

Navigating the Green Transition

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Abstract

Green investing (also variously referred to as “clean, sustainable, and climate change” investments) is an investment approach that has gained considerable momentum. By 2018, at least \$30.7 trillion of funds is held in sustainable or green investments, up 34% from 2016, according to a report by the Global Sustainable Investment Alliance. During the first quarter of 2020, global sustainable funds further saw inflows of \$45.7 billion, according to Morningstar, while the broader fund universe had an outflow of \$384.7 billion.

In fact, this investing approach was already coming off a banner year through the well-known ESG approach. However, green investment is more than ESG. For example, Tesla’s ESG rating is controversial, but its products are undoubtedly green. In this report, attention will be given to “green investment”, which its evaluation is mainly based on environmental performance. We also see an acceleration in green investment in the aftermath of Covid-19. In the equity market, iShares Global Clean Energy ETF - the world’s largest clean energy ETF - has gained 101% year-to-date (09/12/2020), as compared to 14.38% in the S&P 500.

As green investment continues to gain audiences among institutions, policymakers and citizens, we expect the green wave to be one of the most important secular trends through the years. And we invite investors to include sustainability in portfolios to take the advantages in the increasing demand and the benefits of risk diversification and deliverable returns.

In the following parts of the report, we first discussed why sustainability became the most wanted investment since Covid-19. We also presented how green investing delivers better performance through empirical risk-return analysis. Further, we consulted a clean-energy engineer, who works for the Nasdaq-listed company Canadian Solar, to guide investors through the renewable industry. And based on the industry insight we proposed investment recommendations. Finally, we informed investors of potential limitations that may appear during the investment period.

1. Green investments to accelerate in post-COVID times

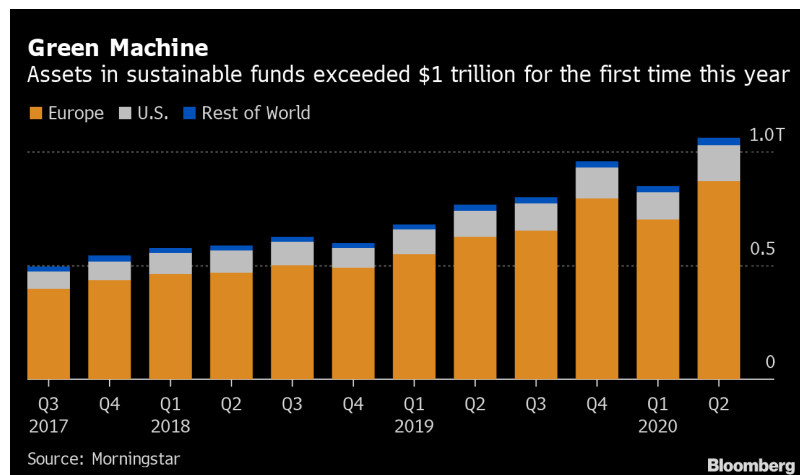
The ongoing COVID-19 pandemic has dealt great damage to the world's economy, yet Covid-19 may as well prove to be a major turning point for green investing as trillion dollars were pulled in to green recovery and as the pandemic alters society's values.

1.1 Fiscal Stimulus

Both monetary and fiscal responses to COVID-19 pandemic have been large and swift. Specifically, fiscal policy plays a larger role today than in the global financial crisis. The effects of both sides are self-evident: Fed's quantitative easing tends to inflate asset prices through discount factor, as it already did in the past decade, meanwhile fiscal policy is more of a demand-side stimulus. Overall, they encourage investments and spendings. To figure out the direction for those investments, let's look at the fiscal commitments. We will regard three key economic areas: Europe, the US and China.

- **Europe**

The European Commission announced in September a €750 billion stimulus, among which €225 billion (30%) of green bonds will be issued as part of this pandemic recovery fund. This green bond issuance alone will be enough to approximately equal the volume of green securities sold globally last year. Additionally, the European Central Bank decided it will accept green bonds as collateral for Eurosystem operations as well as include such debt in its asset purchase schemes, starting in January 2021.



- **United States**

In the United States, the president-elect Joe Biden has pledged to re-join the Paris Agreement. His words, “on my first day in office after the Trump administration”, underlies the priority of climate related issues in his plans. Mr. Biden intends to make US electricity production, for long dominated by coal, carbon-free by 2035 and to have the country achieve net zero emissions around the middle of the century. To go in this direction, as part of his plan to reboot the country's economy, he announced a \$2.2 trillion fiscal support in the renewable energy sector.

Moreover, he expressed his intentions to invest in electric vehicles manufacturing and charging points, financial incentives for consumers to trade in their vehicle for a cleaner alternative, more efficient sustainable construction projects, a modern reiteration of the Civilian Conservation Corps as well as various of nature-based solutions for climate change, further cementing his green views for the nation.

- **China**

China is also striving to improve its environmental bearings. President Xi Jinping announced to the UN General Assembly that the country, for long one of the world's biggest polluters, is taking steps to fight against climate change. Mr. Xi declared that the CO2 emission peak will occur before 2030 and that China will become carbon neutral by 2060.

The government introduced the New Infrastructure Plan, as part of its post-COVID-19 recovery package, to encourage investments in 7 key areas: 5G networks, industrial internet, inter-city transportation and rail systems, data centers, AI, ultra-high voltage power transmission, and new-energy vehicle charging stations. The government investment in these new infrastructure projects is expected to total around \$ 1.43 trillion to \$2.51 trillion for the next five-year period until 2025. Although there remain several questions as to how exactly carbon neutrality will be achieved, what actions will the country take, and what is meant exactly by carbon neutrality, this shows interest from Beijing to shift towards a greener future.

We focus on the above 3 key economic areas because they account for more than half of the world's emission. Indeed, with our 3 key areas leading investments in the climate-related sectors in the post-COVID era, investors are voting with their feet on the promising growth opportunities --- the green sectors.



1.1.1 Equity Market

In the equity market, the changing fortunes for the green sectors are already coming into view. The NASDAQ Clean Edge Green Energy Index Fund has gained more than 100% over the S&P 500 since the March COVID sell-off. The

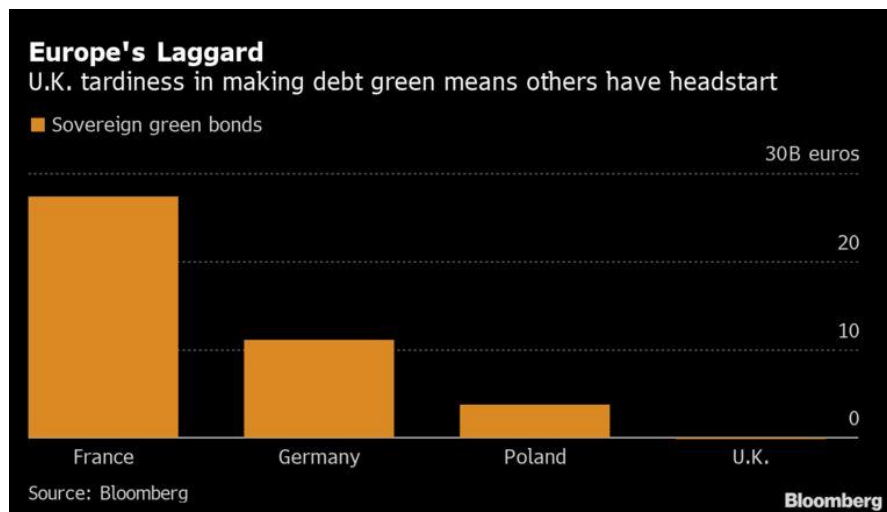
market capitalization weighted index is designed to track the performance of companies that are primarily manufacturers, developers, distributors and/or installers of clean energy technologies.

Most recently, renewable companies have seen their stocks rise accelerated following Biden's win: The world's biggest provider of wind and solar energy NextEra Energy (NEE) outpaced over-a-century-old giant ExxonMobil (XOM) as the biggest energy or utility company by market capitalization.

