Human Innovation - A Thought Leadership Series

Part 3 - The Sustainability Revolution and the Electricity Sector

The Sustainability Revolution

The sustainability revolution is here and it is driving wholesale change across generation, transmission, distribution and prosumers. With an increasing number of countries moving in this direction to solve net zero emissions by 2050, let's take a look at how the electricity sector has or will soon be changing.

A sustainable electricity sector	
	**US$5 trillion 10-year investment in renewable energy**[1] Given the load factors of intermittent renewable energy, this means much more capacity is required compared to thermal generation.
	**1,200GW thermal retirement in the next 10 years**[2]
	**138 million electric vehicle (EV) adoption in 2030 globally versus 7.6m in 2020** with a mixture of charging times and increasing destination capacity requirements making it harder for the Distributed Network Operators (DNOs) [3]
	**80 generation points in the UK 10 years ago compared to > 1 million today** moving much more of the capital investment to DNOs compared to Transmission Owners (TOs). In the GB market this has been around GBP30 billion for DNOs compared to GBP10 billion for the TOs in the most recent price control periods for example.
	**The above factors drive further grid instability**, as we can see from observable grid Balancing Market data during Covid restrictions. This is significant as high renewables with low demand provide a glimpse of Net Zero conditions in recent times on the legacy grid.
	**Forecast hydrogen demand according to BNEF New Energy Outlook 2021 Green Scenario is growth to 1,318 million tonnes and around 22% of total final energy consumption**, up from less than 0.002% today. The largest users could be the power sector with 553 million tonnes or 42% of demand, then steel, cement, petrochemicals and aluminium of 341 million tonnes and then transport with 161 million tonnes by year 2050. To combat climate change, the hope is that much of this hydrogen production will be powered by surplus renewable electricity to electrolyser water to produce green hydrogen. The progress of green hydrogen in the sustainability revolution is critical to achieving true Net Zero emissions, as it can address the most challenging decarbonisation loads in high grade industrial heat and long-distance transportation.

[1] BNEF [2] UK IPCC [3] IEA

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Conclusions

Innovation has been at the heart of human civilisation for some 2.4 million years. Our recent innovation periods of the scientific, industrial, and technological revolutions have paved a pathway to becoming a victim of our own success and we are now subsequently wrestling with how to get back to pre-industrial levels of emissions through the current sustainability revolution.

The next part in our series examines what might be the **top challenges of net zero** within the sustainability revolution era and how innovation must form a key part of the answer.