exponential energy FORTUNES

The masterkey stocks that could erupt in 2022 and beyond

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The masterkey stocks that could erupt in 2022 and beyond

I believe that energy storage is perhaps the most underappreciated segment in energy-transition investing right now.

Before I discuss the three stocks that I'll be recommending in this report, allow me to briefly outline why I believe this.

Governments are keen to spend their way out of the pandemic and lockdown-induced economic slump. A big part of many nations' spending plans is dedicated to the green transition, from renewables to hydrogen…

But technology driving solar and wind energy production is far more advanced than that of energy storage.

Similarly, electric vehicle (EV) sales have significantly increased this year, and are forecast to continue rising throughout the decade.

This means that battery storage and batteries are a major bottleneck for renewable energy.

But battery and storage stocks have yet to receive nearly as much attention from investors as stocks in other areas of the green energy transition. That's why the stocks I'm recommending are potentially lucrative opportunities.

For full details of current prices and "buy-up-to" limits, check the portfolio for details.

First, let me give you some context on two minerals, lithium and graphite, that are central to the great green energy transition.

Let's start with lithium.

In late 2020, it was becoming increasingly clear that there would not be enough lithium – the most critical component bar none in the EV supply chain – to meet the growing demand from these vehicles.

Unless we were to see massive investments to catch up with demand, we would inevitably see a lithium shortage that had the potential to ultimately slow EV adoption.

Quite simply, we were on the verge of a multi-year bottleneck in the supply of battery-grade lithium.

Over a year later, it's true to say that the lithium squeeze is real. Lithium demand is stronger than ever, and prices are at record highs.

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Prices of lithium carbonate hit $75,000 per tonne in April, almost 12 times prices at the beginning of 2021, driven by strong demand for EVs. In April last year, the mineral was trading at around $15,000.

The increase comes as the amount of the metal used has almost quadrupled over the last decade.

But, to my mind, we're just getting started. In fact, I think 2022 could be the year when the supply crunch really hits home as EV sales accelerate. Lithium carbonate prices might be at all-time highs, but it's easy to see them soar above $100k per tonne over the next year.

After all, the lithium demand trajectory is roughly double the rate of the supply response, creating an almighty supply/demand gap that will widen every year. That's because it takes seven years to build a lithium mine, so supply can't quicklyand easily ramp up to meet the surging demand.

JPMorgan reckons there will be 19% a year increase in demand for lithium over the coming ten years, on a compound annual growth rate basis, based on demand for EVs and batteries.

What this means is that the lithium deficit is set to be bigger in 2025 than the entire industry was in 2016!

And with so few new credible lithium projects on the horizon, it seems inevitable that prices will continue to climb higher.

Of course, we need to be selective. But we've identified a junior miner that is set to take advantage of this powerful trend: **Galan Lithium**, our first "masterkey" stock recommendation.

Now let's turn our attention to another key component in electric car batteries, **graphite**.

You see, despite absorbing far less attention and generating far fewer headlines than lithium, graphite is absolutely fundamental to the energy revolution and the trillion-dollar EV market.

Graphite is a form of carbon that is to anodes, the negative end of a lithium-ion battery, exactly what lithium is to cathodes, the positive electrode, and is largely irreplaceable.

According to BloombergNEF, graphite should remain the anode material of choice until at least 2035.

Make no mistake: this means a lot of graphite will be needed.

After all, the average EV requires up to 70 kgs of graphite (each EV battery contains 20-30% graphite), meaning every million EVs require around 75,000

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tonnes of natural graphite.

In 2019, the global graphite market was valued at $14.9 billion. But by 2027, it's expected to be valued at almost $22 billion. I think it might be worth much more than that, however.

The market has certainly started to tighten over the last few months, with graphite prices – now testing the record highs seen in 2018 – responding accordingly.

To my mind, the price rally will almost certainly continue through 2022 and beyond as the sheer scale of anticipated demand buoys prices.

According to Benchmark Mineral Intelligence (BMI), the world could be short 80,000 tonnes of the mineral in 2022 as demand from the EV sector rapidly scales up.

In fact, some of the largest original equipment manufacturers (OEMs) of batteries and EVs are starting to fret about their graphite supply – just as they have done with regards lithium – with consumers now fighting over a limited stock of material, whether it be naturally sourced graphite or its synthetic counterpart.

With demand projections as they are, no automaker or battery manufacturer can risk being left behind.

But there are some interesting market dynamics at play in the graphite market.

First, the market is increasingly wary of the fact that China totally dominates the graphite supply chain. Some 90% of graphite anodes used in batteries – and around 70% of all graphite – comes from China.

