FEG INSIGHT

APRIL 2021

INVESTING IN CLEAN ENERGY

F·E·G®
investment advisors

INVESTING IN CLEAN ENERGY
The Renewable Energy Revolution

In late 2019, clean energy investing began to emerge as a major theme, with buzzwords such as "energy transition," "green energy," "low carbon/ decarbonization," "sustainability," and "ESG"—with the emphasis on "E"—dominating the investment space. As interest and activity continued, the sector has experienced massive and unprecedented capital flows in both public and private markets. This trend is being driven by a myriad of factors, including concerns around climate change, supportive government policies from the Biden administration, gains in the prices of clean energy stocks, accompanied by lofty valuations of SPACs focused on clean energy strategies.

Environmental concerns and poor performance in the traditional energy sector over the past seven years have also set the stage for the renewable energy revolution. While a shift to renewable energy sources is not a new concept, there is growing conviction that clean energy has turned from a lofty and noble idea into a viable option for development and growth. The improved economics of wind and solar energy sources—which a decade ago may have been considered impossible without subsidies—has added further credibility to green energy as an investment option.

Consider the Following

- In February of 2021, Royal Dutch Shell announced it would start reducing oil production, calling an end to a decades-old strategy centered on producing more hydrocarbons, as it seeks to capitalize on a shift to low-carbon power. The move marks a historic shift for the company, and follows similar announcements from larger, integrated oil companies, such as BP.[1]
- Private equity energy managers, who traditionally focused exclusively on oil and natural gas projects, have more recently pivoted to offer "energy transition" funds. EnCap, Lime Rock, and Kayne Anderson, are among those offering such strategies.
- The WilderHill Clean Energy Index, which tracks businesses focused on transitioning toward cleaner energy and decarbonization, was up 200% in 2020.[2]
- Goldman Sachs estimates $16 trillion in capital expenditures for cleantech and renewables through 2030 and $70 trillion to meet Paris Climate Accord goals.[3]
- A BlackRock survey of 425 asset managers overseeing approximately $25 trillion in assets found that the managers plan to double their sustainable assets (to an average of 37% of their portfolios) over the next five years.[4]

Increased credibility and conviction in clean energy has resulted in an overwhelming array of options for investors to deploy capital. This FEG Insight frames the discussion around clean energy, providing a brief background and offering guidance for investors on how to make sense of the clean energy opportunity set. This publication also considers some of the overlooked aspects of the energy transition story and highlights the risk associated with capital flooding into the sector. For the purposes of this analysis, the terms "clean energy," "renewable energy," and "energy transition" will be used interchangeably, although these terms can have different connotations.

Cleantech 1.0

In 2006, the clean technology sector—also known as "cleantech"—quickly became one of the hottest investments by venture capitalists in Silicon Valley. Oil and natural gas prices were on the rise and were expected to continue climbing, which prompted investors to seek positions in companies tied to the renewable energy sector.

By the close of 2011, the cleantech sector was in shambles. During the rise and subsequent fall of cleantech 1.0, venture capital poured an estimated $25 billion into cleantech startups and lost a whopping $12.5 billion.[5] What drove the cleantech sector collapse? These are four of the largest factors:

1. VENTURE CAPITAL STRUCTURE

In the 2000s, venture capital (VC) was the only true structure to access funding for cleantech. Many of these firms built models for cleantech similar to technology investments. Investors quickly learned, however, that renewable energy carried unique technical risks and required more capital and a longer development time horizon than the tech sector. Further complicating matters was the rise of generalist VC firms—as opposed to specialists—who lacked a solid understanding of the capital requirements and return expectations of the renewable energy marketplace.

2. THE GREAT RECESSION

As was the case with virtually all risk assets, the Great Recession removed unrealistic outlooks and brought pessimism into the market. Potential within the cleantech industry dried up as investors sought to reduce risk and increase liquidity in their portfolios. The lack of capital resulted in the failure of several companies, promising or otherwise.

3. THE COLLAPSE OF SILICON PRICES

Significant scientific breakthroughs in silicon solar cell manufacturing came about while supply constraints loosened. Coupled with large investments from China and other Asian governments, the cost of silicon solar products fell by a drastic 85%.[6] Numerous solar technologies were battling for low-cost leadership, but the price declines ultimately derailed these competing technologies.

