

THE MONTHLY DOSE OF CLIMATE SOLUTIONS

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AN EVENTFUL FIRST QUARTER COMES TO AN END

Very polarized energy views mark the coexistence of green growth and brown value

We are delighted to share the March edition of our newsletter. We summarize the major events in the month, share the performance of our two indices, and go over the companies with the most striking share performance in this last month of the quarter.

Ember, an independent not for profit think tank, shared global renewable energy figures for 2021, and we review some of their exciting findings. Ember show evidence that the acceleration of the energy transition was already taking place before Russia invaded Ukraine.

We also share a recent study by a German PhD in Energy Economics that looked at how his country could solve renewable energy intermittence and get to a 100% renewable energy grid. Next, we share a podcast we did with Julian Poulter, Sr Partner at Energy Transition Advisors, on the topical point of the inevitability of the energy transition. Lastly, we take a deep dive into iShares' Global Clean Energy ETF (ICLN), and demonstrate the benefits of our rigorous methodology in comparison.

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MARCH IN REVIEW

GREEN GROWTH SHARES RECOVER DESPITE MACRO UNCERTAINTIES AND STILL POLARISED ENERGY VIEWS

High uncertainty and polarised views keep volatility high.

Markets lack consensus on key figures, from how persistent energy related inflation will be, to the extent of a recession in the Eurozone in case of energy rationing in Germany if Putin cuts supply of natural gas, to the number of interest rates increases in the US, to the duration of the war in Ukraine and the unfolding of the pandemic. Looking back at the key events in March it is easy to see why markets have been volatile. On March 7th, the CBOE S&P 500 Volatility Index climbed 115%, the same day that Brent Crude Oil picked at \$139.13. On March 15th the US FED approved a ¼ percentage point increase of the federal funds rate, the first increase since December 2018. In a hawkish stance, officials indicated rate increases at each of the remaining six meetings this year. The 10-year Treasury yield started the month at 1.74% and ended at 2.38%. In the last week of March, China went back to lockdown and financial hub Shanghai with its 25 million inhabitants becomes the hotspot of Covid cases in the country. After a month of war in Ukraine, peace talks on March 30th don't progress as Putin demands the surrender of Mariupol.

Putin to “solve climate change” versus “the war derails the energy transition”.

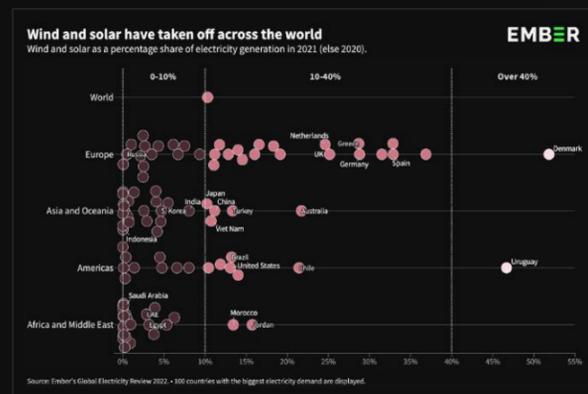
Polarized views dominate the news, with some analysts pointing out that Europe re-started several coal-fired power plants and must enter into long term contracts for US LNG from shale gas sources, to swap fossil fuel supplied by Russia, and, therefore, climate change mitigation is no longer a priority. This narrative is misleading. Coal, crude and natural gas did not become any more investible, cleaner, cheaper or less volatile since the invasion of Ukraine. Security of supply is a top priority for all countries, the EU in particular, and the acceleration of the energy transition is undeniable. President Macron is going forre-election on April 10th, Biden must do all he can to avert a massive mid-term election fiasco for the democrats in November. We must make a distinction between the need to avert a recession, to deal with inflation and manage this energy crisis, with the mid to long term commitment of moving away from fossil fuel.

Figures for solar and wind in 2021 are out – it was record high year for both.

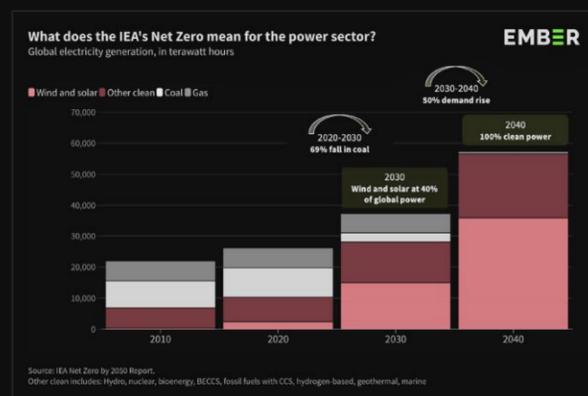
We were already accelerating the adoption of decarbonising solutions prior to the invasion

because these renewable sources of electricity are the most price competitive.

As independent not for profit think tank Ember recently reported, in 2021 solar generation rose 23% over the previous year, while wind generation increased by 14%.



Solar + Wind now represents over 10% of global electricity generation. If taking all clean electricity sources (i.e. nuclear, hydro and biomass) the non-fossil fuel based electricity generated on the planet in 2021 reached 38% (more than coal at 36%). When The Paris Agreement was signed in 2015 the share of electricity produced from solar + wind was 4.6%, so the 10.3% (to be precise) figure Ember reported for 2021 represents a 124% growth – more than double in around 5 years. Ember also highlights two remarkable trends in some coal heavy countries. Between 2019 and 2021 Australia's solar + wind rose from 13% to 22%, while their share of fossil fuels fell from 79% to 70%, and in Vietnam the participation of solar + wind rose from 3% to 11%, while their share of fossil fuels fell from 73% to 63%. The two graphs below show additional striking facts. First, note that all five of the world's largest economies passed the landmark of 10% electricity from solar and wind (US, China, Japan, Germany and the UK). Second, three countries (Denmark, Luxembourg and Uruguay) have passed the 40% level of electricity from wind and solar. Lastly, note that for the NetZero plan IEA published last year to materialize, solar and wind need to represent



40% of all electricity generated by 2030, a four-fold increase from current levels.

New legislation to add force to the tail wind of the decarbonisation megatrend.

