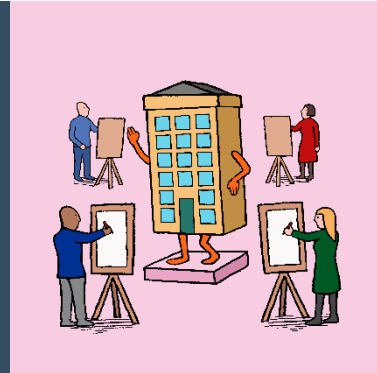


MONTANARO BLOG

Electrification: investing in the backbone of the energy transition

By Harriet Topham

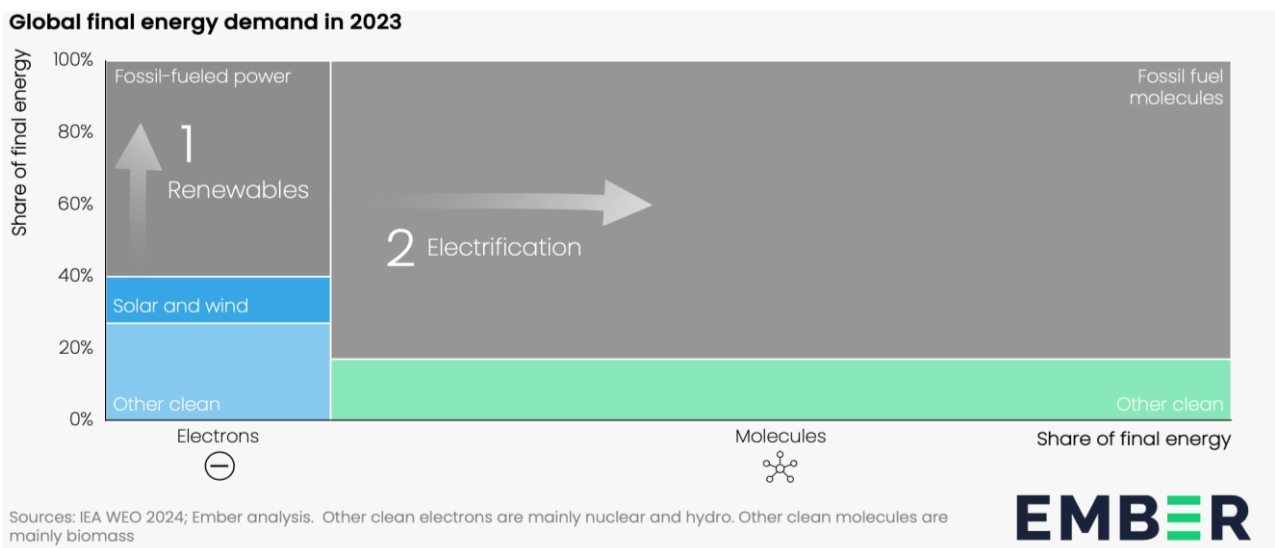


The electrification factor

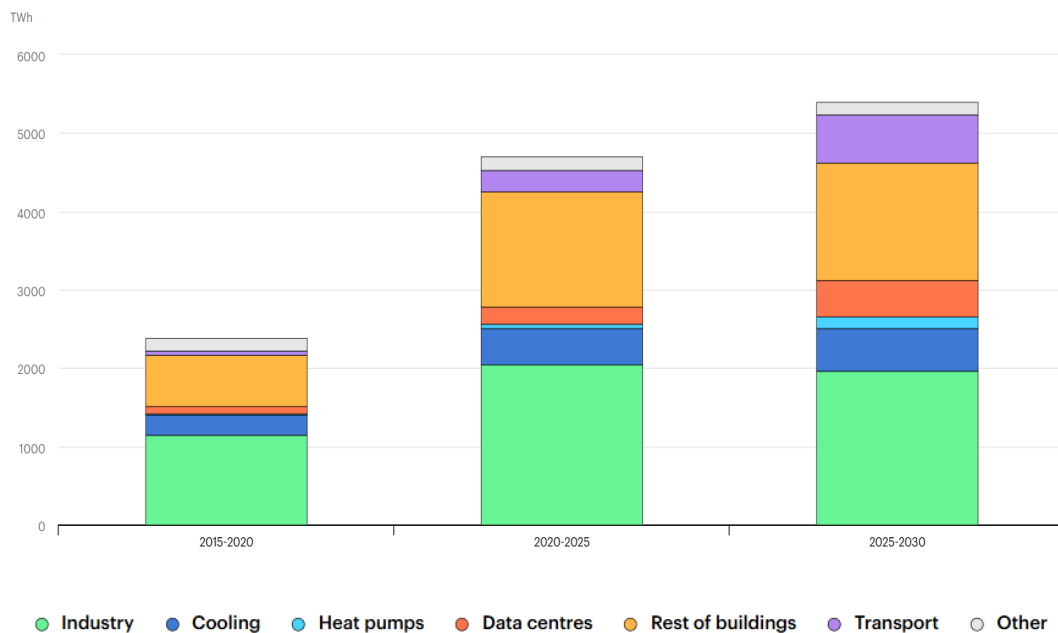
Renewable energy and electric vehicles often dominate discussion around the energy transition. Yet both ultimately depend on a deeper structural shift: the growing electrification of the global economy.

As transport, buildings and industry move away from fossil fuels, electricity demand is expected to rise substantially. In our view, one of the most important and often overlooked questions is no longer whether sufficient renewable power can be generated, but whether electricity networks can expand quickly and reliably enough to transmit and distribute that power where and when it is needed.

Electricity currently accounts for around 22% of global final energy consumption, so the vast majority of energy demand is still met by fossil fuels such as coal, oil and gas. As the chart below illustrates, much of this demand could ultimately be electrified, highlighting the scale of the long-term investment opportunity across electricity infrastructure.



Indeed, as economies adopt technologies such as electric vehicles, heat pumps and electrified industrial processes, it is estimated that *electricity demand could more than double by 2050*.



Beyond decarbonisation, electrification may help reduce dependence on imported fossil fuels and also strengthen energy security, a growing priority following the energy market disruptions caused by the closure of the straits of Hormuz. Expanding domestic power generation and modernising electricity networks will not only support the transition towards cleaner energy systems but also improve resilience and greater control over energy supply and pricing.

The combination of rising electricity demand, energy security priorities and long-term decarbonisation targets support a substantial and sustained investment cycle across electricity infrastructure.

The grid: a critical bottleneck

While renewable generation capacity has expanded rapidly in recent years, electricity networks have struggled to keep pace. Indeed, the key constraint within electrification is not the ability to generate renewable power, but the ability to transmit and distribute electricity reliably across ageing grid systems. Expanding renewable generation has been significantly faster than actually building the transmission infrastructure that is required to connect and distribute that power.

Much of today's grid infrastructure was originally designed for centralised fossil fuel-based power systems, rather than decentralised and renewable-heavy electricity networks. At the same time, rising demand from electric vehicles, heat pumps, industrial electrification and AI-driven

data centres is placing a growing strain on infrastructure that, in many cases, is decades old.

The result is mounting bottlenecks across electricity systems globally. BloombergNEF estimates that around 1,000GW of solar projects and 500GW of wind projects in Europe and the US are currently waiting for grid connection. *Together, this exceeds the capacity of the entire US power system.* Without significant grid expansion, large parts of the energy transition may struggle to scale at the pace policymakers, businesses and consumers increasingly require.