What's more, although graphite deposits are found in various places on the earth, including Asia, Africa and North America, graphite is not suitable for batteries straight out of the ground, and must be processed first. But as almost all of the world's processed graphite comes from China, this marks a significant supply chain issue.

This situation has become a national security matter for countries such as the United States that are now looking for other sources of battery metals such as graphite.

What this means is that there is now a push to develop non-Chinese parts of the supply chain amid wider security of supply issues.

Second, the nature of graphite favoured by the industry is changing.

Traditionally, for anodes, the battery industry has favoured synthetic graphite over natural graphite due to the former's higher purity levels, its controlled specifications, longer lifespan and a faster charge turnaround, though things are

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starting to change.

For starters, the Acheson furnace process employed in synthetic graphitisation requires more energy – and therefore more cost – than for spherical graphite produced out of natural mined flake material. In fact, natural graphite is around half the cost of synthetic graphite, according to Fastmarkets.

What's more, natural graphite offers a higher capacity and is much more environmentally friendly, too. After all, synthetic graphite is made from petroleum coke and is a refined oil product.

In practice, most anode technology battery makers employ a mixture of both types of graphite in varying percentages depending on the process and the producer.

But with prices for synthetically built graphite increasing between 6% (for the high-end variety) to around 40% (mid-range) over the past year amid rocketing energy costs and tumbling availability (due to power-rationing imposed operational shutdowns in China), battery makers are increasingly shifting their strategy towards a higher proportion of natural graphite.

BMI forecast a "trend in the blend" toward 50% natural versus 40% today by 2030.

Luckily, there is one company that is perfectly positioned to take advantage of the changing dynamics in the graphite industry.

With the world facing a graphite deficit of over 80,000 tonnes as soon as 2022, the firm I have identified is one of only a handful of producers outside of China that is prepared and able to fill the gap.

Indeed, this Canadian mining company is developing what it says is the "largest graphite operation in the western world" – just two hours north of Montreal in Canada.

What's more, its entire focus is on natural graphite.

Add the fact that it also has plans to erect a battery anode manufacturing hub that will refine and process the graphite it takes out of the ground, and you have a producer positioning itself perfectly to capitalise on the sweeping changes hitting the graphite industry.

The company's name is **Nouveau Monde Graphite**, and it is our second "masterkey" stock recommendation.

The third company I will tell you about sits on the demand side of the energy storage and battery equation. It is a manufacturer of long-duration storage (defined as a system that can store energy for more than ten hours), which is often called the Holy Grail of clean energy.

It is the linchpin technology that will provide flexible, affordable renewable

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energy at scale, allowing the economy to run off intermittent energy sources 24/7, including backing up power after any grid disruptions.

While lithium-ion batteries will play a dominant role in the electrification of transportation, it has been clear for some time that longer duration grid-scale energy storage will likely need a different battery.

That's because lithium-ion batteries – which have dominated new long-duration storage up to now – can rarely deliver their full power capacity for more than a few hours, are prone to catch fire, and also see their capacity diminish the more they're used.

But in an announcement at the end of September, a subsidiary of Japanese financial services group SoftBank heralded a serious breakthrough in long-duration storage by confirming a record purchase of a different type of long-duration storage: *iron flow* batteries.

What makes these batteries unique is that they are made primarily of iron, salt and water, three of the most abundant elements on Earth.

Not only are these materials much cheaper and more readily available than the elements used in batteries today, such as lithium and cobalt, but the iron flow batteries' composition also inherently eliminates the fire risk presented by lithium-ion batteries.

These batteries store energy for between four and 12 hours, a time frame that pairs well with renewable energy sources such as solar and wind.

What's more, they are remarkably resilient. Their capacity stays exactly the same over a life span of over 20 years, which is much longer than their lithium-ion equivalents.

In short, these batteries promise to be cheaper, safer and have better operational life than conventional lithium-ion storage.

Indeed, the batteries bought by SB Energy will help enhance grid resilience by providing long-duration storage for solar energy in utility scale projects across Texas and California, allowing those power plants to provide electricity for hours after the sun sets.

The deal involves a commitment by SB Energy to deploy two gigawatt-hours of these batteries over the next five years. SB Energy will buy enough batteries over the next five years to power 50,000 American homes for a day.

Coming hot on the heels of other, smaller orders for the same iron flow batteries, the deployment of iron flow storage technology commercially at scale represents an important energy transition milestone.

Indeed, the $300 million SB Energy battery deal heralds a new age for clean

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energy in general and energy storage in particular.

A new Iron Age, if you will.

And with storage set to be one of the major winners of US President Joe Biden's ambitious clean energy initiatives, the time is now perfect to add the recently listed US manufacturer of the batteries purchased by SB Energy to our portfolio.

This company goes by the name **ESS Tech** and it is our third "masterkey" stock recommendation.