On March 21st the US SEC released a 465-page document with its proposed rules for climate change related disclosures. The SEC is proposing for public comments, deadline on May 20th, on the language that would amend both the Securities Act of 1933 and the Exchanges Act of 1934. Companies, domestic as well as foreign registrants, would be required to include climate related information in their registration statements and periodic reports, including 10-Ks. Scope 1 and 2 metrics would start to be reported for Fiscal Year 2023

and Scope 3 figures starting for Fiscal Year 2024. GHG emission metrics are centre stage of the proposal, but financial disclosures are part of the goal: “proposed financial statement metrics would consist of disaggregated climate-related impacts on existing financial statement line items”. The ability to determine with precision what constitutes “green” revenue and capex, and what is “brown” revenue and capex will give investors a very powerful tool to determine where companies are in the energy transition, providing a much better view on where companies are in the energy transition. The SEC mandatory disclosure is of monumental importance as it will allow for a clear distinction of businesses facing fossil fuel risks and those with solutions. iClima will be formally submitting comments to the SEC during this public hearing phase.

INDEX PERFORMANCE IN MARCH AND LOOKING AHEAD

Coexistence of green growth and brown value will persist.

US shale gas is a short-term winner of the European energy crisis, but so are the green short-term solutions like energy efficiency, heat pumps, solar rooftops and local batteries. Consumers of electricity want security of supply and are embracing the alternatives readily available at fast pace, finding in the solutions a way to reduce electricity and heating costs. But make no mistake, fossil fuel is no longer viable in the long run and more long-term decarbonising technologies, like offshore wind, long duration energy storage and green hydrogen are the true winners of the energy crisis. Green and brown will coexist for a while, it is just inevitable for we are in a transition. As shown in the table below, March is an example of this coexistence, with iClima Distributed Energy Index up 5.65% while the iShares Oil & Gas E&P ETF was up 9.4%.

| | | Jan-22 | Feb-22 | Mar-22 |
|--------|--|---------|--------|--------|
| iClima | iClima Global Decarbonisation Enablers Index | -12.79% | 1.16% | 1.69% |
| iClima | iClima Distributed Renewable Energy Index | -17.43% | 5.52% | 5.65% |
| ^SPX | S&P 500 | -5.26% | -3.14% | 5.21% |
| ^IXIC | NASDAQ Composite | -8.98% | -4.14% | 5.08% |
| SMOG | VanEck Vectors ETF Trust – VanEck Vectors Low Carbon Energy ETF | -14.24% | 3.78% | 1.80% |
| ICLN | iShares Trust - iShares Global Clean Energy ETF | -11.43% | 10.45% | 3.91% |
| LIFE | Rize UCITS ICAV - Rize Environmental Impact 100 UCITS ETF | -11.37% | 0.89% | 3.24% |
| SPOG | iShares Oil & Gas Exploration & Production UCITS ETF | 15.41% | 4.82% | 9.40% |

In April, we expect recession concerns to be top of mind. As the first quarter came to an end, the yield curve inverted, in what is often seen as a sign of possible recession. On March 29th, the yield of the two-year Treasury Note rose above the yield of the ten-year, an event that had not been observed since August 2019. As economists often point out, in the last 50 years the inversion of the yield curve happened every time before the US economy entered into a recession. In Europe the recession fears will escalate if Putin indeed cuts the gas supply to Germany in retaliation for non-rouble payments of the exports. A sudden cut would force the German government to ration electricity, which would cause a GDP drop.

BIG MOVERS

SNAPSHOT OF DECARBONISATION INDEX BIG MOVERS

WORKHORSE

Workhorse (WKHS, up 59.74% in March) The last mile delivery EV company benefitted from a solid rally in 2020, shares peaked in January 2021 and has since suffered a massive drawdown. Share performance in the month is being attributed to the overall expectation that high gasoline prices will accelerate the adoption of BEVs. In addition to the trucks, the company also develops electric drone technology and a pilot program with US Department of Agriculture, that started in August last year, is showcasing the application of drones for wetland supervision and data collection. The company has been vocal about its intention to push their aerospace solutions.

ARCIMOTO

Arcimoto (FUV, up 12.41% in March) The fun utility electric three wheeled producer is another beneficiary of higher gasoline prices and the expected acceleration of adoption of more sustainable transportation alternatives. The company announced full year 2021 results, output nearly tripled, to 331 vehicles. Their new manufacturing plant is now in operation and at full capacity will be able to produce 50,000 vehicles a year. The company is pushing the rental model, with the first company owned rental facility opened in San Diego with more rental partnerships starting this year. Their shared mobility concept started also in CA, and the company launched three new FUV models (a pickup truck, a on-road three-wheeler, and a small fire combat equipped model).

SNAPSHOT OF DISTRIBUTED RENEWABLE ENERGY INDEX BIG MOVERS

SUNRUN SUNPOWER™

SunRun (RUN, up 11.33%), Sunpower (SPWR, up 19.8%) and Sunnova (NOVA, up 14.44%) are the top names in the installation of solar rooftops in the US market. A surge in oil & gas prices globally enhances the competitiveness of alternative clean energy solutions. Some investors expect a powerful rally, as producing electricity behind the meter from solar installations is one of the few short term solutions that consumers of electricity have in their hands to achieve security of supply and savings. An additional boost to these companies would come from a positive

Livent ALBEMARLE

Livent (LTHM, up 10.7% in the month), **Albermale Corporation** (ALB, up 12.89% in March) and **Sociedad Quimica y Minera** (SQM, up 29.34% in the month) are names in the Battery Supply Chain subsegment.

Commodity prices related to the energy transition were already rising before the war in Ukraine, and prices of minerals like nickel, lithium and cobalt have risen post invasion, lifting the stocks of relevant producers. Securing access to supply of key battery minerals is of strategic importance and president Biden is considering using the Defense Production Act to support investments in the US mining industry.

