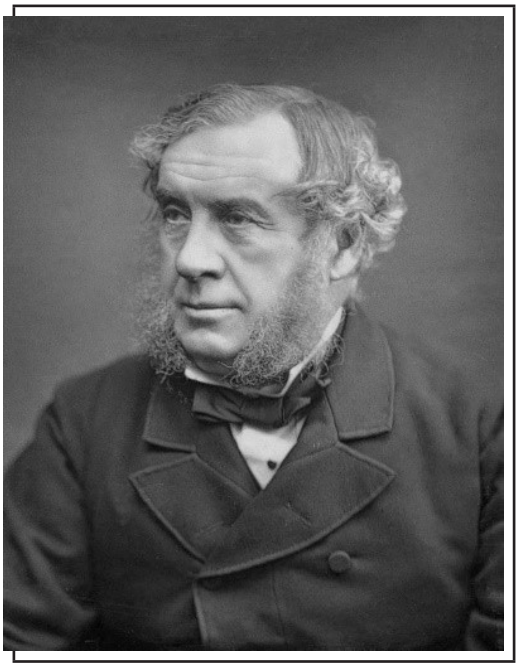
MUST-BUY HYDROGEN PICK #2: The pioneering UK fuel cell maker upgrading NASA tech



Take a look at the man in this picture…

His name is William Grove – he's a Welsh lawyer turned scientist. Today his name is largely forgotten. Only a few Victorian-era historians know about him…

But, in the not-too-distant future, I believe William Grove will be finally recognised as one of the truly great British inventors, alongside names such as Isaac Newton, Graham Bell and Michael Faraday.

Because in 1842, Grove discovered a revolutionary way to produce electricity.

Until then electricity came from "voltaic piles" – rudimentary batteries in history. They were a series of zinc and copper discs that created a current when connected with a wire.

The current was weak.

But Grove found a way of making it strong… strong enough that it "could be felt by five persons joining hands, and which when taken by a single person was painful."

He was so amazed by his results that he penned a letter to Michael Faraday – the English scientist who discovered electromagnetic induction, the principle behind the electric transformer and generator – to share the news.

"I have just completed a curious voltaic pile which I think you would like to see," he wrote.

Grove's discovery was indeed ground-breaking.

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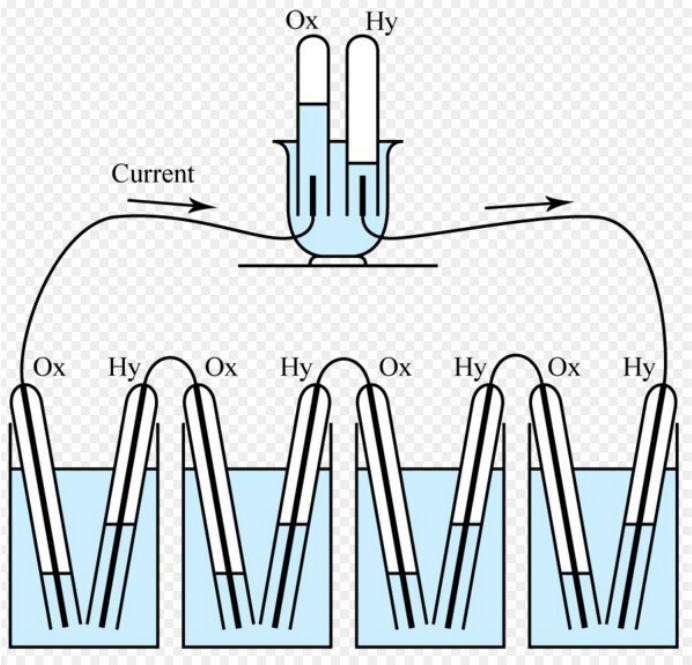
He had produced electricity by combining oxygen with the most abundant element in the universe – hydrogen.

We now call Grove's invention a hydrogen "fuel cell".

Effectively, a hydrogen-powered battery.

Here you can see an illustration of the design Grove sent to Faraday. After the letter, Grove met with Faraday for a private demonstration.



Source: Wikimedia

But what exactly is a fuel cell?

As Grove would have explained, in essence, fuel cells cleanly and efficiently convert chemical energy from hydrogen-rich fuels into electrical power and heat via an electrochemical process.

This process is efficient and emits water rather than pollutants as there is no burning of the fuel.

Similar to a battery, a fuel cell comprises many individual cells that are grouped together to form a fuel cell stack. Each individual cell contains an anode, a cathode and an electrolyte layer.

When a hydrogen-rich fuel enters the fuel cell stack, it reacts electrochemically with oxygen (ie, ambient air) to produce electric current, heat and water. While a typical battery has a fixed supply of energy, fuel cells continuously generate electricity as long as fuel is supplied.

Shortly after Grove announced his invention, the German-born engineer Moritz Hermann von Jacobi used a bank of Grove's batteries to power an electromagnetic motor boat on the river Neva in Saint Petersburg.

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And the technology later went on to be used extensively by the American telegraph industry.

For this invention, Grove received a Royal Medal.

At the time, it seemed that hydrogen-powered engines would replace its steam equivalents.

But Grove's success was short-lived.

Why?

Oil.

Sudden discoveries of enormous amounts of cheap oil outcompeted hydrogen.

For a century and a half, oil and gas burned bright and kept hydrogen in the shadows.

But things are starting to change.

Grove's invention is now gaining traction

Never mind the fact that oil and gas are dirty pollutants that the world is slowly abandoning.

It recently became a lot cheaper to produce hydrogen.

See, while hydrogen is the most abundant element in the universe, it doesn't exist in "free" form. You have to create it – by turning water into hydrogen, using a process called electrolysis.

And the cost of doing so is collapsing.

According to BloombergNEF, the cost will drop sharply over the next decade – by as much as a whopping 80%.

Nobel Prize winner Steven Chu said this could unleash the hydrogen economy over the following years.

In fact, according to ENGIE engineer Kevin Kinsella, hydrogen now costs the same as natural gas in the UK.

These falling costs will create a $2.5 trillion market as the hydrogen economy develops.

That's why the Electrochemical Society calls hydrogen the "holy grail of clean-energy".

