

THE MONTHLY DOSE OF CLIMATE SOLUTIONS

DECEMBER 2022



THE REVENGE OF FOSSIL FUELS
Investors allocated to brown value names motivated by excess cash flow.
A green swan will materialize by the end of 2023

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DECEMBER IN REVIEW

COP15 elevates nature as an asset class and the EU Carbon Border mechanism could be a proxy for a global carbon pricing. The last month of the year saw very bad share performance for many names in the iClima universe.

The month started with a trade meeting between the US and the EU discussing the “unfair disadvantage” that the Inflation Reduction Act (IRA) will give EU companies compared to those in the US. The fear is that the \$430 billion Bill will support US based companies in a way that is not in line with World Trade Organisation rules. Several EU member countries are calling for similar support to EU based green companies. From December 7th to 19th, Canada hosted the COP15 UN Conference on Biodiversity, an event chaired by China. The biggest news to come out of the conference was on what is referred to as the “30 by 30” target, a commitment by 188 countries to protect 30% of the world’s land and sea by 2030. Plans to halt and reverse nature loss are key, as currently only 17% of land and 8% of marine areas are under protection. At COP15, it was agreed to raise the target for conservation to 30% while also restoring 30% of land and sea ecosystems, and halving food waste by the

end of the decade. The Global Biodiversity Framework (GBF) will set up a fund and Public Private Partnerships will aim to mobilize \$200 billion per year. Another key planet impacting event took place outside Montreal. In Europe, the 27-country block on December 18th reached an agreement to make its carbon market deeper and broader. The EU emissions trading scheme will include heating, road transport and shipping. The speed with which heavy emitter companies, like steelmakers, need to decarbonize will also increase. Most importantly, the EU will set a Carbon Border Adjusting Mechanism (from 2026) that could be a proxy for a global carbon pricing, as the EU will apply a pollution price on the import of certain products to Europe. In the words of Peter Liese, the lead negotiator for the European Parliament, “It is the biggest climate law ever in Europe, and some say in the world.” The agreement now needs the endorsement of all member states and the parliament to become binding.



German MEP Peter Liese,
Lead lawmaker on the EU emissions
trading system (EU ETS) reform bill.

A YEAR IN REVIEW

The good,
the bad,
the ugly.

To say that 2022 was an eventful year is an understatement. With the invasion of Ukraine, the exacerbation of the energy crisis, inflation spiking, central banks' hawkish response, China's continued zero-Covid policy and several climate events (like the floods in Pakistan and the droughts in China), we had a perfect storm for capital markets. Our economies are marked by the coexistence of Business as Usual (BAU) high emission activities and new solutions, brought to market by innovative companies with viable, price competitive, sustainable alternatives. This is the worst of times and the best of times, as we showcase below.

THE GOOD

US Consumers show that clean energy equates to savings:

As US electricity consumers see their retail electricity tariffs rise as a consequence of natural gas (NatGas) price increases, they have flocked to solar rooftops. Residential solar in America added a record 5.6 GW of installations in 2022, with Florida, Texas, the Midwest and California leading the trend. Commercial users added ca. 1.9 GW in the year, bringing the total amount of new solar rooftops installed ‘behind the meter’ to 7.5 GW. It is important to emphasize that the full impacts of the Inflation Reduction Act will not kick in until 2023, which will give further impetus to this ongoing trend. Users of electricity are aiming for self-sufficiency, therefore becoming “ProSumers,” motivated by savings immediately after moving away from traditional full grid dependency.

Demand destruction across the globe further increases the impetus behind renewable energy:

At year end, the IEA released a detailed report forecasting that growth in renewable energy will accelerate as a response to the (fossil fuel) energy crisis. The IEA’s revised figure is 30% higher than their forecast from a year ago, predicting that 2,400 GW of new renewable

capacity will be added to grids between 2022 and 2027. The report finds that renewables will represent 90% of all new sources of electricity, surpassing coal as the main source of global electricity by 2025. The IEA Director, Fatih Birol, predicts that the world “will add as much renewable power in the next 5 years as it did in the previous 20 years.” There are some additional remarkable predictions in the IEA report. Firstly, China will account for ca. 50% of all new renewable additions in the period (together with the US and India, the three countries will represent 2/3rd of all global growth). Secondly, solar PV capacity will triple over the 2022-2027 period. Thirdly, IEA expects the US and India to add material manufacturing capacity across solar supply chains, with investments of over \$25 billion in both countries in the five-year period. Lastly, the report points not just to utility scale solar, but also residential and commercial behind-the-meter solar rooftops that will witness material acceleration.

Electric Vehicles become top of mind for car buyers in key markets:

EY’s Mobility Consumer Index earlier this year surveyed consumers across 18 different countries and for the first time showed that more than 50% of buyers intended to purchase an electric car as opposed to one with an Internal Combustion Engine (ICE) . The IEA estimates that 13% of all global new cars sold in 2022 were electric. Global sales of electric passenger vehicles in 2020 were ca. 3 million units, a figure that doubled in 2021 to 6.6 million units. Final numbers for 2022 are not yet out, but passenger electric vehicles are on track for over 9 million units in the year. The existing fleet of passenger electric cars reached 16.7 million at the end of 2021, a figure that will likely pass 25 million by the end of 2022 with China and the EU continuing to lead in adoption. The IEA’s Net Zero Emissions 2050 Scenario forecasts that the global electric passenger car fleet will surpass 300 million units in 2030, when electric cars will represent over 60% of all new car sales. The electrification of transport has a direct impact on demand for crude oil. BloombergNEF points out that passenger electric cars in 2021 displaced 0.2 million

barrels per day (Mb/d) of oil. When also considering electric vans & trucks, electric buses, and electric 2 & 3 wheelers, total oil displacement reached 1.5 Mb/d in 2021. More than 65% of that oil 'avoidance' comes from the 2 & 3 wheelers, a fact not much emphasized, as the fleet of these e-bikes was almost 275 million at end of 2021 with sales of the electric versions representing 42% of the total sales of the category. Extrapolating the 1.5 Mb/d of oil displacement enabled by the current total fleet of all electric vehicles to the 2030 forecast fleet (when passenger electric cars alone are expected to reach over 300 million units), the total displacement of crude that the electrification of transport enables could reach 27 Mb/d in 2030. This is a material fraction of our current oil production, nearly 100 Mb/d. The likelihood of this 2030 forecast scenario materializing is high, which means it may be time to start writing the obituary for crude oil.

