Accelerating the Energy Transition

Overview

The demonstrated preference by governments, corporations, consumers, and financial institutions towards a sustainable economy since the second half of the previous decade has renewed investors' interest in Energy Transition and Cleantech. As we try to put in context the corporate pledges to go 'net-zero' and the inflow of Venture Capital ("VC") and other forms of institutional capital into those sectors, it is important to understand whether and why this resurgence would not see a repeat of the past mistakes.

Cleantech remains a dirty word in investors' parlance. Of about $25B invested in funding cleantech start-ups from 2006 to 2011, less than half has been returned[1]. But to understand what led to such a spectacular failure and whether the circumstances have changed now, it is imperative that we discern what factors contributed to the rise of investor interest in the first place.

In 2006, public awareness of climate change was rising as former Vice President Al Gore's Academy Award-winning *An Inconvenient Truth* was released. Earlier that year, acutely aware of America's dependence on oil and gas, President Bush had declared "America is addicted to oil" in his State of the Union address in the same year[2]. This bipartisan support was also reflected in policy incentives such as the Investment Tax Credit and the Production Tax Credit created through the Energy Policy Act in 2005.

These factors, combined with rising commodity prices (including electricity and oil and gas), fueled the cleantech bubble – often called Cleantech 1.0. However, as highlighted in a seminal paper published in the MIT Energy Initiative[1] in 2016, high failure rates, dearth of strategic acquirers, decline in commodity prices from 2009, and long incubation cycles contributed to the collapse of the investment in the space.

1 **High Failure Rates**: Between 2007 and 2011, over 90% of cleantech investments failed to return capital to investors, a much higher failure rate than startups in other sectors, such as medical and software.

2 **Lack of Strategic interest**: Among those that did succeed and exited, a dearth of strategic acquirers led to fewer cleantech companies getting acquired under favorable terms and hence resulted in lower cash-on-cash multiples and IRRs for the investments.

3 **Dependence on commodity prices**: After rising for over a decade, energy commodity prices declined due to the shale revolution. The U.S. total energy expenditure declined from $1.6 T in 2007 to a little over $1.0 T in 2017 ("Today in Energy", EIA, August 6, 2016). Lower costs of conventional energy sources made it harder to justify innovation and R&D in alternative energy sources.

4 **Long incubation cycle**: In the absence of strong federal Research, Development, Demonstration and Deployment ("RDD&D") funding, the Venture Capital industry tried to plug in the gap to get the companies over the 'Valley of Death'. But getting involved with these early stage companies meant that the incubation cycles were longer than the typical five-year time horizon with which the VCs are comfortable.

Following settling of the dust from Cleantech 1.0, there has been an increasing discussion about what is often called Energy Transition and Climate Tech. Starting in 2013, and accelerating from 2015, the growth of VC and corporate investment into climate technology has been substantial. Between 2013 and 2019 the annual VC investment in climate technology grew from $418 MM to $16.3 B, five times the average growth in VC[3]. As anticipated, this resurgence has been met with a mixed reaction. We believe that due to a confluence of factors, the next upcoming wave of Energy Transition and Climate Tech investing is likely to pan out very differently than Cleantech 1.0. While there are some differences in what's included in the scope of Cleantech versus Climate Tech, since 84%[4,5] of the total investment over the last six years could classify as either, for the purpose of this exercise we will be using the terms interchangeably.

To begin with, poor historical returns in Cleantech were driven by higher failure rates than the rest of the VC subsectors. In the past few years, however, the equation has reversed.

A leading indicator for higher success rates among Climate Tech startups is the Seed to Series A graduation rate. Between 2013 and 2019, 29% of Climate Tech startups that raised a seed round raised a Series A round as well, compared to 19% across all sectors in VC[6]. This implies a higher likelihood of Cleantech startups crossing the 'valley of death' and overcoming the R&D to commercialization barrier.

There has also been a fundamental shift in the way energy and utility corporations think about their energy transition strategy. Ten years ago, the majors were retracing their steps on renewables – Shell announced it would not invest in wind and solar in 2009, and BP left the solar industry in 2011[6]– the same companies are now affirming their commitment to reduce the carbon footprint of their operations (including end-use by customers). Following the example of Italian ENI, which committed to reducing its Greenhouse Gas ("GHG") emissions by 80% by 2050, majors such as Shell, Equinor, BP, and Repsol have publicly set forth steep targets for their carbon footprint reduction[7].