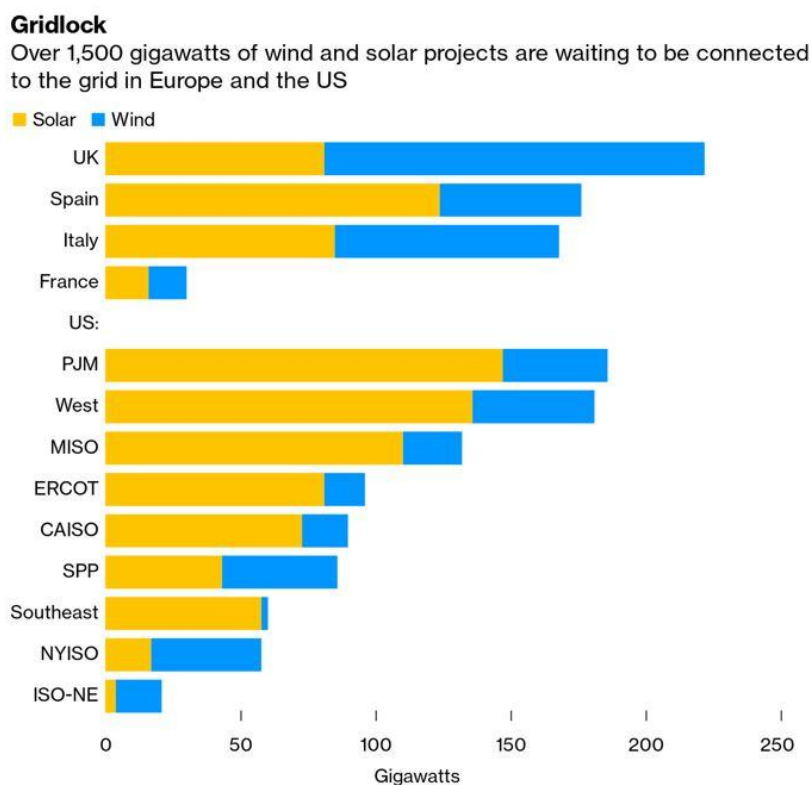


Chart: BloombergNEF

The investment required to modernise and expand electricity networks is substantial. According to International Energy Agency analysis, *approximately 80 million kilometres of electricity grids may need to be added or modernised by 2040 to meet national energy and climate targets - equivalent to rebuilding the world's entire existing grid network.*

At the same time, much of today's infrastructure is ageing. In the US, for example, around 70% of transmission lines are more than 25 years old. As electricity systems become more reliant on intermittent renewable power sources, grids will need to become not only larger, but also more flexible, efficient, resilient and interconnected.

This is likely to support sustained investment not only in transmission and distribution networks themselves, but also in a broad range of enabling technologies and equipment,

including transformers, substations, high-voltage connection systems, HVDC transmission infrastructure, conductors, grid monitoring technologies and digital network management systems.

The impact of data centres and AI

The rapid growth of AI and cloud computing are emerging as additional structural drivers of electricity demand. Essentially, the expansion of digital infrastructure is becoming ever more closely linked to the availability of physical electricity infrastructure.

Data centres already account for a meaningful share of power consumption across several major European hubs. According to Ember, they represented between 33% and 42% of electricity consumption in Amsterdam, London and Frankfurt in 2023, while Dublin approached almost 80%. Demand is expected to rise sharply from here, with European data centre electricity consumption projected to increase by more than 150% between 2024 and 2035.

A similar trend is evident in the US, where data centre demand is concentrated in major hubs such as Northern Virginia, already the world's largest data centre market. Utilities in these regions are warning of mounting pressure on electricity networks as power demand accelerates.

The challenge is therefore moving from simply generating electricity to ensuring grids possess sufficient capacity to transmitting and distribute power reliably. In some established data centre markets, waiting times for grid connections have already extended to between seven and ten years.

The rapid expansion of AI infrastructure is exposing broader constraints across electricity and industrial systems. Large-scale projects are facing delays linked not only to grid bottlenecks, but also to hurdles over permits, labour shortages and limited availability of critical electrical equipment such as transformers and turbines. In some regions, projects requiring power loads comparable to a nuclear reactor are competing for already constrained grid capacity.

This reinforces an important point: the ability to deploy AI at scale is becoming dependent not only on advances in software and semiconductors but also on the physical infrastructure required to generate, transmit and distribute electricity reliably. Electrification and grid modernisation are becoming critical enablers not only of the energy transition, but also of the broader digital economy.

Investing across the electrification value chain

While public market discussions around electrification often focus on highly visible areas such as renewable energy developers or electric vehicle manufacturers, many of the most attractive opportunities for global SmallCap investors lie within the industrial and infrastructure value chain enabling electrification.