THE BAD

Wind equipment manufacturers changed pricing strategies, reflecting their increased costs from inflation and supply chain issues, and that contagion affected wind developers:

In Spain, the government tendered 3.3 GW of utility scale wind in 2022 but the result of that process, published at the end of November, showed that only 45.5 MW was awarded. The reason why only 1.3% of the wind projects were granted is because of the link to a ceiling of €47/MWh, which developers believe is not in line with current conditions. The GW not awarded in Spain will be added to the 2023 tender, adding pressure to the permitting process. WindEurope association warns that there are 2,000 wind projects currently awaiting permission from Spanish authorities, with 19 GW of the projects in need of full environmental impact assessments by January 23rd, otherwise needing to re-submit requests. Spain is not an isolated case, and the German Wind Association has alerted the market of similar risks. Streamlining permitting and grid connections must be a top priority for every EU country.

THE UGLY

Current higher fossil fuel prices do create demand destruction but also incentivise exploration companies to drill:

Oil majors are back to investing into Exploration and Production (E&P). Carbon Tracker points out that 62% of the investments into exploration approved in 2021 and the beginning of 2022, adding up to \$103 billion, are inconsistent with a Paris aligned pathway. Around \$58 billion of such investments are beyond even a 2.5° C scenario. The most-cited 2050 Net Zero scenario is that of the International Energy Agency (IEA), and in that 1.5°C pathway there is no need for new oil & gas development, as production is expected to fall by 22% by 2030 and 44% by 2035 vis-à-vis 2019 levels (as we highlight above, demand for oil under BloombergNEF assumptions is likely to be 27% below current levels). How do we reconcile that material permanent drop in demand for crude a few years from now with Chevron's all time high market capitalization of \$335 billion, Exxon's at over \$440 billion, and Saudi Aramco's at \$1.84 trillion? Markets are not pricing in the fast electrification of transportation, the main source of demand for crude. Petroleum products in the US accounted for about 90% of the country's total transportation sector energy use, with gasoline comprising 54% of all such demand. As the IRA's \$7,500 fiscal stimulus for EV adoption kicks in materially in 2023, including for vans, SUVs, pickup trucks (below an \$80,000 sticker price), passenger cars (below a \$55,000 price) and commercial vehicles (with no restrictions on where the battery was sourced or manufactured), the speed of adoption in the US market will materially increase. This will have an impact on the market's expectations of the displacement of oil and gasoline in the US. Currently, there is no consensus on when demand for oil will peak and how fast it will drop, and markets are not pricing in demand for crude being permanently 27% below current levels in 2030.

PERFORMANCE NOT IN LINE WITH THE SIZE OF THE GREEN OPPORTUNITY

In 2022 even investors with an ESG mandate drifted from green solutions towards fossil fuels. In a risk off market, future cash flows get discounted as a bird in the hand is seen as more valuable than two in the bush and pre-profitability companies are sold off materially, with many investors concerned about cash positions that would not cover at least 18 months of expenses. We believe that when we look back at the summer of 2022, when IRA and REPower55 elevated the solutions to the energy crisis, we will be able to point out the moment when the energy transition started to accelerate. Looking at the table below that summarizes the performance of iClima's six unique climate equity indices, it is clear that markets are not pricing in the fast transition scenario. Instead, fossil fuel is the key segment with strong performance in the 2022 equity space. While the FED hikes rates and fossil fuel is seen as the winner of the energy crisis, there will be no conviction on the secular case for green solutions. That could change after the summer when companies in our universe start to report IRA and REPower55 induced material revenue growth and margins improvement.

iClima Indices

2022 Monthly & Annual Performances

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2022	2021	2020
CLMA	-12.79%	1.16%	1.69%	-10.86%	2.23%	-8.89%	12.05%	-3.66%	-12.81%	2.47%	4.51%	-7.52%	-18.34%	7.33%	83.51%
DGEN	-17.43%	5.52%	5.65%	-17.28%	3.93%	13.00%	20.80%	-0.51%	-13.63%	0.84%	9.46%	-7.25%	-26.83%	18.18%	134.24%
ADPT	-13.02%	-2.78%	0.74%	-8.37%	-1.05%	-13.14%	16.27%	-4.70%	-8.78%	10.06%	6.34%	-4.98%	-24.58%	36.71%	30.97%
ERLY	29.62%	1.57%	14.30%	-24.27%	0.89%	-22.75%	17.13%	-0.22%	-13.96%	-4.69%	-16.79%	-21.27%	-69.85%	N/A	N/A
LDES	-13.29%	-2.47%	10.25%	-12.03%	0.21%	-8.71%	14.24%	-7.47%	-10.63%	3.32%	7.19%	-8.45%	-28.14%	-15.15%	178.80%
LESS	-14.83%	-2.48%	-2.17%	-11.82%	-6.02%	-13.04%	9.06%	-0.66%	-9.62%	1.72%	5.50%	-5.36%	-41.77%	-4.43%	83.73%

PREDICTIONS FOR 2023 AND BEYOND

UNPACKING THE ARGUMENT FOR A RETURN TO GREEN ALLOCATIONS

GreenTech ready for primetime, but not until the end of summer.

The best thing to solve high fossil fuel prices are high fossil fuel prices, as the demand destruction caused by high NatGas, oil and coal prices is a huge economic motivation for consumers of hydrocarbons to replace existing boilers, ICE cars, and coal fired power plants for lower emission solutions. Potential Avoided Emissions, the megatons of CO₂e not emitted into the atmosphere because a more sustainable alternative replaces BAU, is a positive externality of the energy crisis. When looking at the share performance of the iClima Global Decarbonization Enablers Index, representing 170 listed companies with products and services that move us away from the high emission, unsustainable way we run our economies, the conclusion is that markets are pricing a “no transition” or a “slow transition.” Analysts are mistakenly interpreting an increase in consumption of coal and a surge in demand for liquified natural gas (LNG) as the world not having alternatives and therefore needing to continue consuming fossil fuels. However, the acceleration in adoption of green alternatives is real. Therefore, our view is that the most relevant, sizeable, and impactful investment opportunity of our lifetime will stop being discounted in 2023. The total market capitalization of the 170 companies in the iClima Decarbonization Enablers Index ended the year at ca. \$2.6 trillion (roughly the same as the sum of current market capitalizations of Saudi Aramco, Exxon and Chevron). We estimate that by 2030, the value of the true green companies could jump to \$40 trillion, a 15x increase prompted by annual investments of \$3 trillion towards the energy transition and decarbonization. The two main triggers of the shift from brown value (trap) to green growth in 2023 will be the acceleration of the energy transition in Germany and the impact of the IRA in the US.