TESLA

Tesla (TSLA, up 23.8% in March) There is never a shortage of news on the leading BEV maker. The company announced a stock split plan, that would come in the form of a dividend, the second split in the last two years (previous split was in August 2020). Earlier in the month the company officially opened its Berlin Gigafactory (the first in Europe, located just outside Berlin). It has approval to produce up to 500,000 cars per year and 50 GWh of battery capacity at this site. The plant started operations 2.5 years after the company announced its plan, a delay to the original strategy mostly caused by Covid related supply chain issues. Lastly, the company just announced a one week shutdown of the Shanghai Gigafactory, due to the surge in Covid cases. Tesla sold 116,360 China made cars in the first two months of the year.

conclusion to the Build Back Better (BBB) legislation, that in its original text extended the tax credits for “local solar” to 10 years and increased the rate to 30%. There are three scenarios for a revised BBB: that it just simply is never approved, that democrats agree on Sen Manchin’s demand for a deficit reduction provision and pass the bill, or that lawmakers turn to bipartisan bills on key issues. The climate part of the bill always did receive support from Manchin so it is possible that some form of additional tax support for solar investment is approved before the mid-term elections.

maxeon

Maxeon Solar (MAXN, up 35.58%) and Meyer Burger (MBTN.SW, up 11.15%) are producers of solar rooftop panels, Maxeon with sales in over 100 countries while Meyer Burger sells higher end panels to the European market. The EU plans to support the adoption of one of the only short-term solutions to the energy crisis: solar panels behind the meter. The REPower EU plan aims for solar rooftops to front load around 15 TWh within a year, which would require 7 GW of behind the meter solar panels to be added to the system. As a reference, according to PV Tech, in 2021 almost 26 GW of solar was added to the grids across the 27 EU Member States, bringing the total installed capacity (that is predominantly comprised of utility scale solar) to near 165 GW.

stem

Stem (STEM, up 15.65% in the month) and Fluence (FLNC, down 3.1% in March) are US based companies with clean energy storage solutions, combining hardware, software and applying AI for storage asset optimization. Stem closed the month with a \$1.69 billion market cap, while Fluence closed at \$2.25 billion (both way below valuation at time of listing, when Stem was valued at \$3.97 billion and Fluence at \$4.7 billion). The clean energy storage market in the US alone is likely to growth over 120 x until 2035 and both companies are already growing significantly. Stem’s 2021 annual revenue reached \$127.4 million (it was \$36.3 million in FY21), while Fluence’s revenue in 2021 was \$680.8 million, \$561.3 in 2020 and \$92.1 in 2019.

EVgo

EvGo (EVGO, up 24.01% in the month) and ChargePoint (CHPT, up 36.91%) are two US based EV charging network companies. EVGo operates the largest public fast charging network for EVs and was the first to be powered 100% from renewable energy. The company reported annual results this month, with revenue up 52% over FY20 at \$22.2 million. EvGo ended the year with 850 locations, 1,900 stalls in operation plus a pipeline of over 3,100 stalls and a total of 3 million users across 30 states. ChargePoint announced the results for FY that ended in

January 2022, revenue at \$242.3 million, 65% above previous FY, reiterating guidance of revenue for the current FY between \$450 and \$500 million.

ENPHASE

Enphase Energy (ENPH, up 21.04% in March) is a 16-year-old company and a world leader in microinverters having sold over 13 GW since inception. The company is a global player that has evolved its offering beyond this innovative equipment, now building all-in-one solar, battery and software solutions. In FY 2021 revenue reached \$1.38 billion, almost double the FY 2020 \$774.4 million in sales. At end of month market cap of \$27 billion the company trades at P/S of 20.3, the P/S multiple was at its highest level at 38.1 in January 2021. Enphase is a solid player in the distributed renewable energy space.

AMERESCO Green • Clean • Sustainable

Ameresco (AMRC, up 23.74% in March). The company provides energy efficiency solutions, irrefutably one of the few short-term solutions to the current energy crisis. Revenues in FY 2021 reached \$1.2 billion and company reiterated guidance for what they expect to be “another year of strong growth in 2022” with revenues in the range of \$1.83 billion to \$1.87 billion and adjusted EBITDA between \$200 million to \$210 million. Energy conservation to generate cost savings is top of mind globally and Ameresco is a key player in the space.

SOLVING RENEWABLE ENERGY INTERMITTENCE:

THE RISE OF CLEAN ENERGY STORAGE SOLUTIONS

The invasion of Ukraine has led to a landmark moment of acceleration in the transition to renewable energy, with first Germany and then the EU announcing strategies to accelerate the deployment of low carbon technologies and energy efficiency improvements alongside the re-sourcing of natural gas. We are at a historical juncture, with decisions taken now likely to have a major impact on the energy system of the future.

Energy storage is a crucial part of this discussion, and it is encouraging to see that the debate has moved from whether a grid could be 100% renewable based, to how energy storage is to unfold and enable a purely green grid. As Marek Kubik [explained](#), the “question isn’t really if we can solve this issue, but rather what the most cost-effective solution will be”. Marek is an energy storage specialist and Managing Director at Fluence Energy. The company is a JV between AES and Siemens and a leading energy storage tech player, having designed and installed several battery-based energy storage systems, currently the solution of choice for almost all new energy storage deployment worldwide.

The popularity of batteries is due to the fact they are ideal for second-to-second grid balancing and for keeping the grid stable when there is a lot of intermittent generation from wind and solar. Marek emphasizes that batteries are also well positioned to bridging daily imbalances – a 100MW solar farm with a 100MW/400MWh battery system “can more or less provide firm power around the clock, even at night.” It might be surprising, but Marek emphasizes that a grid does not need that much duration to deal with daily variability. His view is that the longest durations we will see required are 6 to 8 hours, and batteries are already competitive for that. However, weekly or seasonal storage will be needed if we are to get the last 10 to 20% of electricity off fossil fuel generation. While wind and solar are somewhat complimentary – stronger winds in the winter and of course longer days in the summer, we still get periods where both will be insufficient. There are several solutions to seasonal storage – green hydrogen, compressed or liquid air, thermal storage, gravity based and pumped hydro being the technologies attracting material investments.

