Human Innovation - A Thought Leadership Series

Part 5 - Key Net Zero Challenges #2 Energy Independence

This thought leadership series on innovation has so far shown that:

- Human innovation has been an intrinsic part our evolution as a species for at least 2.4 million years or 86% of our time on planet Earth;
- A brief examination of history in the electricity sector has shown that not much has fundamentally changed from the 1880s; and
- As a result of successes in the Scientific, Technological and Industrial Eras this has given rise to becoming a victim of our successes and given rise to our current Sustainability Era where we are aiming to combat climate change to pre-Industrial emissions levels. One of the end states of this era aims to achieve **net zero emissions** by at least year 2050.

However, in order to achieve net zero by 2050, we foresee at least five key **net zero challenges** today and these now discussed in the remainder of this series. So far, we have discussed #1 Balancing the Grid and today we discuss #2 Energy Independence.

#2 Energy Independence

Grid balancing in the context of rising intermittent renewables can be met with flexible thermal power generation with green hydrogen holding some vital promise here as a decarbonisation pathway. There is, however, a spectacular rise in the battery storage development pipeline globally. In the UK market alone, the development pipeline for battery storage is now over 16GW located mainly in the south, with around 1.3GW in operation. Additionally, there are new announcements of proposed schemes on a regular basis; and these schemes are getting larger and larger.

A key challenge of net zero will be energy independence. Given the conflict in Ukraine, governments are actively seeking to accelerate renewables deployment, but this will also require an exponential increase in technologies that serve to balance the grids.

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However, much like oil and gas demand in Europe, it is reliant on other countries for the raw materials to produce battery storage. Around 20 minerals that include rare-earth metals such as cobalt, lithium and nickel are required for battery storage and those we see in modern electric vehicles. There is no domestic supply of such metals in Europe, at least not at a deposit level.

They are largely found in China, or in supply chains between developing economies and China; so, China effectively controls the supply chain and its gates. Cobalt is largely taken from the Democratic Republic of Congo (DRC) where the press regularly un-cover unethical practices of child labour and systematic corruption. These practices also do not align with European values. Green hydrogen then, as a decarbonised storage medium that can be combusted within power generating stations equipped with turbines and engines, would seem like a more energy independent route to go for Europe at least. This leads on to our next key challenge of difficult loads - we will explore this in the next part of the series.

Conclusions

Recent conflict events have reminded our governments of the importance of energy independence. As renewables targets are brought forward, we will also have to ensure that balancing this intermittency affordability is also sufficiently addressed. We look forward to seeing the role that innovation can play in this material challenge.