THE
Ethical
CORPORATION MAGAZINE

AI AND SUSTAINABILITY

January-February 2026

EARTH IN THE BALANCE

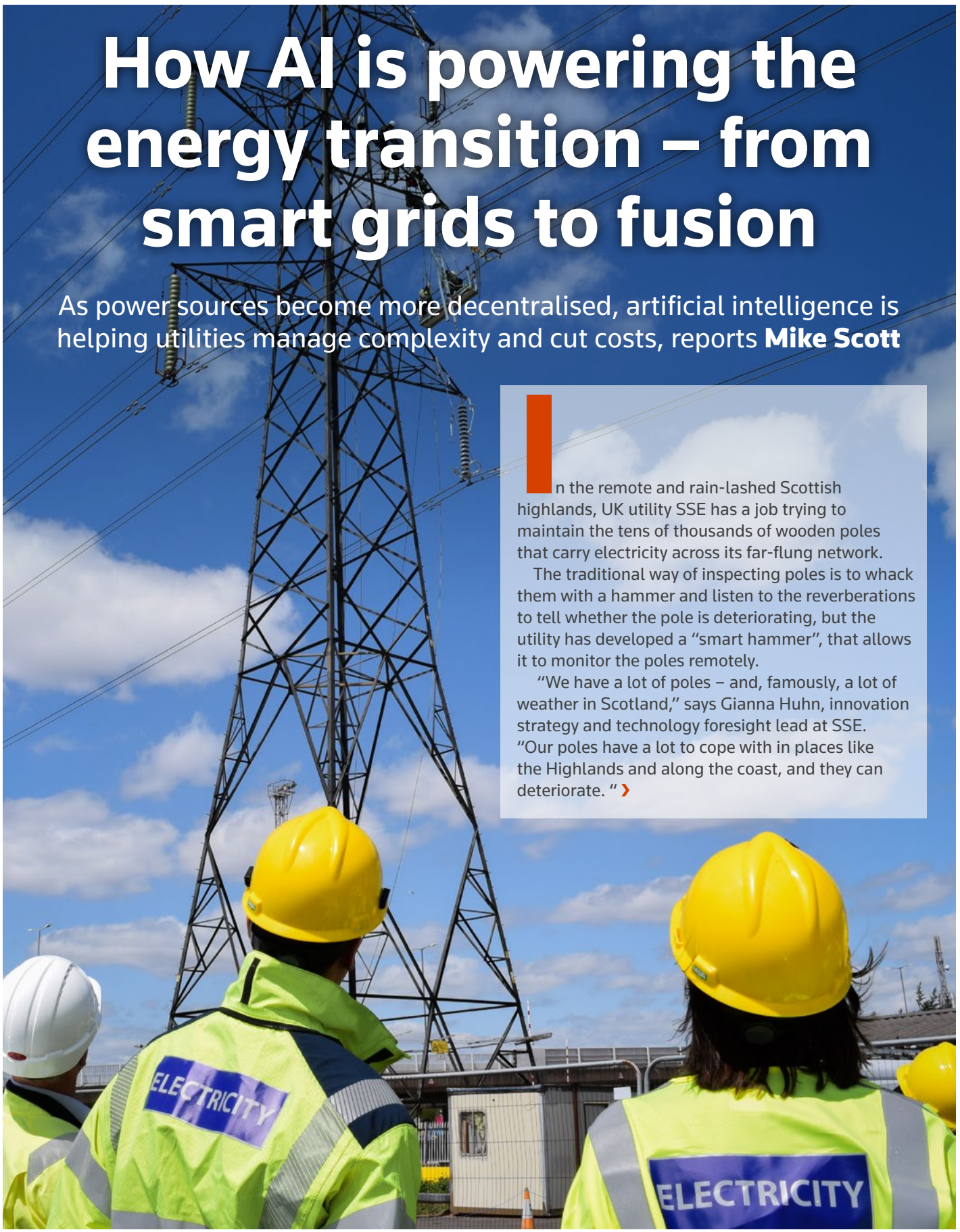
Can we make artificial intelligence a force for good?