We cannot be afraid of curtailing renewable energy

Solar panels have been on a deflationary slope since the 70’s. More recently, between 2010 and 2020, the global weighted-average total

installed costs of utility-scale solar PV went down by 81% (from US\$ 4,731/kW in 2010, to ca. US\$ 883/kW in 2020). Tony Seba and his team at [RethinkX](#) forecast that the combined capital cost of solar PV, wind power, and batteries will decline a further 75% by 2030 . This means that the total installed costs of utility-scale solar PV could reach US\$ 221/kW by 2030. As a reference, the Energy Information Administration, EIA, [estimates](#) that the base cost for a natural gas fired combined cycle power plant in 2020 was US\$958/kW.

Tony Seba, a specialist in energy system disruption, argues that

“IT IS BOTH PHYSICALLY POSSIBLE AND ECONOMICALLY AFFORDABLE TO MEET 100% OF ELECTRICITY DEMAND WITH THE COMBINATION OF SOLAR, WIND AND BATTERIES (SWB) BY 2030 ACROSS THE ENTIRE CONTINENTAL UNITED STATES AS WELL AS THE OVERWHELMING MAJORITY OF OTHER POPULATED REGIONS OF THE WORLD.”

RethinkX believes that solar will become overwhelmingly the cheapest possible source of electricity, making the marginal cost of energy for a system run off solar and wind at a ratio of 10:1 near zero for most parts of the year.

Perhaps the most striking finding from RethinkX’s report was that, contrary to most simulations that aim to minimise curtailed energy, the team designed their energy system model to maximise energy surplus production. Seba argues that generation capacity can be maximised if sized to meet demand on a short cloudy winter day, with storage becoming far less of an issue. Producing solar energy is very likely to cost much less than storing clean energy. The cost competitiveness of this grid is such that RethinkX estimates it could be built at a cost equivalent to 1% of the US’s GDP.

The US Grid to 2035: Over 10 x solar and 100 x clean energy storage growth

At the same time last year another relevant study was published. The US Department of Energy’s (DoE) published its [Solar Futures Study](#). According to the DoE, the US had around **76 GW** of solar capacity (of which 46 GW was utility scale, 28 GW was distributed solar and 2 GW was CSP) in 2020, which **supplied ca. 3%** of the country’s electricity demand. In the Study, three scenarios to 2050

were modelled, a Moderate case, a Decarbonisation case, and a Decarbonisation + Electrification case that sees CO2 emissions fall 95% by 2035, with 90% of electricity produced by solar and wind by 2050.

By 2035, the study predicts that battery storage in the US is to jump from current **3GW to 374GW** under the most positive scenario. In their Decarbonization + Electrification case the US **reaches 994 GW of solar** capacity by 2035, versus 373 GW in the most moderate case. A crucial finding is that the ratio of solar PV in the system between the Decarbonisation + Electrification and the Moderate cases is ca. 3x. while in the same year the ratio of battery storage capacity between the two cases is ca. 6x (374 GW in total versus 59 GW). Clearly, the more solar the system has, the more it needs storage. In all scenarios, the duration of battery solutions until 2035 is mostly 4 hours and 6 hours, with 8-hour storage being less than 5% of all clean energy storage in the Decarbonisation + Electrification case. In this accelerated decarbonization case the US grid reaches ca. 78% wind and solar despite it being unlikely that seasonal storage will yet be operational.

Salt caverns and the acceleration of the energy transition in Germany

Germany is bringing forward its goal of reaching a predominantly green grid – post Ukraine invasion the target was set to 2035, as opposed to the original 2050. The path to a 100% renewable energy system requires long duration energy storage. The discussion is no

longer if it can be done, but how it can be done. A recently published [article](#) by Oliver Ruhnay, PhD in Energy Economics gives us insights on the storage needed to enable such target.

This study estimates the storage requirements for Germany to reach 100% renewable electricity by 2030. The authors looked at 35 years of hourly time series data for renewable generation and load and concluded that the maximum energy deficit due to scarce wind and solar occurs over a period of 9 weeks. Solving for this, a potential solution based on a cost optimization model, would require 56 TWh of storage (for an assumed annual electricity demand of 540 TWh). The primary storage source would be hydrogen in salt caverns (54 TWh), sufficient to supply 24 days of average load (so 36 TWh of electricity, 7% of the annual load). Moreover, existing pumped hydro storage would contribute 1.3 TWh and batteries just 59 GWh (although this figure would represent a 40-fold increase vis-a-vis the 1.5 GWh installed capacity of small- and large-scale batteries in Germany). A striking point is that only 65% of the primary energy supply would be used to serve load (455 TWh), 23% would be charged into storage (160 TWh) while 12% would be curtailed (84 TWh).

The final combination of long duration energy storage will be a function of the evolution of the different technologies and the different costs. Additional solutions like vehicles to grid and virtual power plants, both aggregating batteries distributed across the grid, are also evolving fast. The question is no longer “if” the grid can be 100% renewable based, but when and how.



Source: <https://fuelcellsworld.com/news/u-s-is-building-salt-mines-to-store-hydrogen/>

JULIAN POULTER

AND THE INEVITABILITY OF THE TRANSITION

Julian Poulter is a partner at Energy Transition Advisors (ETA) and former founder of the Asset Owners Disclosure Project (AODP). Julian spent the early part of his career as a consultant with companies like KPMG, working primarily in oil, gas and finance, a combination which he never expected would prove so useful.

A self-professed 'Al Gore convert', Julian was struck by the mammoth financial implications of the climate crisis after watching An Inconvenient Truth. Seeking institutions addressing this issue, he found only the Carbon Disclosure Project, now CDP, for investors, so founded the AODP as an equivalent for asset owners. When the Task Force for Climate Related Financial Disclosure (TCFD) was formed, incorporating many of the core principles of the AODP, Julian moved on to ETA. Here, he serves as a key member of the UNPRI's Inevitable Policy Response Consortium, providing realistic forecasts for financial institutions. During our interview, he shared some valuable insights from these forecasts, as well as some wider thoughts on the character of the transition ahead.

The IPR consortium incorporates three core assumptions into its model. Firstly, that governments will not permit anything less than flat GDP in pursuit of decarbonisation. Secondly, and similarly, governments will not 'hammer' developing world economies with taxes etc, ensuring to at least some extent a just transition. Finally, it uses only commercially viable technologies in its forecasts.