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In addition to focusing on reducing the intensity of their fossil fuel operations, oil and gas majors are also positioning themselves to become power companies. Taking a U-turn from its 2009 stance, Shell announced in March 2019 its plans to invest $1B – $2B to become the largest power company in the world by 2035. Its acquisition of First Utility Ltd, the EV charging station company The New Motion BV, and battery manufacturer sonnen GmbH demonstrate Shell's commitment to the Energy Transition strategy. Similar moves by Total (acquisition of SunPower and Direct Energie, plans to add 7 GW of renewables addition to the portfolio over the next 5 years), and BP (acquisition of Chargemaster) point to a broader trend vs an anomaly[8,9] (Figure 1 provides a very conservative estimate based on projects confirmed as of June 2020). Utilities and power companies have taken similar steps by increasing the penetration of renewables in their mix. NextEra (47% lower carbon intensity than the U.S. electric power sector average in 2019[10]) and Ørsted (72% reduction in carbon intensity from 2009 to 2017[11]) are perhaps the best-known examples. From 2015 onwards, utilities have also actively sought to acquire Cleantech startups to enable the energy transition. Enel's $300MM purchase of demand response provider EnerNOC and EV infrastructure startup eMotorWerks, and Centrica's $81MM purchase of Restore (demand response startup) are three out of eight major acquisitions announced by utilities in 2017 itself[12].

With a much better strategic alignment and a robust trend of M&A activity by energy and utility companies, the current and upcoming crop of Cleantech startups should have a much higher level of strategic interest than what was seen in Cleantech 1.0.

Another important difference between 2008 and now is the changing motivation behind pursuing clean technologies. Prior to 2008, rising commodity prices were as critical a motivation as reducing the greenhouse gas ("GHG") emissions behind Cleantech investing. In the wake of the Paris Climate Accord signed in 2015, however, the importance of the former has diminished substantially. Governments, Corporations, Consumers, and Investors are increasingly showing a preference for environmentally responsible companies.

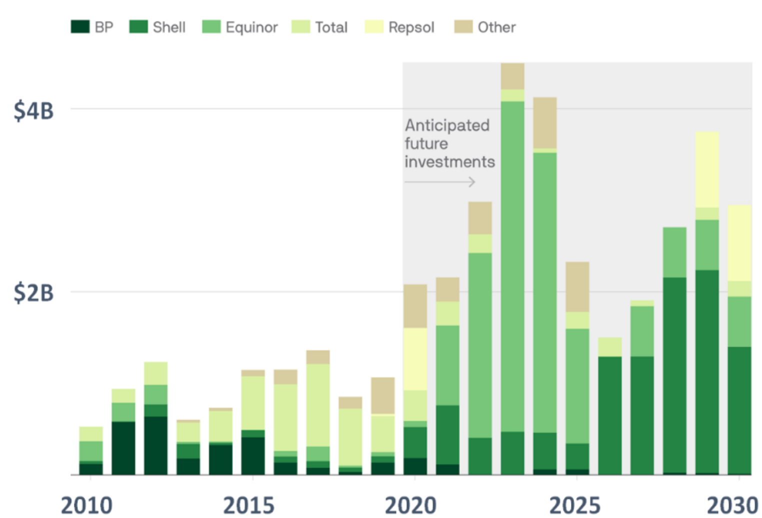

FIGURE 1. *INVESTMENTS IN RENEWABLES BY OIL AND GAS COMPANIES*
SOURCE: RYSTAD ENERGY, AXIOS

In March 2020, the European Union submitted its long-term strategy targeting net zero GHG emissions by 2050[13] and, in the U.S., 17 states already have statutory GHG reduction and reporting requirements[14]. Among Corporations, nearly 1/4th of Fortune 500 companies, including Apple and Walmart, have committed to carbon neutrality targets by 2050[15]. Lastly, financial institutions endorsed climate action when 130 banks, collectively holding $47T in assets (1/3rd of the global banking sector), committed to strategically align their business with the goals of the Paris Climate Accord[16]. Given the above considerations, GHG emission reductions and not commodity prices are appearing to take center stage in discussions around Climate Tech and Energy Transition this time around.