And why in Davos the world's first Hydrogen Council was created. Today it has quadrupled in size. It has over 60 member companies, including Big Oil companies such as BP, Royal Dutch Shell and Anglo American and major can manufacturers such as Audi, BMW Group, Honda and Toyota.

Together these companies have €2.6 trillion in revenue and employ 4.2 million people.

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Even Saudi Arabia is making moves into hydrogen. Saudi Aramco opened its first hydrogen station in June 2019.

The hydrogen economy is happening, make no mistake.

This hydrogen economy refers to the idea of transforming our existing hydrocarbon-based infrastructure – from static power generation to a full range of transportation applications – to run on hydrogen in order to cut carbon and carbon dioxide emissions.

This transformation can occur wherever hydrocarbons are used as fuel, but there is particular interest in the potential transport applications, which hark directly back to the invention Grove discovered in 1842.

Fuel cell vehicles already on our roads

You see, FCEVs are increasingly seen as a particularly viable alternative to conventional internal combustion engine vehicles, complementing growth in battery-electric vehicles.

FCEVs are powered by electric motors, but instead of carrying their energy in a battery pack, they create electricity by combining hydrogen with oxygen from the air in a fuel cell. Water vapour and heat are the only by-products from the vehicle's exhaust.

Countries around the world are forging ahead with the technology: Japan aims to have 200,000 hydrogen cars on its roads by 2025, served by 320 fuelling stations, while China, the world's biggest car market, is putting its manufacturing and policy might behind hydrogen fuel cells, just as it has with battery-electric vehicles.

In fact, China expects to increase the number of hydrogen-powered vehicles on its roads by over 666% in the next decade. Behind this move is Wan Gang, former minister of science and technology. It was his advice that drove the massive boom of electric car sales in China.

But now in a recent Bloomberg interview, Wan said that he wants China to move to hydrogen-powered cars.

In California, hydrogen charging stations are part of a $900 million project to cut pollution.

FCEVs are on British roads, too.

But it's not just countries driving the shift, companies are making their own plans too.

General Motors, Amazon, Walmart and courier firm DHL are all already creating fleets of vehicles powered entirely by hydrogen. That could be the start of a much bigger shift away from "traditional" vehicles (or even electric cars) – and towards hydrogen-powered engines.

Hyundai is getting in on the act too. It plans to spend $6.7 billion to increase the number of hydrogen-powered cars it produces 200-fold. It's working closely with a startup formed by executives from Google, Tesla and Uber to do this.

Not all fuel cells are created equal

There are different types of fuel cells depending on the kind of electrolyte they employ, each with its own advantages, limitations and potential applications.

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However, there is one type I want to focus on today: alkaline fuel cells.

These are the oldest and arguably most effective of all fuel cell chemistries, achieving up to 60% electrical efficiency.

There are certainly the most reliable and powerful form of fuel cell, which is why NASA uses them for its space shuttles. They are also used in submarines.

However, they have historically failed to find commercial terrestrial applications due to cost. The catalysts and materials used in the 1950s and 60s provided high power output but at a very high cost.

As a result, no one has previously managed to bring this incredible technology to market. Costs have just been too prohibitive.

Until now.

One small British company has worked out how to make an alkaline fuel cell that uses lower-cost components and runs at a lower temperature.

It has spent ten years developing the technology behind closed doors. It now has an alkaline fuel cell with sufficiently low costs and high lifespan that it is suitable for the public market.

Indeed, the firm is now aggressively targeting some high-growth power markets. Ten years of hard work in the lab is now coming to fruition.

Its name is AFC Energy (AFC:LSE).

From the space station to your shopping basket

The company, which was established in 2006, originally looked at the "chlor-alkali" market – applications for hydrogen where the fuel was emitted as a by-product of industrial processes.

But over time AFC Energy realised there wasn't a huge amount of growth there – in fact, industrial sites are getting better at recycling their waste gases.

So AFC pivoted. It changed direction, choosing to focus its energy on higher growth markets such as EVs.

Fast forward to today and AFC has recently announced four products it's bringing to market, the first of which is a 72kwh hydrogen-fuelled EV charger. It was developed in partnership with major EV charger manufacturer Rolec.

Let me explain why this is so exciting.

Although there are currently over 100,000 EVs in the UK, estimates suggest that to reach our decarbonisation goals by 2050 as mandated by the government there will need to be 30-40 million on British roads in 20 years' time.

Of course, meeting this amount of electricity demand will pose big questions on the grid network. But FCEVs essentially run "off-grid" with clean electricity.

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Currently, off-grid power comes mainly from stationary diesel generation, which has been said to produce as much as one-third of our national carbon emissions.

AFC off-grid chargers, using hydrogen as a fuel and its alkaline fuel cell technology to generate electricity, offers a cost-competitive, clean, zero-emissions and stand-alone facility for homes and businesses to charge their cars of the future.

AFC's revolutionary charging application came to market in December last year.

Its first iteration is targeting multi-use sites – car parks, business parking, supermarkets and other off-grid applications.

AFC's partnership with Rolec is a huge bonus for the company, as the latter company already has a presence in 40 countries, thus bringing its distribution network and expertise to the table as well as its manufacturing capability.

Beyond EVs

But the applications for AFC's technology go far beyond EVs and chargers. It can also be used to decarbonise the heat and power sectors.

That's because fuel cells produce both power *and* heat, in a device the same size as your boiler, effectively bring both heat and power generation in-house.

AFC is right at the cutting edge of this crucial industry, and its fuel cell has beaten the competition in one incredibly crucial way.

Let me explain.

As I mentioned before, the big hurdle for fuel cells has been money – they cost too much.

A few years ago, AFC had an operational fuel cell, using hydrogen.

But it was configured so it could only use hydrogen that was 99.999% pure, or better. And it was big, too, generating 50 MW of power but taking up a space the size of a shipping container.

The cost per kilo of hydrogen at that purity is about £10-£12.

Now, however, after extensive technological redevelopment, it has been set up so that it can use hydrogen from ammonia.

Ammonia has many advantages, such as ease of transport and lower cost, though it is less pure.

The cost reduction this allows is massive, because using hydrogen from ammonia only costs about £2 per kilo or less.

