The nearly unlimited demand for better energy storage

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Taking stock of where we find ourselves roughly half way through 2022, a few things are very clear:

- The Russia/Ukraine situation has created a source of stress in fossil fuel markets, contributing to rising price levels that feed into the inflation narrative, which remains high.
- The world—with some regions pushing harder than others—continues to affirm its commitment to fight climate change, which of course zeros in on lowering carbon emissions.
- There is more and more discussion about methods of energy storage beyond electric vehicles. Electric vehicles are very tangible, but improving electric grids and thinking about other energy solutions like hydrogen are also important. European Parliament lawmakers even voted on 8 June 2022 to ban the sale of new internal combustion vehicles from 20351.

At this point, roughly half way through 2022, where do we see ourselves honestly on the journey to more and better energy storage solutions?

We believe that a truly 'electric vehicle' future will require enormous investments across a range of different types of firms, and we are only in the very early stages.

Electric vehicles: Batteries + infrastructure

While we focus a lot on the batteries and related metals that go into electric vehicles, we cannot forget about the charging infrastructure. The Biden Administration is preparing to give states $7.5 billion for new charging stations2.

That's not to mention that, if all America's cars were EVs and Americans drove as far in them as they drive today, the country's power consumption would rise by 28%3.

Giving the money doesn't necessarily translate to charging stations being instantly built and available. Consider that states received $424 million that could be used for charging stations as part of a $2.8 billion settlement by Volkswagen AG to resolve the 'dieselgate' scandal. More than 4 years after the money was disbursed, states have spent roughly 48% of those funds on charging stations4.

Not enough chargers…yet

U.S. Sales of EV and plug-in hybrids doubled to more than 600,000 during 2021, and sales figures show that EVs have reached 6.6% of total cars sold in recent weeks as gasoline prices rise. Outside of California,

the network of chargers needed to service millions of EVs doesn't exist yet. The Biden Administration wants 500,000 public chargers by 2030, but McKinsey & Co. estimates that as many as 1.2 million are needed.

So far the U.S. has around 93,000 public chargers5.

Miners need to find more raw materials

Companies that produce lithium, like Albermarle, benefit in the short-run from higher prices of lithium carbonate, a critical ingredient in EV batteries. It's possible that lithium prices are now well above the cost curve, which points to the likely direction of prices in the coming years to be more downwards than upwards.

The possible trajectory of lithium prices has big impacts—for instance companies like General Motors and Ford Motor company can see their shares impacted if investors believe that lithium prices will remain higher for longer. Will lithium prices peak in 2023 and then fall in subsequent years? It's impossible to know for sure.

Project spending by 10 large mining companies, including Rio Tinto PLC, BHP Group Ltd. And Glencore PLC is expected to stay at roughly $40 billion this year and next year, putting the capital expenditures well below a peak level of about $80 billion that was experienced in 20126.

Priority has been given to dividends and buybacks, and it's also true that minimising environmental impacts has also influenced the capital expenditure decision. The problem is that the lower expenditures create catalysts for metals prices, such as those of copper and iron, to rise, which then threatens to create a headwind for the shift to renewables.

Rio Tinto saw its licenses revoked in Serbia, for example, related to a $2 billion lithium investment after protests about possible environmental damage7.

Lithium-ion technology is only the beginning8

Mechanical Energy Storage

Energy Dome is an Italian start-up that is building 'carbon dioxide batteries.' Carbon dioxide gas can be stored at a high pressure when energy is abundant. Then, when electricity is needed, the high-pressure gas can be run through a turbine.

This category is dominated by pumped-storage hydropower, but storing gas under pressure, as Energy Dome does, is another option. One can also raise large solid blocks that fall on a pully system powering a generator to mitigate fluctuations in energy supplies.

Electrochemical Energy Storage

Flow batteries store their chemicals in external tanks, and bigger tanks allow for the storing of more energy. ESS, a firm in Oregon, makes a flow battery that uses iron and salt. When charging, the salts are converted to iron deposits on the electrode; when discharging, the iron dissolves and the stored chemical energy is converted to an electrical charge.

Form Energy, uses a process it calls ‘reversible rust’. Washing-machine-sized devices inhale oxygen from the air when discharging to convert iron to rust; when charging, they apply a current to convert the rust back to iron and emit oxygen. The firm claims to be able to store power for up to 100 hours.

Thermal Energy Storage

Antora uses thermal storage, heating up blocks of carbon to as much as 2,000 degrees Celsius. This stored energy can be used to heat steam or air in a pipe, but it’s also possible that the glow from the blocks can be directed to photovoltaic cells to generate electricity.

Rondo Energy uses battery bricks made of novel materials it heats to over 1,200 degrees Celsius, and that stored energy is later delivered as heat directly if industrial customers need it or to create steam to turn a turbine.

Malta, a firm in Massachusetts, is pioneering an electro-thermal system that can store electricity as heat in molten salt and then use that heat to produce electricity.

Chemical Energy Storage

Chemical storage can use electricity that can make a chemical to be used later in a generator or engine. An electrolyser that splits water into hydrogen and oxygen and then stores the hydrogen is particularly interesting. Chemicals are very ‘storable’.

Conclusion: We need energy and high cost is a catalyst for new avenues

In the near term, high inflation is painful for many consumers and businesses, but over a longer period of time it is this ‘pain’ that inspires entrepreneurs to figure out new solutions. Energy storage will be one of the most important topics in the coming decades, and it is likely that meeting the global goals of mitigating carbon emissions and solving climate change will require an array of solutions.

1 Source: Abnett, Kate. “EU lawmakers back ban on new fossil-fuel cars from 2035.” Reuters. 8 June 2022.

2 Source: Hiller, Jennifer. “Electric Vehicles Proliferate, While Charging Stations Lag Behind.” Wall Street Journal. 30 May 2022.

3 Source: “Green gases can help in the shift from fossil fuels to electricity.” Economist. 23 June 2022.

4 Source: Hiller, 30 May 2022.

5 Source: Hiller, 30 May 2022.

6 Source: Ramkumar, Amrith. “Mining Firms’ Cautious Spending Threatens Shift to Green Energy.” Wall Street Journal. 19 June 2022.

7 Source: Ramkumar, 19 June 2022.

8 Source for Mechanical, Electrochemical, Thermal and Chemical Storage sections is: “Decarbonisation of electric grids reliant on renewables requires long-duration energy storage.” Economist. 23 June 2022.

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