Lastly, low corporate and federal RDD&D budgets have been a problem that have long plagued the energy industry. The energy industry spends only 0.5% of its revenue in R&D, which is much lower than the 14.2% observed in Pharmaceuticals, 7.5% in Aerospace and Defense, or 3.2% in the Auto industry[17]. One of the reasons why VC investments in Cleantech 1.0 failed was because Venture Capitalists tried to make up for the void left by lack of federal funding and low corporate R&D sponsorship. But getting involved with pre-commercialization stage companies meant longer incubation periods than those suitable for the VCs.

After the Paris Climate Accords, however, the lack of sufficient federal funding was identified as a focus area and 22 of the participating countries came together to launch Mission Innovation, a global initiative with the goal of accelerating public and private global clean energy innovation. Under Mission Innovation, the members were committed to doubling their investment in clean energy innovation over five years (2016 – 2020). These pledges have led to impressive results; between 2016 and 2019, the annual RDD&D budgets among the Mission Innovation members have increased from $13.9 B to $21.1 B (by 52%)[18, 19] (Figure 2). While the actual increases have been shy of the original targets, it's worth noting that U.S. federal RDD&D budgets have continuously increased year after year despite a change in Presidential administrations, indicating bipartisan support in Congress for fostering clean energy innovation. Increased federal RDD&D budgets also has a multiplier effect on the venture ecosystem.

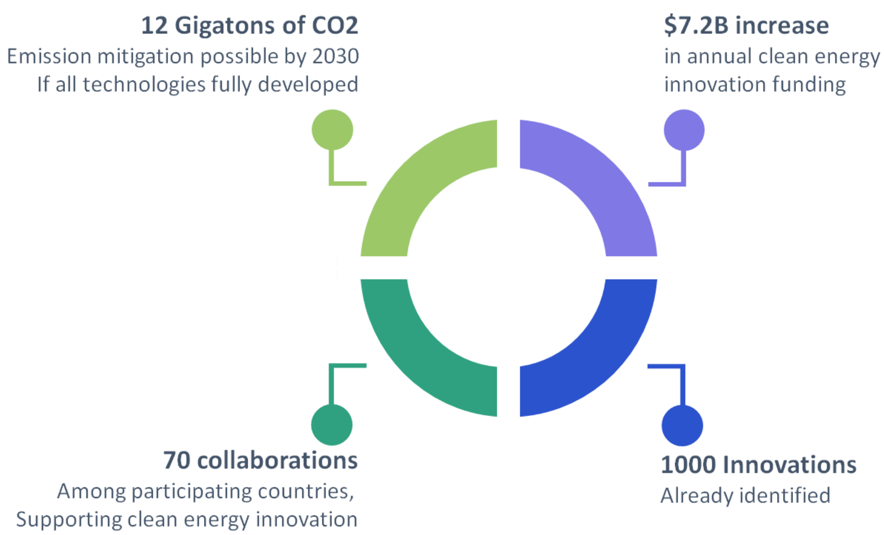

Figure 2. *Summary of Mission Innovation Achievements (2015-2019)*
Source: Mission Innovation Impact and Review

One highly popular and effective initiative is the U.S. Department of Energy's ("DoE") Advanced Research Projects Agency – Energy ("ARPA-E"), which is modelled after Department of Defense's DARPA. ARPA-E fills the gap between Research & Development and Deployment (commercialization). Over the last 10 years, 145 projects supported by ARPA-E have attracted $2.9 B in follow-on funding from the private sector, and 76 projects have gone on to form new companies[20].

For corporate RDD&D activities, a barometer besides their internal R&D budgets is the corporate venture capital ("CVC") activity. Among oil and gas CVCs for instance, the overall activity (measured by number of deals per year) has increased by more than 3x over the last 10 years. Moreover, 67% of those transactions in 2019 funded Cleantech startups, consistent with the strategic change discussed before[21] (Figure 3). Due to this increasing activity, CVC now accounts for 32% of capital deployed in the energy vertical and 30% of the capital deployed in the mobility and transportation vertical of Climate Tech. Lastly, investors with a more patient capital approach in Climate Tech, such as Breakthrough Energy Ventures and Oil and Gas Climate Initiative ("OGCI"), aim to bridge any gap that would be left by the federal and other sources of RDD&D funding.