Less pain but no stock gains in the beginning of 2023:

There was extreme pessimism in markets in 2022, and reasons for hope (of a sustainable future) were deeply discounted. We closed the year with uncertainty on how much the US FED will continue to increase interest rates, when inflation will be contained, and if

unemployment rates will rise. Markets will continue to second guess the FED while waiting for more data to show us when the US will enter into a recession and how deep and prolonged it will be. Meanwhile in Europe, countries will attempt to replenish NatGas inventories without imports from Russia, which can bring back volatility and price increases to energy markets. China’s long-awaited reopening post-Covid, if successful, would positively impact its growth. Growth companies will not hit bottom in valuations until the macro scenario is clearer. Having said that, we expect material further acceleration of top line growth in several companies benefiting from demand destruction of fossil fuels combined with the IRA stimulus. In a “risk-off market,” investors will want hard evidence of not only revenue acceleration but also a path to profitability. Therefore, our prediction is that it will take 1Q23 and 2Q23 earning releases for investors to then price in the green cash flow. Investors will however be discerning; the era of the rising tide from quantitative easing raising all boats irrespectively has ended. Hypergrowth is great, but profitability is better and the green companies with both are likely to rally first (that is why Enphase continues to demonstrate solid share performance).

IRA kicks in and changes everything:

GreenTech can save us from climate change, with a little help from Uncle Sam. The IRA Bill was able to leverage successful policies in European countries. Research shows that “not all subsidies are equal,” as consumers have a strong preference for point-of-sale discounts as opposed to fiscal stimulus via annual tax return filings. The IRA earmarks a total of \$369 billion of investments into energy security and climate change as follows: \$161 billion as fiscal stimulus for clean electricity; \$100 billion to make clean technology and solutions more affordable; \$75 billion for environmental conservation and ca. \$33 billion to support US-based clean-tech supply chain development. The full impact of the Bill will be seen in the next year. Some of the key incentives for clean vehicles benefiting lower or middle-income individuals are up to \$4,000 in consumer tax credits to buy used clean

vehicles, and up to \$7,500 in tax credits to buy new clean vehicles in 2023, with a direct upfront discount starting in 2024. For residential clean energy, the credit applies to American homeowners and renters for the next 10 years, with a 30% tax credit towards rooftop solar, geothermal heating and battery storage. The IRA will transform the US buildings sector, as retrofits and new developments will converge energy efficiency, mobile and stationary clean energy storage, and vehicle electrification. It will also change green financing processes, as previous legislation had the Investment Tax Credit (ITC) and Production Tax Credit (PTC) used by the asset owners only, which gave rise to complex “tax equity” investment structures. The IRA introduces a credit transfer provision so that taxpayers that invest into one of the solutions can transfer their tax credits to an unrelated person for cash. In 2023, the new language is likely to accelerate and create flexibility in project financing. In terms of consumers, the IRA puts individuals at centre stage in adoption of the solutions and targets immediate savings as the main driver prompting the transition to lower emission alternatives, adding to fossil fuel demand destruction. Lastly, the Bill turbocharges green H₂, giving a \$3/Kg production tax credit that will immediately bring green H₂ to parity with blue H₂.

FID will be a key acronym:

Reaching Final Investment Decision (FID) will be critical in 2023. Lending in 2022 continued despite interest rate increases as banks that lend to infrastructure projects did not stop underwriting investments, but public market issuances came to a stop during this period of increased hawkishness. Developing renewable energy projects under project financing structures requires many elements to be successfully in place before the financial commitment to move forward with a project is secured. Negotiating land agreements, sourcing equipment and construction (Engineering, Procurement & Construction, or EPC, contracts), obtaining grid connection, getting full permits, and sourcing financing are the required conditions for developers of utility scale renewable projects to reach FID.

In 2022, inflation, supply chain issues and rising base interest rates precluded many developers from achieving targeted Internal Rates of Return (IRR). More expensive equipment and higher costs of capital, when renewable energy tariffs are expected to remain flat or keep going down, did not equate to FID in many cases. However, in 2023 we expect EU and US regulators to alleviate bottlenecks to the permitting process, supply chain issues to improve, and cost of capital to stabilize, translating into a positive environment for the 2,400 GW of renewable energy projects to be developed by 2027.

Back to a (green) future, with security as a goal:

Our objective interpretation of available data is that persistently high energy costs combined with fiscal policies promoting green solutions are already encouraging an energy transition (the increase in *uninvestable* fossil fuel E&P is a risk, but with a good chance of not materializing). This new economic phase requires a completely different investing mind-set, where “the best defence is offense” adage holds. Allocating to broad portfolios aligned with green growth through companies that have relevant solutions, while being aware of all the risks involved with overexposure to industries marked for obsolescence (like oil drilling and coal mining) is key. We see investment opportunities in i) clean energy production and storage, with an emphasis on distributed behind-the-meter solutions; ii) food waste reduction & water security; iii) reuse & recycling; iv) energy efficiency; and v) electric transportation as some of the key solutions poised for hypergrowth in 2023. The common denominator that will make companies overdeliver on growth and margins next year is cost. The need for security and predictability of expenses will prompt buyers to embrace efficient use of electricity, water, food, materials and transportation.



A GREEN SWAN WILL BECOME VISIBLE BY THE END OF 2023

With some key companies with potential to materially move economies away from high emissions BAU showcasing what alignment of people, profit & planet looks like.