1) Galan Lithium

Galan Lithium is an Australia-based, international mining company developing high-grade lithium brine (which refers to a lithium-rich form of water) projects in the lithium triangle region of South America.

There, it has two projects – Candelas and Hombre Muerto West (HMW).

It also has a project in Australia, located just to the south of Greenbushes, which is one of the largest and most famous lithium mining areas currently in operation.

Candelas is a valley, 15km long and 3-5km wide. Its drilling has indicated strong volumes of brine and a potential source of 685,000 tonnes (685 kilotonnes).

It also has its own water source, meaning the company won't have to impact the local supply by taking water from the nearby Los Patos river.

However, HMW is the flagship resource for Galan. It is a 14km long by 1-5km wide area which is just one part of the larger Hombre Muerto salar. And yes, if you're wondering, that does translate as the "dead man's salt flat". But let's hope that's not a sign.

In fact, you could almost say the opposite. Because Hombre Muerto is the second best salar in the world for the production of lithium from brines. And HMW, in particular, has some of the best grades and lowest impurities in Argentina.

And as we know, the Lithium Triangle is well set up for new projects, with existing physical and regulatory infrastructure for new project development.

The south Greenbushes project was recently acquired from an Australian mining company called Lithium Australia. Galan now has 80% ownership of the rights to the product of the land.

Galan has an exploration licence for 43km2 of the area to the south of the established Greenbushes mining zone.

Across the three projects, Galan has a total indicated resource of 2.95 million

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tonnes of lithium carbonate equivalent (LCE – an industry measure for comparing all kinds of lithium deposits).

That deposit has a purity of 858 milligrams of lithium per litre (mg/l), and those are only the current indicated resources. Across the three projects, there is plenty of potential for exploration upside, especially at HMW.

One reason I like and have chosen Galan is this exposure to the Lithium triangle, but with the added diversification of the Australian mine too.

You see, the operations in Argentina will be brine evaporation pond based. But, the Greenbushes project is a little different.

Spodumene meanwhile is just lithium ore, and requires hard rock mining of the more traditional, open-pit type that you might know.

So Galan has a key project in the Lithium triangle carrying out brine evaporation, plus a project carrying out spodumene mining in Australia, near the biggest hard rock lithium mine in the world.

It's targeting a quick route to market, which makes sense given the rapidly rising price and the urgent need for new supply.

I think the upside is huge.

Galan's financials

Let's look at the financials of Galan. The firm is a junior miner looking to reach production in the next few years.

This means it is non revenue-generating, and will need to raise a large amount of capital to reach its production goals.

The key stats financially at this stage are to do with the size and quality of the lithium deposits, and expected capital expenditure to get to production and then to make each unit of lithium.

Galan's resource is estimated at 2.95 million tonnes of LCE at 858mg/l. That second part is the lithium concentration in the brine, in milligrams per litre.

Anywhere close to 1,000mg/l is good, and 858 is as the good end of the normal range for most deposits.

The higher the concentration (and the lower the impurities), the lower the capex per kilo of lithium.

On that note, the HMW project has some of the lowest impurities in Argentina, which should help.

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Comparing the HMW's capex forecasts against other lithium deposits, it looks good, and it also has 100% ownership, so will get the full benefit of the lithium produced.

For example, its total capex is estimated to be $439 million, which is roughly $100 million less than the Salar Blanco and Kachi deposits, which also have similar (20,000-25,000 tonne per annum) production capacities.

Its capex per tonne of lithium is also lower than those two, and about the same as for two deposits run by Galaxy Resources and Lithium Americas Corp (LAC – $3,500 per tonne). Galan's HMW deposit sits at the low end of the range on that particular metric, though the LAC mine can produce 40,000 tonnes per year.

To put it bluntly, Galan's potential profits far outweigh its current market valuations.

The company's discount relative to the net present value of sales is to do with certainty about achieving production in a certain timeframe, and over the life of the project.

It is also based on future estimates of lithium prices, which are always a tricky proposition to get exactly right.

But I certainly believe that the upside given rising lithium prices could be enormous.

Of course, there are plenty of other junior miners out there. But that's the point. Only a few established players are already mining and selling lithium. In a few years' time, maybe enough of the juniors will have brought their mines to production and flooded the market with supply. But we are a long way from an oversupplied lithium market for now.

In the interim, I think any company that can execute on its pathway to commercial production is likely to do very well for investors.

Risks

Three main risks apply to Galan, and these are related to operations, financing and the pandemic.

As a junior miner, Galan could come across as yet unforeseen operational difficulties. It's not enough to just find a lithium deposit, you also have to effectively test its quality, go through the permitting process, build the infrastructure and logistics to take it to market, and find buyers for your product. We are investing in Galan because of the nature of its deposits and its experienced management team, but bringing a lithium mine into operation is no easy task.