1.1.2 Fixed Income Market

The fixed income market also saw passions in green bond demand. In September 2020, as we mentioned, Germany issued its first-ever 10-year green sovereign bond, raising €6.5 billion. The issuance was met with record demand that investors queued up for over €33 billion. The green bonds are "twin bonds", issued alongside conventional federal bonds with similar maturity and rate of return. They include a unique feature where investors will be able to swap the green bonds for an otherwise identical conventional bond, to help mitigate any liquidity concerns. According to Reuters, the Germany bonds priced for a yield of -0.463%, meaning investors paid a 1 basis point premium compared with the conventional twin. That confirmed expectations the bond would come at a premium for investors hoping to bolster their green credentials.

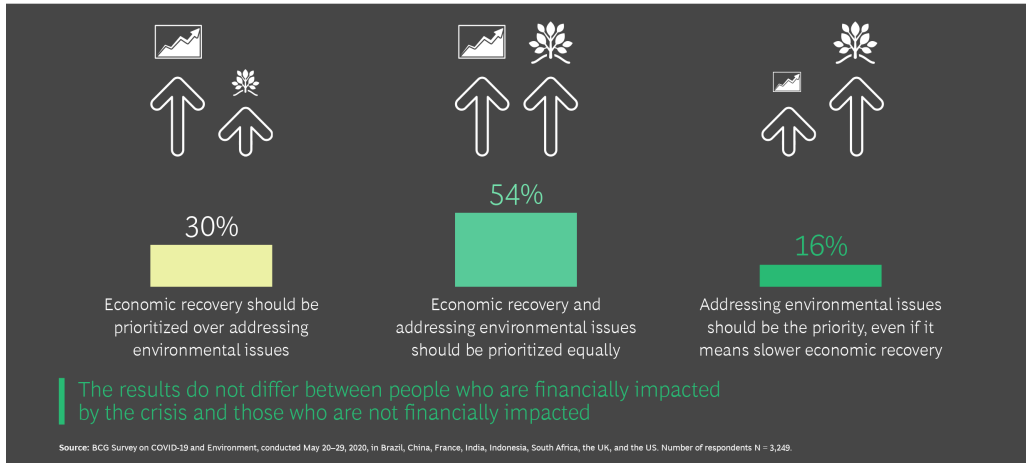
In November 2020, Germany launched its 2nd green bond with 5-year maturity. It raised 4.6 billion euros and demand exceeded the amount offered by 1.29 times. Going in the same direction, but with greater efficacy, is France, which has managed to issue €25.8 billion worth of green bonds this year.



1.2 Changing Behavior

The behaviour of people has also been largely affected by the current pandemic. "The rebound in civil society has been impressive, with an increase in volunteering, social cohesion, community support and focus on public good vs. private freedoms," as JPMorgan said in a recent note to clients.

One area where considerable shifts in awareness and habit have been observed is the environmental concern. A study conducted by BCG interrogating 3,000 people from 8 countries has revealed climate related concerns are at an all-time high, and that the general public is more determined than ever to change things for the better.



The scale of this shift of consciousness is striking. Around 70% of the participants admitted to now being more aware of the ongoing climate change issues than before the COVID pandemic. Consumers want to see firms take more radical approaches to improve the dire situation, as 87% of the contributors declared that businesses should have environmental issues in mind when conducting their operations.

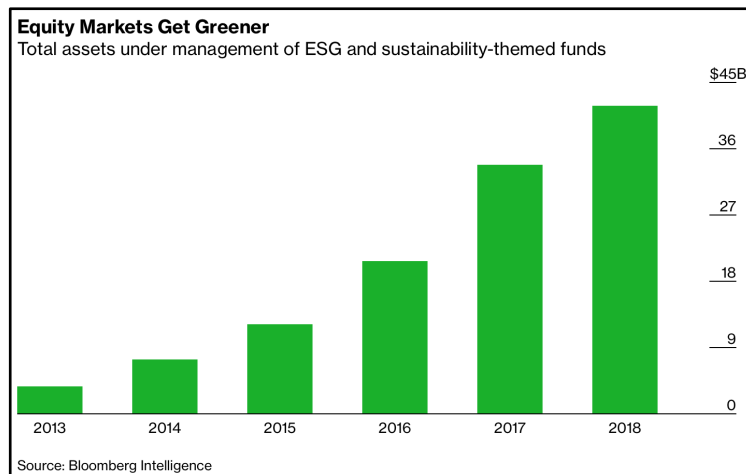
It is therefore clear that these are quickly becoming fundamental questions that are to be addressed in every aspect of our future. Two thirds of the attendants are of the opinion sustainability should be a top priority in the post-pandemic efforts to boost the economy, and 40% stated they will take actions themselves to adopt a more sustainable behaviour.

2. Not just a COVID-theme or election hype: green investment is one of the most important secular trend

Many impacts on society and the environment will be due to the changes in climate extremes. And the increasing attention paid to the possible consequences of climate change has strengthened international cooperation on green finance, with initiatives from both the industry and the institutions.

Among the main steps taken in this direction, the following are particularly worth mentioning: the institution of the Task Force on Climate-related financial disclosure (TCFD) by the Financial Stability Board (FSB) in 2015, the establishment of the Green Finance Study Group (GFSG) within the framework of the G20 and the institution of the High-Level Expert Group on sustainable finance (HLEG) by the European Commission in 2016. Finally, in December 2017 the Network for Greening the Financial System (NGFS) was established, promoted by a group of central banks and supervisory authorities.

These initiatives have led to a unanimous consensus on the opportunity to raise awareness of the risks arising from climate change in the financial system but so far there has been no adequate growth in awareness of the risks linked to climate change and the opportunities linked to the transition towards a low carbon economy. Regarding this issue, we will present investors empirical risk-return analysis in the following paragraphs.



2.1 Green Investing Can Effectively Diversify and Mitigate Risks

In recent years we have seen an increase in the frequency and intensity of environmental disasters such as floods, landslides, fires, droughts, high temperatures and so on. Each of these factors may affect the financial system, which may be exposed to different types of climate risk (Climate-Related Financial Risk, hereinafter CRFR) that have not yet been fully captured and assessed by the current financial models. Indeed, we strongly believe that nowadays climate risk is to all intents and purposes a financial risk. The aim of this paragraph is to inform the reader of the existing link between climate change and financial risk through the analysis of five types of risks identified by the literature.

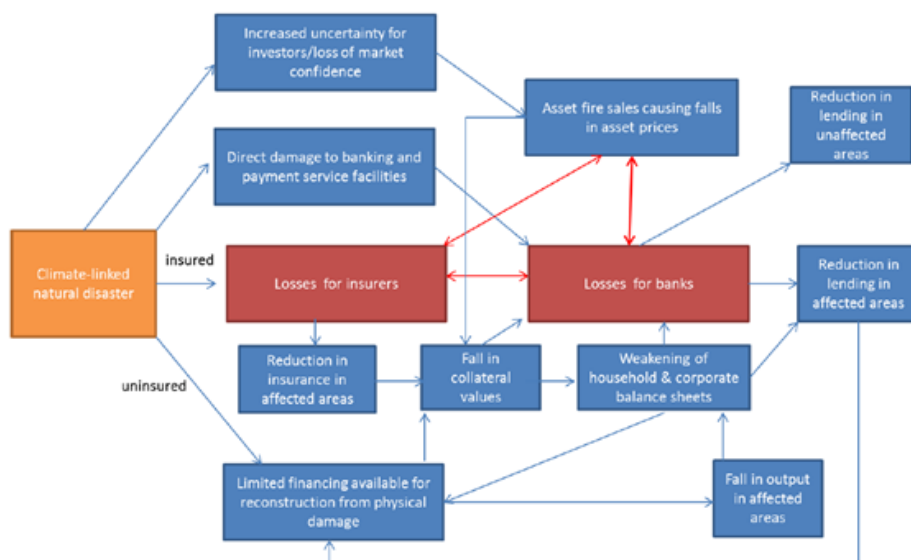
- **Physical Risk**

The first is the physical risk, with effects on economic entities exposed to extreme natural events. For example, environmental disasters may destroy the physical capital (houses, industrial warehouses and plants, and public or private service facilities), therefore forcing households, businesses and both local and central public bodies to allocate financial resources to reconstruction. Such a diversion of resources has, among other things, the effect of increasing debt, thus squeezing the resources available for consumption and investment and aggravating the possible compression of income generation determined by the physical damage (e.g. due to production being interrupted or to not being able to use strategic infrastructure). These effects may spread to the financial sector through different channels. Repaying loans may therefore become more complex due to the before mentioned diversion of resources for restoring damaged property or assets. Environmental shocks may increase the number of non-performing loans in the portfolio of banks that are particularly exposed to households or businesses in the areas most at risk; this could induce banks to restrict the supply of credit, which would potentially affect the effectiveness of the credit channel of monetary policy. Moreover, if these effects were on a large scale, this would threaten the stability of the financial system as a whole.