AFC has also shrunk its fuel cells, so they are producing 1 MW or 10 MW of electricity, rather than 50 MW. This makes them more flexible, and accessible to a wider array of customers.

AFC's technological and cost-cutting improvements have made it a frontrunner in hydrogen fuel cell technology.

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Indeed, the former head of fuel cells at Rolls-Royce and LG called it “the holy grail” of fuel cells.

The way it achieved such affordability was by designing a new membrane, which forms the central part of the fuel cell where the chemical reaction happens.

This new membrane is a product in its own right, too.

It’s called the “AlkaMem”.

I won’t go into too much technical detail, but essentially by reconfiguring the structure of the fuel cell in which the chemical reaction occurs, it allows for an increase in efficiency when turning fuel into power.

Essentially, it allows the fuel cells to use a lower grade of hydrogen, which is the key to AFC’s cost-savings.

Late last year, the company announced, via its partner De Nora S.p.A., that the membrane’s performance in the alkaline electrolysis process “exceeded internal expectations”.

De Nora called it a “truly disruptive” technology in the alkaline water electrolysis industry.

That news has sent the share price shooting up, as the membrane technology is a crucial part of AFC’s technological and competitive advantage.

In terms of how it’s aiming to monetise this technology, AFC is aiming to use a licensing business model, whereby it leases out the intellectual property for its fuel cell and membrane to manufacturers who want to adapt it to their product, just like Rolec has done with the EV charger.

This licensing model allows AFC to keep costs low. It has done all the R&D to create the technologies, now larger businesses will pay it annual fees for the right to manufacture them.

How this works is that other companies will pay AFC for the intellectual property, and then use it to adapt the technology to their own needs, be it marine propulsion or office heating and power.

Financials

Right now, AFC’s financials are nothing to write home about.

A few years ago, it had some revenues, but it’s spent the last three years re-designing the product to make it commercially viable, so on the sales front there hasn’t been much action over the last couple of years.

That’s set to change but, for now, the only thing to look at is its financing.

Total cash was £2.6 million at the end of FY 2018, but it has since secured a $4 million convertible loan facility that it can draw upon if required.

AFC lost £0.7 million in the six months to April 2019, which actually reflects a pretty strong control of costs. Since the interim reporting date, it has raised another £1.1 million, giving the company ample time and money to bring its products to market over the next year.

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It's also interesting to note that the CEO, Adam Bond, has chosen to take a large part of his salary in shares and options, with those options available at a strike price of 50p per share, over four times above the current share price.

Not only does this reflect his huge confidence in the business, but it also means that, now the company has entered the commercialisation phase, he will be incentivised to get the share price above the 50p mark so that his options become profitable.

That leaves a lot of room to the upside, make no mistake.

Finally, it's of note that for a tiny company, it does have a huge and experienced backer in Schroders, which is a long-term owner with an 11% stake in the company, and has recently been topping up its position.

You can't read too much into that of course, but AFC is hosting another institutional investor day soon. Hopefully the entry of another large backer will provide support for another strong upward move.

Risks

A key risk is that it's still very early days. Although commercialisation is happening now, no products have actually been tested out on the market.

Although AFC Energy has had a lot of expressions of interest, it remains to be seen what proportion of those turn into actual sales.

What's more, we don't even know what kind of margins it will be making, how profitable each unit will be, or what sales growth will look like in the different markets it is targeting.

There is a lot that we can't yet know, and that uncertainty is a key risk.

Saying that, it does represent an opportunity.

That's because you can't make outsized gains by investing very early in companies if you wait to find all that out. If you waited to see what Amazon or Google would become when they started out as booksellers and search engines, you'd have missed almost all of the returns.

I can see huge potential, and an incredible technological advantage in AFC, in a market that is set to grow at a ridiculous pace over the next decade or two.

For me, that sounds like an incredible opportunity, and makes the risks surrounding the share price volatility and the uncertainty worth taking.

Certainly, most of the downside (costs) is behind the firm, meaning it's now time for it to monetise all that effort.

However, we can't ignore another key risk that pertains to its share price.

In late 2019 and early 2020, with all the positive news announcements about its products, commercialisation and the success in testing the AlkaMem product, the share price has rocketed up.

In fact, it's more than quadrupled in the space of three months, now trading around 20p.

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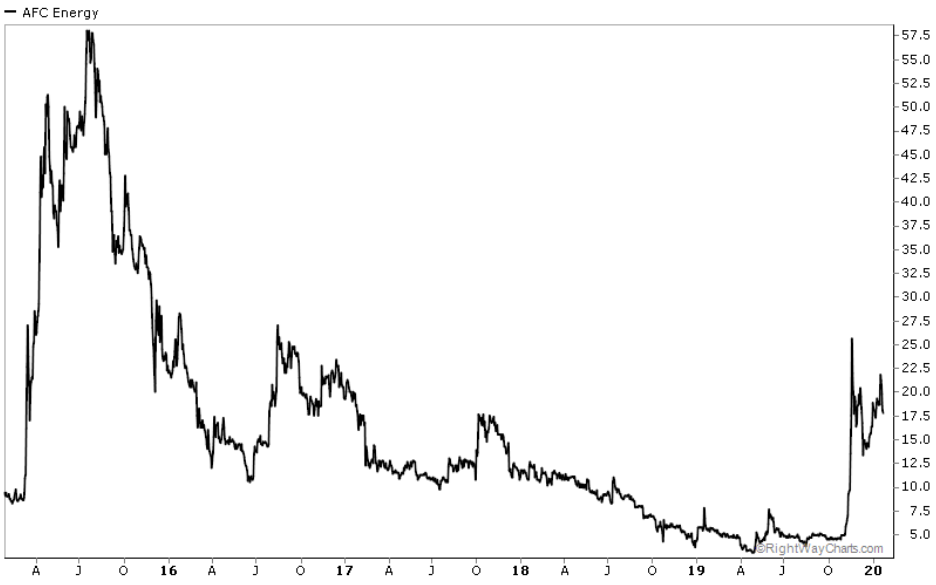
Back in 2015, the stock was trading around the 40p-50p range, but then as the company started to go quiet, and change direction, this fell down as low as 3p.

The share price is certainly volatile, so it's likely we'll see prices fall lower as speculators take profits before prices march higher again.