Then, either through difficulties with the company specifically, the lithium sector,

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or the broader financial markets, Galan may struggle to access the new capital it needs to complete the operational build-out to start production and sales. A broader market downturn, a surprise turnaround in the EV roll-out or (even less likely) a new mainstream battery chemistry could all have that effect.

It's also worth mentioning that the company's stock has seen a significant price increase over the last year, alongside soaring lithium prices. So, it's important to recognise that the timing isn't ideal.

Of course, Covid-19 may still pose a risk to markets. Given the incredible run Galan has been on, it feels like a good reason to remain cautious in our approach.

Perhaps we will even see lockdowns and travel bans affecting the operations of miners such as Galan.

These are very uncertain times. There are also a couple of strategic risks I'd like to discuss.

Galan has taken the approach of buying land and discovering deposits adjacent to well-established, productive lithium mining areas – the Hombre Muerto salar in Argentina and Greenbushes in Australia.

In some ways, this is smart. Such deposits are naturally occurring in certain places for a reason, and their size and quality indicate that this is a good idea.

However, there are big established lithium mining companies right next door that didn't expand into these areas, perhaps for a reason. If these areas were truly prime real estate, the big local players probably would have noticed.

Yes, these are notable risks, but I still think Galan is a perfect way to gain exposure in the weakest link in the entire EV supply chain: the lithium market.

Action to take: BUY Galan Lithium (GLN.AX). Remember to check the portfolio for the latest advice and buy limits here.

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2) Nouveau Monde Graphite

Nouveau Monde Graphite is certainly in the right place at the right time.

The company is building a vertically integrated graphite and battery anode production site in Canada, delivering 42,000 tonnes of anode material to market per year, starting in 2025.

To do this, Nouveau Monde is developing two properties: the Matawinie open-pit graphite mine in Saint-Michel-des-Saints, approximately 150 km north of Montreal, and a conversion facility that can further purify the graphite material, housed in nearby Bécancour.

The Matawinie mine is both fully permitted and already under construction, ahead of commissioning and the start of commercial production in 2023.

The company expects the mine to produce over 100,000 tonnes of high-purity graphite flake per year over an estimated mine life of approximately 26 years – which constitutes the largest projected graphite operation in North America and Europe.

The operation can certainly provide the volumes required to major auto OEMs, put it that way.

What I like, particularly, is that Matawinie is set to become the world's first all-electric open-pit mine, showcasing an all-electric mining equipment and vehicle fleet by 2028. It has already signed an agreement with Caterpillar for the development, testing and deployment of zero-emission machines for the mining fleet at Matawinie.

This chimes with Nouveau Monde Graphite's emphasis on producing "sustainably mined" graphite.

To that end, Nouveau Monde says its operations will rely on nearby hydroelectric power to offset the carbon emissions associated with graphite production.

What's more, the firm has set up a partnership with lithium-ion battery recycling company Lithion Recycling, also based in Canada, to reclaim the graphite that would normally be unusable when battery anode materials are recycled.

The material to be recycled will come from Nouveau Monde's own anode material plants.

As said, in addition to its mine, the company aims to build a plant in Bécancour to turn the mined graphite into finished materials used in a battery anode, offering one of few alternatives to China for graphite. This will be the battery anode manufacturing hub.

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Plans are on track for commercial production

Currently, the company is in what it calls both Phase One and Phase Two of its three-phase plan.

Phase One entails taking the necessary steps to ensure that every aspect of the project is built on a solid foundation – i.e. the de-risking phase. By the end of Q1 2022, NMG will be producing 2,000 tonnes per annum of anode material. This includes everything from the graphite flake concentrate (which the mining site produces) to the finished product via a newly-built demonstration plant.

Phase Two, which is running in parallel with the first phase, is the execution phase. By the end of 2023, the mine will be fully commissioned, while the 45,000 tonnes per annum anode processing plant in Bécancour is scheduled to start commissioning in early 2025.

Phase Three is the growth part. Not only does the firm have plans to expand at its mine site, it also hopes to look at developing graphite resources in both Europe and in the United States.

Indeed, the modular nature of Bécancour's plant design means it will be relatively easy for the firm to construct similar processing facilities in any region of the world that wants to shore up its local supply chains so as not to be so dependent on China-produced materials.

The company can also expand its processing operations by not relying solely on the graphite it mines itself but by processing material mined elsewhere and shipped to Canada. To that end, having a nearby port means it is easy to import and ship material to the site.

Certainly, being located in Canada and maintaining all of its production and refining processes in-house gives Nouveau Monde a notable advantage, offering potential customers a supply chain benefit of not having their material processed in China, where almost 100% of flake material is currently processed.