Volatility has been extremely high for green growth names, as the standard deviation around the mean of what is a fair market price for the companies is exceptionally wide. On one side there are investors optimistic on the incredible growth prospects of the relevant climate solutions, with the other side of the spectrum represented by the risk off investors that fear insufficient cash, unclear path to profitability and overestimate the strength of the case for BAU. A bear market brings back discipline on capital budgeting for all companies, and pre-profitability ones in particular. Hypergrowth is great but

profitability is better, and we see many companies in our universe aiming for both in the short term. Below we showcase a few companies in our universe that have relevant and impactful climate solutions, in segments like battery recycling, V2G, green H2 transportation, EVs, and long-duration energy solutions (LDES) that will see revenue accelerating in 2023. We believe all these names (with the exception of AppHarvest, that has a more uncertain path to profitability) are undervalued and have solid long-term prospects.



A Gogoro battery-swapping station

gogoro

Gogoro Inc (GGR, down 13.35% in December, down 67.8% in the year)

This Taiwanese based developer of urban electric two wheelers – mopeds, motorcycles and scooters - is well known for its battery swapping “Gogoro Energy Network.”

Management:

CEO and co-founder Horace Luke founded the company in 2011, after many years at Microsoft and at HTC where he was CIO, having started his career at Nike. Gogoro’s products were engineered for change and designed for high UX. Luke believes that “Consumers are what’s going to change the world, not necessarily industries or governments. They’re voting with their own money, their own habits—that is what’s going to change how people use energy in the world.” Gogoro’s battery swapping walls are a clever way to remove the concerns that users of electric two wheelers may have on battery range and logistics of charging. Earlier in the year the company surpassed 500,000 monthly battery swapping subscribers in Taiwan.

Growth:

Currently almost all of Gogoro’s 2022 full year revenue was derived in the Taiwanese market. This geographical concentration will change, as the company is fast expanding in other Asian countries (India, South Korea and Indonesia) and in Israel with China as a

key market to target. Gogoro’s shares have suffered also due to the geopolitical tension between Taiwan and China and the end of Covid related disruptions in China. The concern of many analysts is with competition and profit margins given that most of Gogoro’s current revenue (ca. 70%) comes from the manufacturing side.

Financial strength & valuation:

The company closed the year at a market cap of \$875 million, and management reiterated total revenue guidance for the year of between \$370 and \$390 million, a TTM P/S of 2.2x. Cash position at the end of 3Q22 was \$249 million, increased by a \$345 million syndicated credit facility (that also retired a previous \$182 million old credit loan). Gogoro reported adjusted EBITDA of \$9.2 million in 3Q22, down from \$15.2 million in 3Q21. A profitable company with a solid moat, wrapping recurring service fees on an efficient manufacturing capability, Gogoro is one of the most exciting names in micro mobility.

stem

Stem Inc (Stem, down 31.6% in December, down 52.8% in the year)

The San Francisco based leader in intelligent clean energy storage solutions offers hardware installation that it sources from OEMs, wrapped in a software platform called Athena that operates, optimizes and monetizes energy storage systems. Its original focus was on the Behind the Meter (BTM) market but in 2019 Stem entered into the Front of the Meter (FTM) segment. At the end of 2021 the company acquired Also Energy Holdings, enhancing its solar software management offerings as Also Energy had 32.5 GW of solar assets under management in over 50 countries, ca \$50 million in revenue and 60% gross margins.

Growth:

Stem’s 3Q22 revenue reached \$99.5 million (\$207.5 million YTD), its 12 month pipeline was \$7.2 billion (compared to \$5.6 billion at the end of 2Q22), while contracted backlog was \$817 million at 3Q22 end.

Financial strength:

The company ended 3Q22 with \$294 million in cash & short-term investments, and its long-term convertible notes were \$447.4 million. Management expects to reach positive adjusted EBITDA in the second half of 2023 and reiterated revenue guidance for 2022 of between \$350 to \$425 million. Stem closed the year at a market cap of \$1.48 billion, trading at TTM P/S of 5.7x (but potentially below 2x on a forward P/S). The IRA Bill will give further impetus to revenue growth, adding to the already robust 150% 3Q22 over 3Q21 top line increase. Markets seem to question the price paid for Also Energy, dislike the debt raised to partially finance its acquisition and the fact that the company is not yet profitable. There is not a scenario where renewable energy intermittency is not solved, and Stem has a solid position in the clean energy storage space and could see a rally in price if it demonstrates acceleration of growth with solid operating margins after one or two quarters of IRA impact (around summer 2023).

FLUENCE

A Siemens and AES Company

Fluence Energy Inc (FLNC, down 0.7% in December, down 51.8% in the year)

The JV between US IPP AES and Siemens is a recognized leader in FTM clean energy storage system integration.

Eventful year:

Earlier in the year its shares dropped over 30% shortly after the company declared force majeure for three of its utility scale clean energy storage projects, as Covid related supply chain disruptions in China precluded the required batteries from being delivered to the projects on time. A few months later, change in management took place, with former AES project developer Julian Nebreda becoming the company’s new CEO. At year end, Fluence announced it will start to develop Fluence made battery packs in the US, with production expected to start at the beginning of 2024. The strategy will allow Fluence to benefit from IRA incentives (of \$10/kWh), while increasing control of its supply chain, improving reliability of supply of battery modules and battery management system.

Financial strength:

Fluence reported 4Q22 results on December 16th for the FY ending in September. For the fiscal year, Fluence deployed a cumulative 1.8 GW of energy storage systems, doubling the total deployment reached in the previous year (0.9 GW as of September 2021). Total revenue reached ca. \$1.2 billion, an increase of 76.1% over the previous fiscal year (US based revenue represented over one third of the total, at \$468.4 million - a 24.3% increase over the previous year). cash, restricted cash, and ST investments ended the FY at \$530 million. Management guidance for revenue next year is between \$1.4 to \$1.7 billion, a forward P/S of 1.6x on a market cap of \$2.8 billion. Despite having a solid pipeline of contracted projects, strong cash position, and IRA fuelled US growth, the reversal of current negative operating margins is likely necessary for the company to demonstrate a path to profitability.