What this also means is that, if the price is above the buy limit, then please hold tight and wait for the shares to pull back before investing.

I recommend you BUY AFC Energy (AFC:LSE)

Action to take: buy AFC Energy
Ticker: AFC: LN
Price as 27.01.20: 18.80p
Market cap: £87.19 million
52-week hi/low: 28.20/3.00p
Buy up to: 18.5p



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MUST-BUY HYDROGEN PICK #3: The “Saudi Aramco of hydrogen”

As you’ll know by now, hydrogen will have key role in slashing carbon emissions over the coming years, helping to decarbonise the heating, power, industrial and transport sectors across the world.

This, after all, is a global story.

We have identified a Norwegian company that has business in Europe and the US, as well as a growing footprint in Asia, particularly in South Korea, perhaps the world’s most advanced hydrogen market.

It doesn’t make fuel cells like AFC; instead it’s more like a global, established version of ITM Power, manufacturing electrolyser technologies that allow hydrogen to be produced from renewable-sourced electricity.

The name of this superstar hydrogen powerhouse is Nel ASA (NEL.OL).

Nel is a Norwegian hydrogen company.

But it’s not just any old hydrogen company.

It was actually founded all the way back in 1927.

That makes it an older company than Saudi Aramco. That level of industry know-how and industry knowledge gives it a huge advantage over many other, smaller hydrogen outfits just starting out.

Since it was founded, it has delivered over 3,500 units to over 80 countries. It is now the largest electrolyser manufacturer in the world.

Specifically, it is the leading manufacturer of alkaline and so-called proton-exchange membrane (PEM) electrolysers for industrial processes and energy storage, and fuelling equipment and solutions.

In fact, its hydrogen solutions cover the entire value chain from hydrogen production technologies to manufacturing of hydrogen fuelling stations for FCEVs.

This makes it a “fully integrated” hydrogen firm in that it covers all bases. This gives it a greater scope to benefit from the boom in hydrogen fuel applications – be it power generation, heating or transport.

It has a global reach and is now just starting to really come into its own with some big deals.

Nel manufactures PEM electrolysers that produce hydrogen (and oxygen) from water.

(Fuel cells in hydrogen cars do the opposite, converting hydrogen into electricity and water. Both are the same chemical reaction, just in different directions.)

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Nel is on a different scale to most specialised hydrogen players, however, with revenues already in the hundreds of millions, an established global presence and decades of technological leadership.

Nel has something of a size and leadership advantage, too. It has a diversified product range, global supply chains and a well-established brand, which means that newcomers to this exciting industry can look back on decades of experience and expertise, allowing them to trust Nel with their hydrogen needs.

You see, Nel doesn't just make and sell one thing. It can deliver the full variety of electrolysers in terms of power and size, and it also manufactures refuelling stations, thus covering both the up- and downstream, if you will, of hydrogen as a fuel.

It functions as a manufacturer and retailer of products, to put it at its most basic. It has a range of electrolysers, fuelling stations and storage units, and customers can quite simply purchase them, ready-made.

By offering both production and refuelling, Nel is exposed to the full growth of the hydrogen economy. It is also seen as a preferential bidder in some contracts where both production and refuelling/storage apparatus are required at the same site, such as at motorway service stations.

Nel completes the set by also developing its own technology. For example, it has developed the world's most compact hydrogen fuelling station, which can connect to cars, heavy-duty trucks, forklifts and more.

It literally has hydrogen covered from the inception of the tech to the bonnet of your car.

Working with the Tesla of FCEVs

One immediate catalyst that makes this such an exciting time for investors right now is Nel's partnership with a company called Nikola Motor, which is trying to be the Tesla of hydrogen fuel cell vehicles.

Nel is already an investor in Nikola, having ploughed $5 million into its C-funding round in late 2018. Nikola's valuation has since tripled, so Nel is already doing well on its investment in the company, but the even better news is what Nel is working on *with* Nikola.

Hydrogen applications in transport are varied, but Nikola focuses on heavy-duty trucks predominantly. It has just ran its first delivery for Ab InBev (which has ordered 800 Nikola trucks in total), and has $14 billion in pre-orders for its next-gen semi-truck, the "Tre". That's the highest ever pre-order book for a truck in American history.

This just goes to show how fast the transition to hydrogen is happening in certain parts of the transport sector, and Nel is very much a part of that.

You see, Nikola has committed to building 700 hydrogen fuelling stations across the US by 2028, and has selected Nel as its primary supplier for the electrolyser units with associated refuelling and storage units for this extraordinary, multi-billion dollar project.

It's the largest electrolyser and fuelling contract ever awarded, and here we can really see the value of Nel's diversified product offering.

Providing the full range of products, from production to distribution and storage, allowed Nikola to select Nel as its one partner for this project, rather than splitting it

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between two or three companies. This is really where you can see Nel's competitive advantage paying off.

Nikola is doing this as it also plans to roll out its hydrogen trucks over the same timeframe, and it can't do so without a refuelling network to match.

A bright future for Nikola means a bright future for Nel, as its key supplier of hydrogen technology, and as an investor too.

But that isn't all Nel has going on either.

Global partnerships

Other deals in Nel's portfolio include a partnership to build a hydrogen production and refuelling station with Norway's largest grocery wholesaler, ASKO. ASKO already has 600 trucks on the road. Nel is building a hydrogen production facility and fuelling station. It will produce 300kg of hydrogen per day, to fuel a new fleet of heavy-duty fuel cell trucks.

Nel was responsible for the first hydrogen-powered train in Germany, and is also part of the H2Bus consortium aiming to get 1,000 hydrogen buses on the road in Europe. The buses the consortium offer will be the lowest cost, zero-emission bus alternative on the market, and Nel has been granted rights as the exclusive supplier of electrolysis and refuelling units to the consortium.

It has joined a JV with other hydrogen leaders in Norway to construct a number of renewable hydrogen production facilities there. The JV, called Green H2 Norway, is aiming to be the exclusive supplier of green hydrogen for Hyundai's range of hydrogen fuel cell trucks, which are planned to hit Norway's roads this year.

It also recently received an order from Engie, which is building a hydrogen-fuelled mining truck from Anglo American, the mining giant.

