

WHITE PAPER / **THE GREEN INDUSTRIAL REVOLUTION**

BACKING UP VISION WITH SUBSTANCE AND INVESTMENT

by **Jonathan Chapman**, CEng, MICE, MIET

The U.K. government's energy white paper sets out how the U.K. will clean up its energy system and reach net zero emissions by 2050, a bracing commitment to a broad reconsideration of energy systems, including a significant investment in hydrogen and renewables. Delivering on the promise will depend on reinforcing ideas with practical plans.



Making significant strides towards the U.K. government's emissions target will require bold moves and a whole system approach, with different energy sources addressing the varying needs of industry, commerce and households. Hydrogen could play a critical role in assembling that puzzle.

A study conducted last year in collaboration with the Cheshire Energy Hub in the area around Ellesmere Port demonstrated how a local smart energy system, drawing on a reimagined combination of resources, could reduce regional greenhouse gas emissions by as much as 34%. Extrapolating the findings nationally suggests the potential for serious emissions reductions.

Prime Minister Boris Johnson demonstrated a promising commitment to enabling a whole system approach to energy in November 2020 as he set out a 10-point plan for a green industrial revolution, which included investing up to £500 million in hydrogen.

This was further endorsed in December 2020 when the government published the long-awaited Energy White Paper, setting out how the U.K. will clean up its energy system and reach net zero emissions by 2050.

A credible, coherent and holistic plan for building a zero-emission energy system, it promises action across the board to deliver on the core goal of a "decisive and permanent shift away from our dependence on fossil fuels."

Increased investment and new policy interventions either are confirmed or on the way relating to energy efficiency, green heating, hydrogen, carbon capture and storage, renewables, biomass, electric vehicles, smart grids, governance and regulatory reform, and nuclear power.

Achieving net zero by 2050 still will be fraught with challenges. So what does the government need to focus on now?

SHORING UP INFRASTRUCTURE

Top of the agenda is the already-announced commitment to produce enough electricity from offshore wind to power every home, quadrupling production to 40 GW

by 2030. This is laudable, and good news for jobs in construction and engineering.

Unlocking the offshore wind bonanza, however, will require ongoing investment in the U.K.'s national grid transmission system as well as an offshore transmission system to minimise the impact on the coastal communities that are so often affected.

We need a capable and reliable transmission and distribution system to bring the power from the point of generation to where people live. The government, and Ofgem in particular, needs to recognise the value in investing in this infrastructure, encouraging investors and enabling them to make a fair return.

Supporting the rapid increase in the number of electric vehicles needed to meet the government's target of banning the sale of new petrol and diesel cars by 2030 will require not only an extensive and reliable public charging network, but also the ability for people to safely and security recharge their cars near where they live.

Whether it is charging on your drive or close to your home, local electrical distribution systems will be stretched. Few streets currently could cope with multiple electric vehicles for every household.

The problem must be solved dynamically through solutions such as the installation of smart meters, by putting customers in greater control of their energy usage, and by large-scale energy users coming together to solve challenges at a local level.

In addition, the introduction of heat pumps will place further strain on the current last-mile network. The distribution network operators (DNOs) need to be properly funded to address this and make their networks secure and reliable, incorporating technology to manage loads and communication systems so they and their customers can be active participants in the energy transition.

A SYSTEM IN TRANSITION

Delivering the plan will require a whole system approach to energy transition, and it is good to see the government embracing this thinking. But using hydrogen for major industrial sites, heavy transport and home heating needs careful consideration. There will, for example, be many technical roles that will require investment in retraining and upskilling, from system planners to heating technicians learning how to install hydrogen boilers and heat pumps.

Fundamentally, the green industrial revolution must be underpinned by a substantial shift in the way the energy system is managed and regulated.

The Future Power Systems Architecture (FPSA) programme has set out what these changes could look like. The aim of the programme, a collaboration between the IET and the Energy Systems Catapult, is to identify the new capabilities that will be required by the electricity system in 2030. Taking a whole system approach, the programme has considered the traditional power system together with the installations, appliances and devices on the customers' side of the meter. It looks at how this interacts with other energy vectors, such as transport and heat, and shows that transforming the U.K. energy system to become clean, secure and affordable requires integrating and optimising solutions and innovations in a rapidly changing sector.

There is a broad responsibility to take what we've learned from the tragedy of COVID-19 and use it to plan the U.K.'s recovery for a safer, more sustainable future.

The government recognises this, but its commitments will need to be backed by a substantive and serious reappraisal of energy infrastructure, its management and regulation.

BIOGRAPHY

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