To that end, the company says it is already actively engaged with Tier-1 EV and battery manufacturers in its efforts to negotiate a long-term cornerstone supply agreement, indicating in a September 2021 statement:

> *Thus far, these manufacturers, with whom the company is engaged in commercial discussions and/or has signed MoUs and NDAs, represent a total projected yearly production capacity of approximately 1 TWh by 2030 that would correspondingly require over 1 million tonnes per annum of battery-grade graphite.*

The firm has already secured sales agreements for hundreds of tonnes of high-quality graphite, produced from the company's demonstration plant.

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Financials

Of course, setting up a large-scaled graphite production and refining site is expensive business. Nouveau Monde says it has already spent nearly CA$100 million on research and development alone.

Between January and end-September 2021, the firm spent CA$10.7 million on property plant and equipment at the mine and a further CA$13.5 million at the demonstration plant. These expenditures explain how its net loss jumped from just under CA$10 million to just over CA$29 million in the respective nine-month periods to end-September 2020 and 2021.

As the company doesn't yet generate any revenues, it has so far largely been reliant on funding from the debt and equity markets.

Last year alone, Nouveau Monde raised over CA$130 million through public and private offerings, the exercise of warrants, private placements and financial levers from governments to support its current operations and the advancement of its key projects.

Of that sum, CA$72.9 million was raised following its secondary listing on the NYSE.

By the end of September 2021, Nouveau Monde had CA$81.3 million in cash. That puts it in a strong position financially to be able to fund growth, with plenty of cash left for the next year at least.

It's certainly positive that last year's fund raises and expenditures are now behind us.

Risks

Of course, there are some considerable risks to consider.

Certainly, developing a graphite mine and processing facility in Quebec is a gamble, as these kinds of operations are not common outside of China. Although Nouveau Monde has done everything it can to move the odds in its favour, there will always be factors both inside and outside the company's control that could certainly weigh on the share price.

There are the usual risks that all miners face, be it with funding, production and project delays.

For sure, Nouveau Monde will need additional financing until commercial production is achieved in 2023, so the longer that takes the more expensive it will be. Investors should expect further fund raises and further dilution.

Another risk pertains to the future market price of graphite. We're assuming

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graphite prices will continue to ramp higher as the EV and battery revolution takes hold. But nothing is guaranteed, especially if supply manages to keep pace with demand. Maybe the EV boom will stall, or the move to graphite-free anodes will develop faster than expected. Nouveau Monde will need prices to remain well above production costs, so it won't want to see falling prices of graphite, coated spherical graphite or anodes.

Although I think this is uncertain, Nouveau Monde is not the only producer eyeing forecasts of improving market fundamentals, so more supply is guaranteed. Saying that, it takes 8-10 years to develop a graphite mine, so supply can't be turned on like a tap, and Nouveau Monde has a serious head start over many other potential producers.

Yes, there are some notable risks to consider, but the upside is huge.

Like lithium, graphite is one of the most abundant and essential ingredients in EV batteries.

And just like lithium, graphite is beginning to experience a serious squeeze, with the market moving into deficit as soon as this year.

Countries around the world are now struggling with a graphite shortage amid concerns over a lack of graphite supply and wider security of supply issues.

But industry changes mean only a few developers will be able to take full advantage – including Nouveau Monde Graphite, which is entirely focused on its own anode supply chain.

Action to take: BUY Nouveau Monde Graphite (NOU.V). Remember to check the portfolio for the latest advice and buy limits here.

3) ESS Tech

Though ESS itself was founded in 2011, iron flow batteries have been around a lot longer than that.

In fact, the idea of an iron flow battery has been with us since the 1970s, but ESS is the first – and so far, only – company to have solved technical issues that have curtailed their deployment up to now.

To explain why, I'll just need to quickly explain how the batteries work.

In a battery, the electrolyte is the chemical medium that connects the two ends, the anode and the cathode. In iron flow batteries, the electrolyte is made of iron, salt and water.

The iron flow batteries themselves consist of two storage tanks with a membrane between them. The membrane allows electrons to flow back and forth between

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the tanks, all the time keeping the liquids separate.

Unlike in traditional lithium-ion batteries, the electrolyte in flow batteries needs to be physically moved using pumps as the battery charges or discharges.

In human terms, the battery is the heart, the electrolyte is the blood and the proton pump is the kidney, which keeps everything in balance.

The fact that iron flow batteries depend on highly technical pumps and membranes have stopped them scaling up to now. Firstly, getting the right mix of iron, salt and water is essential. Secondly, creating a membrane that lasts a long time is far from easy.

In the past, last-mile engineering challenges have added unacceptable capital and operating costs when compared to other available technologies.