The headline conclusion from their work is that the transition is inevitable. They predict plummeting demand for fossil fuels, a strong policy ratchet in the mid-2020s and the continued drop in prices of renewable technology.

Unfortunately, a major finding is also that achieving Net Zero by 2050 is effectively beyond reach. Thus, they predict an increasing use of negative emissions technologies (NETs) in order to claw back the overshoot. This will be primarily afforestation and reforestation, with some increasing exploration into more esoteric carbon removal technologies such as direct air capture (DAC) in the late 2020s.

Julian is cautious in hypothesising on the character of the transition. He is clear that short term fossil fuel price rises will not alter the direction of travel, and investors seeking immediate gains on these price rises risk being stung by the fundamental and inevitable demand reduction. He also notes that these rising fossil fuel price rises only entrench the competitiveness of renewable energy, further driving down fossil fuel demand. Beyond this certainty, he argues that the scale of disruption is unquantifiable. While unlikely to cause the economy-wide contagion seen with the collapse of the subprime mortgage market in 2007, there could still be significant losses, particularly with each year that serious policy action is delayed and must therefore become more drastic.

It is brilliant to hear Julian's analysis of the path ahead, and recent events only make it more certain. In the last month alone, Germany, the Netherlands, France, Belgium, Italy, the UK and the European Commission have all announced the sort of policy acceleration that the IPR had forecasted for the middle of the decade, all in response to the energy crisis and Russia's invasion of Ukraine. Fossil fuel use may surge in the very short term, but the fundamental economics on which Julian is so certain are only further shifting, and further entrenching the competitiveness of renewable technologies.



NASDAQ

THE WORLD REIMAGINED

Gaby now writes weekly articles for Nasdaq.

Please find below the first four articles on various topical issues pertaining ESG and green investments.



The European Union is not letting a crisis go to waste.



How the European Union will embrace innovation and accelerate renewable energy plans.



Why we need to be more precise with ESG definitions.



Cars are becoming autonomous, computerized power plants on wheels.

ANALYSING THE MAINSTREAM INDICES: THE CASE OF ISHARES 'ICLN'

ICLN iSHARES GLOBAL CLEAN ENERGY ETF

- The Good:**
Over \$5 billion AUM, TER of 42 bps.
- The Bad:**
ICLN used to be a very concentrated (sub 35) fund and had to change approach in 2021. The over exposure to Plug Power caused the strong 2020 performance but also the poor 2021 return.
- The Ugly:**
In reality, ICLN misses several key solutions and has constituents that are not relevant for the clean energy transition.
- It has three large hydro Brazilian names (Cemig, Copel, and Eletrobras). Large hydro is not a clean energy solution (it is low emission energy), this showcases that the S&P Global Clean Energy index was built with the same backward looking toolkit, looking for low emission energy names as a proxy for clean energy.
- It has Siemens Energy AG (material fossil fuel association), and EDP and Electrobras (material coal fired power plant assets).
- It misses several fast-growing key solutions for the clean energy future, such as long duration energy storage, energy efficiency, vehicles to grid, virtual power plants, battery recycling.
- Despite promise, ICLN ends up effectively as a utility scale solar and wind play, once the only solutions. It lacks a forward looking metric and fails to exclude companies with fossil fuel assets.

GCLIMUN iCLIMA DECARBONISATION ENABLERS INDEX

- One stop shop for comprehensive decarbonisation solutions. Over 100 companies NOT part of ICLN, including electric transportation, battery supply chain, energy efficiency, telepresence, water & waste solutions, recycling solutions, pollution control, ride sharing, plant based diet, lighting solutions and more. Negative screening, green revenue analysis, and a forward looking metric (PAE).



GLDGENER iCLIMA DISTRIBUTED RENEWABLE INDEX

- Represents the fastest growing segment in clean energy, also the only short term solutions to the energy crisis. Energy efficiency, local solar and local batteries, all components of a distributed, digital and renewables based grid. Negative screening, green revenue analysis and a forward looking metric (PAE).



| Annualized returns | 2019 | 2020 | 2021 | 2022 YTD |
|---------------------------------------|--------|---------|---------|----------|
| ICLN Clean Energy | 43.81% | 141.31% | -23.80% | -0.89% |
| iClima Decarbonisation Enablers Index | 31.91% | 83.51% | 7.33% | -9.68% |
| iClima Distributed Renewable Index | 77.66% | 134.24% | 18.18% | -7.71% |

ICLN
Represents predominantly large solar and wind. It does NOT represent a holistic set of climate change, or even clean energy, solutions.
75 constituents.