And it has also won a recent contract to provide Copenhagen's first refuelling station for hydrogen taxis for green energy supplier Everfuel.

In Korea too, Nel has established a subsidiary that is making huge steps in that well-developed hydrogen market.

Late last year, the South Korea-based subsidiary announced it had received two more orders for Nel's H2Station refuelling units from the Hydrogen Energy Network Co. (HyNet), taking its total orders for the year to 12. The value of this order alone was around €2.7 million.

The H2Station is the aforementioned "World's most compact hydrogen station" – and these deals highlight the value of Nel's technological leadership.

The stated ambition of Nel Korea is to reach 100 orders by 2022 (around a third of Korea's national target). On that basis, the company is expecting to generate around €135 million from its Korean subsidiary alone.

In 2018, its business in Asia only contributed just over NOK 30 million (roughly €3 million), so this deal alone would almost match that. The total of 12 stations should show up as a dramatic increase in sales in next year's results.

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As I mentioned earlier, Korea is actually the most developed and promising market for hydrogen, not just in Asia, but worldwide. It's a real strength of Nel that it has an established subsidiary there that's already performing well, growing its order book and generating revenues for the company.

Two great things stand out about Nel's collaborations.

One, the size of the projects, with Nel collaborating with large companies both at home in Norway and globally.

Two, we can see the value of Nel's integrated business model, where within the hydrogen economy it is working on production (electrolysers), as well as refuelling. This means it can sign a range of deals across the developing industry, taking advantage wherever and in whatever way it is required.

The deals for Nel certainly keep coming thick and fast. Each one increases the global reach of hydrogen as a fuel and an investment, and Nel is a huge part of increasing availability and awareness of this remarkable solution in the great global decarbonisation.

The firm's product offering is generating huge attention, which shows itself very clearly in the books, as I'll show you now.

Financials

Financially, Nel is starting to prosper in terms of sales and revenue, although achieving profitability might still be a few years away.

Revenue has grown from almost NOK 90 million (about £7.5 million) in 2015 to an impressive NOK 450 million in 2018. And what's more, the pipeline of orders is as high as it has ever been, at NOK 350 million – and that doesn't even include the Nikola Motor contracts which should run into the billions. The largest portion of revenues came from electrolysers, and then fuelling stations, primarily in North America and then Europe. Its Asian subsidiary is growing rapidly though.

Currently, its electrolysers produce more sales, and are only marginally loss-making at the operating level. It's the fuelling stations that are costing the company at the moment. That does give Nel some room to manoeuvre, should it wish to chase profitability more quickly, it could focus more on electrolysers and shrink its fuelling stations business slightly.

Its latest reporting for Q3 2019 suggested a record quarter for revenues (NOK 149 million), representing 28% quarter-on-quarter growth.

That is very promising, although I must temper the excitement by pointing out that 2018 saw an extension of losses, as investment in a new manufacturing plant and heavy investment in business development, alongside some one-off legal and higher salary costs.

It does seem to be a company in growth mode, so I can't see extreme cost-cutting coming in anytime soon.

What's more, in place of profitability, it has been issuing shares, raising around NOK 750 million over the last 18 months to keep its cash balance strong.

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Risks and rewards

Obviously, the key risk facing all companies right now, especially those in nascent industries such as hydrogen fuelling and electrolysis, is a local or global recession.

Whichever way you look at it, the record bull run in major stockmarkets since 2009 cannot go on forever, and there are a number of indicators that point to a global slowdown in trade, an overvaluation of some markets (the US in particular) and a dangerous amount of corporate debt.

The slowdown of growth in China, at the same time as extended anti-establishment protests in Hong Kong, is a particularly concerning sign.

A recession in the US or China would affect many companies, sometimes indiscriminately as a look at long-term prospects or fundamentals goes out of the window in times of panic. It's almost impossible to say what would happen to companies like Nel in such a situation, but I mention it only to make you aware of the major risk to global markets over the coming year or two.

In the meantime, there are a couple of company specific risks to know about.

In June 2019, the stock fell to just over NOK 5 (from over NOK 9 in late May) after an explosion at the Kjørbo hydrogen station, located just outside of Oslo.

The cause of the explosion was a hydrogen leak from a plug in one of Nel's electrolysers. Nearby roads had to be closed for a couple of hours, while Nel worked which emergency responders to contain the risk.

While it was swiftly brought under control, the episode reminds us that hydrogen is a highly flammable gas. Any incidents like this in the future will likely similarly hurt Nel's share price.

Another key risk pertains to Nel's move to profitability. Revenues may be ramping up very quickly but, if each sale is loss-making, then more sales just means more losses. It'll be important to keep an eye on efforts to bring the company's losses down, so that it's at least profitable at the operating level.

One key challenge for the company in this regard is that current electrolysis technology isn't quite there yet. It's still too expensive to be easily profitable. The two key hindrances are the cost of green hydrogen (produced from renewable sources), which is much more expensive than hydrogen produced from natural gas, and the electrolysis technology itself.

There are breakthroughs here and there, such as a reduction in the purity of hydrogen required for the process, but more will be required in order to achieve sufficient cost reductions for profitability.

But the cost curves for green electrolysis show that the technology is becoming cheaper all the time, meaning gains for manufacturers are ahead – and not behind – us.

What I see in Nel is a company that is set to be one of the biggest growth sectors in heating, transport and power. That's an immense opportunity.

Nel's has a long history of technological leadership in the field, a strong and diverse product offering, and an established global presence, which together are contributing to immense revenue growth. The stage is set for some fantastic returns from this company over the coming years.

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The hydrogen tailwind is blowing, and Nel is sailing along very merrily indeed.

I recommend you BUY Nel ASA

Action to take: buy Nel ASA
Ticker: NEL: NO
Price as of 27.01.20: NOK 8.86
Market cap: NOK 11.03 billion
52-week high/low: NOK 10.56/4.26
Buy up to price: NOK 9.5

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MUST-BUY HYDROGEN PICK #4: A critical hydrogen market supplier primed for "double growth"

The three hydrogen-focused companies we have recommended so far are involved across a wide range of applications, from electrolysers that will produce abundant emissions-free hydrogen from surplus renewable electricity to fuel cells that use that same green hydrogen to power our cars and trucks.