Plug Power (PLUG, down 22.5% in December, down 56.2% in the year)

The US hydrogen and fuel cell specialist stands to benefit significantly from the upcoming US government incentives under the IRA, where renewable electricity and clean hydrogen plants in 2023 can receive a production tax credit of 2.6 cents per kWh and up to \$3/kg of hydrogen, respectively, up until 2032. Despite this, a recent [ICCT study](#) showed it is doubtful that green hydrogen will be price competitive for applications such as transport in the US in the near future and suggests that end uses that are more challenging to electrify will make the most sense in the nearer term – a large part of the company’s current revenue comes from forklift applications where hydrogen replaces lead acid batteries, with substantial contracts including Amazon and Walmart. The company’s share price fell in the last quarter since [reducing its hydrogen production guidance](#) for 2022 down to 50 tons of green hydrogen per day by year end, from an earlier forecast of 70 tons per day as well as reducing 2022 revenue guidance of \$900-925 million by 5-10%. Assuming revenues come in at the lower end, based on an end of year market cap of \$7.2 billion the company would have a P/S ratio of 8.9. On the 3Q22 earnings call, CEO Andrew Marsh claimed that current negative margins will be transformed, with break-even margins achievable in 2023. As sales of its electrolyser business ramp up and the company builds out its green hydrogen platform which will be profitable, this will allow hydrogen generation at one third the cost that the company pays to source hydrogen today.



Meyer Burger Technology AG (MBTN.SW, up 6.7% in December, up 31.6% in the year)

As we summarize in this [infographic](#), investors in this risk off year only rewarded green companies that are “first order of innovation” names, manufacturing key equipment like batteries, inverters, and solar panels. Swiss-German Meyer Burger is an example, as the company manufactures high end solar PV for residential and commercial installations.

Solar panels to solar tiles:

The company [closed](#) the year manufacturing



Proterra (PTRA, down 31.9% in December, down 57.3% in the year)

California based Proterra’s mission is to enable the electrification of commercial vehicles, from medium to heavy duty trucks and buses. The company is a supplier of batteries, vertically integrating the batteries into electric buses it manufactures, and is a service provider of Vehicle to Grid (V2G) software and management solutions. It has produced [over](#) 750 MWh of batteries, installed more than 90 MW of charging infrastructure, and has delivered ca. 950 electric buses. LG Energy Solutions has been a partner on the battery side since 2016.

Tailwinds in the US:

Electric commercial vehicles are a [prime beneficiary](#) of the IRA that puts in place a battery manufacturing tax credit of \$35/kWh for cells and \$10/kWh for US produced modules; commercial vehicle tax credits of up to \$40k/vehicle for class 4 to 8 types; and \$1 billion in rebates for class 6 or 7 vehicles. In particular for US electric school and electric transit buses there is \$7 billion in funding already approved between 2022 and 2026. At a year-end market cap of \$850 million, the company trades at a P/S of ca. 2.6x when annualizing the [3Q22](#) revenue of \$96.2 million and first three quarters revenue of \$229.4 million. Loss from operations in the nine months ended in September added to \$147 million, and the company has \$409 million of cash & cash equivalent at end 3Q22. Management needs to demonstrate in 2023 that the IRA tail winds will translate into profitability.

over 321 MW of high performance solar cells and modules, with management [reiterating](#) an expected production volume of 1.0 to 1.2 GW in 2023 and 3 GW in 2024. Moreover, the company has successfully launched a pilot project for its solar tile products and the full market launch of the Meyer Burger Tile is planned for the second half of 2023. With a market cap of CHF 1.965 billion, it is this almost 10x increase in production (and sales) in the next two years that seems to be driving up the share price of this key equipment maker, even in a market like 2022.



Wallbox (WBX, down 36.3% in December, down 78.1% in the year)

The Spanish based EV charging specialist closed the year at a market cap of \$583 million, after going public via a SPAC in June 2021 that [valued](#) the company at \$1.5 billion.

Management & Investors:

Iberdrola is the largest institutional investor in the company that was [founded](#) in 2015 by two former Tesla employees (Enric Asunción and Eduard Castañeda). Management expects 2022 revenue to reach \$167 million, more than double the revenue of the previous year, and reiterates a revenue forecast for 2023 at ca. \$400 million. Gross margin in 3Q22 was above 41%. On the corporate side, the company has clients like Uber, Amazon, Ford, Fisker, Pepsi and Walmart. Concerns over its cash position vis-à-vis fast global growth expansion seem to have taken down its share price, despite the company’s strategy making it a direct beneficiary of the extraordinary growth prospects for EVs.



Tesla (TSLA, down 36.7% in December, down 65.0% in the year)

The share price of the US electric vehicle, solar and storage specialist extended its slide in December, continuing the trend for 2022.

Management:

The actions of CEO Elon Musk remained in the spotlight as he [sold approximately \\$3.6 billion worth of Tesla stock](#) during the month, though shortly after [stating](#) it was unlikely that he would sell any in the next year and “probably not the year thereafter.” Investors may be concerned with the potential impact on the Tesla brand of Musk’s increased involvement in political and cultural discourse as well as the amount of time Musk appears to be spending on Twitter, though he has stated that he hasn’t missed a major meeting for Tesla and is [looking for a new Twitter CEO](#).

Growth:

Tesla delivered just over 1.3 million new vehicles to customers in 2022, an increase of 40% on the previous year, missing analyst expectations as well as the 50% growth target Elon Musk frequently mentions on company calls. Factors such as Covid shutdowns in China and global supply chain issues may have played a part in missing the target, though as these headwinds ease and ramp of production in the new Texas and Berlin factories increases, the outlook for growth may be more positive in 2023 – especially if government IRA EV incentives turn out to be

favourable. There is some [confusion](#) around why certain Tesla models don’t seem to qualify for the subsidy at the moment, despite being more environmentally friendly than hybrid models that do qualify.

Financial strength and Valuation:

Tesla’s [market cap has fallen](#) from \$1.2 trillion at the start of the year to under \$400 billion at year end, meaning that valuation measures such as P/E have compressed to 2020 levels. Yet, the company’s underlying fundamentals remain strong in comparison to many legacy and newer auto players. As we enter a new year with a possible recession in which many in the auto industry may struggle, Tesla looks to be well-positioned with low debt and a strong cash position, ending 3Q22 with \$21.1 billion in cash. It also has some of the highest margins in the automotive industry (27.9% in 3Q22).



