ITPENERGISED

Onshore Renewables & Storage Series

Hybrid Renewables Explainer

Thought Leadership

- Part 1—Definition and market
- Part 2—Enablers and barriers
- Part 3—Valuation approaches
- **Part 4—Drivers, ITPEnergised hybrid experience and net zero**
- Part 5—Visual summary

Introduction

This mini-series takes a closer look at hybrid renewables and how, among a number of solutions, it has the potential to support the Paris Agreement, the UN Sustainable Development Goals (SDGs), a growing world ambition to achieve net zero in our lifetime and to outperform current Environment and Social Governance (ESG) value propositions. This series is written for boards and investment committees of funds, utilities, developers, policy makers and network companies who would like to:

1. Increase returns in lower wind energy yield years;
2. Increase returns when project grid charges are anticipated to start rising;
3. Increase the number and variety of returns by maximising your grid connection as route to market;
4. Increase returns with more valuable flatter generation profiles to offtakers / internal retail position;
5. Reduce lifetime cost of energy at a system level, increase self-balancing and reduce costs of balancing;
6. Develop a platform capable of incubating innovation that cuts across silos from pilots to scale;
7. Diversify risk at the point of connection;
8. Defer investments in grid infrastructure;
9. Introduce option value into the portfolio, at least cost, even at the development stage; and
10. Outperform your current ESG proposition with higher renewable energy density for given land use.

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Drivers

Our thoughts of the potential drivers for hybrid renewables for funds, utilities and developers are discussed below:

Funds – hybrids would come under impact investing for a portfolio with long term and stable revenues; given the generation profiles of solar and wind together. The addition of one or more renewable generation / storage types also provides a diversification strategy spreading risks across a broader range of asset types. Single asset type portfolios may be open to increased valuations / real option value given the potential to convert to hybrid renewables. Additional geographic diversification to countries and regions with differing and higher negative correlation of wind and solar and supportive regulatory regimes for these hybrid projects may also provide for additional upside. Increasing the renewable energy density of the portfolio for a given land area versus a portfolio with standalone renewable technologies in the same land area provides an even more compelling Environment and Social Governance (ESG) proposition. Please read more in our ESG series **here**.

Utilities – where feasibility studies indicate positive commercials for hybrid schemes this form of investment may also allow for more synergies across their own inhouse asset management and O&M teams. Additionally, it may provide a natural laboratory to perform incubation of new innovation projects. This could comprise discrete technologies and platforms such as hybrid digital twins, control algorithms, big data, artificial intelligence and machine learning. Technology transfer from microgrid controllers could be scaled for larger HRPPs; including some of the superior capabilities of embedded phasor measurement units. Successful pilots could then allow much larger scaled roll outs across a utilities' actively managed renewable portfolio.

Developers – hybrids could allow a form of optioneering through permitting regimes. It may be possible to treat planning permissions as a series of option value within the permitting validity periods. These periods may be extendable. The exercise of the options may allow a phased approach to hybrid renewable investing as markets and the regulations continue to evolve. It may also better position development projects from a sales perspective as any plain vanilla valuation would now come with the potential upside of option value created from hybrids.

Storage

Hybrid storage solutions may include conventional lithium ion battery storage. At ITPEnergised we have experience with both lithium ion storage, and flywheel storage, in hybrid renewable applications. We have also been actively supporting hydrogen projects in the UK and are also looking to work on green hydrogen storage applications which would extend the duration potential for storage in such schemes. Our experience is wide ranging.

ITPEnergised hybrid experience

ITPEnergised hybrid renewables experience includes the following: general feasibility, red flag fatal flaw analysis, technical due diligence, review of site location and layouts, composite hybrid energy yield assessment, curtailment analysis and probability assessment, valuation, grid connection, intellectual property due diligence, hybrid EIA, hybrid ecological surveys and hybrid permitting. These have been for mainland and remote island applications for a wide range of clients from governments, utilities and developers. Speaking to ITPE's John Barclay, who evaluates energy self-generation schemes for industry and public entities, hybrid renewables perform well for light electricity and low grade heat applications where there is available land but he notes "there is no one size fits all solution." Availability of land and roof space are key considerations for solar PV and wind turbine solutions. Land area and location can also be significant factors in technologies such as biomass boilers and battery energy storage systems.

Heat pumps have limitations for certain 'hard to heat' industries and will often require a significant grid connection for the heat pump motor when utilised at scale. Ground source heat pumps also require land area whilst water source heat pumps require access to a watercourse. For more electricity intensive sites and high-grade heat applications, it is challenging to apply solar PV, wind, storage and heat pumps to meet the heavier demand without some form of fossil/ biofuels. Certain industries such as steel and glass production also require direct heat transfer from combusted fuels to the process. However, this can open up opportunities to Organic Ranking Cycle (ORC) technology to recover high grade heat which can't be used elsewhere and use that resource to generate electricity.

More widely, ITPEnergised acts as a trusted advisor to investors and developers of low and zero carbon technologies and associated infrastructure, throughout the asset lifecycle, as shown in **Figure 1 below**:

Figure 1 – ITPEnergised services capability

Net Zero

There is a worldwide trend voicing a desire to achieve net zero in our lifetime. In the EU and UK that ambition is further enacted in law, and is time bound, with a clear mandate to achieve this goal by year 2050. In this series, we take a closer look at the UK, in the context of the recent December 2020 energy white paper published by their government. We hope this provide a sense of what this journey feels like; with the understanding that many of these initiatives will have applications globally.

Hybrid renewables has the potential to align directly and indirectly with the recent December 2020 UK Government Energy White Paper "Powering our net zero future." In areas of alignment, there is potential to help drive: green public transport, green hydrogen, green finance and innovation and zero emission vehicles, as discussed in the Prime Minister's ten-point plan. In support of the government's overview of their key commitments this will also help with building world-leading digital infrastructure for our energy system, support a green recovery from Covid-19 – working with industry to develop 5GW of low-carbon hydrogen production capacity by 2030 and in creating a fair deal for consumers. For consumers it will help align with the goal of creating opportunities to reduce bills and carbon emissions.

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For power, hybrid renewables can help electricity become a key enabler for the transition away from fossil fuels and decarbonising the economy cost-effectively by 2050 and, additionally, accelerate the deployment of clean electricity generation through the 2020s. There is also a social imperative that is supported by hybrid renewables of transforming the electricity system that helps to support UK jobs and new business opportunities, at home and abroad. For the energy system, hybrid renewables may also help to minimise the costs to consumers, ensuring electricity networks are able to integrate increasing renewable generation, making sure that energy system information about supply and demand is used to drive greater efficiency and lower costs and ensure that the system's rules and governing institutions support the transition away from fossil fuels.

Conclusions

In the fable of Aesops, "The North Wind and The Sun," a competition of strength ensued between these elements as to which of these was able to take the cloak off the traveller first. In our modern day challenge; to 'take the cloak off' achieving a net zero future, competition may need to turn to collaboration, as our best results may be derived from how we harness both the sun and the wind together. Hybrid renewables may be one, among many, of these solutions on our increasingly collective and more collaborative journey towards net zero.

In the final part of this thought leadership series, we will provide an infographic that summarises the key takeaways for our series on hybrid renewables. Please also look out for upcoming case studies and tools development on our hybrid renewables journey.