The potential markets the firms are involved in – from industry and power to shipping and transport – are all huge and disruptive in their own right, together forming perhaps the single biggest piece of the great decarbonisation puzzle.

After all, hydrogen produced via green energy has huge potential to help phase out fossil fuels, whilst minimising reliance on mining metals such as cobalt and lithium.

Green hydrogen not only bypasses grids, it also allows for the storage of intermittent renewable supply – supply that can fuel planes, trains and automobiles and replace fossil fuels in steel and ammonia.

Planned projects our recommendations are involved in include powering all manner of transport applications on hydrogen, using it as a replacement for natural gas in both our gas networks, domestic boilers and power plants, and as a way of storing excess electricity produced by renewables such as wind and solar on particularly sunny and windy days.

But there's a gaping hole in our hydrogen recommendations, a part of the equation that all the other components wholly rely upon.

Indeed, this application is a critical enabler of the hydrogen economy, a vital part of the value chain in which hydrogen plays a decisive role in the development of a fossil-free future.

The application involves the storage and distribution of the hydrogen itself.

After all, hydrogen storage is an important issue to solve in order to bring the various elements of the hydrogen economy together.

So this is something I want to put right today, in what will be our fourth hydrogen-focused stock in the *Exponential Energy Fortunes* portfolio.

The firm I am recommending is a manufacturer of hydrogen storage tanks.

But, having been in business for nearly 20 years, it's not just any old manufacturer.

It is now the world's largest manufacturer of hydrogen tanks, a market that itself is expected to rise from less than €100 million today to €8 billion in just ten years – a factor 80 increase.

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Much of the company's work has been done with research and development projects throughout the world. In the past five years, it has been really ramping up its efforts in the hydrogen field.

Before I introduce the company, let me explain why exactly hydrogen storage is so important.

Hydrogen storage – a vital part of the value chain

Early in 2020, Deloitte released a hydrogen report. It was called "Fuelling the Future of Mobility: Hydrogen and fuel cell solutions for transportation".

The report provides a thorough and detailed look at where hydrogen fuel cells are in disrupting transportation and where they might get to. It uses a model of "total cost of ownership" (TCO) which includes purchase price, operating costs and fuel costs in its predictions.

It included some stark predictions, such as that FCEVs would become TCO-competitive with internal combustion engine vehicles (ICEVs) by 2026, and with battery electric vehicles by 2027. That's globally.

In Europe, the disruption will happen even faster, with FCEVs breaking even on a TCO basis with BEVs by 2023 and ICEVs by 2024.

This will be achieved through cost improvements in components, fuel and infrastructure.

In the US, for example, purchase cost is expected to fall by around 30% by 2024, while operation costs should fall by over 50% in that same timeframe. These are seriously rapid cost declines.

The lifecycle of a fuel cell in a vehicle is also expected to grow from 25,000 hours to 30,000 hours, both lengthening their life and lowering part replacement costs.

But one key factor holding this transition back at the moment, according to the report, is the cost of storage infrastructure, both for refuelling stations and in the vehicles themselves – the fuel tanks.

Together with fuel costs, these made up over 50% of operational costs in 2019.

One of the reasons for this is the low density of hydrogen gas, which makes it difficult to store and transport cheaply or efficiently.

So one key development will need to be technological advancements in storage capabilities.

After all, successful commercialisation of FCEVs, for example, will depend upon the creation of a hydrogen delivery infrastructure that provides the same level of safety, ease and functionality as the existing gasoline and diesel delivery infrastructure.

This is where our latest *Exponential Energy Fortunes* recommendation – a company by the name of Hexagon Composites – comes in.

Hexagon has developed large composite tanks and optimised hauling systems for the efficient and cost-effective storage and transportation of energy gasses, including compressed hydrogen gas.

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Hexagon Composites (HEX.OL) – delivering infrastructure for the hydrogen economy

Hexagon is another Norwegian company, just like our last hydrogen stock, Nel. Hexagon has technological leadership globally in the storage space, and is also busily acquiring subsidiaries to broaden its exposure to all aspects of the burgeoning hydrogen industry.

Broadly speaking, the firm is a global leader in the supply of clean energy technology, specifically for gas storage, distribution, and fuel systems. It's collaborating with leading gas distributors, vehicle manufacturers, and system and component suppliers to deliver projects all along the hydrogen industry's value chain.

But its original speciality is in storage and transmission – specifically, in what it calls type-4 cylinders and systems. Type 4 is just a designation – each "type" of gas storage cylinder has different characteristics and benefits. Type 4 cylinders are metal-free, plastic bodies wrapped in a strong fibre material.

Their key advantages include weight – Hexagon's type 4 cylinders are 70% lighter than their steel-equivalents. They are also corrosion and fatigue resistant relative to metal containers, and have improved economics for transport because of their lighter weight, as well as better operational efficiency through lower maintenance and lower fuel consumption.

These containers are not hydrogen-specific. In fact, Hexagon is active in the storage and distribution of compressed natural gas (CNG) storage, a fuel that can also be used in place of gasoline, diesel fuel and liquefied petroleum gas (LPG). CNG combustion produces fewer undesirable gases than these aforementioned fuels.

So while hydrogen is certainly the next big thing, Hexagon is already generating revenues and profits, with healthy margins to show that the business model is profitable. I'll get to that in more detail later on.

A solid defensive moat

Hexagon's experience goes longer than a decade, which is important as handling flammable gases comes with a fierce regulatory regime, naturally. This gives Hexagon something of a defensive moat – it won't be easy for other companies to just step in and decide to encroach on their business once hydrogen takes off.

An established relationship with the regulator, well-rehearsed safety procedures and technical expertise are all vital in this line of work. So as hydrogen demand rises, Hexagon's business will be better protected than most.

Hexagon mass-produces these type 4 cylinders and is the global market leader in gas storage cylinders. This covers all gases, including non-green CNG amongst others.

As it's not totally focused on hydrogen at the moment, Hexagon is a slightly broader play on the decarbonisation theme. But with targets being set all over the world (EU – 40% cut in CO2 emissions before 2030), the market for low-carbon fuels will have a contribution to make, just as zero-carbon solutions will. And as the hydrogen momentum picks up, both the company and I expect it to move more and more in the latter direction.