Overall, due to better chances of survival, increased alignment and strategic interest by corporations, tailwinds that are independent of commodity prices and that are likely to stay in place, and infusion of much needed federal RDD&D budgets make Climate Tech an increasingly attractive opportunity for VCs going forward.

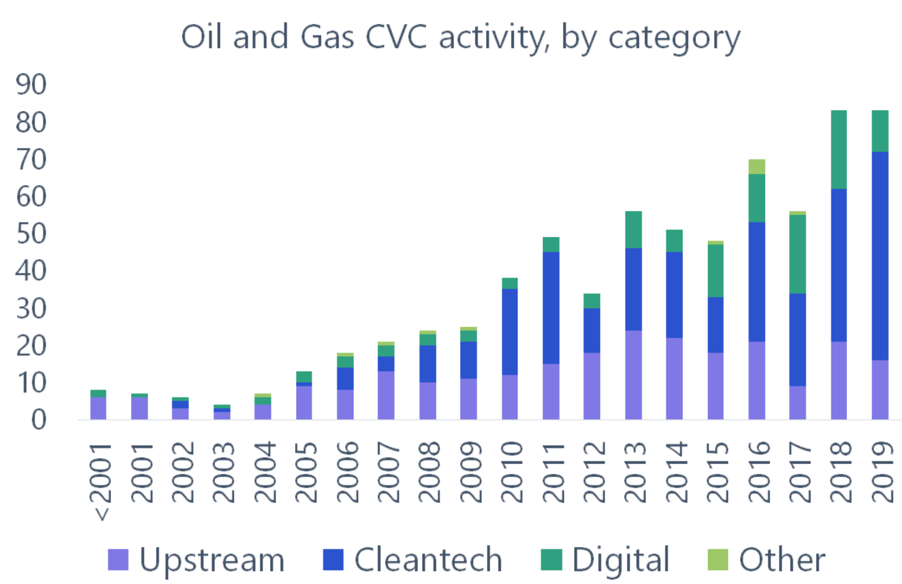

FIGURE 3. *OIL AND GAS CORPORATE VENTURE ACTIVITY BY TECHNOLOGY CATEGORY*
SOURCE: IHS MARKIT

Closer Look: Molecule and Electron Divide and Opportunities

Although funding within Energy Transition and Climate Tech has been growing rapidly and is anticipated to do so in the future, to date it has been highly concentrated around a few themes[22].

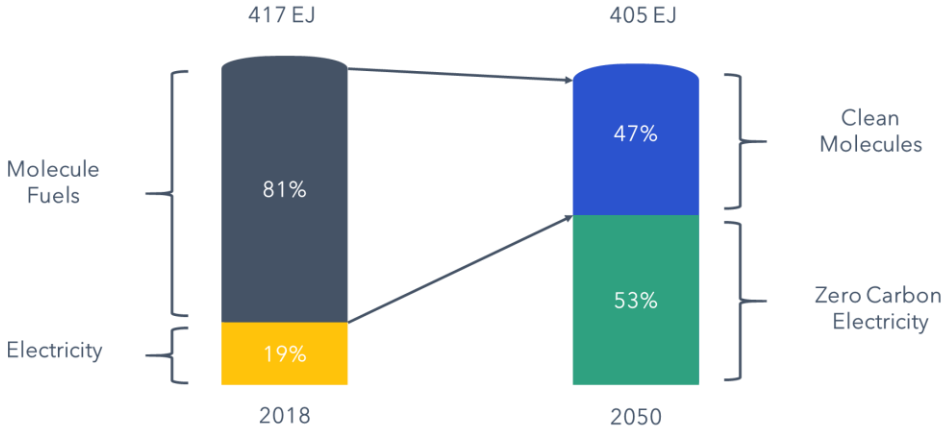

Figure 4.
Projected Global Energy Consumption (Exajoules)
Source: Bloomberg NEF, IPCC