- **Policy Risk**

A second risk arises from the commitments made by the international community with the aim of stabilizing the atmospheric concentration of greenhouse gases at a level that allows the increase in temperature to be kept below 2°C and to continue with the efforts to limit this increase to below 1.5°C compared with pre-industrial levels. A non-regulated transition towards a low carbon economy could sharply reduce the value of

energy reserves and the infrastructure for their exploitation and processing and using fossil fuels (coal, oil and gas). Unlike physical risk, this transition risk is not persistent but could disrupt the stability of the financial system. In fact, given the importance of the energy sectors, a sudden drop in the value of reserves and related infrastructures could trigger a race to sell the securities of energy companies, with consequences that could permanently affect the path to global economic growth (as happened with financial companies exposed to the subprime loan sector during the last great financial crisis that led to the Great Recession). Moreover, the transition could be inflationary, because climate policies may require the use of alternative energy sources that are currently more expensive, or the introduction of carbon pricing systems that affect prices and economic activities (e.g. the imposition of a carbon tax, designed to grow over time in line with the growth in goals to reduce emissions). Finally, since the demand for energy is inelastic in the short-medium term, a sharp increase in energy prices would increase the financial vulnerability of businesses and households due to their higher expenditure on the purchase of energy goods. The profound process of change triggered in recent years by the introduction of increasingly binding goals for the reduction of greenhouse gas emissions has particularly involved the electricity generation businesses, making obsolete their conventional business model in which generation relied mainly on fossil fuels.



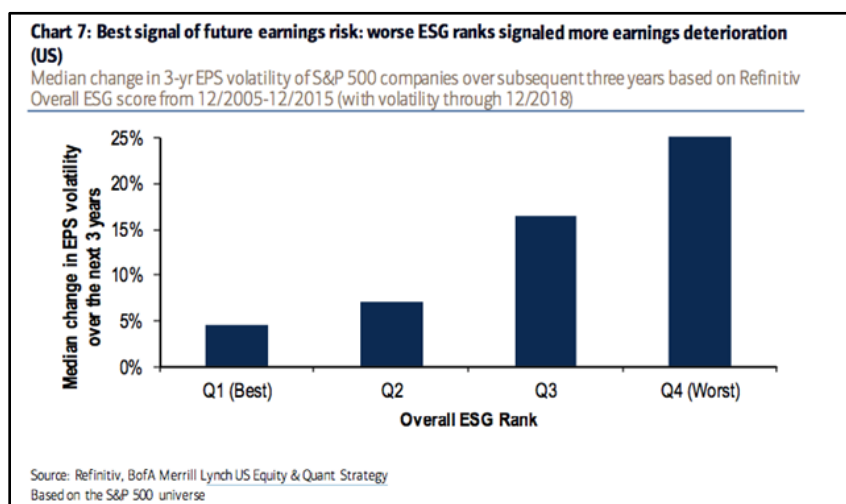
- **Portfolio Risk**

Sustainability is a big topic, and there are many different views of it. As part of the green investing approach, ESG has been widely acknowledged in improved diversification, at least in equities. Given a reasonable sustainability budget, it appears that asset owners are able to achieve both their traditional risk and return objectives, as well as their sustainability objectives, in an actively managed multi-asset portfolio.

Companies with the worst ESG profiles from the investable universe are not dissimilar to avoiding the most overpriced or most leveraged securities. In particular, according to a report of BofA Merrill Lynch US Equity & Quant Strategy, ESG is the best measure of risk superior to leverage or other risk and quality factors. While companies facing ESG challenges are more prone to large-scale negative events and subject to greater idiosyncratic risk, which can be detrimental to stock performance. In some cases, a major ESG event impacting a single company also affects the returns of its industry peers, a scenario that can create significant negative

shocks in portfolios. Alternatively, firms with a strong reputation for corporate social responsibility have shown they can better withstand crisis situations and limit the magnitude of major stock price declines.

We also found that the amount of S&P 500 bankruptcies during 2005-2015 investors could have avoided is equal to 90% (data from Refinitiv), if they had screened out firms with below average environmental and social rankings 5 years earlier. A successful example can be seen in asset manager Pax World Funds, who avoided PG&E bankruptcy in 2019.



- **Liability Risk**

There is also the liability risk, which is typical of the insurance sector. It materializes, for example, when those suffering damage due to phenomena induced by climate change pass it on to those whose business is taking on these kinds of risks, i.e. insurance companies.

There is no estimate of the overall size of these risks, but some of them have been assessed in individual studies. Dietz et al. (2016) used a VaR model to estimate the physical risks linked to climate change in the absence of mitigation measures additional to the expected ones: the financial assets exposed would be in the range of \$2,500 to \$24,200 billion.

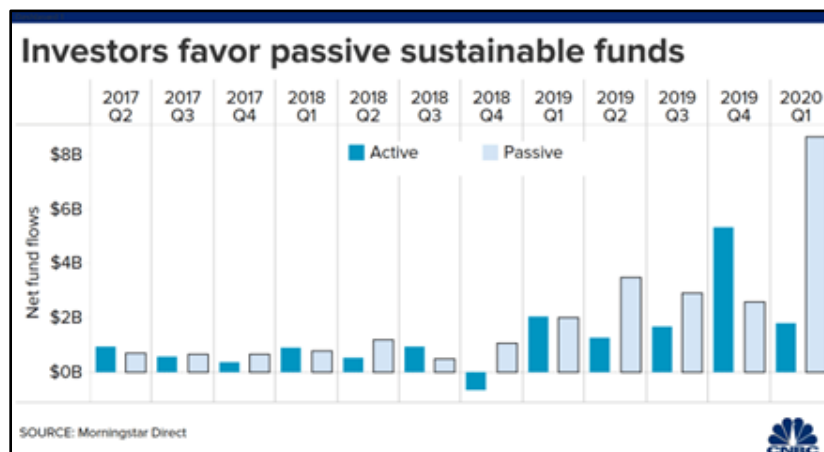
2.2 Sustainable Investing Improves Returns

From the return perspective, asset managers who incorporate sustainability will likely to secure inflows, as they're able to position themselves toward increasing green demands, and to deliver at least comparable, if not market-beating, performances.

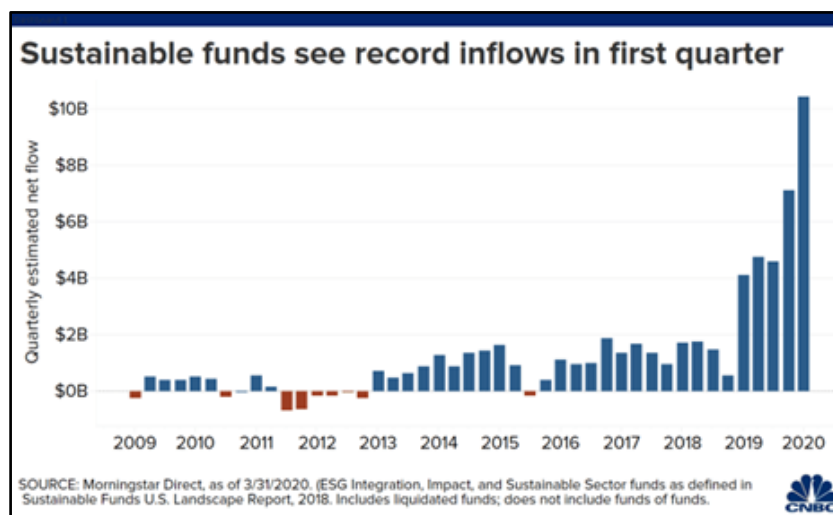
2.2.1 Increasing Client Demand as Seen in Record Inflows

Clients are seeking value that extends beyond financial gain. Sustainability focused funds attracted a record amount of capital in the first quarter of this year, even as the pandemic rattled worldwide markets. Global sustainable funds saw inflows of \$45.7 billion, while the broader fund universe had an outflow of \$384.7 billion, according to Morningstar.