Hexagon has the luxury of existing revenues streams from other gases, so it's not reliant on hydrogen taking off this month or this year. Rather, as the economics become more favourable, it can increase its exposure.

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Hydrogen is Hexagon's future

Saying all this, Hexagon is shifting strongly towards hydrogen. Over 50% of its business now comes from the hydrogen economy. For example, the company has been busily acquiring companies to broaden its offering to the coming wave of hydrogen applications.

Indeed, Hexagon is investing NOK 660 million in the production of hydrogen storage tanks, a venture the firm describes as a potential "game changer".

But its hydrogen strategy is multi-faceted. It's not just a global leader and specialist in the crucial field of safe storage and transmission. It is now a direct play on the rapidly expanding FCEV market.

Fuel cells emerged late last year as one of the most exciting investment stories right now, but the market hasn't yet picked up on Hexagon's potential.

We've seen that investors are greedily chasing hydrogen fuel cell stock prices higher (including our recommendation AFC Energy). But because Hexagon is a storage specialist, first and foremost, we are still ahead of the rush.

To cement the idea that its hydrogen business is really starting to pick up steam, Hexagon announced in 2018 that it had received an order worth NOK 1.8 billion (circa £150 million) for two hydrogen storage tanks for FCEVs. This was the largest hydrogen tank order ever for the automotive industry.

So many things were confirmed by this order, including that:

- FCEVs are now receiving huge investment
- Storage is viewed as critical
- Hexagon is seen as a trusted partner by the fuel cell industry
- The money involved is becoming really serious
- We're seeing a rapid acceleration in the hydrogen economy, all along the industry value chain.

All things considered, the order was a really positive sign for the company and the industry as a whole.

In another example, 2019 saw the major German carmaker Audi pick Hexagon to supply high-pressure tanks for a multi-year hydrogen tank development and production project.

Audi has already stated it will increase investment in bringing hydrogen fuel cell technology to market – which can only be good news for Hexagon.

Daimler is a customer, too. In fact, Hexagon now has four contracts to supply hydrogen storage tanks to original equipment manufacturers (OEMs) for FCEVs. Many of these tanks will be manufactured at Hexagon's plants in Ohio and Germany, with production beginning in 2020 and the contract lasting five years thereafter.

It's already signing deals and the party hasn't even started

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Remember, this is just for cars, and the real party hasn't even started yet.

The firm is also moving into the maritime industry, providing tanks for the first hydrogen vessel in the US.

Not just that, Hexagon is also part of a hydrogen-focused joint venture with Nel and PowerCell called Hyon which utilises each partner's respective technologies and competencies to develop hydrogen projects. As part of this it has at least four exciting hydrogen fuel cell maritime projects on the go.

More broadly, Hexagon has delivered on hydrogen contracts in the distribution, refuelling station, rail, marine, passenger vehicle, and heavy-duty vehicle sectors. This shows what a truly remarkable market it can access, which makes its potential growth enormous in the coming years.

The company itself offers its most conservative estimate for its own market opportunity as NOK 28 billion, and that's just from the passenger car market. Adding in the other hydrogen segments takes it to NOK 81 billion. And I repeat – this is its most conservative estimate, using an incredibly modest 1.9% annual adoption growth rate for hydrogen vehicles between now and 2028.

That would take FCEVs to a 1% share in the global market from below 0.1% today. Given the targets provided by different countries and companies over the last few years, I think it could be much higher than that.

Remember, supplying hydrogen tanks means huge scope for Hexagon to transport green hydrogen from wind and solar plants once the electrolysis process is centralised.

But it's not just its core business' strong performance that is turning Hexagon into a hydrogen superstar…

Entering the hydrogen vehicle market directly

You see, as well as playing a key role in supplying hydrogen to consumers, it is also entering into the hydrogen vehicle market directly.

Last year it completed the acquisition of a company called Agility, which has an offering of fuel solutions for medium- and heavy-duty vehicles. It was a buy-out acquisition, in which Hexagon bought the 50% that it didn't already own, and consolidated it fully into the company. Agility's hydro revenues now account for almost half of the total group revenues.

What Agility adds to Hexagon's current specialism is a direct application to the vehicle and transportation industry.

Agility's specialism is in integrating energy storage, delivery and conversion systems into commercial vehicles, making it the perfect addition to Hexagon's storage expertise.

FCEVs are set for explosive growth, whoever you ask. The acquisition, for me, shows that the company understands where some of the best growth is in the hydrogen industry (FCEVs), and it also shows that the company is commercially minded and well prepared for the coming S-curved growth in hydrogen cars, buses and trucks.

The company itself had a strong 2018, with deals made with hydrogen bus companies in Italy, Portugal, India and more.

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The consolidation of Agility's accounts with Hexagon's has given the revenue and profit figures an enormous boost. We will see a smoothening out over the next year and beyond.

Setting itself up for the future

Slightly less of an immediate impact will be felt from last year's acquisition of a company called Digital Wave to Hexagon's portfolio.

Digital Wave is a smaller, more niche technology company whose capabilities are in the unique testing and requalification of high pressure gas cylinders.

That makes it more of a supporting act to Hexagon's existing storage and transmission business, rather than a distinct addition in its own right.

Digital Wave's technology will allow for cheaper and better maintenance of Hexagon's storage and transmission products by allowing for "smart censoring" – ie, self-maintenance by the products themselves.

So in Hexagon we've got a company that's a specialist and a global leader in a growing field with high barriers to entry, relatively low competition, and an extraordinarily strong and urgent tailwind. With a proven business model and smart, timely acquisitions, I'm very excited about the future of Hexagon.

Now, as ever, let's see how the company is looking from a financial perspective, before making sure we're clear on some of the risks involved as well.

Financials

Hexagon is in good shape financially.

It's not the perfect picture, but for a company in such a young and developing sector of the energy market, it's doing very well indeed.

That's because its products are already utilised by natural and compressed gas markets, so it has existing revenue streams from those markets, as well as growing sales from the hydrogen industry.

Revenue fell a few years ago, from NOK 1,651 million to NOK 1,221 million between 2014 and 2016, but it has since risen back up to 1,487.

