

How can the world reach Net Zero with lithium ion batteries?

The forward march of the energy transition is one of the global megatrends of our time.

The need to transition towards non-fossil fuel energy, in particular wind and solar, is nothing new. The world woke up to this a decade ago. But the ability to store this energy on a wide scale, efficiently and economically, will be a revolutionary development.

The rise of pure electric vehicles demonstrates the lithium ion battery is becoming better, lower cost and more abundant. This means it is here to stay. Yet making batteries at scale and building the corresponding critical mineral supply chains is a huge challenge.

The lithium ion battery and the core supply chains that feed into it are under an ever intensifying spotlight.

Why is this the case? Recent comments from policy-makers, international organisations, and, earlier in the year, Tesla CEO Elon Musk, have fuelled Benchmark's thinking on how big the lithium ion battery ecosystem needs to become. Musk estimates that the world requires 240TWh of deployed batteries - batteries in the wild, installed and operating - for a sustainable energy future. This has provided a quantifiable target that the industry can work towards.

Benchmark data shows that in order to achieve this 240TWh Net Zero goal by 2050, the industry will need to scale from 1.1TWh of annual lithium ion battery output in 2023 to nearly 15TWh in 2050.

This 15x increase in battery cell output isn't really the central challenge. Rather, it is building the critical mineral supply chains of lithium, nickel, graphite, cobalt, and manganese that provide the raw material foundations to support this increase.

We believe Benchmark's 'Net Zero 240' concept provides a valuable framework for the industry and guides how to think about its sustainable energy goals.

While it is important to acknowledge the potential of alternative battery chemistries, we have chosen to concentrate this analysis on lithium ion batteries due to their long-term tailwinds. Battery chemistry will not be static, but neither will the requirements for a clean energy future.

This Benchmark report outlines how big the lithium ion ecosystem, from mine to end-market, needs to become to reach Net Zero.

Every destination needs a roadmap, and Team Benchmark is happy to provide a template for the path forward.