| | | |
|----|--|-------|
| 1 | Aemetis, Inc. | 0.11% |
| 2 | Algonquin Power & Utilities Corp. | 1.73% |
| 3 | Array Technologies Inc | 0.49% |
| 4 | Atlantica Sustainable Infrastructure plc | 0.56% |
| 5 | Avangrid, Inc. | 0.81% |
| 6 | Azure Power Global Ltd. | 0.13% |
| 7 | Ballard Power Systems Inc. | 0.95% |
| 8 | BKW AG | 0.61% |
| 9 | Bloom Energy Corporation Class A | 1.15% |
| 10 | Boralex Inc. Class A | 0.94% |
| 11 | Brookfield Renewable Corporation Class A | 1.17% |
| 12 | Canadian Solar Inc. | 0.40% |
| 13 | Centrais Eletricas Brasileiras SA | 0.62% |
| 14 | China Datang Corp. Renewable Power Co. Ltd. Class H | 0.32% |
| 15 | Clearway Energy, Inc. Class C | 0.78% |
| 16 | Companhia Energetica de Minas Gerais SA | 0.99% |
| 17 | Companhia Paranaense de Energia | 0.28% |
| 18 | Consolidated Edison, Inc. | 6.14% |
| 19 | Contact Energy Limited | 0.81% |
| 20 | CS Wind Corp. | 0.41% |
| 21 | Daqo New Energy Corp Sponsored ADR | 0.89% |
| 22 | Doosan Fuel Cell Co., Ltd. | 0.47% |
| 23 | EDP Renovaveis SA | 2.03% |
| 24 | EDP-Energias de Portugal SA | 3.62% |
| 25 | Encavis AG | 0.79% |
| 26 | Enel Americas S.A. Sponsored ADR | 0.58% |
| 27 | Energix-Renewable Energies Ltd. | 0.31% |
| 28 | Enlight Renewable Energy Ltd | 0.49% |
| 29 | Enphase Energy, Inc. | 8.32% |
| 30 | ERG S.p.A. | 0.46% |
| 31 | Falck Renewables S.p.A. | 0.39% |
| 32 | First Solar, Inc. | 2.67% |
| 33 | Flat Glass Group Co., Ltd. Class H | 0.67% |
| 34 | FuelCell Energy, Inc. | 0.59% |
| 35 | GCL New Energy Holdings Limited | 0.06% |
| 36 | Green Plains Inc. | 0.51% |
| 37 | Gremz, Inc. | 0.05% |
| 38 | HANWHA SOLUTIONS CORPORATION | 0.91% |
| 39 | Iberdrola SA | 3.61% |
| 40 | Innogy Renewable Energy Inc. | 0.78% |
| 41 | JinkoSolar Holding Co., Ltd. Sponsored ADR | 0.69% |
| 42 | Maxeon Solar Technologies, Ltd. | 0.10% |
| 43 | McPhy Energy SA | 0.18% |
| 44 | Meridian Energy Limited | 0.72% |
| 45 | Meyer Burger Technology AG | 0.38% |
| 46 | NEL ASA | 0.47% |
| 47 | Neoen S.A. | 0.70% |
| 48 | NordeX SE | 0.69% |
| 49 | Northland Power Inc. | 1.92% |
| 50 | Ormat Technologies, Inc. | 0.92% |
| 51 | Orsted | 5.95% |
| 52 | Plug Power Inc. | 4.33% |
| 53 | PowerCell Sweden AB | 0.31% |
| 54 | Renewable Energy Group, Inc. | 1.07% |
| 55 | RENOVA, Inc. | 0.18% |
| 56 | Scatec ASA | 0.66% |
| 57 | Shoals Technologies Group, Inc. Class A | 0.70% |
| 58 | Siemens Energy AG | 1.65% |
| 59 | Siemens Gamesa Renewable Energy, S.A. | 1.61% |
| 60 | SMA Solar Technology AG | 0.25% |
| 61 | SolarEdge Technologies, Inc. | 6.10% |
| 62 | Solaria Energia y Medio Ambiente, S.A. | 0.56% |
| 63 | SSE plc | 3.76% |
| 64 | Sunnova Energy International Inc | 0.77% |
| 65 | SunPower Corporation | 0.58% |
| 66 | Sunrun Inc. | 2.11% |
| 67 | TPI Composites, Inc. | 0.18% |
| 68 | Unison Co., Ltd | 0.08% |
| 69 | VERBIO Vereinigte BioEnergie AG | 0.43% |
| 70 | VERBUND AG Class A | 1.80% |
| 71 | Vestas Wind Systems A/S | 8.26% |
| 72 | West Holdings Corporation | 0.22% |
| 73 | Xinjiang Goldwind Science & Technology Co., Ltd. Class H | 0.40% |
| 74 | Xinyi Energy Holdings Limited | 0.39% |
| 75 | Xinyi Solar Holdings Ltd. | 2.97% |

Legend & Comments:
Unique to iCLIMA indices
EDP will not be coal free until 2025
Siemens Energy has material FF association
Large hydro is not an environmentally friendly solution
Eletrobras owns most of the coal fired power plants in Brazil

GCLIMUN
iClima Decarbonisation Index represents a comprehensive set of decarbonization solutions.
166 constituents.