Net profit fluctuated rather erratically in the same period, having three excellent years in 2014, 2016 and 2018 (NOK 256 million, NOK 299 million and NOK 142 million respectively), with profit under 100 million for the years between 2015 and 2017.

So far in 2019, the growth trends into 2018 have continued.

Revenue in Q3 2019 grew 178% quarter on quarter, to NOK 770 million (from NOK 276 million).

The nine-month revenue for the first three quarters of the year also grew rapidly – 133% – from NOK 1,059 million to NOK 2,474 million.

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The financials in general paint quite an erratic picture, so there isn't so much value extrapolating these Q3 figures out into the next few years, especially as they will have been distorted by the acquisitions mentioned above.

The financials, then, are more helpful as an indication of where the money is being made. A few years ago, we would've seen a company more focused on the natural and compressed gas markets. Whereas now, we are seeing a much higher proportion of revenues coming from its hydrogen solutions, and the business' organic growth being driven by that side of things.

It's also reasonably well capitalised, having raised NOK 493 million last year via a private placement of new shares. It's getting ready.

Risks

As always, I want to make you aware of some of the risks involved in this investment.

Today, they fall into two very specific categories: systematic risks and specific ones.

Systematic risks are what they call market risks. The idea is that the risks are to the market, but affect the company.

In Hexagon's case, the market risks are two-fold. Firstly, that the rollout of the hydrogen economy, which is currently accelerating at an incredible pace, stumbles slightly in real terms – ie, battery electric vehicles get a technological boost somehow, making FCEVs less competitive. Or an incident such as an explosion at a hydrogen facility freaks out the market and deal-making slows.

The other market risk lies in the stockmarket. You will have noticed (via our other very profitable hydrogen plays) that investors are loving the hydrogen sector right now. There are companies going vertical.

One reason I like Hexagon so much is that it hasn't done that yet. I feel that investors have underrated its potential relative to its peers.

However, in such market conditions, volatility and fragility do increase. Prices are swinging more wildly than normal, even for the renewables sector as a whole.

A loss of the widespread bullish sentiment on the sector as a whole could hurt Hexagon's share price, regardless of the positive trajectory of the company.

If that did occur, it would be a short-term loss as I am enormously confident that with a five-year or ten-year time horizon, the only way is up for Hexagon and the hydrogen sector as a whole.

So those are the systemic risks – market risks out of the company's control. There are also some specific risks to Hexagon that are directly related to its business model and operations.

The first one relates to its product – type 4 gas container tanks. These are currently an excellent solution to the gas industry's storage and distribution needs, but they are not the only one.

The cheapest form of long-distance gas transportation will be to build pipelines. Currently, as the hydrogen economy is only in its very early stages, there is little appetite

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or money from government to build such pipelines, but once hydrogen has become the global gas of choice as we expect it to, infrastructure spending should catch up and pipelines will be built – which will be competition for Hexagon.

Pipelines can't do everything, mind, and won't replace what Hexagon offers by any stretch, but their addition to the hydrogen economy will be a limiting factor on Hexagon's potential market.

Also, and I alluded to this above, safety is a key concern with hydrogen.

As hydrogen gains traction globally, the risk increases that safety isn't adequately handled in places with underdeveloped infrastructure or policies.

So as ever, this investment is not without risk. And it certainly is a volatile time in the hydrogen stockmarket right now, so this is a risky pick, but in the short-, medium- and long-term I remain confident that Hexagon will be our next hydrogen winner in the Exponential Energy Fortunes portfolio as Hexagon becomes a real superpower in the industry.

A hydrogen play primed for "double growth"

Remember, Hexagon is solving one of the hardest problems in hydrogen: storage.

It supplies critical technology for not one but two fast growing sectors of the hydrogen market.

First, it plays a key role in supplying and storing hydrogen to, and at, commercial sites. Think of it like an oil pipeline business – but for hydrogen. It gets the fuel to the places that need it, quickly and efficiently.

That alone is going to be a key market in the future.

But this business has also signed a series of deals to deploy hydrogen-powered vehicles on the road.

It's already teamed up with Audi and Daimler amongst others.

And I think we can expect more big deals to be signed in the future.

The bottom line: this unknown firm is quietly becoming a key player in the hydrogen markets. I doubt it'll stay under the radar for long.

I recommend you BUY Hexagon Composites ASA

Action to take: buy Hexagon Composites ASA
Ticker: HEX.OL
Price as of 27.01.20: NOK 32.55
Market cap: NOK 5.92 billion
52-week high/low: NOK 44.95/ 24.55
Buy up to: NOK 43

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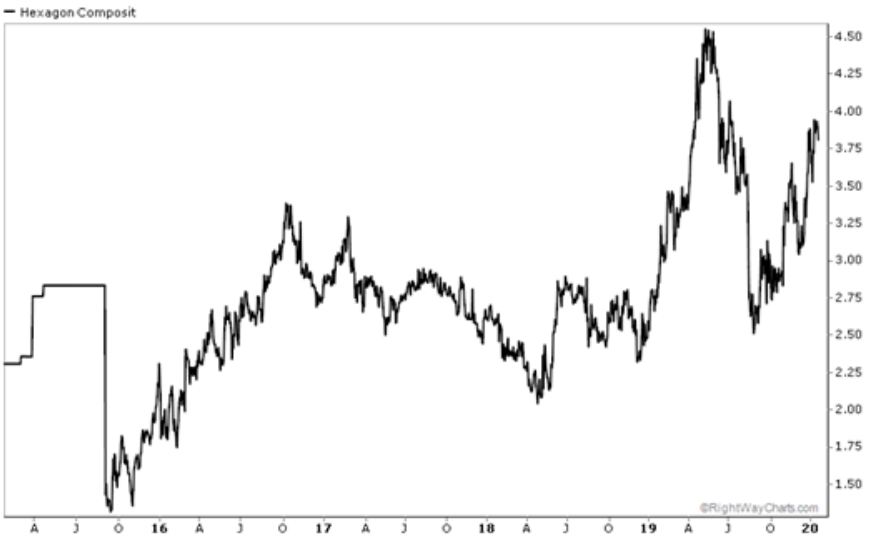

All the best,

James Allen
Editor, *Exponential Energy Fortunes*