

Quarterly Commentary O3 2020

EGA Renewables Infrastructure

From the EGA Portfolio Management Team



The Underlying Importance Of Battery Day

A well-worn Wall Street adage – "Buy the rumor, sell the news" – was on full display after Tesla's (TSLA) much-hyped Battery Day failed to impress investors with bold predictions that within three years they would achieve lithium-ion battery costs below \$100/KWh and, subsequently, a \$25,000 electric vehicle. Skeptical investors used to the ambitious forecasts of Tesla CEO Elon Musk waved off his proclamations and Tesla stock took a breather after a furious multi-month rally. We're as impatient as the rest of humanity, but technological advancements take time; even if, in hindsight it seems progress is made overnight. Noteworthy is the public's willingness to once again buy into the Elon Musk hype machine, which shows people recognize battery technology is critical to a cleaner, renewable tomorrow.

So what did Tesla say? The company's goal is to halve battery costs through advances in cell manufacturing and chemistry. This would suggest battery costs below \$100/KWh, allowing for further reductions in Tesla's electric vehicles that make them competitive versus gas-powered alternatives. The realization of these goals would transform the energy landscape, as the impact would go beyond electric vehicles and into the more important electric generation business. While the cost of producing wind and solar power is lower than coal or natural gas, the problem is intermittency (i.e., "the sun doesn't always shine and the wind doesn't always blow"). The solution for intermittency is inexpensive storage that allows renewable power generation to be produced when the sun is shining or the wind is blowing, stored, and used at a later time when power demand is high. Pairing inexpensive storage with inexpensive production is the key to the Renewables revolution.



Source: Bloomberg New Energy Finance

A Walk Down Energy Storage Street

The concept of energy storage goes beyond a single battery technology like lithium-ion. It's about removing inefficiencies in a system that can drive reductions in both the overall need for energy and its price as well. There are multiple ways to reach this goal, most familiar among them is batteries but there are also mechanical and chemical solutions. Thanks to its success in Tesla cars and cellular phones, lithium-ion is leading the energy storage race at a micro level, but the high capacity race that aims to solve intermittency issues of renewable energy (wind/solar) is wide open. Below we look at the pros and cons of lithium-ion and other solutions for what many believe will be the next great leap forward.



Source: U.S. Department of Energy

Lithium-Ion. Used primarily in vehicles and cellular phones and considered to be the leader of battery technology, lithium-ion positives include: (1) a high energy density in that they're lightweight, (2) a low self-discharge rate, which is a phenomena where chemical reactions over time reduce its stored charge, (3) high energy output in they can discharge at high currents to drive stronger machines, (4) environmentally sound. The negatives include: (1) higher relative costs, (2) shorter battery life cycle, (3) potential for overheating and causing fires if not manufactured correctly, (4) potential shortages in lithium-ion battery demand grows.

Lead Acid. Used primarily to start automobiles, backup electric power, or the electric component of diesel-electric engines, lead acid positives include: (1) relatively inexpensive to produce, (2) reliable and can withstand harsh conditions, (3) easily rechargeable. The negatives include: (1) minimal portability given their heavy weight and bulkiness, (2) if not properly recycled the components are environmentally hazardous, (3) limited lifespan.

Molten Salt. Whether it be in the form of molten (liquid) salt or saltwater, batteries using the natural characteristics of salt are being developed to solve renewable energy intermittency issues. The positives of molten salt are: (1) high energy and power densities, (2) less expensive since materials are common and large scheme production is relatively simple, (3) long lifetimes. The negatives include: (1) limited portability, (2) the high operating temperature required to keep components in a liquid state, (3) capacity constraints.







Flow Batteries. Flow batteries may be used like a fuel cell, whereby ion exchange occurs between two liquids

separated by a membrane. Recharging occurs when an electric power source drives a re-separation of the two liquids allowing for ion exchange to re-occur. The positives of flow batteries are: (1) scalability in that the quantity or size of the two liquids used will increase its capacity, (2) quick discharge/recharge and long lifetimes, (3) low maintenance requirements that allow the battery to remain idle for long periods of time. The negatives include: (1) lower power density and minimal portability, (2) higher complexity as a result of its mechanical activation, (3) the liquids or components utilized are relatively expensive.



We're going to skip evaluating compressed air energy storage (CAES) and flywheels given they're primarily used for load leveling within large grid systems, though highlight even these technologies are being re-imagined for a renewable world.

Other energy storage solutions not detailed in the pie chart on the previous page are pumped storage and green hydrogen. In both cases we reiterate the key is storing renewable energy so it can be deployed during periods of high demand. This balancing of supply and demand is critical as we progress forward to a pure renewable world.