NIO (NIO, down 23.7% in December, down 69.2% in the year)

The China-based electric vehicle manufacturer is also well-known for its [battery swap station](#) approach to EV charging. The company’s share price fell significantly in December as supply chain disruptions due to covid in China saw the company cut delivery guidance from 48,000 to 43,000 units.

Growth:

NIO delivered 40,052 vehicles in 4Q22, up 60% YoY with annual deliveries for 2022 reaching 122,486 vehicles, up 34% YoY. As of the end of 2022, NIO deployed 1,315 power swap stations worldwide, 1,228 power charger stations with 6,225 chargers and 1,058 destination charging stations with 7,159 chargers. The company held its NIO day event on the 24th of December, launching two new electric vehicles; the EC7 coupe SUV and the ES8 all-around SUV as well as its new 500kW ultra-fast Power Charger and third-generation Power Swap station which can complete up to 408 swaps a day and takes only 20 minutes to charge a 100kWh battery pack from 10% to 80%. NIO currently has 1,300 Power Swap Stations in China and plans to have 1,700 by 2023 as well as rolling out [120 across Europe](#), with the goal of having [1,000 outside China by 2025](#).

Financial strength and valuation:

As of 3Q22 vehicle margins were 16.4% with gross margin at 13.3%, cash and cash equivalents were RMB 18.1 billion and the net loss for the quarter was RMB 4.1 billion.



BYD (1211.HK, up 0.57% in December, down 27.76% in the year)

The Chinese conglomerate's core revenues are driven by its hybrid and battery electric vehicle, mobile handset component and battery and photovoltaic segments.

Growth:

2022 has been notable in terms of international expansion and December saw announcements that BYD will begin sales in a list of new European countries. Sales to these new regions will be further augmented by the company's recent purchase of ships to support exports and management's search for European manufacturing sites to

support localisation of production. Despite the recent impact of covid in China, BYD's December sales of new energy vehicles (hybrids + fully electric vehicles) were up 150% YoY with annual sales reaching 1,863,494 units, up 208.64% from the previous year, including 911,140 fully electric and 946,239 plugin hybrid passenger vehicles. The company stopped producing full combustion engine vehicles in March 2022. The battery division reported installation of 11.15 GWh for December, up 120.9% from 5.05 GWh YoY, bringing installed capacity for 2022 to 89.83 GWh, up 136.9% from 37.92 GWh in 2021.



Li-Cycle Holdings Corp. (LICY, down 25.27% in December, down 52.21% in the year)

The North American lithium-ion battery resource recovery and recycling company founded in 2016 has grown to become the largest battery recycling company in the market, with four operational recycling facilities and over 100 battery suppliers. Despite a 57% drop in its share price in 2022, Li-Cycle is well-positioned for the upsurge in the Lithium recycling market over the next few years.

Accelerated expansion:

Li-Cycle's expansion strategy remains underpinned by accelerating demand for EVs and therefore, lithium-ion batteries. The company inaugurated its third and fourth lithium-ion battery recycling facilities in Arizona and Alabama this year. Both facilities have the capacity to handle up to 10,000 tonnes of manufacturing scrap and end-of-life batteries per year, which is enough to power approximately 20,000 EVs. Li-Cycle is also constructing its first commercial hub facility in Rochester, New York, which is set to open in 2023 and will process battery materials enough to power approximately 225,000 EVs.

Milestone Partnerships:

Throughout the year, the Canadian firm secured strategic alliances. The commercial partnership with both Glencore and LG Energy Solution and LG Chem was the most

significant. In addition, Li-Cycle received strategic investments totalling \$200 million from Glencore and \$50 million from LG Energy Solutions, respectively.

Financial strength and valuation:

The company reported 3Q22 revenues of \$5.4 million, which were offset by a \$7.3 million unfavourable non-cash fair market value pricing adjustment relating to prior-period black mass sales. The company reported a net loss of \$27.52 million, nearly quadrupling from \$6.9 million the previous year. The company's adjusted EBITDA loss increased to \$31.6 million in 3Q22 from \$5.3 million the previous year, owing to higher operating expenses related to the company's Hub and Spoke network's growth and expansion. Li-Cycle ended the third quarter with a strong cash position of \$649 million in cash & cash equivalents.

Benefits of the IRA:

Li-Cycle is also one of a few companies vying for the IRA recycling incentives. The North American-focused business structure has given Li-Cycle an advantage with the IRA seeking to expand the domestic market by providing incentives to manufacturers who have secured supply chains in the United States or North America. In addition, Li-Cycle stands to benefit from the \$335 million set aside in the Bipartisan Infrastructure Law to encourage battery recycling programmes and expand the lithium mining industry in the United States.



AppHarvest (APPH, Down 37.08% in December, down 85.41% in the year)

The Controlled Environment Agriculture (CEA) industry has been braving severe headwinds in 2022. Several CEA and vertical farms have ceased operations due to ongoing supply chain delays, labour shortages, the economic downturn, and an increase in energy costs, while others are cutting costs through consolidation and layoffs. The Kentucky-based AppHarvest which was unrelentingly optimistic at the start of the year, rapidly saw their stock price plummet by 85%, reaching a 52-week low of \$0.47. Despite adding on three new facilities in the last two quarters of 2022, AppHarvest was fraught with increased capex, plant health issues and inefficient operational capacity which saw muted growth in 3Q22 and put the company on the brink of running out of cash by the first quarter of 2023. Management announced that they were scaling back their initial roadmap of 12 facilities by 2025 to prioritise the positive cashflow of the four operational farms. The next two quarters will be critical for AppHarvest to capitalise on its quadrupled farm network. The business is extremely capital intensive. At the current run rate, the company is spending \$41 million annually on its cost of goods sold alone. As per iClima's projections, even if the four farms deliver its ambitious revenue targets, it would still have negative gross margins.

Shot in the arm?