4. THE RISE OF FRACKING

Perhaps the most dramatic shift in the economies of the sector came from the use of horizontal drilling for natural gas and oil. The assumption had been that the steady rise of natural gas prices would continue, thus making the more capital intensive cleantech sector competitive. Instead, natural gas prices plummeted by 80% since 2006, making natural gas cheaper, more plentiful, easier to extract, and less environmentally damaging than coal.[7]

Ultimately, the downfall of cleantech 1.0 can be attributed, in part, to: VC firms not fully understanding clean energy capital requirements; the economic downturn; the decline of silicon solar prices; and the rise of fracking. How has the landscape changed to make clean energy viable today?

Cleantech 2.0

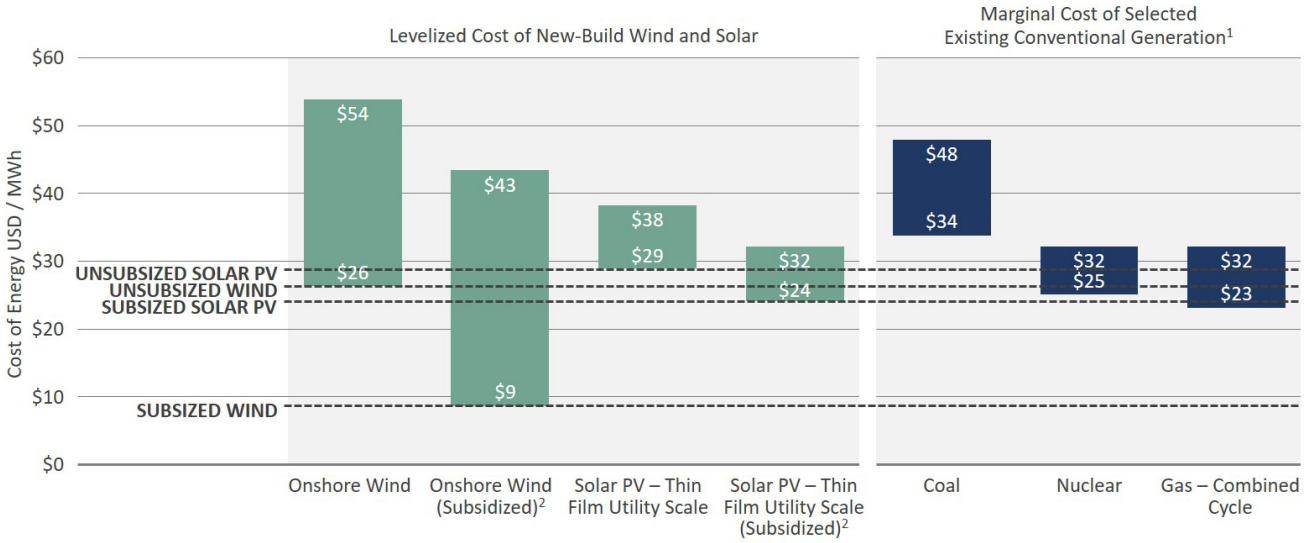
As global markets recovered from the Great Recession and venture capital dollars began to flow once again, the lessons learned from cleantech in the 2000s took hold. In 2006, most investments were chasing disruptive technologies in an environment where it was still unclear what technology would prove to be the leader.

Today, the opportunity set and economics in clean energy have been more fully delineated and established around a broader range of assets and businesses.

Over time, new technologies have also increased solar and wind project efficiency and significantly reduced costs, which has led to renewable energy's improved price-competitiveness with other traditional sources of energy.

RENEWABLE AND CONVENTIONAL ENERGY SOURCES BOTH HAVE COMPETITIVE MERITS

Levelized Cost of Energy – Renewable vs. Marginal Cost of Selected Existing Conventional Generation



Note: Unless otherwise noted, the assumptions used in this sensitivity correspond to those used in the global, unsubsidized analysis as presented on the page titled "*Levelized Cost of Energy Comparison—Unsubsidized Analysis*". [1] Represents the marginal cost of operating fully depreciated as combined cycle, coal, and nuclear facilities, inclusive of decommissioning costs for nuclear facilities. Analysis assumes that the salvage value for a decommissioned gas combined cycle or coal asset is equivalent to its decommissioning and site restoration costs. Inputs are derived from a benchmark of operating gas combined cycle, coal, and nuclear assets across the U.S. Capacity factors, fuel, variable and fixed operating expenses are based on upper and lower quartile estimates derived from Lazard's research. [2] The subsidized analysis includes sensitivities related to the TCJA and U.S. federal tax subsidies. Please see page titled "*Levelized Cost of Energy Comparison—Sensitivity to U.S. Federal Tax Subsidies*" for additional details.