Rather than attempting to predict which electric vehicle manufacturer, renewable developer or AI platform ultimately emerges as winners, we are investing in businesses supplying critical components, equipment and infrastructure across the wider electrification ecosystem. Many effectively operate as “suppliers to them all”, sitting further up the value chain and benefiting from broader electrification trends irrespective of which end-market technologies or companies ultimately succeed.

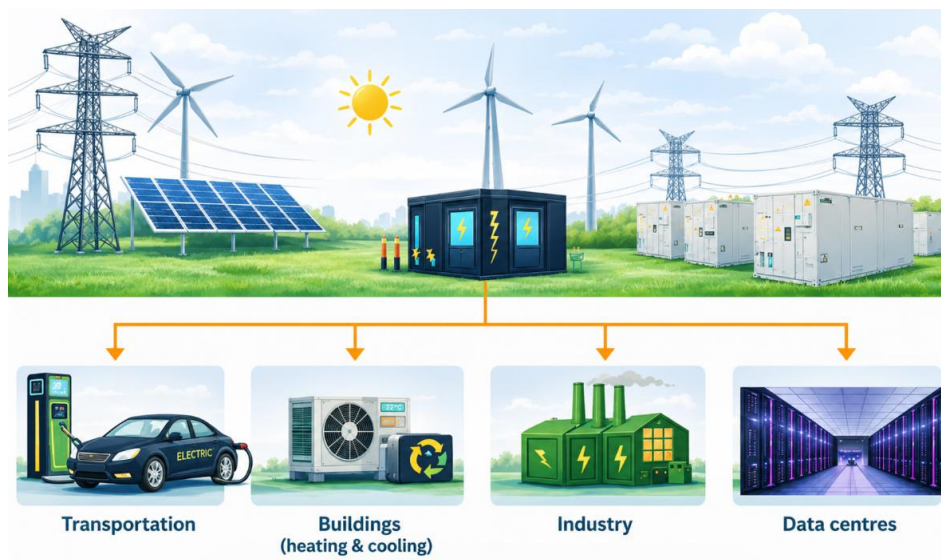


Chart: Montanaro Asset Management

Examples within our portfolios include **Pfisterer**, a specialist provider of high-voltage connection systems used in electricity grids and HVDC transmission projects, and **Hammond Power Solutions**, a manufacturer of dry-type transformers supporting electrification, renewable integration and data centre growth. We also invest in businesses supplying transmission structures and specialist copper components used throughout modern electricity systems.

These companies often occupy highly specialised niches characterised by technically demanding products, stringent certification and regulatory requirements, as well as deeply embedded customer relationships. Their products are mission-critical to grid reliability and safety, despite

representing only a small proportion of overall project costs. This combination can support resilient demand, pricing power and attractive economics.

This is where SmallCap investing can be particularly compelling. Specialist industrial businesses occupying strategically important positions within the electrification value chain are often overlooked compared with more visible renewable energy or electric vehicle companies.

These smaller companies also differ in important ways from parts of the renewable generation sector itself. Renewable developers can be more exposed to power price volatility, subsidy frameworks and financing conditions. In contrast, many infrastructure and component suppliers benefit from demand linked to long-term grid investment and broader electrification trends.

A long-term SmallCap opportunity

Electrification is likely to remain one of the defining industrial and infrastructure themes of the coming decades. Rising electricity demand from AI and digital infrastructure, growing energy security priorities and the broader shift away from fossil fuels across transport, buildings and industry all point towards sustained investment in electricity networks. In some regions, decarbonisation targets may further reinforce these trends.

The stock market may be underestimating both the scale and duration of the investment required to modernise electricity systems globally. Electricity infrastructure is becoming not only a critical enabler of the energy transition but also of the broader digital economy.

For investors, this creates an opportunity to identify specialist businesses occupying mission-critical positions within the electrification value chain that benefit from long-term structural investment in grid modernisation and electricity infrastructure. Quoted small companies should reap the rewards.

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