About 80% of the money has gone into index funds, which means retail investors are likely behind the surge. While exchange-traded funds are only part of the investment landscape, they are the primary destination for new retail investor flows, so seeing ESG-related funds take in so much capital in 2020 shows this theme is now catching a very large tailwind.



Over the last month the iShares ESG MSCI USA ETF ([ESGU](#)) has proved the most popular vehicle, attracting roughly \$555 million in new investments, according to FactSet. Other popular choices include Xtrackers MSCI USA ESG Leaders Equity ETF ([USSG](#)), which saw inflows of around \$503 million, while the iShares ESG MSCI USA Leaders ETF ([SUSL](#)) garnered \$493 million in new capital.



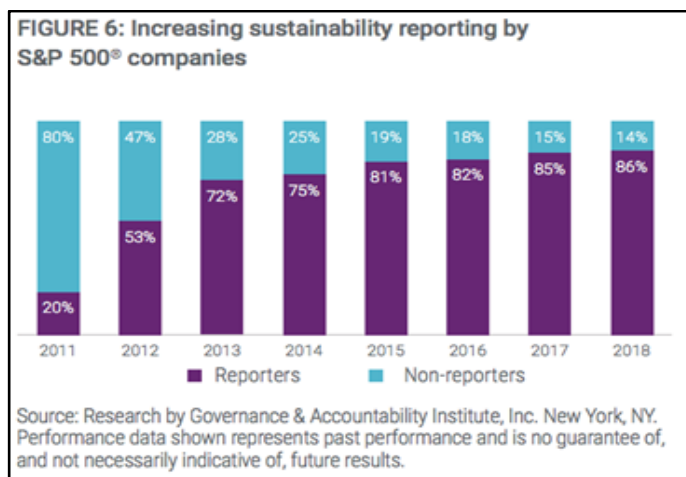
Particularly, Millennials are one of the driven forces in the record inflow. The fact that this part of population is also the same that is increasingly investing in the stock market through new popular online platforms as Robinhood represents a great opportunity for investors. Taking ESG as an example, new investments in ESG funds are expected to total approximately 20 trillion in the next two decades. Likewise, with greater recognition of the risks and opportunities arising from environmental considerations, such as climate change, investors are increasingly focused on avoiding investment losses connected to these risks, and on positioning themselves to profit from correctly anticipating climate and social trends. According to a survey conducted by Natixis Investment Managers, approximately three quarters of participants across generations said it was important to have their investments match

their personal values. Overall, asset managers who are able to cope with the shift in investor preference will have more opportunities in securing larger market share.

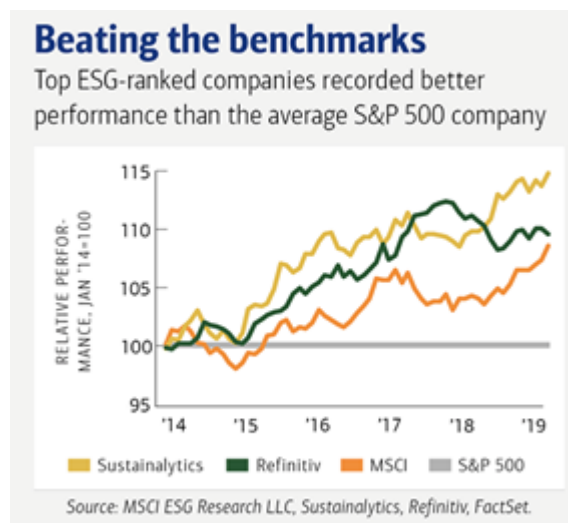


2.2.2 Sustainable Investing Is Also Deliverable

Crucially, sustainable investing is a value proposition that asset managers are able to deliver. Firstly, from measurement and standard perspectives, environmental disclosures give fund investors a more accurate picture of the carbon footprint associated with their investments, as an increased number of companies are publishing sustainability reporting during the 2010s.

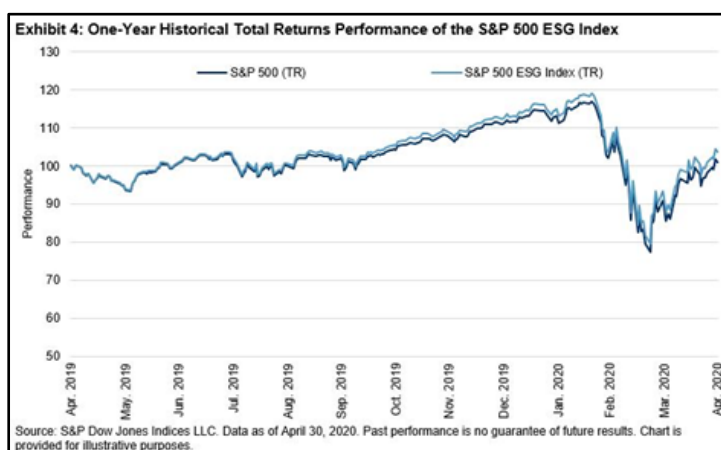


Secondly, as society transitions to a 100% renewable world (hopefully), green investing is becoming a must-have in all the market participants. This secular trend makes green investing non-cyclical, which is distinct from value, size or other traditional financial factors. Therefore, the inclusion of sustainability considerations into indexing will grow more consistently over time, because it is not subject to the inevitable periods of out- and underperformance characteristic of traditional financial factors.



Equally important, sustainable investment is also able to deliver comparable, if not market-beating, returns. This year, the Nuveen ESG Large-Cap Growth ETF ([NULG](#)) has returned 36.53% YTD as of December 9th 2020, for example, while the iShares ESG MSCI USA ETF ([ESGU](#)) — the largest of its kind with more than \$7.1 billion in assets under management — has returned 20.58% YTD. The S&P 500, by comparison, is down roughly 14.38% in the same period.

- Research from data provider Morningstar examining the long-term performance of a sample of 745 Europe-based sustainable funds shows that the majority of strategies have done better than non-ESG funds over one, three, five and 10 years.



The analysis carries weight as up until now there has been limited data on sustainable funds' long-term performance due to the relatively short track records of many strategies and huge variety in ESG approaches. "The findings debunk the myth that there is a performance penalty associated with ESG investing," said Hortense Bioy, director of passive strategies and sustainability research at Morningstar. ESG factors are not just 'nice to have' but drivers of outperformance. It is both right and smart to exclude certain business practices in violation with well recognized conventions or with inherent high risk and negative impact. Sustainable funds' rates of success varied depending on the asset class. Of the seven asset classes examined by Morningstar, US large-cap blend equity funds that invest sustainably were the best performers, with more than 80 per cent of funds in this category beating their traditional peers over 10 years. The study showed that sustainable funds also outpaced traditional funds during the market sell-off sparked by Coronavirus in the first quarter, notching up average excess returns of up to 1.83 per cent. ESG funds'

low exposure to oil and gas gave them an edge at a time when energy stocks suffered steep losses. However, even excluding the unusual market conditions unleashed by the pandemic, the majority of sustainable funds in the study still beat traditional funds over the long term. Morningstar found that sustainable funds have greater survivorship rates than non-ESG vehicles. On one hand, 77% of ESG funds that were available 10 years ago still exist, compared with 46% for traditional funds.

Finally, new technology and industry disruptions also create the potential for explosive investment growth. Tesla, a leading electric vehicle manufacturer, for example, has seen its stock price multiply as much as 152 times since its IPO, while conventional internal combustion automaker equities have languished. Meanwhile, legal risks for companies that operate unsustainably are rising; in recent years there has been a growing number of lawsuits against fossil fuel companies, tobacco and opioid companies. These regulatory changes and a societal shift in favor of greater sustainability will increasingly drive corporate financial performance and further fuel interest in green investment, as investors seek to invest in innovative companies and those that are compliant with global standards.

3. Investment recommendations

We recommend investors to focus on electric vehicles (EV), battery cell manufacturers and solar photovoltaics (PV), as they are the sub-sectors with the most certainty. Whereas green hydrogen is a hot topic but it's still under R&D.

The following paragraphs will present a holistic framework for investors to understand the renewable industry. We will (1) briefly walk through classical energies and discuss why they're still important in energy transition, (2) evaluate the renewable energy universe and present why we overweight solar PV over others, (3) then talk about storage (battery) and explain why it's essential in the development of the green economy, (4) further analyse how green hydrogen can make substantial contributions in energy production and storage, (5) and finally present our targets in the investment universe.