- How tech companies are reaching for the nuclear option
- Desert storm over water use by data centres
- Stopping deforestation in its tracks with predictive AI

Reuters Events

How AI is powering the energy transition – from smart grids to fusion

As power sources become more decentralised, artificial intelligence is helping utilities manage complexity and cut costs, reports **Mike Scott**



SSE

In the remote and rain-lashed Scottish highlands, UK utility SSE has a job trying to maintain the tens of thousands of wooden poles that carry electricity across its far-flung network.

The traditional way of inspecting poles is to whack them with a hammer and listen to the reverberations to tell whether the pole is deteriorating, but the utility has developed a "smart hammer", that allows it to monitor the poles remotely.

"We have a lot of poles – and, famously, a lot of weather in Scotland," says Gianna Huhn, innovation strategy and technology foresight lead at SSE. "Our poles have a lot to cope with in places like the Highlands and along the coast, and they can deteriorate. " ›

REUTERS/MATTHEW CHILDS

AI can help to determine which direction a wind turbine needs to face to maximise its power output.

The smart hammer is Bluetooth-connected, producing better results than the human ear by using neural network technology to analyse sound wave patterns and "learn", she explains.

"But thanks to AI, it's not just a hammer, it's linked to an asset-management tool: the more poles we whack, the more are included in the tool and the more it learns about the strengths and weaknesses of the whole system."

Maintaining electricity poles is only one of myriad ways that renewable energy companies like SSE are using AI to make their operations more efficient.

"AI has huge transformative potential for the energy sector," says Huhn. "It can make it safer, more efficient and more sustainable."

For example, SSE is using AI to help determine the maximum amount of power that a transmission line can safely carry, a process that takes into account temperature, wind speed, sun and cloud cover. "We can push about 15% more power through our lines, which reduces network constraints and makes the grid more flexible and resilient," Huhn adds.

AI can also help to determine which direction a wind turbine needs to be facing to maximise its power output. This sounds simple, but can involve three different applications: one predicting the strength and direction of the wind, another moving the blades, and a separate system calculating how the turbine's output fits into the demand on the system.

> **By using AI 'we can push about 15% more power through our lines, which ... makes the grid more flexible and resilient'**
>
> **GIANNA HUHN, SSE**

The technology can also calculate how much power all the renewable assets on the grid will generate at a particular time, based on weather conditions, and so how much non-renewable energy will need to be generated.

Seun Ajao, associate professor in data science and AI at Manchester Metropolitan University, says AI is coming into its own as power networks becomes more decentralised. "There are so many different dynamics right along the value chain, from production to transmission and delivery to the customer, which make the energy sector very complex," says Ajao. "AI will be very useful in areas ›

ranging from predictive modelling to weather forecasting and ensuring the grid is balanced."

The spread of distributed energy also means that power loads and demands are becoming much more time- and location-specific, says Neel Gulhar, chief product officer at UK energy software company Kaluza.

"In central Melbourne, for example, there's so much solar power that it needs to be curtailed or soaked up by batteries to ensure the grid remains balanced. Meanwhile, just outside the city, there's not enough solar and the system is 'islanded', or isolated from the rest of the grid. There's huge congestion on specific nodes and a short distance away there's a very different problem, with not enough generation. And both those challenges need to be managed at the same time."

> **In central Melbourne there's so much solar power it needs to be curtailed ... to ensure the grid remains balanced. Meanwhile, just outside the city, there's not enough solar and the system is 'islanded'**
>
> **NEEL GULHAR,** Kaluza

Meanwhile, at a retail level, a single household may have solar panels, a heat pump, a battery and an electric car, all being managed by different apps. AI can analyse consumption patterns and solve a lot of pinch points, he says.

