White Paper
Fundamental Growth and Core Equity

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Investing in Long-Term Growth
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STATE STREET GLOBAL ADVISORS

Contents

Macro Narratives and Market Swings: Navigating Uncertainty in Equities

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While 2023 typically generated strong returns for many of the world's equity markets, the year was not without its challenges. But amid the shifting macro and geopolitical backdrop, central banks wrongfooting market expectations on rates, and the rise of the Magnificent Seven, there were positives to be taken away.

The transition to a new year is always a great time for reflection. The early part of 2023 was dominated by macro narratives that focused on economic and financial volatility coupled with geopolitical tensions. Challenges in the banking industry combined with a US Federal Reserve (Fed) that was set on containing inflation led many to believe that an economic recession was imminent. By mid-year, it had become clear that China's post-pandemic recovery was not sustainable, global economic growth was slowing, and the Fed was not going to adopt a more accommodative stance given where inflation levels were. Equity markets fell, eroding the gains achieved earlier in 2023. Later in the year, the Fed indicated a pause on rates and disinflation returned, creating a soft landing narrative. Meanwhile, artificial intelligence (AI) became a new catalyst for markets.

The "Magnificent 7" — the seven largest US companies by market capitalization — drove a significant portion of the US stock market's returns as well as its increasing valuation. In reality, the Magnificent 7 also delivered substantial earnings and free cash flow growth, providing some fundamental basis for their strong returns. Excluding these seven stocks, the overall index return was far less impressive in 2023. For our US-exposed strategies, all of which had strong alpha generation in the year, the impact of the Magnificent 7 was closer to neutral as underweights offset overweights. This demonstrates that even with the narrow market leadership, there were opportunities outside of the top mega-caps.

As strong as 2023 was for the market, it was largely a recovery from a soft 2022. Over the two-year period, the global markets were essentially flat, with the Magnificent 7 only slightly positive. Meanwhile, the valuation of the market actually declined during the two years on positive earnings growth.

As we look forward, our biggest takeaway from 2023 is perhaps not surprising: quality wins over the long term. Companies with experienced management teams, strong market positions, and deep competitive moats with healthy balance sheets are most likely to deliver compounding growth that is undervalued by a market focused on short-term macro narratives. 2024, heavy with elections, war and festering tensions, will likely again be geopolitically volatile. However, over the long term, we see the continuation of the mega-trends of electrification, climate transition, and AI, all driven by global innovation. For the companies that are well-positioned to benefit from these trends, this can be a very positive environment.

In our latest quarterly newsletter, we include one article that is very relevant in the context of where we envision long-term growth opportunities to emerge. This article takes a close look at the importance — and the mechanics — of carbon capture in achieving net zero targets by 2050.

Carbon Capture: Enabling Energy Transition

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The global economy is in the process of transitioning from dependence on fossil fuels to increased generation and use of clean energy. Many governments and companies are taking concrete steps to avoid the worst climate impacts by targeting net zero emissions by 2050. We believe companies with credible transition plans will increasingly attain a competitive advantage. While some industries are relatively easy to decarbonize, others require technological breakthroughs to bring them to their net zero target.

For those “hard to abate” industries, we think there are no easy answers on the best path to Net Zero by 2050. The diversity of energy resources, location, infrastructure, and policies should encourage a multi-pronged approach to ensuring the availability, affordability and sustainability of long-term energy needs.

Within this context, we believe the coming decades will see a growing focus on clean energy sources. Carbon Capture, Utilization and Storage (CCUS) is an important element of that transition, especially for those countries that sit on huge natural resources. CCUS is an important part of our views of company resilience during the global climate transition.

But what is CCUS? How does it work? Is it safe? In this article, we outline the fundamental concepts of CCUS.

CCUS and How it Works

Carbon Capture and Storage (CCS) and Carbon Capture, Utilization and Storage (CCUS) are terms used for technologies that capture carbon dioxide (CO2) that would otherwise escape into the atmosphere, and transport the captured CO2 to the point of utilizing it in downstream industrial processes or for long-term storage. We elaborate on the steps involved below:

Capture
Capturing CO2 from power stations, industrial facilities or directly from air

→

Transport
Moving compressed CO2 by ship or pipeline from point of capture to point of use or storage

→

Use
Using captured CO2 as feedstock to create products or services

→

Storage
Permanently storing CO2 in underground geological formations, onshore or offshore

Step 1. Capture

Capture of CO2 accounts for approximately half[1] to two-thirds[2] of the cost of CCUS. The cost of capturing CO2 at source is influenced by a number of factors, including the cost of fuel and the concentration of carbon. For example, carbon dioxide accounts for about 421ppm[3] or 0.04% of the air that we breathe,[4] which compares to the 12–14% it accounts for in the flue gas of a coal coal-fired plant or the 14–33% of a cement plant's emissions.[5] This is why capturing CO2 from flue gas is more economical than direct air capture (DAC).