3.1 The Framework

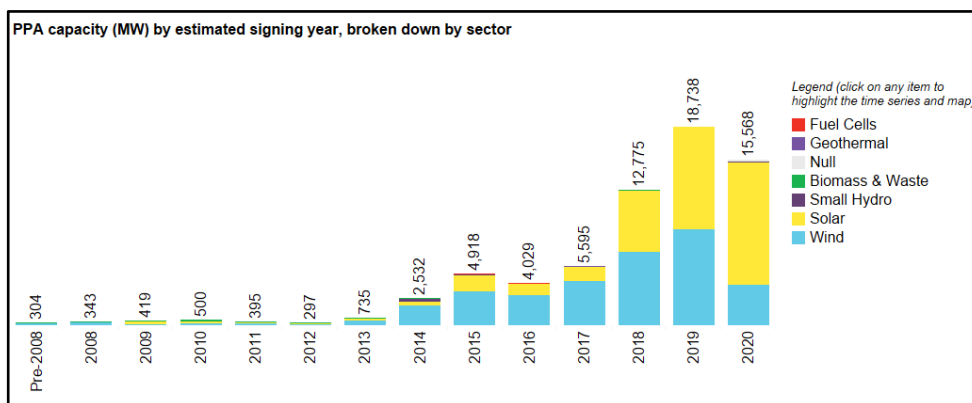
- **Classical Energies**

Oil, gas and coal are traditional resources for energy production. Despite fluctuations in oil prices and expensive gas rates, coal prices are cheap and stable. When they're burned, they release carbon dioxide which is the main driver of global warming. Nevertheless, classical energies still have certain advantages that are challenges to a 100% renewable world.

When energy is produced from oil, gas and coal, there's no storage problem. To ensure a steady supply of electricity to consumers, electric power plants produce and place the right amount of electricity at every moment to *instantaneously* meet and balance electricity demand. Yet when it comes to renewable energies, environmental conditions can be unstable inputs. For example, a rainy day can be troublesome to a 100% solar-energised home. Proper storage can cope with this issue of instability. However, storing even a small amount of energy requires large space and the cost is expensive. Meanwhile cheap storage is not yet available. Before we go further on this downside, let's take a look at the renewable energy universe.

● Renewable Energies

Biomass, geothermal, hydro, tides, wind and solar PV are the major types of renewable resources to generate energies. And we believe solar PV is the most promising among them.

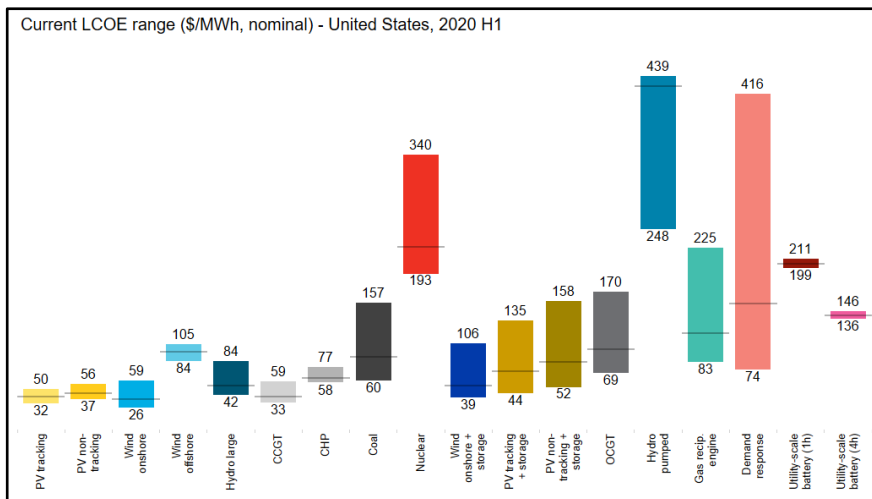


- Firstly, taking into account the overall energy production process, *biomass* is not green. Biomass comes from organic waste and wood residues, and strictly speaking, it's carbon neutral. Burning biomass releases carbon dioxide in the same amount for which is exhausted through photosynthesis. If we further consider the procedure for which biomass requires machines to grow, transport and process its resources, we'll immediately realise that running machines requires oil. Hence, the overall production cancels out the benefits.
- Secondly, *geothermal energy* depends on proper geographical sites, making it an unstable industry. For this reason, countries without proper sites cannot assess this energy. Using satellites, at the same time, governments and companies are already aware of available sites. And once people know all the spots, the exploitation is done.
- Thirdly, *hydro* shares the same issue with geothermal, that increasing consumption cannot be met once all the good sites are exploited.
- While fourthly, *tides* as energy is costly and the development is hindered by R&D.

Then, we're left with the 2 most commonly used renewable resources: wind and solar.

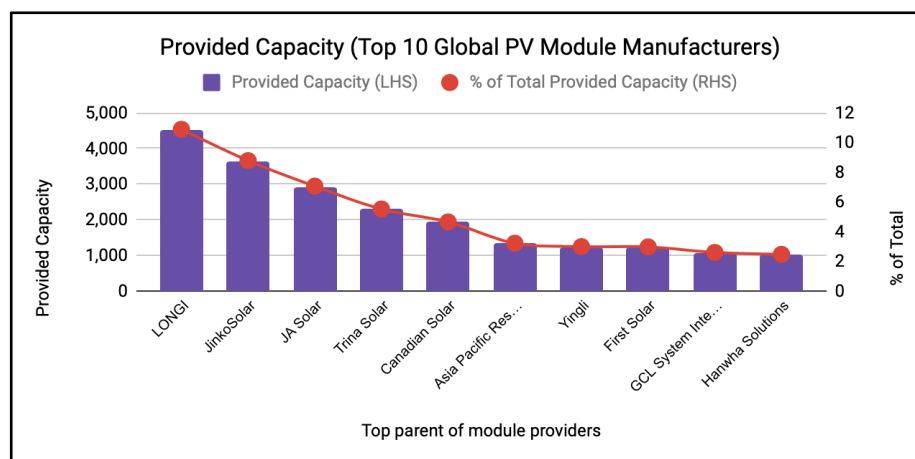
- **Wind energy** is one of the most important sources to produce electricity. Generally, wind farms can be onshore or offshore. Onshore wind farms are operating on terrestrial locations, therefore the constructions raise problems in landscape permission and land availability. Those concerns are no problem for offshore farms, which are operated in the ocean. Whereas the construction complexity is also increased. Overall, wind energy is a robust technology and is commonly used in northern countries where sun is scarce.

Economy of scale is another important feature for wind farms operation, besides the mature technology. For a long-term period in the past, the levelized cost of energy (LCOE) for onshore wind was always cheap. However, a decade of cost reduction in PV modules has boosted a larger adoption of **solar PV energy**.



- One of the most appealing aspects about **solar PV** is the (1) ease of installation. When the sunlight touches the PV panel, it will be directly transferred into electricity. Such direct and swift energy production is by far the easiest to function. Meanwhile, solar is also (2) an accessible energy for most regions, making the solar PV technology available to cope with increasing carbon free demand worldwide. Besides, (3) PV is by far one of the cheapest energy. Over the past 10 years, the cost of solar panels has plunged 82%. Particularly, those advantages about solar PV made it also (4) suitable to roll-out in the least-developed countries, where sunlight is abundant.

Given those benefits, we strongly recommend investors to overweight PV modules manufacturers, who will be benefited from increasing demands. Especially, since the top 10 global PV module manufacturers take over 51% of the worldwide market share, we suggest buying top players as they have sufficient capacities to take full advantages.



