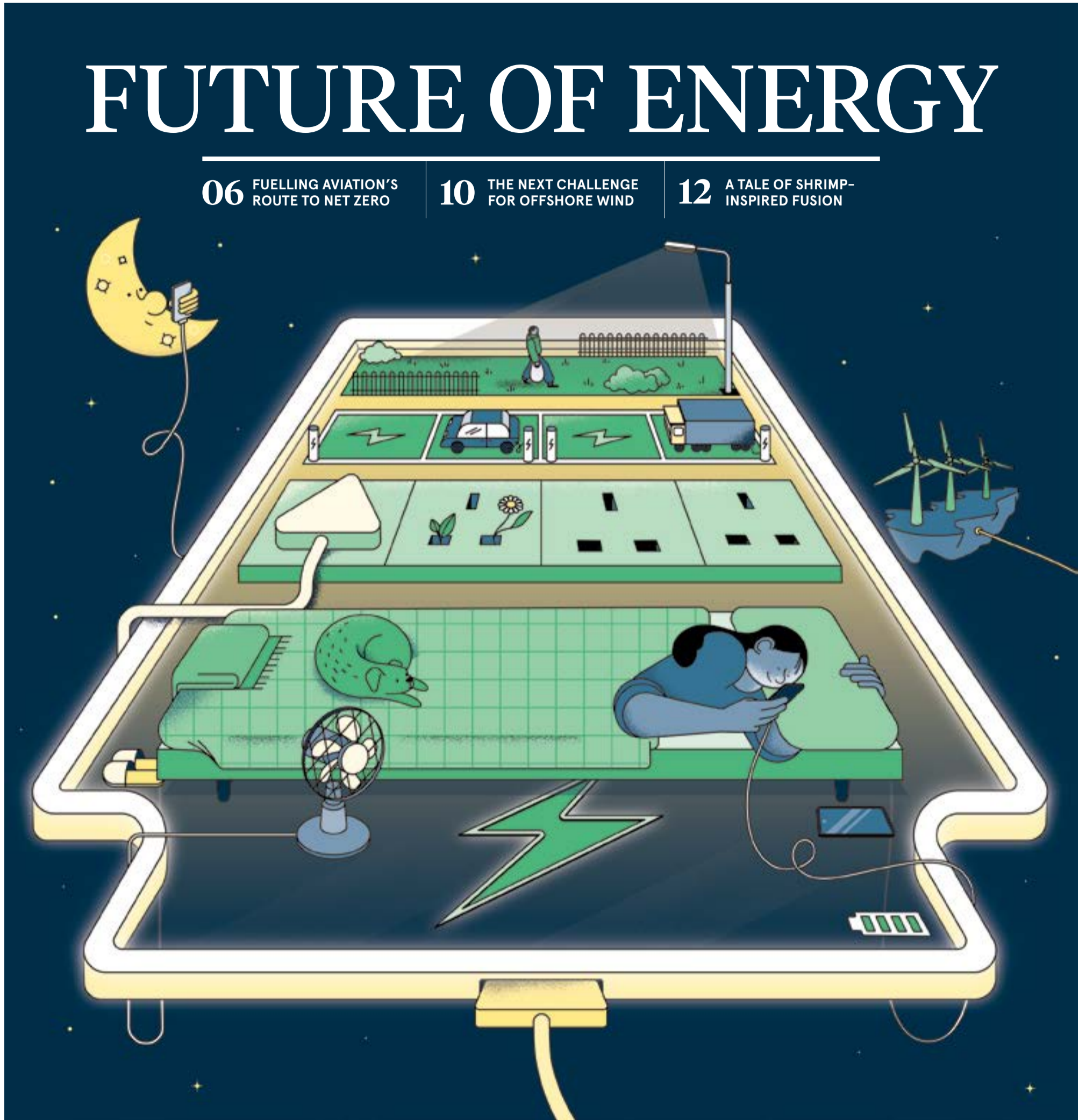


FUTURE OF ENERGY

06 FUELLING AVIATION'S ROUTE TO NET ZERO

10 THE NEXT CHALLENGE FOR OFFSHORE WIND

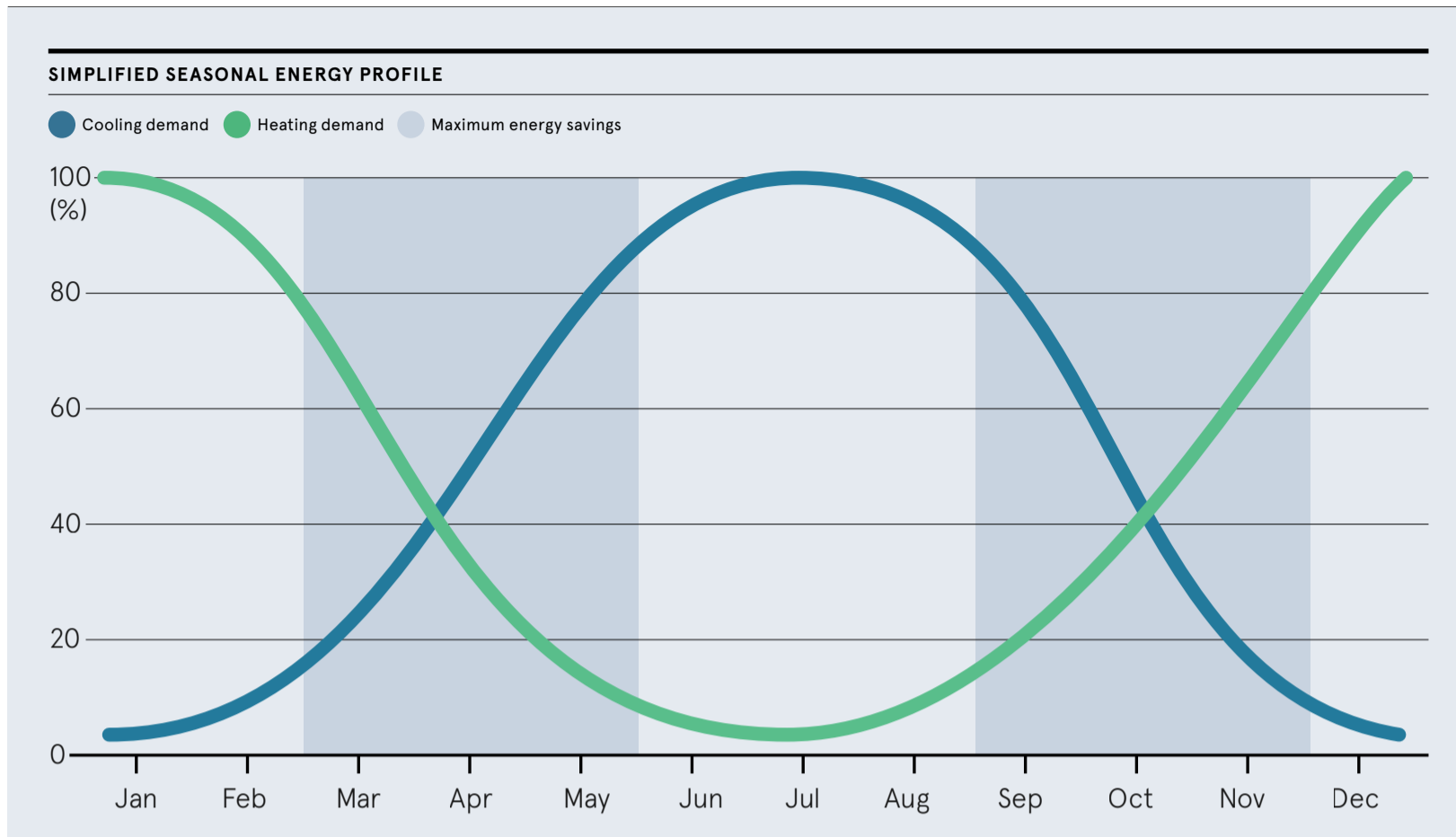
12 A TALE OF SHRIMP-INSPIRED FUSION



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Why breaking down energy silos is the key to decarbonisation

Innovative heat pump technology and electrified thermal management systems are set to become game-changers in the way commercial buildings are managed. But to get the most out of these technologies, the mindset that places heating and cooling in separate silos needs to change

On the face of it, we are in a Catch-22 situation. As global warming leads to a hotter world, there will be greater need for more cooling and more air conditioning than ever before. But this means more energy use, often through burning fossil fuels, which simply exacerbates climate change.

Heating, ventilation and air-conditioning (HVAC) can be part of the solution. The key to this, says Jose La Loggia, president, commercial HVAC EMEA at Trane, a strategic brand of Trane Technologies. Trane Technologies, is to stop seeing heating and cooling as separate entities.

"The heating and cooling requirements of a building have historically existed in silos," he says. "But this is a way of thinking that needs disrupting."

"You have this absurd situation where on the one side you are using fossil fuels to create heat, and then on the other, you're using electricity to reject heat from the same building."

This inefficient use of energy means that in Europe, buildings are

responsible for 40% of energy consumption and 36% of greenhouse gas emissions. Almost half of the energy used in buildings is on heating and cooling.

A thermal management system combines the ability to chill and heat by recovering energy that would otherwise be wasted. When powered by renewable electricity, they can play a crucial role in decarbonising buildings and cities, helping to remove the need for fossil fuels and reduce greenhouse-gas emissions.

This innovative and proven approach to heating and cooling has seen Trane partner with a growing number of organisations that are looking to decarbonise their operations and enhance a building's efficiency and sustainability.

