



LOCAL ENERGY NETWORKS

THE KEY TO OUR LOW CARBON FUTURE

The UK government has set the challenge of a zero-carbon society by 2050, For industry, meeting this goal will require a hybrid approach of reducing dependency on the national grid and looking to local low carbon sources, writes energy infrastructure specialist **Channa Karunaratne**.

For the industrial sector, long reliant on carbon-intensive gas boilers and electricity drawn from an increasingly overburdened national grid, meeting the government's legally binding net zero emissions target will require wholesale changes to the way power is bought and consumed. The race to net zero is now on – and shifting to low-carbon energy generated within local networks could prove key to meeting the state's ambitious target in time.

As well as providing an alternative energy source, eliminating or reducing reliance on centralised, third-party energy suppliers sooner rather than

later could result in financial gain. De-monopolising the major utility companies of old means businesses can start trading in locally-produced, cleaner, flexible forms of heating, cooling and power. To meet the 2050 target, carbon taxes on industry will almost certainly rise, hurting businesses which fail to adapt.

Right now, there is no single technology able to bring a building, business, or society as a whole to net zero. Each development, whether at a building, estate, town or city-wide scale, will require bespoke solutions which meet its own unique needs and features.

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A raft of low-carbon components can make up a district energy network. AECOM has identified some of the most promising.

Waste industrial heat

Industry emits a huge amount of waste heat, which is typically released into the atmosphere. This heat can be captured via heat pumps and re-distributed back into a building, curbing energy consumption and carbon emissions. This recovered heat can also be integrated into a wider district heating network, providing heating and hot water across, for example, an industrial park, hospital or a town. ➔



THIS YEAR, RENEWABLE ENERGY OVERTOOK FOSSIL FUELS AS THE COUNTRY'S PRIMARY SOURCE OF POWER FOR THE FIRST TIME SINCE THE INDUSTRIAL REVOLUTION.

Natural capital

The UK may not be known for balmy temperatures, but the country is nonetheless home to rivers, lakes, coastlines and canals which hold heat and energy. Heat pumps use a similar technique to refrigeration systems to absorb and extract heat from the air, the ground or from water — used to provide both industrial and domestic heat, as well as hot water. AECOM is setting up the Natural Capital Laboratory as a testbed site near Loch Ness, Scotland, to measure and quantify natural capital. Government, NGOs, researchers and clients will carry out research and experiments on-site, including the exploration of natural heat energy for local networks.

Renewables

Renewables now offer estate owners a host of low-cost energy solutions — and battery storage technologies are developing to allow businesses to store or sell the surplus power they generate. Major corporates from Google to IKEA are now procuring their own exclusive electricity supply from dedicated onshore and offshore wind farms. In the public sector, AECOM is working with Transport for London (TfL) to explore the use of on-site solar panels to help take the transport authority to net zero.

Combined Heat and Power systems (CHP)

In recent years CHP has stopped being a low carbon technology, due to the decarbonising grid. However CHP systems could still help bridge the gap between today's carbon-intensive

industries and a zero-carbon future. CHP systems, which tap the heat generated by thermal power generators, may provide the financial incentives that are crucial to the success of low carbon projects. It's not all bad though — in 2018, there were over 2,400 hours when the electricity grid's emissions factor was 'dirty' enough that using CHP would have saved carbon. Those periods also coincided with the colder months, when electricity is at its most expensive. We could have our cake and eat it!

Natural gas

Cleaner gases can be fed into the nation's gas systems. For example, UK energy regulator Ofgem and gas distributors Cadent and Northern Gas Networks, are trialling a blend of hydrogen in their natural gas networks to reduce carbon dioxide emissions. By switching to cleaner gases like hydrogen and biomethane, significant adaptations to the nation's existing infrastructure may be needed — raising the question of who will pay for the changes.

Carbon Capture and Storage (CCS)

CCS technology — whereby carbon dioxide is captured as it is emitted and then stored, typically underground — could allow carbon-emitting buildings, power plants and even vehicles to continue to operate in a net zero future. Investment and research are needed to bring CCS to commercial scale; the UK abandoned a £1 billion CCS development programme in 2015.

However, the technology could enjoy a reprieve after a 2019 government report by the Committee on Climate Change branded CCS a "necessity" if we are to reach net zero by 2050.

Building a local, low-carbon future

An increasingly climate-aware public is demanding a shift towards sustainable energy — and some political parties are even lobbying for the UK to reach net zero two decades sooner — by 2030. This is not just blue sky thinking. Rapid evolutions are now the norm in the energy industry.

Take renewable energy. In 1991, the nation's first commercial wind farm was built. This year, renewable energy overtook fossil fuels as the country's primary source of power for the first time since the Industrial Revolution. The UK's pivot from fossil fuels to green energy took less than three decades.

To achieve net zero, local and central government will need to support the public and private sector's work by delivering planning laws and regulation that enable the creation of low-carbon energy networks. A net-zero society won't be created overnight; but with state support and the uptake of existing and emerging solutions, we just might hit the 2050 deadline.

AECOM works on delivering long-term cuts to large public sector estate owners. We are regularly tasked with reducing carbon emissions, energy costs, and building stronger resilience against building, system and utility failures.

To do this, we design energy networks with electricity, heating and cooling systems all working together, tapping into the local natural potential and renewables. Feeding energy across the estate we enable load shifting and dynamic balancing to ensure a constant, clean supply of energy. 