Pumped storage helps flatten the supply/demand curve by using water pumps to send water into a reservoir above the hydroelectric turbines at times when electric prices are low. When electric prices are high the water is released, which powers the hydroelectric turbines and sends power back onto the grid. Once again, the idea is to flatten the curve and while pumped storage may seem a bit like a Rube Goldberg device it accomplishes its task quite well.



Finally, green hydrogen is a hot topic recently though it'll likely be many years before this technology will have a meaningful commercial impact. The basic idea is to direct excess renewable energy to separate hydrogen out of the water molecule (electrolysis), at which point it can be stored and burned when renewable energy is ebbing. Conceptually the idea is to have hydrogen generation replace or complement natural gas generation, thereby reducing our dependence on another fossil fuel.





It's taxing to evaluate all these technologies, but the point is that whether you're looking at it from a behind-themeter or utility scale perspective doesn't matter. The race to the bottom for energy storage costs is under way, and the goal is reductions in both the overall need for energy and its price as well. The market tends to appreciate new technologies when they can stand on their own two feet, and renewables is on its way there. This all feeds into our view that renewable energy is a multi-decade megatrend, with a huge runway for growth (see below).



Source: IRENA

The Rally Continues: Europe & North America Extend The Recovery

Renewables Infrastructure stocks as measured by the Eagle Global Renewables Infrastructure Index (RENEW) continued their impressive recovery from the pandemic-driven weak first quarter, adding 8.14% during the third quarter. That compares favorably to the broader U.S. market (S&P 500: 8.93%), the world market (MSCI World: 7.93%), and other comparable indices. Higher beta, higher risk renewable stocks rallied more during the quarter than quality-focused indices like RENEW, though over the longer-term the comparisons are more favorable once risk (i.e., standard deviation) is factored in.

					Std Dev
Index Name	3Q20	YTD	3 Years	5 Years	(3-y r)
S&P Global Clean Energy Index	48.50%	58.85%	30.51%	17.38%	26.90%
S&P 500 Index	8.93%	5.57%	12.28%	13.78%	17.17%
MSCI World Index	7.93%	1.70%	7.74%	10.12%	16.57%
PHLX Utility Index	7.12%	(3.67%)	8.51%	11.06%	13.61%
DJ All REIT Equity Index	1.27%	(12.05%)	3.61%	6.44%	16.60%
Barclays US Corp High Yield Bond Index	4.60%	0.62%	4.21%	6.91%	9.49%

Source: Bloomberg



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Returning the focus back to RENEW, we highlight two specific areas of interest: (1) a comparison of the lower 50% and upper 50% of constituents, and (2) a regional comparison. First, the lower 50% of the index (smaller weights) outperformed the upper 50% for a second straight quarter due to their higher leverage to market fundamentals. Meanwhile on year-to-date performance, we spotlight the performance of the upper 50% and lower 50% is balanced equally at +17%. We believe this balance shows the index is driven by the entirety of its 50 constituents and not a handful of high-flyers. It's our view this underlying balance underpins the stronger risk-adjusted return performance of RENEW versus other renewable indices.



Source: Bloomberg

Our second point focuses on RENEW's regional returns. The majority of RENEW constituents are found in Europe (69%) and North America (25%) on account of the OECD restrictions embedded within RENEW. These weights are a window into the ESG and environmental progress of these regions, as Europe was the first to take the lead and only recently has North America joined the movement. Over the last three years Europe has added \$115bn in float capitalization that comes in well above the \$74bn in North America, and reductions in Oceania (-\$3bn) and Asia (-\$1bn). North America is still playing catch-up, while Asia and Oceania stocks appear to have not yet bought into the ESG/Renewables trend.



Source: Bloomberg

Finally, and as per the below pie charts, we aggregated performance data into our split of EBITDA composition to provide a glimpse into how we would allocate the performance by asset class. Of course, this analysis doesn't account for the diversified nature of the vast majority of RENEW's constituents, but hopefully provides a guide as to how we believe each sub-segment is performing. We believe this is another way to show the quality nature of the constituents within the RENEW Index, and reiterate the index skews more towards owners/operators and, to a lesser extent, consumers and away from manufacturers and other more economically sensitive parts of the Renewables chain.



Renewables Infrastructure Team Update

There were no significant team related news items to highlight this quarter. We continue to focus on the research and portfolio execution effort as well as our indexing initiative and are in constant dialogue with industry experts and management teams. The absence of in-person conferences has been made up by the large multitude and great variety of virtual events that have been hosted by the broker community since the pandemic started. We don't believe these virtual events are an effective replacement for meeting with management teams and the investor community in person, though we believe we're procuring and analyzing more than enough information to make critical investment decisions.

We look forward to communicating the results of your investment next quarter and thank you for your continued patronage and confidence in Eagle Global Advisors.

- The Eagle Renewables Infrastructure Team