| | | |
|-----|---|-------|
| 1 | ABB LTD-REG | 0.98% |
| 2 | ACCIONA SA | 0.72% |
| 3 | ACEA SPA | 0.52% |
| 4 | ACUTY BRANDS INC | 0.59% |
| 5 | ADVANCED ENERGY INDUSTRIES INC | 0.30% |
| 6 | ALBEMARLE CORP | 0.78% |
| 7 | ALFEN NV | 0.40% |
| 8 | ALGONQUIN POWER & UTILITIES | 0.73% |
| 9 | ALSTOM SA | 0.51% |
| 10 | AMERESCO INC | 0.46% |
| 11 | AMERICAN WATER WORKS CO INC | 0.89% |
| 12 | APPLIED MATERIALS INC | 0.94% |
| 13 | APTIV PLC | 0.84% |
| 14 | ARGIMOTO INC | 0.35% |
| 15 | ATLANTICA SUSTAINABLE INFRASTRUCTURE PLC | 0.66% |
| 16 | AUDAX RENOVABLES SA | 0.31% |
| 17 | AZBIL (YAMATAKE) CORP ORD | 0.53% |
| 18 | BADGER METER INC | 0.29% |
| 19 | BALLARD POWER SYSTEMS INC | 0.33% |
| 20 | BANDWIDTH INC | 0.14% |
| 21 | BEYOND MEAT INC | 0.21% |
| 22 | BLINK CHARGING CO | 0.36% |
| 23 | BLOOM ENERGY CORP | 0.46% |
| 24 | BORALEX INC -A | 0.36% |
| 25 | BORGWARNER INC | 0.60% |
| 26 | BYD CO LTD | 0.89% |
| 27 | CANADIAN SOLAR INC | 0.38% |
| 28 | CARBIO SA | 0.27% |
| 29 | CERES POWER HOLDINGS PLC | 0.37% |
| 30 | CHARGEPOINT HOLDINGS INC | 0.77% |
| 31 | CHINA HIGH SPEED TRANSMISSION EQUIPMENT GROUP CO LTD | 0.25% |
| 32 | COMPAGNIE DE SAINT GOBAIN SA | 0.94% |
| 33 | CONTACT ENERGY LTD | 0.63% |
| 34 | DELTA ELECTRONICS INC | 0.82% |
| 35 | DOCUSIGN INC | 0.62% |
| 36 | DOOSAN FUEL CELL CO LTD | 0.35% |
| 37 | DS SMITH PLC | 0.52% |
| 38 | EAST JAPAN RAILWAY CO | 0.87% |
| 39 | EATON CORPORATION PLC | 0.96% |
| 40 | ECOLAB INC | 0.90% |
| 41 | ECOPOR CO LTD | 0.41% |
| 42 | ECOPOR HN CO LTD | 0.32% |
| 43 | EDISON INTERNATIONAL | 0.97% |
| 44 | EDP RENOVAVEIS SA | 1.01% |
| 45 | ENCAVIS AG | 0.37% |
| 46 | ENCE ENERGIA Y CELULOSA SA | 0.38% |
| 47 | ENERGIX-RENEWABLE ENERGIES LTD | 0.31% |
| 48 | ENERSYS | 0.31% |
| 49 | ENLIGHT RENEWABLE ENERGY LTD | 0.32% |
| 50 | ENPHASE ENERGY INC | 1.15% |
| 51 | EVGO INC | 0.45% |
| 52 | EXIDE INDUSTRIES LTD | 0.27% |
| 53 | FALCK RENEWABLES SPA | 0.30% |
| 54 | FERGUSON PLC | 0.91% |
| 55 | FIRST SOLAR INC | 0.72% |
| 56 | FLUENCE ENERGY INC | 0.43% |
| 57 | FUELCCELL ENERGY INC. | 0.45% |
| 58 | GENERAC HOLDINGS INC | 0.98% |
| 59 | GIANT MANUFACTURING CO LTD ORD | 0.51% |
| 60 | HALMA PLC | 0.84% |
| 61 | HANNON ARMSTRONG SUSTAINABLE INFRASTRUCTURE CAPITAL INC | 0.69% |
| 62 | HELLOFRESH SE | 0.46% |
| 63 | IBERDROLA SA | 0.95% |
| 64 | IDEX CORP | 0.86% |
| 65 | INFINEON TECHNOLOGIES AG | 0.83% |
| 66 | INNERGEX RENEWABLE ENERGY INC | 0.31% |
| 67 | ITM POWER PLC | 0.39% |
| 68 | ITRON INC | 0.25% |
| 69 | JINKOSOLAR HOLDING CO-ADR | 0.35% |
| 70 | JOHNSON MATTHEY PLC | 0.58% |
| 71 | KANDI TECHNO | 0.33% |
| 72 | KERRY GROUP PLC-A | 0.80% |
| 73 | KINGSPAN GROUP PLC | 0.91% |
| 74 | KION GROUP AG | 0.65% |
| 75 | KLABIN SA - UNIT | 0.66% |
| 76 | LANDIS+GYR GROUP AG | 0.30% |
| 77 | LEE & MAN PAPER MANUFACTURING ORD | 0.24% |
| 78 | LI AUTO INC | 0.86% |
| 79 | LI-CYCLE HOLDINGS CORP | 0.35% |
| 80 | LITTELFUSE INC | 0.70% |
| 81 | LIVENT CORP | 0.61% |
| 82 | LIXIL GROUP CORP | 0.62% |
| 83 | LKQ CORP | 0.75% |
| 84 | LONDON STOCK EXCHANGE GROUP ORD | 1.06% |
| 85 | LUOYANG GLASS COMPANY LTD-H | 0.34% |
| 86 | LYFT INC | 0.70% |
| 87 | MAXEON SOLAR ORD | 0.41% |
| 88 | MCPHY ENERGY SA | 0.36% |
| 89 | MERCURY NZ LTD | 0.65% |
| 90 | MERIDIAN ENERGY LTD | 0.82% |
| 91 | MEYER BURGER TECHNOLOGY AG | 0.36% |
| 92 | MONDI PLC | 0.55% |
| 93 | MYR GROUP INC/DELAWARE | 0.33% |
| 94 | NEL ASA | 0.40% |
| 95 | NEOEN SA | 0.68% |
| 96 | NEXANS | 0.61% |
| 97 | NEXTERA ENERGY PARTNERS LP | 0.64% |
| 98 | NFI GROUP INC | 0.23% |
| 99 | NIBE INDUSTRIER AB | 0.95% |
| 100 | NIO INC - ADR | 0.80% |
| 101 | NIU TECHNOLOGIES | 0.22% |
| 102 | NORDEX SE | 0.35% |
| 103 | NORTHLAND POWER INC | 0.68% |
| 104 | NOVOZYMES AS CLASS B | 0.84% |
| 105 | NUVVE HOLDING CORP | 0.27% |
| 106 | OATLY GROUP AB | 0.45% |
| 107 | ORMAT TECHNOLOGIES INC | 0.72% |
| 108 | ORSTED A/S | 1.10% |
| 109 | PENTAIR PLC | 0.89% |
| 110 | PLUG POWER INC | 0.78% |
| 111 | POTLATCHDELTIC CORPORATION | 0.63% |
| 112 | POWERCELL SWEDEN AB | 0.35% |
| 113 | PROTERRA INC | 0.30% |
| 114 | PRYSMIAN SPA | 0.70% |
| 115 | QUANTA SERVICES INC | 1.07% |
| 116 | REGAL REKNORD CORP | 0.69% |
| 117 | RENEWABLE ENERGY GROUP INC | 0.49% |
| 118 | RENOVA INC | 0.27% |
| 119 | REPUBLIC SERVICES INC | 1.02% |
| 120 | RESIDEO TECHNOLOGIES INC | 0.65% |
| 121 | ROYAL DSM NV | 0.92% |
| 122 | SAMSUNG SDI CO LTD | 0.84% |
| 123 | SCATEC ASA | 0.32% |
| 124 | SCHNEIDER ELECTRIC SE | 0.98% |
| 125 | SHOALS TECHNOLOGIES GROUP INC | 0.36% |
| 126 | SIEMENS AG | 0.98% |
| 127 | SIEMENS GAMESA RENEWABLE ENERGY | 0.88% |
| 128 | SIMPLIO TECHNOLOGY | 0.29% |
| 129 | SMA SOLAR TECHNOLOGY AG | 0.36% |
| 130 | SMART METERING SYSTEMS PLC | 0.27% |
| 131 | SMITH (A.O.) CORP | 0.63% |
| 132 | SOC QUIMICA Y MINERA CHILE-B | 1.20% |
| 133 | SOLAREDGE TECHNOLOGIES INC | 0.99% |
| 134 | SOLARIA ENERGIA Y MEDIO AMBI | 0.37% |
| 135 | STEM INC | 0.22% |
| 136 | SUMITOMO FORESTRY CO LTD | 0.62% |
| 137 | SUNNOVA ENERGY INTERNATIONAL INC | 0.38% |
| 138 | SUNPOWER CORP-CLASS A | 0.39% |
| 139 | SUNRUN INC | 0.72% |
| 140 | SUZANO SA | 0.75% |
| 141 | TATTOOED CHEF INC | 0.29% |
| 142 | TESLA INC | 0.94% |
| 143 | TOMRA SYSTEMS ASA | 0.65% |
| 144 | TPI COMPOSITES INC | 0.38% |
| 145 | TRANE TECHNOLOGIES PLC | 0.96% |
| 146 | TRIMBLE INC | 0.85% |
| 147 | UBER TECHNOLOGIES INC | 0.89% |
| 148 | UMICORE | 0.78% |
| 149 | UNITED RENEWABLE ENERGY CO LTD | 0.34% |
| 150 | URPM-KYMMENE OYJ | 0.81% |
| 151 | VEECO INSTRUMENTS INC | 0.32% |
| 152 | VERBUND AG | 0.92% |
| 153 | VESTAS WIND SYSTEMS A/S | 1.04% |
| 154 | VICOR CORP | 0.47% |
| 155 | VIVINT SMART HOME INC | 0.30% |
| 156 | VOLTA INC | 0.28% |
| 157 | VONOVIA SE | 0.91% |
| 158 | WACKER CHEMIE AG | 0.77% |
| 159 | WASTE CONNECTIONS INC | 0.98% |
| 160 | WEYERHAEUSER CO | 0.90% |
| 161 | WOLFSPEED INC | 0.73% |
| 162 | WORKHORSE GROUP INC | 0.36% |
| 163 | XINJIANG GOLDWIND SCIENCE & TECHNOLOGY CO LTD | 0.58% |
| 164 | XINYI SOLAR HOLDINGS LTD | 0.80% |
| 165 | XPENG INC - ADR | 0.78% |
| 166 | ZOOM VIDEO COMMUNICATIONS INC | 0.73% |