Approaches to Carbon Capture		**Capture Technologies**	
Pre-combustion	CO2 is separated from fossil fuel prior to combustion. For example, when natural gas is processed with steam to eventually produce hydrogen and a concentrated source of CO2	**Absorption**	CO2 from an exhaust stream is dissolved into another material with a subsequent process to separate the CO2 out of the solution. Can be energy intensive
Post-combustion	CO2 is separated from exhaust gases created by burning fossil fuel, for example, in a power plant	**Adsorption**	CO2 molecules adhere to the surface of another material with a subsequent process to separate the CO2 using heat or pressure. Has the potential to be less energy intensive relative to absorption
Oxy-fuel combustion	Uses pure oxygen in the combustion process rather than air to produce a more concentrated stream of CO2	**Membrane**	Applying a membrane to either capture CO2 or only letting CO2 pass through the membrane as a filter
		Cryogenic	Cooling the exhaust gas to separate solid CO2 from the light gases

Source: State Street Global Advisors as of December 2023

According to the International Energy Agency (IEA), it is still unclear which technology is going to be most effective in delivering cost reductions and performance improvements as several are still in the early stages of development and demonstration.[6]

Step 2. Transport

Captured carbon is compressed, usually at the capture site, so that it can transported more easily to where it will be used or stored. Compression of CO2 by itself is also an energy intensive process. Compressed carbon can then be transported by means of ships or pipeline for long distances and high volumes, or by truck or rail for shorter distances at a higher price point. In the US, for example, 70 million tonnes per annum (mtpa) are transported via an 8,000 kms CO2 pipeline network primarily used for enhanced oil recovery (EOR).[7]

Step 3. Utilization

The utilization of carbon dioxide refers to technologies that use CO2 as an input rather than releasing it into the atmosphere, like the fizz in carbonated beverages. The IEA estimates that roughly 230mn tonnes of CO2 is consumed by industry annually,[6] with the production of fertilizers accounting for the largest use, as well as increasing pressure on an oil reservoir to force oil towards the production wells, a process known as Enhanced Oil Recovery (EOR). A lot of work is being done to enhance usage of CO2 in synthetic fuels as an alternative to fossil fuels in the production of chemicals and building materials, but this is in the early stages of development.

Step 4. Storage

The carbon capture storage industry was born out of enhanced oil recovery in the US.[8] This is done by 'injecting' the captured carbon into onshore and offshore sites. As the amount of injection increases (operational facilities average around 1mtpa, with projects under development targeting 5 to 10 mtpa), the industry is moving more towards deep geological formations like exhausted oil and gas fields or saline formations that are well below the water table. The IEA estimates that global storage capacity amounts to at least 8,000 gigatonnes, implying that storage space is not a limiting factor.[9] Areas of storage innovation like forests or using agricultural land as carbon sinks are considered volatile since they can release the stored carbon during wildfires. Other areas are still early in the development cycle, such as ocean fertilization that could potentially oxidize CO2 into the deep ocean.