Data source: Lazard

Traditional energy companies are also making a fundamental shift, with a record two-thirds of oil and gas executives planning to adopt a less carbon-intensive energy mix in 2021 and beyond.[8] As more companies prepare for clean energy, the shift away from non-renewable fuels toward next-generation solutions will likely continue.

The Clean Energy Investment Spectrum

As clean energy continues to garner attention from the broad investment community, the key issue facing investors today is how to make sense of the proliferation of clean energy investment options and where to deploy capital. With any investment decision, risk, return, leverage, and liquidity are key considerations.

> *"For venture capital and private equity firms, institutional investors are the customers, and the products are funds. If the customers want a certain type of product, you can definitely believe the VCs and private equity firms will be there to sell it to them."*
>
> – Rob Day, Forbes
> "*We're Already in the Second Clean Tech Bubble*," January 27, 2021

FEG has evaluated managers and strategies in clean energy for over 15 years, maintaining a selective approach focused on those that we believe have a unique niche or competitive advantage. Although the market has become saturated, compelling options do exist. The following briefly summarizes the landscape of investment opportunities.

PUBLICLY-TRADED CLEAN ENERGY STOCKS

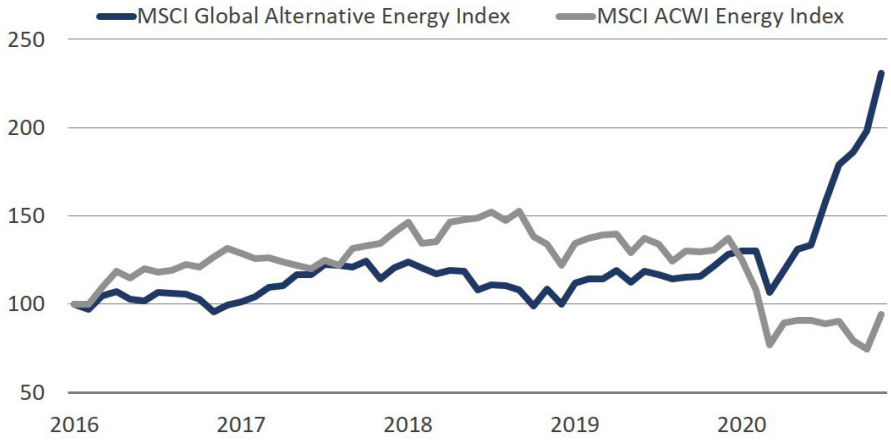
Highly liquid companies—which are sometimes tied to risky business models—include a broad range of businesses engaged in some aspect of energy transition or clean energy. These range from established "utility-like" companies such as Orsted to residential solar companies, like Sunrun.

There has been a flood of new business models and financing structures tied to renewable energy project developers (i.e., YieldCos) and more recently, initial public offerings through Special Purpose Acquisition Companies (SPACs). As with any new allocation to public equities, investors should consider the potential overlap with their existing public equity positions, as many equity managers now have some exposure to clean energy companies.

Earlier this year, The Financial Times highlighted potential risks related to capital inflows in publicly traded clean energy stocks, noting that "Global funds linked to environmental, social and governance principles took in nearly $350 billion last year, compared with $165 billion in 2019." Valuations have also become a concern in this space, with the S&P Global Clean Energy Index trading at over 40 times future earnings after having doubled in the past year.[9] Separately, the MSCI Global Alternative Energy Index significantly outperformed the MSCI ACWI Energy Index over the past year, as another indication of capital flowing into clean energy companies and provides an indication that investors may wish to proceed with some caution in the public space.

ALTERNATIVE ENERGY HAS ALREADY ATTRACTED INVESTOR ATTENTION

MSCI Energy Indices, Indexed to 100, January 2016



Data source: MSCI; Data as of December 31, 2020

PRIVATE INFRASTRUCTURE FUNDS

These funds typically pursue a broad range of investments in sectors such as power generation, airports, toll roads, telecommunications, and water assets. Some funds exclusively target clean energy while others may selectively target deals as part of a broader infrastructure strategy. Distinguishing the underlying profile of assets and potential returns, however, is important. To simplify, infrastructure funds can be viewed as either "core" or "opportunistic" with the common characteristic being their focus on owning and operating the assets.