Though early iterations of iron flow battery technology would always work for a while, the electrolyte fluid would eventually become imbalanced and build up on the battery, making it ineffective over time.

In fact, during charging, the iron flow batteries would produce a small amount of hydrogen, which, left unchecked, would shorten the battery's life.

Effectively, the kidney was working much harder than it should have to, all the time, to keep everything in balance.

Enter ESS's battery technology – effectively a stack of carbon plates that has salt water with iron flowing through each layer.

Iron disperses out of the salt water solution and sticks to one side of the carbon plates. The iron dissolves back into the water solution as soon as the polarity of the plates is changed. What's interesting is that the flow of the ions can be switched, in turn switching the flow of electricity on to and off the grid.

But unlike previous iterations of iron flow batteries, ESS has developed a proton pump that allows the system to keep itself in balance throughout all of those charges and discharges so that the electrolyte is entirely clean.

This proton pump, which stops the electrolyte fluid becoming imbalanced, effectively maintains electrolyte health over the life of the asset.

The pump connects to the tank and passively mixes unwanted hydrogen back into the solution, maintaining the balance of pH and states of charge in the liquid electrolyte circulating through the system.

In doing so, it keeps any hydrogen produced within the system – what's known as "closing the loop" on hydrogen – and thus hugely extending the battery's life.

Whereas other flow chemistries need to come offline regularly to rebalance their

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electrolytes, this is not so with the ESS design.

This has turned what was a lab prototype into a commercially viable battery option.

Leaving lithium-ion batteries in the dust

ESS's proton pump is part of its secret sauce, but by no means all of it.

After all, ESS has been working on research and development for a decade.

"There's a very large intellectual property moat around the core technology, and that will make it very difficult for other competitors to build a battery that is similar to ESS' battery," Rich Hossfeld, co-CEO at SB Energy and a board member at ESS, told CNBC.

Indeed, as former CEO Craig Evans, one of the company's co-founders and now its president, says, "it's not that other companies don't want to do iron electrolyte flow batteries, but that they can't," due to ESS Inc holding key patents and IP.

What this all measures up to is excellent performance compared to its lithium-ion peers.

As said, ESS's iron flow battery can endure more than 20 years of daily use without losing much performance. In fact, they have a prescribed design life of a huge 25 years. However, the battery modules, electrolyte, plumbing and other components may well last for decades longer with proper maintenance. This longevity is unique.

For comparison, conventional battery chemistries have a seven-to-ten-year life cycle.

ESS Tech's batteries can store energy for four to 12 hours, sufficient to enable a solar plant in sunny California to provide 24-hour electricity (i.e. at night as well as during the day), whereas the lithium batteries in cars are typically capped between two and four hours.

Indeed, to go above four hours of energy storage with lithium-ion batteries requires increasing the number of lithium-ion cells. This means, effectively, purchasing an entirely new battery.

But ESS batteries require only extra electrolyte – i.e. adding more water, iron and salt – to add storage capacity to cover longer interruptions at a solar or wind plant. This makes them a lot cheaper to run.

Whereas lithium-ion batteries for grid-scale storage can cost as much as $350 per kilowatt-hour, ESS says that its battery could cost $200 per kWh or less by 2025.

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"The way to think about ESS cost-wise is they are cost parity with lithium-ion at four hours and about half the cost above that, which we think creates a big advantage for them," Hossfeld told CNBC.

And because ESS's batteries use water, they present a much safer option than lithium-ion batteries, which are notorious for catching fire. Hossfeld told CNBC that ESS has been able to get permits for batteries in places that wouldn't have been given to lithium-ion versions, such as in wildfire-prone California.

Although these batteries are much larger relative to lithium-ion, this is much less an issue for grid-scale applications such as power plants than it is for applications such as EVs or mobile phones.

Two types of long-duration storage

ESS currently offers two products: Energy Warehouses and Energy Centers.

The Energy Warehouse is the size of a shipping container, 40-odd feet long and eight feet wide. The Energy Warehouse in necessarily large as the electrolyte needs to be physically moved using pumps as the battery charges or discharges.

One Energy Warehouse shipping container holds 400-600kWh of storage capacity – roughly the energy that you would need to power around 30 homes – and can be configured with variable power to provide storage durations of 4-12 hours.

For larger volumes of energy storage, ESS will string together multiple batteries in what it calls an Energy Center, which can be co-located with a solar or wind farm. One acre of batteries holds up to 6 MW/90 MWh, providing up to 12 hours discharge at rated power.

Energy Centers are intended for utilities and independent power producers – businesses that own large solar farms that then sell that power to the grid, for instance.

For these kinds of larger customers, ESS will use similar battery technology, but the battery modules will be contained together in a building. Customer trials for Energy Centers are expected to begin in 2022.