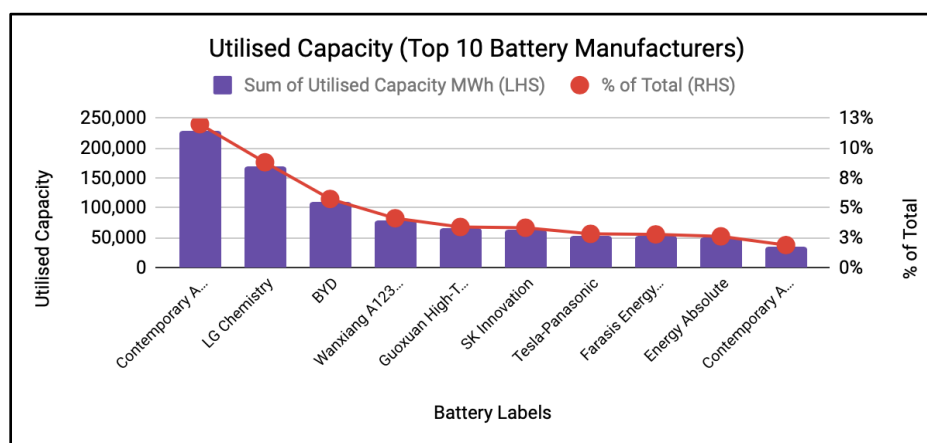
Yet to achieve an 100% renewable world, instability is still an unresolved issue. For wind energy, windy areas are known, but wind per se is hard to forecast. For solar PV, sunlight is not available in the night. To produce instantaneous electricity and maintain smooth transmission, we must re-stress on the storage issue.

● Storage (Battery)

The central idea goes like this: the more renewable driven, the more fluctuation in energy production (ie, moving clouds, rain, evening), and therefore the more demand in storage. The revenue of storage hence comes from two parts: selling electricity in the evening and providing ancillary to make sure smooth energy transmission.

To understand ancillary, think about gas in the classical energy world. Because burning coal and oil requires time, gas will be a supplement in the immediate spike of electricity demand to make sure instantaneous energy transmission. In a 100% renewable energy world, where moving clouds and winter rains are everyday scenes, fluctuation in electricity supply shall be well anticipated. When a cloud covers the sunlight for a few minutes, we need ancillary to catch up to 100% to make sure Bocconi's online streaming courses will not be blacked out by the cloud.

Another issue of storage in a 100% renewable world is its size. Smaller the battery, the more expensive it costs. Yet most of the vehicles demand a smaller size battery, for example, a smaller but stronger battery shall be preferable to cars, since it can leave out more space. At the same time, as society goes greener, the price of energy storage shall be more affordable to average customers.



While battery manufacturing is also a highly concentrated market. The top 10 global battery manufacturers take over 47% of the global market, reflecting that top players have stronger purchasing power. Pressure in price reduction shall be largely transferred to its part suppliers. At the same time, battery manufacturers can also start joint ventures with car manufacturers, as seen in the Tesla-Panasonic case, to further secure revenues and competitive edges.

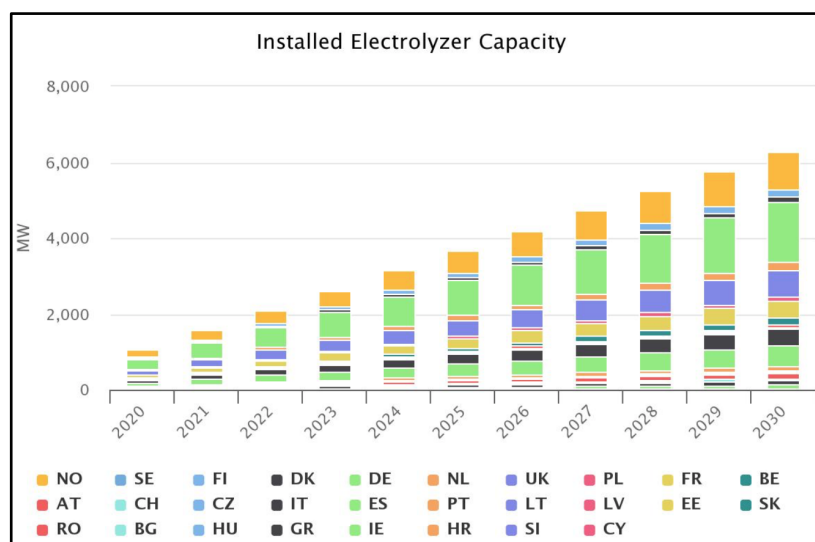
● Green Hydrogen

Put it shortly, there are 3 major advantages in green hydrogen. (1) It's self-sufficient and green. Hydrogen can be derived from water, after burning it produces water. (2) The electricity needed to produce hydrogen can be generated from other renewable resources, such as solar PV. (3) Green hydrogen can electrify all the sectors that storage cannot reach. In fact, hydrogen is transferred like petroleum and gas so that no space is required.

For example, in airplanes and ships, with storage people need to take away some cargo spaces that can be used to make money, but this is not a problem for hydrogen. Overall, green hydrogen is a promising enabler of a zero-emission society.

However, the production is still expensive and requires extensive R&D. Policy makers are involved in research and investments. For example, EU priorities green hydrogen in its strategy. In its recovery plans, the EU aims to install at least 6 GW (capacity) of renewable hydrogen electrolyzers in the EU by 2024 and 40 GW of renewable hydrogen electrolyzers by 2030.

What does the 6 GW hydrogen capacity mean? So far, the capacity in Europe is less than 1GW, and the European Commission wishes to 6 fold it by 2024. Is 6 GW a big capacity? In Italy, total power capacity is 118 GW, and 6GW is 0.85% of Italy's capacity. Installed solar PV capacity in Italy in 2020 is around 21 GW, and 6GW is 29% of Italy's solar PV capacity alone. *Despite fast growing, we suggest investors to focus on our most certain sectors and keep patience in green hydrogen.*



3.2 Target Universe (ETF, Equities and Fixed Income)

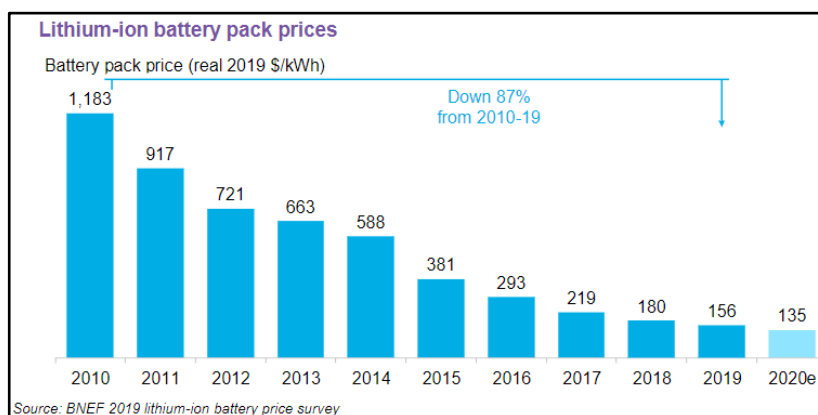
- **ETFs**

For investors who are interested in green investment and have no view on specific equities, we recommend some of the largest ETFs in the sector. These ETFs are liquid and cover the largest equities in the sectors. Yet we remind investors of potential risks to watch: (1) The performance of the clean energy sector is already priced in the good news. To further participate in the wave should watch out timing. (2) Large trading volumes reflect soaring demands, but demand may change with respect to market conditions.

ETF	Net Asset (\$ bil)	avg Volume (shares, mil)	YTD Return	Holdings	Major Sectors	Geography
Invesco Solar ETF	2.7	1.6	174%	26	Solar	Global
First Trust NASDAQ Clean Edge Green Energy ETF	1.5	0.7	156%	44	Energy Equipment & Automobile	US
iShares Global Clean Energy ETF	3.9	4.5	101%	30	Utilities & Industrial	Global

● Equities

In equities, we favor electric vehicles (EV), battery cell manufacturers and solar photovoltaics (PV), as they are the sub-sectors with the most certainty. (1) For EV, the shift toward battery electric vehicle adoption is accelerating as global governments are setting EV sales goals. For example, Europe seeks to have at least 30 million EV on the road by 2030. While the world's total EV unit sales are just 8.6 million in 9 years from 2011 to November 2020. Governments are also supporting infrastructure (i.e. public charging points) roll-out through a range of methods. Besides accelerating sales and supporting infrastructures, battery prices are falling 87% from 2010 to 2019. Extensive price reduction improves the economics of EV ownership. (2) For battery cells, it is a highly concentrated market and top players have stronger purchasing power. Pressure in price reduction shall be largely transferred to its part suppliers. At the same time, battery manufacturers can also start joint ventures with car manufacturers, as seen in the Tesla-Panasonic case, to further secure revenues and competitive edges. (3) For solar PV, increased carbon free demand globally will favor this specific energy for its ease of installation, wide availability and by far the cheapest prices.



