Artificial Intelligence

AI in energy and water: the smart money is on intelligent asset management

Energy and water systems are extraordinarily complex and mature. Their maturity brings with it ageing assets that need careful management to continue to realise their full value. Their complexity means that there is a wealth of data to capture every minute on usage, performance and faults. It is always possible to find further efficiencies. For companies across the energy and water sectors, AI-driven solutions are no longer an aspiration when thinking about asset management, but increasingly a starting point and even a requirement.

The AI upgrade

The current market climate is ripe for investment in asset efficiency. Regulators are incentivising innovation. Wholesale prices are uncertain. Subsidy-free renewables are becoming a reality. Competitive pressures are on the rise.

The wealth of data produced in connection with energy and water assets is being captured by a range of increasingly sophisticated kit, from sensors and cameras to smart meters and connected appliances. Intelligent processing unlocks a multitude of opportunities for driving down costs and optimising assets at all lifecycle stages.

Players across the energy and water sectors are using AI to upgrade their assets in different ways:

1. AI is now a business-as-usual tool for energy network operators. Their dataset is becoming ever richer, with data generated by existing equipment including voltage sensors as well as newer sources such as drones fitted with high resolution cameras that inspect and monitor the condition of infrastructure. Applications for AI in making the best use of this data range from predictive maintenance to helping engineers identify pipe corrosion.

2. Larger oil and gas producers have found a broad range of applications for machine learning technology, including analysis of seismic survey images to optimise reservoir management, use of deep learning tools to improve production processes and processing of data from sensors, drones and robots to identify weaknesses in pipes and vessels and facilitate predictive maintenance.

3. Water companies are employing AI to process data including water demand, weather conditions and pump performance to achieve outcomes including maximising the cost-efficiency of pumps and detecting burst pipes.

4. Wind turbine manufacturers offer AI-driven solutions that analyse data from in-built sensors and historical weather conditions. These solutions are facilitating processes such as automated turbine "tuning", predictive maintenance and fault detection.

The legal perspective

Some interesting regulatory considerations and developments arise at the confluence of AI and energy and water in the field of asset management:

Network companies and regulated revenues – Economic and efficient costs are a key building block of the regulatory model for network companies. Proven AI solutions form a core part of delivering an economic and efficient solution. Ofgem's network innovation incentives aim to push the application of AI innovation even further to open up new opportunities for efficiencies. Meanwhile, Ofwat is also calling for further transformational innovation by water companies, especially in relation to continued investment in network resilience and leak management.

Optimising energy networks – Electricity is a unique commodity as supply and demand must be matched in real time. A broad range of markets and mechanisms are used to achieve this. AI can inform optimal network management. This is an increasingly complex exercise as electricity generation becomes ever more local and intermittent and consumers store and export electricity as well as importing it. There is no doubt that AI will play a crucial part in the intelligent optimisation of assets to avoid constraints and imbalances without excessive reinforcement works. A broad range of businesses is investing in these technologies given the dynamic nature of our energy networks right down to the local, distribution level.

Cyber security and critical infrastructure – Policymakers are seeking to encourage a high level of security in the ICT systems of providers of essential services, such as electricity and gas network operators, electricity, gas and water suppliers, and oil and gas producers. The UK's National Cyber Security Strategy envisages a process of collaboration with industry to ensure the necessary support and regulatory environment are in place to encourage the right investment in security technology. Operators of essential services will be responsible for ensuring that all data platforms and operational interfaces are secure. At the same time, AI will have a role to play in identifying and closing off security vulnerabilities.

Investing in collaboration – Regulators are actively encouraging electricity, gas and water network companies to collaborate closely with third parties on innovative solutions. Network Innovation Competitions, through which funding is awarded to electricity and gas network companies for cutting-edge projects, are open to contributions from other participants such as technology sector businesses. This is not about AI taking over; it is about unlocking the potential of AI for energy and water.

Support for AI solutions in the upstream oil & gas sector – The UK Oil & Gas Authority's Maximising Economic Recovery Strategy requires stakeholders to ensure that technologies, including new and emerging technologies, are deployed to their optimum effect in maximising the value of economically recoverable petroleum that can be recovered from the UK's waters. The Oil & Gas Technology Centre, an industry-led research and knowledge organisation backed by both the UK and Scottish governments, is funding and directing projects that help to unlock the full potential of the UK North Sea. Among others, it is looking at projects using AI to minimise non-productive drilling time, maximise equipment performance, and improve the exploration lifecycle.

Contracting with AI providers – As artificial intelligence becomes a normal part of the management of energy and water assets, owners will need to keep their contracts under review. For example, they will be ensuring that they have the robust contractual protections they may need in respect of things that might go wrong. Provisions on issues such as liability, insurance and business continuity will need to be carefully considered.

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