Adding to the appeal of its solutions, ESS recently confirmed expanded 10-year warranty coverage of its full technology stack by insurance provider Munich RE. The policy, which it offers customers, provides an extended warranty covering the company's system performance guarantee regardless of project size or location.

This effectively eliminates technology-related and business continuity risk for operators – a notable win for ESS's bankability.

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The SoftBank deal is just the start

As said earlier, ESS's deal with SB Energy has completely changed the prospects of both long-duration energy storage and its own coffers.

As part of the $300 million framework agreement to deploy 2 GWh through 2026, the first ESS iron flow battery system was commissioned at an SB Energy location in Davis, California, in October last year.

What's exciting is that SB Energy's Hossfeld, who also sits on ESS's board, says the company would likely buy even more battery capacity from ESS in the next five years.

But SoftBank is by no means the only major player helping to kick-start the iron flow revolution, even if it's responsible for the biggest deal by far.

In September 2021, after a six-month evaluation, Spanish utility Enel Green Power SpA signed a single deal for ESS to supply 17 of its Energy Warehouse battery systems with a combined capacity of 8.5 MWh.

The batteries will provide long-duration storage to support a solar farm in Spain and resilience for the local power grid as part of a broader EU-wide engagement.

A month before that, ESS announced it was selected by TerraSol Energies, a developer and manager of turnkey solar and storage solutions for commercial customers, to deliver an ESS Energy Warehouse flow battery at a commercial facility in Pennsylvania.

These deals and agreements are surely indicators of big things to come.

In fact, ESS said late last year that it has identified a global pipeline of opportunities in excess of $8 billion from now to 2027.

This is based on named projects with customers ESS has already been in talks and signed non-disclosure agreements to discuss. That includes projects and deals booked, awarded and in negotiation.

"Looking ahead, our pipeline and backlog remain robust, and we are rapidly expanding capacity to satisfy the accelerating worldwide demand for long-duration energy storage," said ESS CEO Eric Dresselhuys.

It is no exaggeration to say that billions of dollars are up for grabs over the next few years alone. ESS itself estimates its total addressable market will grow at a 33% compound annual growth rate to reach $56 billion by 2027.

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Aligning with Biden's climate change initiatives

Those growth projections certainly don't look far-fetched when you consider the United States' political will for long-duration storage to prosper.

The recently signed infrastructure bill is spending billions of dollars on getting storage built, which will be manna from heaven for storage manufacturers such as ESS.

Energy storage operators can now qualify for a $5 billion bucket of federal resilience grants, which could bring it to places threatened by grid outages from extreme weather. The bill also authorises $6 billion to expand the domestic battery supply chain, including manufacturing and recycling as well as minerals processing.

However, the still-pending Build Back Better Act – the Democrats' reconciliation bill – could yet deliver the ultimate prize for grid battery advocates: a 30% stand-alone tax credit for energy storage.

Such an investment tax credit proved pivotal to the rise of solar as a cost-competitive power plant and there are high hopes that something similar is on the cards for energy storage. The bill also gives an extra 10% tax credit boost to projects located near retired coal mines or power plants.

If Build Back Better is passed into law, then the whole energy storage sector, including ESS, will receive a huge boost.

Let's look at the financials

ESS has raised hundreds of millions of dollars to chase this rapid growth.

The company is backed by Breakthrough Energy Ventures, Bill Gates' clean energy investment firm; SB Energy; and multinational chemical company BASF, among other investors.

ESS's early momentum attracted $57 million in investments from some of these powerful backers.

The clean energy company then went public on 11 October through a merger with a special purpose acquisition company, or SPAC, called ACON S2 Investment Corp, starting trading on the New York Stock Exchange under the ticker symbol GWH. It raised $308 million in the deal – although this was slightly less than originally anticipated, it's still a hefty sum for a small company employing only 165 people.

ESS plans to spend its new capital to expand manufacturing and its sales operation, for research and to bolster its balance sheet.

Indeed, it's fair to say that the balance sheet needs bolstering.

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For one thing, the company has yet to book any actual revenues, although that should change this year.

The release of ESS's full-year results for 2021, its first as a public company, revealed a $477 million net loss.

The bulk (87%) of this was from losses on the revaluation of warrant, derivative and earnout liabilities, which relate to the listing through a SPAC merger in October. Operating losses accounted for the remaining $60.9 million. ESS ended the year with assets of $250 million of which 95% was cash.

Although it shipped five of its utility scale Energy Warehouse commercial units in the latter part of 2021, it did not recognise revenue on any of them because customer acceptance had not been registered at that point, CFO Amir Moftakhar said in a results webcast.