The Potential of the CCUS Market

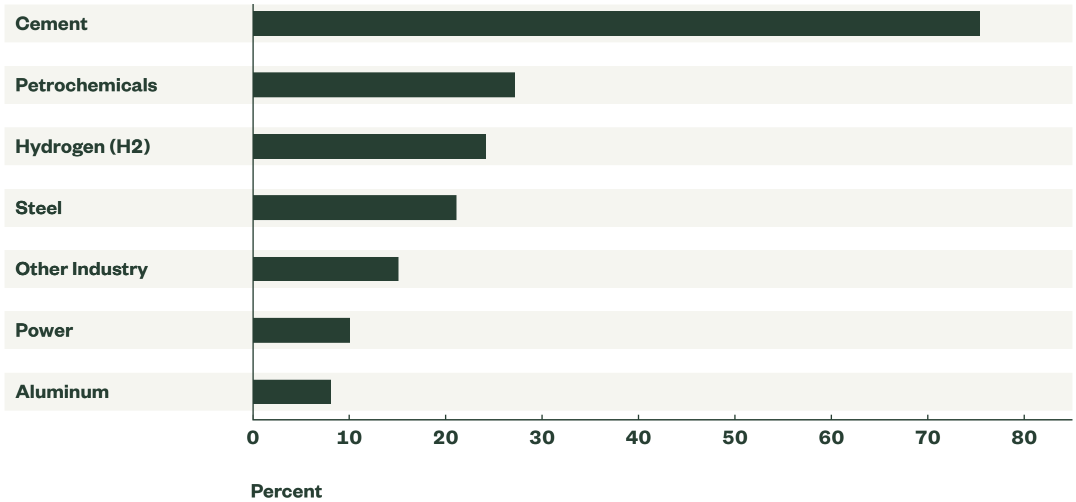
The size of the CCUS market is set to grow considerably by 2030. According to Goldman Sachs, annual spending in CCUS could amount to $90bn in the current decade, based on the estimates in their roadmap to Net Zero.[10]

Meanwhile, BloombergNEF (BNEF) estimated there could be 1,700mn tonnes of CCUS capacity by 2030 in their Net Zero scenario,[11] a compound average growth rate (CAGR) of 51% from the nearly 43mn tonnes captured in 2021. The IEA World Energy Outlook 2022 estimated a lower 1,200mm tonnes of CCUS capacity by 2030 in their Net Zero scenario, the equivalent of 10 new CCUS-equipped facilities being commissioned each month until then.[12]

Bloomberg estimates the total cost for CCUS to be in the range of $109–$198 per tonne.[13] Effectively, this means the cost of carbon credits has to be well north of $100 per tonne to justify setting up a CCUS facility. Carbon trades well below that price in Europe today, meaning that the gap has to be filled either by the premium of a decarbonized product or government subsidies like the Inflation Reduction Act in the US.

The Bloomberg Net Zero scenario estimates the biggest abatement potential for CCUS to be in the cement industry, with the potential to abate 75% of sector emissions by 2050.[14] The estimated abatement from CCUS in some other industries by 2050 is also presented in Figure 1.

Figure 1
Estimated Potential Abatement of Sector Emissions by 2050



Source: BloombergNEF, New Energy Outlook 2022. The above forecast is an estimate based on certain assumptions and analysis. There is no guarantee that the estimates will be achieved.

CCUS: Current Status

The Global CCS Institute (GCCSI) was tracking 244mtpa of projects under development as of September 2022,[15] which they estimate will grow at an impressive 23% CAGR to 2030. However, this falls well below IEA or BNEF Net Zero scenarios.

BNEF has noted that without incentives — either in the form of carbon taxes or revenues from utilization of CO2 — CCUS represents additional costs. This makes policy arguably the most important driver for these projects.

Indeed, GCCSI called out recent policy initiatives that are driving a pick-up in activity.[16] In the US, the Infrastructure Investment and Jobs Act (2021) provides over $12bn for CCS and related activities. The US Inflation Reduction Act (2022) increased the tax credits for CCUS to $80 per tonne of CO2 captured from $50 per tonne before. Similarly, Canada has established a C$2.6bn tax credit for CCS projects. Europe has a number of funding mechanisms such as the Innovation Fund, which aims to mobilize €38bn by 2030 in breakthrough technologies in energy including CCUS. Even China has seen movement in CCUS, with the commercial start of the 1mtpa project by Sinopec at the Qilu Petrochemical plant, with the captured CO2 to be used for enhanced oil recovery.

Criticisms of CCUS

It should be noted that the progress of CCUS and the argument for increased use has not been without criticism.

1 **Lack of a track record,** despite the first patent being filed in 1930. In a 2022 article,[17] the author goes through a list of major CCUS projects in the US with disappointing results. Of the 11 projects selected by the Department of Energy (DOE) for funding after the American Recovery and Reinvestment Act of 2009, only two remain operational. The major projects grossly underdelivered on their promise, either due to cost overruns, lack of an economic case to make the technology viable, or failing to capture emissions across the entire value chain.

2 **Exaggerated claims** around the technology. In a 2019 paper,[18] a 10–30% capture of emissions was calculated based on a study of a CCUS unit in a coal-based power plant. There are three main reasons cited for the variance versus the advertised average of 90%: uncaptured upstream emissions to generate the fossil fuel feedstock, uncaptured combustion emissions from equipment used to power CCUS technology, as well as any uncaptured combustion emissions of the coal plant.