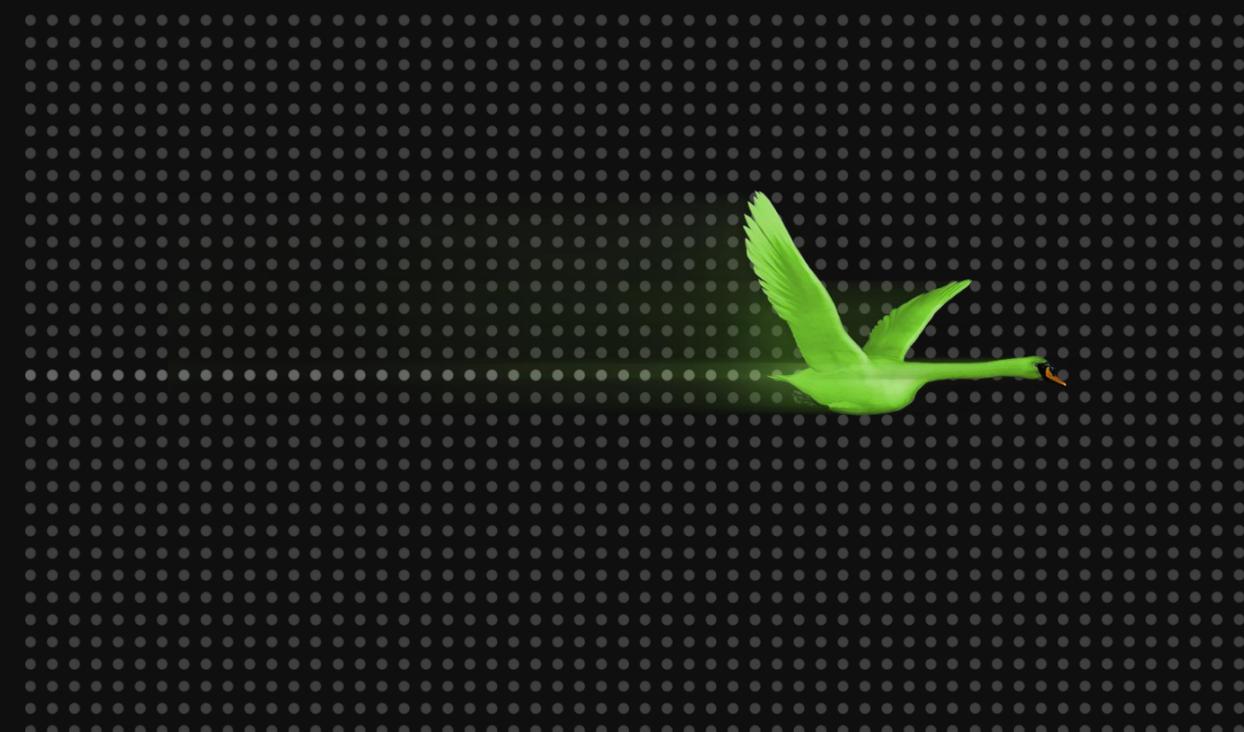
The \$127 million Mastronardi sale-leaseback deal of its Berea-farm provided a much-needed cash infusion. Some of the proceeds from the sale-leaseback will be used to repay Mastronardi Produce's \$30 million bridge loan as well as the first two years of prepaid rent at the Berea facility. According to the company's 8-K, AppHarvest's net proceeds from the sale-leaseback were \$57.5 million, with \$22.5 million set aside for construction costs at the company's Richmond facility. Add another \$90 million for bills in December and January, and their cash-burn rate would still be insufficient to sustain operations until 2023.

Ongoing projects:

The company anticipates CAPEX of approximately \$85 million to \$95 million over the next two quarters to complete the three currently underway construction projects, with \$50 million to \$55 million spent in 4Q22 and the remaining \$35 million to \$40 million paid in 1Q23.

Down, but not out.

With four fully operational farms, AppHarvest should be able to generate increased revenue in the \$35-\$38 million range over the next twelve months and hopefully achieve better operational efficiency.



A SUSTAINABLE WORLD IN THE MAKING

"A green swan is a profound market shift... it delivers exponential progress in the form of economic, social and environmental wealth creation."