"AI can link all these sources together, work out when solar power should charge the car or battery, flow into the house to run the heat pump or be sold to the grid," Gulhar adds. "It can save you money, but there's no way one person would be able to work out when to do all that."

AI is also playing a growing role in the traditional energy industry.

Aramco, the Saudi Arabian oil and gas company, has identified more than 400 use cases for AI across its operations, and calculates that AI has brought it almost $2 billion of value in areas such as reservoir modelling and equipment diagnostics.

It is building its own energy-specific large language model (LLM), an industry first, training the system in-house on its own supercomputer. This strategy is in part to reduce cyber risks, but also as part of a Saudi push towards data sovereignty, a growing concern for many countries.

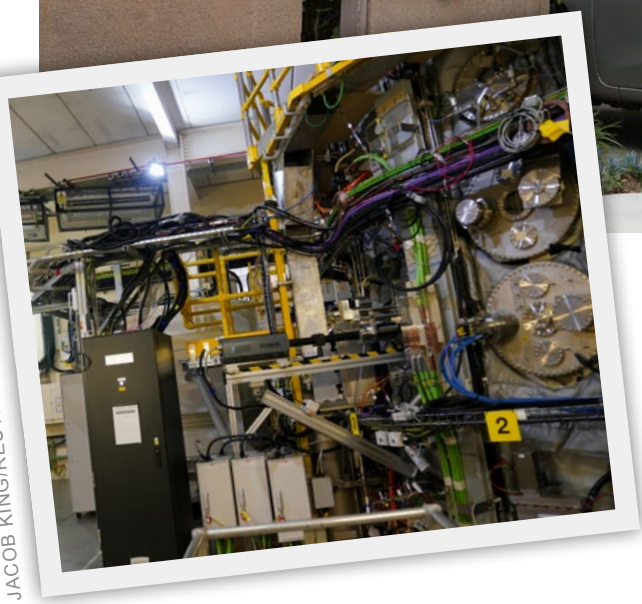
One of the most compelling use cases could be AI's deployment in the race to be the first country to commercially develop nuclear fusion. Fusion is still in its experimental stages, but is hoped to generate vast amounts of zero-carbon electricity through replicating the reaction that fires the sun.

Commonwealth Fusion Systems, a spinout from MIT, is partnering with Google's DeepMind, using ›

REUTERS/HOLLIE ADAMS

REUTERS/LUCY NICHOLSON

AI can help analyse a property's consumption patterns.



JACOB KING/REUTERS

The Atomic Energy Authority in Oxfordshire is home to the UK's fusion research.

deep reinforcement learning to predict and stabilise the plasma that is essential to fusion energy, which can reach temperatures hotter than the sun.

Meanwhile in China, which was said last year to be poised to surpass the U.S. in the quest for commercial nuclear fusion, researchers at the Hefei Institutes of Physical Sciences recently made a breakthrough by developing two AI systems to keep plasma safe and stable inside a reactor.

And In the UK, researchers at the UK Atomic Energy Authority are using AI in digital twins to create digital prototypes that enable them to test designs virtually, which is much quicker and cheaper than building and testing physical prototypes. And, in conjunction with robotics, AI is being used to inspect and maintain components in the extreme environments of fusion power plants.

The UKAEA was picked by the government last year as the country's first AI Growth Zone.

In the here and now, however, the greatest potential for AI to help drive the energy transition is through its ability to help utilities identify cost savings, says Brad Johnson, director of electrical utilities at U.S.-based software company Bentley Systems. "There's so much data that is a stranded asset within utilities. AI can help to reach deep into that stranded asset and extract value and improve a utility's operations and lower costs," says Johnson. "It's helping with the energy transition and addressing the fact that – given that parts of the system are more than 100 years old – the industry has a century of work to do."

Mike Scott is a former Financial Times journalist who is now a freelance writer specialising in business and sustainability. He has written for The Guardian, The Daily Telegraph, The Times, Forbes, Fortune and Bloomberg.