CEO Eric Dresselhuys said he expected to ship 40-50 Energy Warehouses in 2022, all of which were contracted.

ESS acknowledged before listing that the route to profitability is long-term and that commercialisation will cost money.

For what it's worth, the company is expecting revenues of $37 million in 2022, $300 million in 2023 and a huge $3.6 billion in 2027.

There are some notable risks here

However, despite its bullish sales projections, ESS is still a risky investment given that it hasn't actually booked any revenue yet.

As said above, it raised less money in its SPAC merger than it had originally intended. ESS had planned to raise $465 million, but many of the SPAC's investors pulled out of the deal ahead of the initial public offering (IPO), choosing to cash out their shares instead. This suggests they weren't too enthused about ESS'S prospects.

However, the deal held together thanks to $250 million in private backing from investment funds and energy companies, which made up the bulk of the sum ESS raised by going public.

Life hasn't been plain sailing for the stock since it listed, either, despite the shares jumping immediately following the merger, rising over 70% by the end of October. However, they sold off a little in November, declining by 11.4% for the month. This was in large part due to the company filing a prospectus with the SEC on 10 November to sell up to 126 million shares of its common stock, sending shares down more than 10% the next day.

Although the company isn't directly selling the shares or receiving any cash in

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the sale, some of its large shareholders are seeking to cash in on the run-up in the stock price following the SPAC merger.

Although disappointing, the sale of shares by large investors – who want to see a return on their investment after helping fund the company to the point where it stands on its own two feet in the public markets – is pretty standard.

It's also worth pointing out that these shareholders can't sell all those shares right now since more than 100 million are subject to lock-up restrictions for a period of 180 days from the business combination. Basically, these investors are positioning themselves to eventually cash in on their stakes by filing in advance to sell some shares.

But, again, this suggests that ESS still has work to do to win over the hearts and minds – and wallets – of Wall Street. This sentiment could continue to weigh on the share price until the company starts to generate revenue.

On that note, it's also true that the explosive growth ESS has promised to investors is far from assured. ESS is still proving that demand for its products really exists.

Lithium-ion batteries have a big head start on manufacturing at scale and cost reduction on newer battery technologies such as those of ESS. Customers are certainly more familiar with lithium-ion's pros and cons than they are with those of iron flow batteries.

Bringing new batteries to market is notoriously difficult, and the energy storage sector is littered with failed start-ups. ESS will have to prove that its batteries can meet the rigorous demands of power-plant operators.

Relatedly, it's clear that the long-duration market needs a significant scale-up in demand for ESS and other manufactures to succeed.

Of course, this is exactly the driving force behind the support for storage found in both the infrastructure bill and Build Back Better. But regulatory and market design barriers do not yet fully value technologies that can store energy for several hours or even days – so the lobbyists for storage in the US still have work to do.

There is technology risk, too. Although ESS's battery is a cheap solution that can currently provide about 12 hours of storage, utilities will eventually need batteries that can last even longer as more and more renewables are added to the grid. As an example, in October a lack of storage contributed to a record spike in UK power prices when wind speeds remained low for not hours but weeks.

There's a risk that a company will come along with a long-duration battery that will blow all others – including iron flow batteries – out of the water. After all, the long-duration storage sector is highly competitive.

One such competitor to watch is called Form Energy, which is also developing

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a long-duration battery that also uses iron and is also backed by Breakthrough Energy Ventures. Form, however, is developing iron-air batteries, which uses different technology and aims to provide energy storage for multiple days.

Although Form faces many of the same risks as ESS, it could still certainly beat ESS on price if/when it gets its battery to market.

Which brings us to cost. Although ESS is confident that its batteries are much more cost effective than lithium-ion batteries, it still needs to prove this holds true commercially at the scale the firm is talking about. So, all eyes will be on the SB Energy deal and others in the pipeline to see if ESS can really deliver what it says it can.

If you're comfortable with the risks, then I advise you to act now

Yes, there are significant risks, but the potential here is huge. Certainly, the company that truly cracks long-duration energy storage will hit the big leagues.

More than that, if ESS can do what I think it can, then the successful execution of its iron flow battery chemistry will go down as one the most significant milestones in the history of the energy transition.

If you ask me, ESS's batteries have all the characteristics needed to help overcome some of the reliability problems that caused recent blackouts in California and record-high energy prices in Europe – by turning the fluctuations of renewables into a stable, 24/7 power system.

Action to take: BUY ESS Tech (GWH). Remember to check the portfolio for the latest advice and buy limits here.

For full details of current prices and buy-up-to limits for all three recommendations, click here to check the portfolio for details.

If the current price is above the buy-up-to price, wait for it to fall back below before you buy.

All the best,

James Allen
Editor, *Exponential Energy Fortunes*