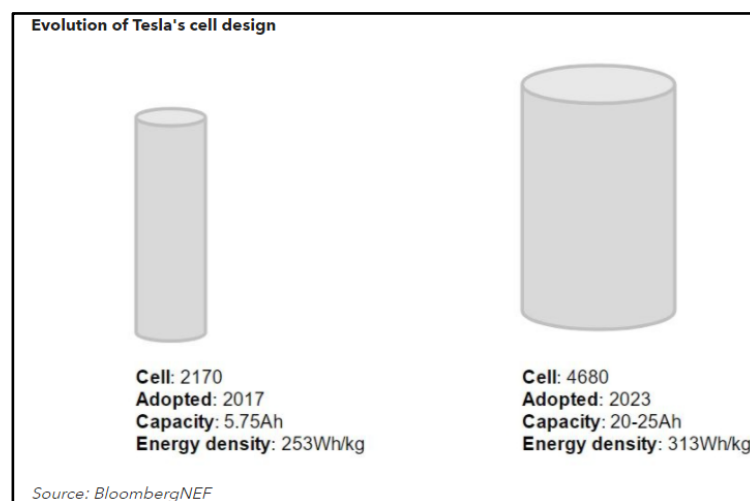
Tesla (NASDAQ: TSLA)

Among listed companies, we like Tesla (NASDAQ: TSLA). Tesla is not just a fully-electric-car manufacturer, it also produces batteries, sells solar panels and differentiates itself through value-added services.

- A. **We have confidence in Tesla's sales, as seen in strong deliveries in China, as the Shanghai factory ramps up to scale, and record zero-emission vehicle credit sales.** In Bloomberg's sentiment, Tesla will need another record delivery number in 4Q2020 to reach the 500,000 annual goal, though if not achieved in pandemic-stricken 2020, then 2021 should be a sure bet. Tesla's Shanghai production has assumed the role of growth

engine as the large potential market of early adopters drives a surge in demand and makes China the company's most important and voluminous market.

- B. **Tesla aims to grow consistently at a rate of 40–50% per year, and to do that, it is going to need more and more batteries. And Panasonic is now helping Tesla to develop a pilot line for 4680 cells from its current 2170 cells.** The new jumbo cells are 46 mm in diameter and 80 mm in height. The larger jelly roll packs more active battery material into the casing for a 5× improvement in energy storage and a 6× increase in power. Scaling up to the pack, the new form factor alone delivers a 16% increase in range.



- C. **Reduction in cost allows the car to be available for more customers.** Elon Musk promised a selling price of \$25,000 for its Tesla car in its “Battery Day” in September 2020. In Bloomberg NEF’s 2019 survey, average Tesla packs cost \$128/kWh. Under Musk’s ambition, Bloomberg NEF estimates that it will cost \$49kWh to manufacture its 4680 cells, and packs are estimated to be priced at \$56/kWh. Such sharp reduction in pack cost would give its \$25,000 electric vehicle a driving range of 200 miles. The company also aims to have 3TWh of capacity by 2030.

SolarEdge (NASDAQ: SEDG)

In the solar sector, we also like SolarEdge (NASDAQ: SEDG). Established in 2006, SolarEdge is a developer and seller of optimized inverters. In a nutshell, inverters are required equipment in PV plants, without them the plants don’t work. Apart from its booming inverter and power optimizer business, SolarEdge is steadily making inroads into the larger distributed energy market.

- A. **SolarEdge is a dominant player in its core inverter business.** IHS Markit ranked SolarEdge as the largest PV inverter supplier worldwide by revenue in 2019. The top two companies in this business, SolarEdge and Enphase, control nearly 80% of the US residential inverter market. In June 2020, SolarEdge launched a new energy hub inverter with prism technology, which can charge smart energy devices up to 200A. Overall, the company was able to deliver an average growth of 45% a year since its listing in 2015.

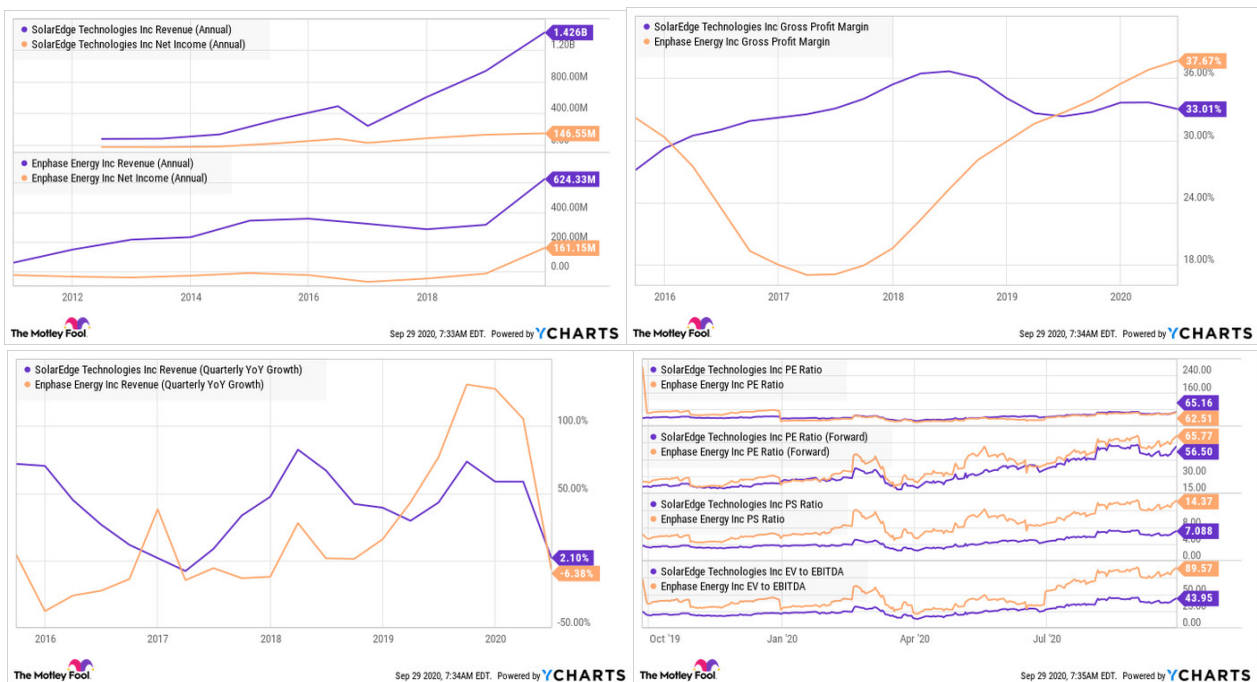
SolarEdge is successfully transforming from its core inverter business to a vertically integrated distributed energy business. Whereas other major solar companies, such as First Solar ([FSLR](#)), are being forced to sell

major parts of their businesses. SolarEdge now involves energy storage and has an entire ecosystem of products targeting the home energy sector. According to an exclusive report by MarketsandMarkets, the global residential energy storage market alone could reach \$17.5 billion by 2024. With its strong presence in inverter and power optimizers among customers, SolarEdge shall have an easier time moving into the broader home energy industry.

We further make a comparison between SolarEdge and Enphase (NASDAQ: ENPH), who is also a well-known player in the inverter business.

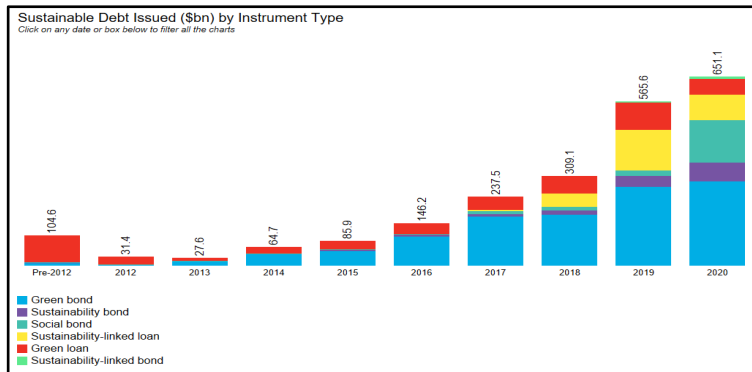
- B. In terms of market share, SolarEdge is the biggest player with global presence.** Its revenue totaled \$1.426 billion in 2019, with the US market alone only accounts for less than 50% of total revenues. While revenue of Enphase was smaller at \$624.33 million. Nevertheless, Enphase has a better net income margin of 26%, versus 10% from SolarEdge. Efficiency in Enphase profitability ratio is a result of cost minimization, including shifting its core teams to India and New Zealand.