- John Elkington



<p>2022 RE build up + energy efficiency top of mind</p>	<p>Over 65% of all packaging waste by weight is recycled in the EU (LDES)</p>	<p>EU gets to 10 million new heat pumps installed since RePower EU (DGEN)</p>	<p>H₂ Green H₂ at \$2/kg, reaching parity with grey H₂ (LDES)</p>	<p>2027 The Green H₂ economy matures</p>	<p>EU operates 17.5 GW of electrolyzers to fuel EU industry with homegrown 10 million tonnes of green H₂ (LDES)</p>	<p>NatGas global demand recedes, after peaking at ca. 50 trillion cubic feet in 2025 (CLMA)</p>	<p>35% of cars sold in CA must be Zero Emission (CLMA)</p>	<p>Germany gets to 70% of electricity from renewable sources (CLMA)</p>	<p>Tesla autonomous robotaxi in operation. Cars become computerized power plants on wheels (DGEN)</p>	<p>2026 LDES solutions in place, Germany's path to a 100% green grid is clear</p>
<p>H₂ Green H₂ is the most expensive H₂ (ca. \$5-\$6/kg) (LDES)</p>	<p>All commercial and public buildings in the EU to have a solar rooftop (DGEN)</p>	<p>2028 ICEs end is near</p>	<p>2035 Focus now on the hard to abate industries</p>	<p>EU energy efficiency above 13% (DGEN)</p>	<p>Total installed costs of utility-scale solar PV reaches ca. US\$ 220/kW (CLMA)</p>	<p>China above 1,200 GW of wind & solar generation capacity (CLMA)</p>	<p>Solar energy becomes the largest electricity source in the EU, with more than half coming from rooftops (DGEN)</p>	<p>50 MM out of global 90 MM new passenger vehicles are pure EVs (CLMA)</p>	<p>Germany starts to add 22 GW of solar per year until 2030 (CLMA)</p>	
<p>Renewables provide ca. 50% of Germany's electricity (CLMA)</p>	<p>Battery pack price goes below \$58/kWh (LDES)</p>	<p>US to have cut geothermal cost by 90% to \$45/MWh (CLMA)</p>	<p>US gets to ca. 1,570 GW of wind and solar generation capacity (1,000 GW solar of which 25% is rooftop) (CLMA)</p>	<p>No more ICE sales in California (CLMA)</p>	<p>The amount of municipal waste landfilled is reduced to 10% or less (by weight) in the EU (LESS)</p>	<p>Solar energy becomes the largest electricity source in the EU, with more than half coming from rooftops (DGEN)</p>	<p>Germany reaches ca. 220 TWh of LDES, representing almost 30% of the electricity demand in the country (LDES)</p>	<p>H&M becomes a fully circular business (LESS)</p>		
<p>China starts year at ca. 678 GW of wind & solar installed capacity (CLMA)</p>	<p>Global EV battery capacity reaches 2,829 GWh (CLMA)</p>	<p>US gets to ca. 1,570 GW of wind and solar generation capacity (1,000 GW solar of which 25% is rooftop) (CLMA)</p>	<p>US gets to ca. 1,570 GW of wind and solar generation capacity (1,000 GW solar of which 25% is rooftop) (CLMA)</p>	<p>No more ICE sales in California (CLMA)</p>	<p>The amount of municipal waste landfilled is reduced to 10% or less (by weight) in the EU (LESS)</p>	<p>Solar energy becomes the largest electricity source in the EU, with more than half coming from rooftops (DGEN)</p>	<p>Germany reaches ca. 220 TWh of LDES, representing almost 30% of the electricity demand in the country (LDES)</p>	<p>Air Taxi eVTOL reaches commercialization (ERLY)</p>		
<p>Between 2010 and 2020, the average price battery pack price decreased from \$1,200/kWh to \$137/kWh (DGEN)</p>	<p>Global stationary battery storage reaches 1,409 GWh (LDES)</p>	<p>US gets to ca. 1,570 GW of wind and solar generation capacity (1,000 GW solar of which 25% is rooftop) (CLMA)</p>	<p>US gets to ca. 1,570 GW of wind and solar generation capacity (1,000 GW solar of which 25% is rooftop) (CLMA)</p>	<p>No more ICE sales in California (CLMA)</p>	<p>The amount of municipal waste landfilled is reduced to 10% or less (by weight) in the EU (LESS)</p>	<p>Solar energy becomes the largest electricity source in the EU, with more than half coming from rooftops (DGEN)</p>	<p>Germany reaches ca. 220 TWh of LDES, representing almost 30% of the electricity demand in the country (LDES)</p>	<p>Municipal waste recycling rates in the EU get to 60% (LESS)</p>		
<p>2023 Grid decentralization advances, V2G goes mainstream, VPPs create savings</p>	<p>Global stationary battery storage reaches 1,409 GWh (LDES)</p>	<p>US gets to ca. 1,570 GW of wind and solar generation capacity (1,000 GW solar of which 25% is rooftop) (CLMA)</p>	<p>US gets to ca. 1,570 GW of wind and solar generation capacity (1,000 GW solar of which 25% is rooftop) (CLMA)</p>	<p>No more ICE sales in California (CLMA)</p>	<p>The amount of municipal waste landfilled is reduced to 10% or less (by weight) in the EU (LESS)</p>	<p>Solar energy becomes the largest electricity source in the EU, with more than half coming from rooftops (DGEN)</p>	<p>Germany reaches ca. 220 TWh of LDES, representing almost 30% of the electricity demand in the country (LDES)</p>	<p>2030 Regeneration is in sight: a sustainable world unfolds</p>		
<p>More companies apply an internal carbon levy – Currently around \$100 per tonne of CO₂, these will gradually increase to \$200/tCO₂ by 2030 (CLMA)</p>	<p>The 2nd global stocktake will be undertaken by the Paris Agreement CMA (ADPT)</p>	<p>68% of cars sold in CA must be Zero Emission (CLMA)</p>	<p>2029 Heat pumps are ubiquitous, ProSumers abound</p>	<p>G20 countries generate 71% of electricity, 62% of transport and 57% of heat through renewables, up from 28%, 5% and 16% in 2019 (DGEN)</p>	<p>600 million heat pumps installed globally (DGEN)</p>	<p>25% of all new solar in the US is behind the meter, consumers of electricity are also producers ("ProSumers") (DGEN)</p>	<p>Voluntary Carbon Markets are 15x bigger than in 2021 (ADPT)</p>	<p>All new residential buildings in the EU to have a solar rooftop (DGEN)</p>		
<p>The 1st global stocktake will be undertaken by the Paris Agreement CMA (CLMA)</p>	<p>Global stationary battery storage reaches 1,409 GWh (LDES)</p>	<p>68% of cars sold in CA must be Zero Emission (CLMA)</p>	<p>2029 Heat pumps are ubiquitous, ProSumers abound</p>	<p>G20 countries generate 71% of electricity, 62% of transport and 57% of heat through renewables, up from 28%, 5% and 16% in 2019 (DGEN)</p>	<p>600 million heat pumps installed globally (DGEN)</p>	<p>25% of all new solar in the US is behind the meter, consumers of electricity are also producers ("ProSumers") (DGEN)</p>	<p>Voluntary Carbon Markets are 15x bigger than in 2021 (ADPT)</p>	<p>All new residential buildings in the EU to have a solar rooftop (DGEN)</p>		
<p>Volkswagen, Ford, Chevrolet, Kia and Rivian EVs have bi-directional capabilities (DGEN)</p>	<p>800 MW of green H₂ will be auctioned in Germany (LDES)</p>	<p>EU adds 16 - 19 GW of solar rooftop capacity in the last 12 months (DGEN)</p>	<p>2024 Green taxonomy & disclosures deepen</p>	<p>Businesses commence reporting against TNFD which helps them manage their nature-related risks from 2023 onwards (CLMA)</p>	<p>Level 4 Autonomous Vehicles expected to be reached (CLMA)</p>	<p>Stakeholder Foods reaches commercialization and precision fermentation becomes a source of protein (LESS)</p>	<p>More companies embrace internal water pricing as a planning tool using a "shadow" price, to address 40% gap between supply and demand of H₂O forecast for 2030 (ADPT)</p>	<p>No new standalone oil & gas boilers will be allowed in Germany (DGEN)</p>		
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