For instance, within energy, 71% of funding has been concentrated on renewable electricity and energy storage[23]. However, under even the most aggressive Intergovernmental Panel on Climate Change ("IPCC") pathways to limit the global warming to 1.5°C, zero carbon electricity would only constitute 53% of the global energy mix by 2050, which implies that roughly half of the energy would have to be delivered by 'Clean Molecules', with Hydrogen being one of the possibilities. This need calls for more concentrated efforts to fund and commercialize technologies focused on mitigating hard-to-abate energy-related emissions in the Transportation, Chemicals, and Industrial sectors.

There's also a mismatch between the impact each of the verticals can have and the level of funding and attention that it has received to date. For instance, the Transportation sector accounts for 14% of the GHG emissions but has received 63% of the Climate Tech VC funding between 2013 to 2019 while Heavy Industry (industrial processes that manufacture chemicals, plastics, concrete and metal etc.) account for 22% of the GHG emissions and have received only 6% of the overall investment. Startups in Heavy Industry addressing GHG emissions haven't necessarily been less successful than the other climate tech verticals; if the number of unicorns per $1B of investment is a metric, Mobility and Transportation has seen 30 unicorns for a total of $37B of VC investment (or 0.8 unicorns / $1B) while Heavy Industry recorded four unicorns for $4B of venture capital invested (1 unicorn / $1B)[24, 25]. Lastly, a significant majority of the investors (over 75%) backing the current wave of Energy Transition and Climate Tech opportunities have made just one or two investments over the last six years. On the flip side, only a handful of investors (~10) have established deeper familiarity as a result of doing deals more frequently (~4 per year).

Given the potential for high returns and for significant GHG emission mitigation, we feel that there's an opportunity to scale up and commercialize Energy Transition solutions beyond decarbonization of electricity, particularly in Heavy Industries. Early CSL initiatives towards Energy Transition have been influenced by this thought.

Why CSL?

Tailwinds around Energy Transition create an opportunity for a fund like CSL Capital Management to make an impact.

In the process of helping energy companies navigate the 2010 energy transition (focused on making horizontal drilling and completions more efficient), CSL managed to build a portfolio of companies with elements of technological differentiation and operational efficiency.

As E&Ps brace themselves for the next energy transition (away from fossil fuels and towards decarbonizing the economy) we seek to enable that by stimulating the venture ecosystem with a focus on overlooked but promising areas within Energy Transition as described above. Leveraging the experience of investing in and growing energy and industrial prospects, CSL has already worked on two unique opportunities that are aimed at reducing GHG emissions from industrial operations and is launching a dedicated effort focusing on Energy Transition opportunities.

Authors

Charlie Leykum
Founder, Managing Partner
CSL Capital Management

Charlie is the Founding Partner of CSL and oversees all aspects of the firm's investment activities including sourcing opportunities and negotiating and structuring transactions.

Prior to founding CSL in 2008, Charlie worked at Soros Fund Management LLC, which he joined in 2004 as an Investment Professional covering energy and a number of other industries for the Quantum Endowment Fund. Charlie was promoted to Portfolio Manager, where he managed a portfolio of energy and basic materials investments and served on several boards.

Charlie graduated with an M.B.A. from Harvard Business School and a B.A. in Economics from Columbia University. Prior to entering Harvard Business School, he worked at Goldman, Sachs & Co. in the Principal Investments Area and in the Leveraged Finance Group within the Investment Banking Division.

Adhok Bellurkar
Vice President
CSL Capital Management

Adhok has been involved with CSL from 2018 and has worked on bolt-on acquisition opportunities and operational improvements with its portfolio companies. From 2020, he has been focused on driving the ESG monitoring and reporting initiatives at the firm and is part of the team focusing on Energy Transition investment opportunities.

Prior to CSL, Adhok has worked with Samara Capital and Unilever, where he implemented projects to reduce GHG emissions and water consumption in the supply chain.

Adhok earned a B. Tech and M. Tech in Mechanical Engineering from the Indian Institute of Technology Madras in 2012 and an MS in Environment and Resources and M.B.A. from Stanford in 2019.

Footnotes

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