Looking at the revenue growth, SolarEdge exhibits a steady growth pattern, in contrast to Enphase's big movement. For 3Q2020, Enphase provided a 33% sequential revenue growth guidance for Q3, disclosure by SolarEdge was 2%. Looking at the forward PE ratio, the market is pricing in higher growth from Enphase.



- C. As for products,** SolarEdge offers optimizers, which provide a more cost effective solution by getting attached to string inverters. Meanwhile Enphase offers microinverters (a small inverter attached to each panel). Though expensive, microinverters allow customers to expand the system easily at lower maintenance costs. Both the solutions have their pros and cons but generally microinverters are believed to be a better option, if cost isn't relevant.

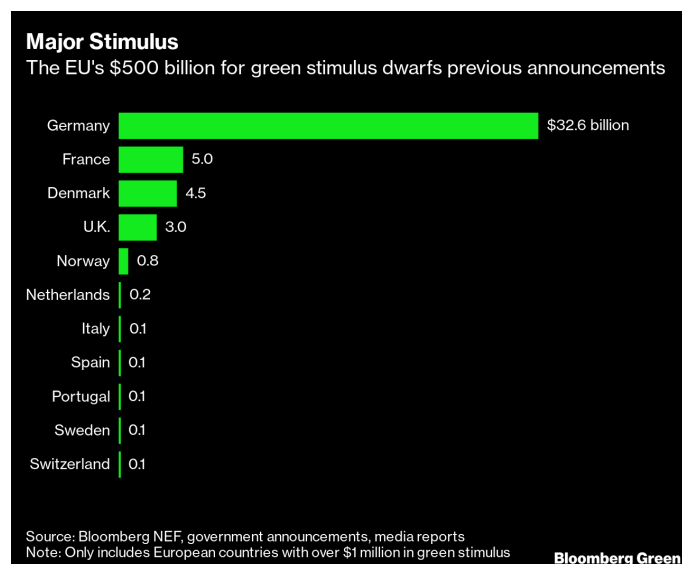
Afterall, for investors who are more risk-averse, SolarEdge is a good choice to keep up with the sector's upside and to play safe in the downside. For investors seeking elasticity, Enphase can offer potential momentum.



- **Fixed Income**

To participate in Fixed Income products, our top picks are sovereign green bonds issued by EU countries. (1) First, green bonds hold the largest share in sustainable debt issuance. It should be much easier to participate in terms of availability. (2) Also, green bonds issued by EU sovereigns and supnationals receive better credit worthiness. For example, among existing green bond issuers, Germany is Fitch's AAA issuer, France is AA, Poland is A-. And European Union as a whole is AAA. (3) Lack of universal standard is an issue for the global green bond market, but not for the EU. EU Green Bond Standard (EU GBS) was published in March 2019 for public feedback. Final report was published in June 2019 with recommendations to the EC on principles as well as a draft model of an EU GBS.

In 2021, investors will see EC's green bond issuance as part of its COVID recovery plan. Besides, Sweden is marketing 20 billion kronor (\$2.3 billion) of the securities to investors, and the U.K. is mulling whether it should tap the category too.



4. Risks and potential issues to overcome

Till now we have discussed the positive aspects of green investments, but we have to keep in mind that there are also limitations and downsides about this form of investments. The aim of this section is providing a brief analysis of the major difficulties that investors face when approaching green investments.

- **Rating**

First of all, are “green” ratings precise? Not really. And they aren’t homogeneous either (so rating interpretation is very important for investors who want to integrate ESG factors into their investment process). The ESG universe is becoming pretty vast, ESG rating agencies all have different biases (some towards E issues, some towards S issues, some towards G issues), and therefore ratings are not necessarily transparent if you don’t fully understand what is behind them. A company can have a high rating with one agency and a low rating with another agency. It therefore is very relevant that whoever becomes a user of the ratings data is aware of the underlying data, and how it is weighted, and how that aligns to its investment objectives.

- **Data Consistency**

Secondly, is data consistent? Companies are just now starting to get used to reporting sustainability key performance indicators. Some are more advanced in this process than others, but as this topic evolves, companies have had to adjust and come up with ways to source new data. This means that even if the ratings were all homogeneous and the rating users knew perfectly well what is behind those ratings, if data is faulty the output will be faulty too. In mid-May the SEC’s Investor Advisory Committee recommended that the SEC establishes ESG disclosure requirements more broadly. The idea behind this is that as disclosure is normalized, data will become more standardized, and ratings will also become more consistent. The conclusion is that the data regarding sustainability and ESG rankings are inconsistent and hinge on the application and interpretation of different ranking systems using different factors with different weights on those factors – the available ESG data does not provide clear guidance on which companies are delivering superior environmental results.

In a nutshell, ESG data and ESG ratings are not perfect. Investors who claim to follow responsible investing principles may not always be as committed to ESG as they should. There are many challenges with sustainable investing, including databases that purport to rank companies along sustainable qualities, but apply different metrics to measure those qualities. That leads to considerable dispersion in ranking public companies with respect to sustainable attributes. Those inconsistencies lead to inconsistent conclusions about which companies are green versus gray, which in turn leads to confusion about how to construct ESG portfolios.

But we believe this isn’t entirely surprising given ESG is just now coming of age globally. Over the next few years, as focus on ESG, companies will be pressured into providing more and better data and rating providers will be pressured into fine tuning its methodologies (or at least making them more transparent).

- **Is ESG a bubble?**

Another \$450 billion green bonds expected for 2021 but one strategist contends ESG a passing investment fad. Total green bond issuance topped \$1 trillion in the past week, joining ESG-focused funds that have a

similar amount in assets under management. In the past month alone, more than \$50 billion of green bonds were sold, including debuts in Germany by a trio of automakers including Volkswagen, and JPMorgan, the biggest U.S. bank by assets, according to data compiled by BloombergNEF.

Is it a bubble? Jared Dillian, an investment strategist at Mauldin Economics, wrote in Bloomberg Opinion that he thinks it just might be. “ESG is nothing but a passing investment fad, not unlike smart beta, the BRICs, structured products or any of the myriad market bubbles over the last 25 years, small and large,” he said. Still, analysts at Bank of America expect another \$450 billion of green, social and sustainable debt to be issued in 2021, roughly equaling this year’s issuance. Sales of green bonds, where proceeds are ring-fenced for environmental projects, will account for “the bulk” of the transactions, Bank of America said. “It’s definitely something that a lot of investors are talking about, and they’re seeking more specific details from companies and better assurances from third-party sources,” he said. “Especially as green bond issuance expands to non-traditional issuers in more diverse sectors, they want to know where the proceeds are going and how green they are”. The Bank for International Settlements, which is often dubbed the central bank for central banks, said last month that it has seen no proof that green bonds result in lower corporate carbon emissions. The median change in carbon intensity—the ratio of carbon emissions to revenue—of green bond issuers has been minimal over time, the BIS said. Concern about the lack of standards in the green bond market surfaced in a big way in 2017 when Spanish oil company Repsol SA became the first major refiner to sell the securities. Since then, energy companies such as Saudi Electricity have sold debt. Investors are growing increasingly anxious about how the funds raised from green bond sales are being used, said Josh Olazabal, head of ESG and Sustainability at CreditSights Inc. The integration of environmental, social and governance criteria has never been more important for investors than in 2020,” said Maia Godemer, a sustainable finance associate at BNEF, which tracks green bond issuance. “It is not only likely that these varieties of financing will grow in volumes in coming years, but we will see further innovation.” More than half of this year’s \$200 billion of green bond sales came from Europe, the Middle East and Africa. The growth has now pushed the wider sustainable debt market to more than \$2 trillion, BNEF reported. That includes bonds to fund social projects, which have been a three-fold jump this year in the wake of COVID-19.

5. Conclusion

There are critics about sustainability but we believe that green investment is not just a fad. It is something that is radically changing the financial sector and it is necessary in a world characterized by global warming and social issues, which are shaping the world as we think of it. The more asset managers integrate these concepts in its philosophy and the more successful green investing will be.

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