GLDGENER
iClima Distributed Renewable is the only index focusing on local solutions and energy efficiency.
56 constituents.

| | | |
|----|----------------------------------|-------|
| 1 | ABB LTD-REG | 1.63% |
| 2 | ADVANCED ENERGY INDUSTRIES INC | 1.67% |
| 3 | ADVANTECH CO LTD ORD | 1.56% |
| 4 | ALFEN NV | 2.18% |
| 5 | ALSTOM SA | 1.22% |
| 6 | AMERESCO INC | 2.50% |
| 7 | ANALOG DEVICES INC | 1.58% |
| 8 | BALLARD POWER SYSTEMS INC | 1.83% |
| 9 | BLINK CHARGING CO | 1.97% |
| 10 | BLOOM ENERGY CORP | 2.51% |
| 11 | BYD CO LTD | 1.48% |
| 12 | CANADIAN SOLAR INC | 2.09% |
| 13 | CHARGEPOINT HOLDINGS INC | 2.13% |
| 14 | CLEANSARK INC | 2.56% |
| 15 | CUMMINS INC | 1.52% |
| 16 | EATON CORPORATION PLC | 1.60% |
| 17 | ENERSYS | 1.68% |
| 18 | ENPHASE ENERGY INC | 2.13% |
| 19 | EVGO INC | 2.46% |
| 20 | FLUENCE ENERGY INC | 1.18% |
| 21 | FUELCCELL ENERGY INC. | 2.48% |
| 22 | GENERAC HOLDINGS INC | 1.81% |
| 23 | INFINEON TECHNOLOGIES AG | 1.37% |
| 24 | ITM POWER PLC | 2.11% |
| 25 | ITRON INC | 1.38% |
| 26 | LANDIS+GYR GROUP AG | 1.62% |
| 27 | MEIDENSHA CORP | 1.42% |
| 28 | MEYER BURGER TECHNOLOGY AG | 1.97% |
| 29 | MYR GROUP INC/DELAWARE | 1.80% |
| 30 | NEXANS | 1.69% |
| 31 | NIBE INDUSTRIER AB | 1.75% |
| 32 | NUVVE HOLDING CORP | 1.49% |
| 33 | NXP SEMICONDUCTOR NV | 1.51% |
| 34 | PHIHONG TECHNOLOGY CO LTD | 1.62% |
| 35 | PLUG POWER INC | 1.84% |
| 36 | PROTERRA INC | 1.62% |
| 37 | PRYSMIAN SPA | 1.66% |
| 38 | QUANTA SERVICES INC | 1.98% |
| 39 | RESIDEO TECHNOLOGIES INC | 1.80% |
| 40 | SCHNEIDER ELECTRIC SE | 1.62% |
| 41 | SIEMENS AG | 1.61% |
| 42 | SMA SOLAR TECHNOLOGY AG | 1.97% |
| 43 | SMART METERING SYSTEMS PLC | 1.49% |
| 44 | SOLAREDGE TECHNOLOGIES INC | 2.35% |
| 45 | STEM INC | 1.19% |
| 46 | SUNNOVA ENERGY INTERNATIONAL INC | 2.10% |
| 47 | SUNPOWER CORP-CLASS A | 2.15% |
| 48 | SUNRUN INC | 1.98% |
| 49 | TESLA INC | 1.55% |
| 50 | TRIMBLE INC | 1.57% |
| 51 | VALMONT INDUSTRIES | 1.84% |
| 52 | VERITONE INC | 1.79% |
| 53 | VICOR CORP | 1.29% |
| 54 | VIVINT SMART HOME INC | 1.66% |
| 55 | VOLTA INC | 1.53% |
| 56 | XINYI SOLAR HOLDINGS LTD | 1.89% |

DON'T MISS OUT ON THE TAILWINDS BEHIND THE KEY SOLUTIONS TO THE ENERGY CRISIS.
Re-allocate part of your ICLN position to the broader and more impactful iClima Decarbonisation and to the disruptive and system changing iClima Distributed Renewable Index.

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