- Core Infrastructure: These funds typically target stabilized, contracted, clean energy projects (wind, solar, battery storage), which produce a yield in the mid-single digit range and have higher leverage, reflecting the profile of the underlying assets. These projects have largely been "de-risked" and are similar in many respects to "core" real estate. In addition to "core" infrastructure funds, utilities, or pension funds would be likely buyers or owners of these assets. As with most yield-oriented investments, competition is intense as capital flows seek returns above those offered by Treasury bonds.
- Opportunistic Infrastructure: These funds have a different return profile, often seeking returns in the mid-high teens, and therefore, may be positioned to undertake development projects in wind, solar, or other renewable energy areas, such as battery storage. The potentially higher returns are due to the risks associated with development, including permitting, construction, and finding suitable buyers once the assets begin producing power.

PRIVATE EQUITY

Focusing on "growth equity," rather than "buyout," these types of strategies provide growth equity capital to businesses with products and services essential to the energy transition.

The distinguishing factor versus private infrastructure funds is the ownership of businesses rather than assets. Examples could include a company offering a charging solution for electric vehicle owners or a software that enables greater efficiencies in managing the power grid as more clean energy comes online.

VENTURE CAPITAL APPROACH

As noted previously, venture capital was the main source of funding in the first wave of clean energy investing during the mid-2000s. Certainly, there were lessons learned from the losses of that period. There is likely to be some overlap between growth equity and venture capital; however, venture capital is distinguished in part by greater technology risk with more binary outcomes.

Both generalist and specialist venture capitalists are likely to pursue clean energy technology; therefore, investors in venture are likely already getting some exposure to clean energy through their existing venture capital allocations.

As investors consider the various areas of clean energy investing, one should understand that there may be crossover between areas and that these classifications may not always be distinct. Choosing those strategies and managers best positioned to deliver returns in what is quickly becoming an overcapitalized segment of the market will be imperative moving forward.

Trade-offs in the Clean Energy Transition

Stepping back, investors are well served by considering and understanding some of the trade-offs relevant to the energy transition story which could be overlooked in the drive to secure exposure to renewables.

A "JUST TRANSITION" AND ENERGY EQUITY

While beyond the scope of this paper, the concepts of "just transition" and "energy equity" in the transition to clean energy are worth understanding. Access to electricity is key to economic development, as it is an essential component in achieving a higher standard of living.

The availability of clean, affordable, and secure energy services improves productivity, education, and health while empowering populations and reducing poverty. This is not to suggest that affordable energy can only be oil and gas, or that the world should not innovate to be more efficient in the consumption of energy to address environmental impacts.

"Although measures to curb emissions and reduce the impacts of rising temperatures are positives for the environment, those who work in industries affected by climate policies risk losing their livelihoods as the economy leans increasingly upon renewable energy. Around the world, there is a growing movement demanding a "just transition" for the workforce, so that workers and others do not suffer from the transition away from fossil fuels."[10]

BASIC MATERIALS

Electric vehicles, batteries, and other energy transition products and infrastructure require substantial amounts of basic metals for construction, such as copper, lithium, cobalt, graphite, and nickel, all of which must be mined, processed, and transported.

According to a McKinsey report, the hard realities of mining still apply, including lead times of up to several years and ecological and social concerns in regions within Africa, South America, and other areas where much of these raw materials are found. Mining more of the raw materials for electric vehicles will require investments of $100 billion to $150 billion.[11]

In other words, even as a cleaner energy solution, technologies such as electric vehicles have both costs and benefits. The key to having an environmental benefit is maximizing the life of low emission vehicles, thereby maximizing the benefit of the raw materials. For more details, see the World Bank's 2020 report, *Minerals for Climate Action: The Mineral Intensity of the Clean Energy Transition*.

FOSSIL FUELS ARE STILL IN THE MIX

Fossil fuels such as coal, oil, and natural gas supply about 80% of the world's energy. In the U.S., coal use has declined, while natural gas usage has increased. Non-renewable fuels are used for electricity, heat, and transportation, and are also key in the production of a wide range of products, from steel to plastics. Although reliance on renewables continues to grow, only about 8% of U.S. power is supplied by wind and approximately 3% by solar.[12]

At the risk of stating the obvious, when the driver of an electric vehicle plugs their car in to charge its battery, at least some of that power is coming from fossil fuels. Investors should recognize that the transition away from fossil fuels will occur over the coming decades, not the next few years.