3 **Safety** Interestingly, in a 2020 research paper analyzing the role of CCUS in the chemical industry,[19] the authors stated in their conclusion that while the availability, accessibility and acceptance of CCS sites is a hurdle, safety is not. We assume that to imply that the risk is similar to any other process that uses combustible gas in the process.

Critics have argued that CCUS is a technology that is giving financial support to the very industries that are responsible for emissions in the first place, and that those funds should be invested in zero emission technologies upfront.

The Bottom Line

Environmental, Social, and Governance (ESG) considerations are integrated in the Fundamental Growth and Core (FGC) equity team's approach to valuation of company quality, and they have been since 2002. In recent years, we have continued to enhance our ability to analyze ESG issues that are material to a company's business. FGC analysts conduct proprietary, in-house climate assessments scoring three key areas:

Climate Transition Readiness, which includes disclosure practices, transition plan credibility, and management accountability.

Climate Risks, both financial and physical. These include direct exposure to carbon pricing, risk of stranded assets, exposure to regulation or litigation, and exposure to severe weather and/or supply chain disruption

Climate-enabling Opportunities including green products, services, and solutions.

CCUS is a transition technology that can accelerate the decarbonization of certain sectors. In a 2021 report, Princeton laid out five scenarios for the USA to achieve Net Zero by 2050 and found CCUS to be relevant in all of them.[20] We believe that there are no easy answers or quick pathways towards Net Zero. The decades of 2020s and 2030s will be important transition periods for green technology to develop, and CCUS represents an important energy transition pathway.

Contributor

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Endnotes

1 Counting the cost of carbon; UBS, 6/13/2023.

2 BloombergNEF, New Energy Outlook 2022.

3 Ppm = parts per million.

4 https://en.wikipedia.org/wiki/Carbon_dioxide_in_Earth%27s_atmosphere#:~:text=The%20current%20global%20average%20concentration,to%20the%20mid%2D18th%20century.

5 CO2 Capture Technologies for Cement Industry, Adina Bosoaga, Ondrej Masek, John Oakey, Science Direct.

6 https://iea.org/reports/world-energy-outlook-2022.

7 https://iea.blob.core.windows.net/assets/181b48b4-323f-454d-96fb-0bb1889d96a9/CCUS_in_clean_energy_transitions.pdf.

8 https://status22.globalccsinstitute.com/wp-content/uploads/2023/03/GCCSI_Global-Report-2022_PDF_FINAL-01-03-23.pdf.

9 https://iea.blob.core.windows.net/assets/181b48b4-323f-454d-96fb-0bb1889d96a9/CCUS_in_clean_energy_transitions.pdf.

10 Green Capex: Making Infrastructure happen; Goldman Sachs, 10/11/2021.

11 https://foodandwaterwatch.org/2022/09/27/carbon-capture-failures/.

12 https://iea.org/reports/world-energy-outlook-2022.

13 BloombergNEF, New Energy Outlook 2022.

14 BloombergNEF, New Energy Outlook 2022.

15 https://status22.globalccsinstitute.com/wp-content/uploads/2023/03/GCCSI_Global-Report-2022_PDF_FINAL-01-03-23.pdf.

16 https://status22.globalccsinstitute.com/wp-content/uploads/2023/03/GCCSI_Global-Report-2022_PDF_FINAL-01-03-23.pdf.

17 https://foodandwaterwatch.org/2022/09/27/carbon-capture-failures/.

18 The health and climate impacts of carbon capture and direct air capture, Mark Z Jacobson, Energy and Environmental Science, Issue 12, 2019, Royal Society of Chemistry.

19 The Role of Carbon Capture and Utilization, Carbon Capture and Storage, and Biomass to Enable a Net-Zero-CO2 Emissions Chemical Industry, Paolo Gabrielli, Matteo Gazzani, Marco Mazzotti, Industrial and Engineering Chemistry Research.

20 Princeton University. Net-Zero America: Potential Pathways, Infrastructure, and Impacts. October 29, 2021 https://netzeroamerica.princeton.edu/img/Princeton%20NZA%20FINAL%20REPORT%20SUMMARY%20(29Oct2021).pdf.

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- Start with rigor
- Build from breadth
- Invest as stewards
- Invent the future

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* Pensions & Investments Research Center, as of December 31, 2022.
† This figure is presented as of December 31, 2023 and includes approximately $64.44 billion USD of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated.

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