Conclusion

"The seven worst words in the investment world are 'too much money chasing too few deals.'"

– Howard Marks, Co-Founder of Oaktree

There is now a broader opportunity set with institutional capital flowing from varying sources seeking to invest in clean energy. This creates both opportunities and challenges for investors, including identifying suitable managers and strategies, as well as increased competition for deals. As with every market segment, investors with a long-term perspective and specialist active managers should be better positioned to outperform. Looking beyond the 'mainstream' could yield better returns.

Additionally, recognizing the hurdles associated with an "energy transition" toward renewables requires an assessment of all the pieces of the energy picture. In other words, going below the surface and beyond the "buzzwords" of the day is crucial. The energy transition is happening, but it is complex and will take time. In the meantime, hydrocarbons are expected to remain a source of the world's primary energy supply for decades to come.

In assessing today's landscape, FEG is optimistic that investors appear to be committed to making clean energy a reality. For those looking at clean energy, the goal of addressing climate concerns is certainly a key component, but only one piece of the solution. An understanding of the risks, including liquidity and leverage, among others, across the varied investment options remains essential.

FOOTNOTES

[1] *The Wall Street Journal*, February 11, 2021.

[2] WilderHill, wilderhares.com.

[3] Goldman Sachs, June 2020.

[4] *The Wall Street Journal*, December 16, 2020.

[5] Francis O'Sullivan, "Venture Capital and Cleantech: The Wrong Model for Clean Energy Innovation," MIT Energy Initiative, July 2016.

[6] Nussey, Bill. "How Venture Investors Lost $10 Billion in the Cleantech Collapse of 2011 (Part 1)." Freeing Energy, December 9, 2018.

[7] "Could Liquefied Natural Gas Fuel Global Commodities Disruption?" Morgan Stanley, September 4, 2019.

[8] "More Oil and Gas Companies Leaning into Renewable Energy Tech," World Oil - Upstream News, January 26, 2021.

[9] "Green Bubble Warnings Grow as Money Pours into Renewable Stocks," The Financial Times, February 19, 2021.

[10] Yeo, Sophie. "Clean Energy: The Challenge of Achieving a 'Just Transition' for Workers." Carbon Brief, April 1, 2017.

[11] Hensley, Russell, Stefan Knupfer, and Dickon Pinner. "Three Surprising Resource Implications from the Rise of Electric Vehicles." McKinsey & Company, May 31, 2018.

[12] U.S. Energy Information Administration (EIA). Accessed March 21, 2021.

201 East Fifth Street
Suite 1600
Cincinnati, Ohio 45202

513.977.4400
information@feg.com
www.feg.com

Cincinnati | Dallas | Indianapolis

Subscribe to FEG's communications at ***www.feg.com/subscribe.***

DISCLOSURES

This report was prepared by FEG (also known as Fund Evaluation Group, LLC), a federally registered investment adviser under the Investment Advisers Act of 1940, as amended, providing non-discretionary and discretionary investment advice to its clients on an individual basis. Registration as an investment adviser does not imply a certain level of skill or training. The oral and written communications of an adviser provide you with information about which you determine to hire or retain an adviser. Fund Evaluation Group, LLC, Form ADV Part 2A & 2B can be obtained by written request directly to: Fund Evaluation Group, LLC, 201 East Fifth Street, Suite 1600, Cincinnati, OH 45202, Attention: Compliance Department.

The information herein was obtained from various sources. FEG does not guarantee the accuracy or completeness of such information provided by third parties. The information in this report is given as of the date indicated and believed to be reliable. FEG assumes no obligation to update this information, or to advise on further developments relating to it. FEG, its affiliates, directors, officers, employees, employee benefit programs and client accounts may have a long position in any securities of issuers discussed in this report.

Neither the information nor any opinion expressed in this report constitutes an offer, or an invitation to make an offer, to buy or sell any securities.

Past performance is not indicative of future results.

This report is prepared for informational purposes only. It does not address specific investment objectives, or the financial situation and the particular needs of any person who may receive this report.

F·E·G®
investment advisors