Hospitals are a classic example of where both a chilling load and a heating load overlap at the same time. At the Mater Dei Hospital in Malta, when the time came to replace the existing chillers, the hospital opted for a new thermal management system that

produces both chilled and hot water at the same time, helping to meet heating, cooling and dehumidification needs across the hospital.

The system has led to savings of over €1m a year on the diesel fuel needed to power a boiler, and also prevents almost 3,000 tonnes of CO2 equivalent each year. But in addition to these savings, Ramon Tabone, senior mechanical engineer at the hospital, believes that improved air quality is another important benefit of the Trane system.



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"We forget the direct impact on the health of the citizens when burning fossil fuels in densely populated city and village centres," he says. "There is no doubt that health-related pollutants have reduced dramatically as a consequence of this project."

Around 80% of the work Trane carries out is retrofit, and while the initial outlay may be higher than simply replacing like-for-like, once savings in fuel costs are factored in, "the system is in some cases better than free," says La Loggia. "They start saving money immediately."

Trane, has also worked on the installation of a low-carbon heating system at Derby College's Broomfield Hall Campus, with the new highly efficient thermal system replacing fossil-fuelled boilers.

According to Iain Baldwin, the college's director of estates: "Relying on a carbon-based heating system was outdated and unacceptable in today's society. This installation is a step in the right direction for the college and is a great example of how green, clean energy provision can be utilised on a greenfield site."

Using the total-efficiency ratio (TER), an industry approach championed by Trane, the company has shown that the new thermal units have brought about a 400% improvement in efficiency and cut annual CO2 emissions by 160 tonnes. TER is based on the calculation that with separate heating and cooling systems, for every two units of energy that are introduced, the best outcome is four units of heating and cooling. A thermal unit boosts this to eight units for every one that is put in.

The Derby project is also comes as part of Trane Technologies Gigaton Challenge, the company's commitment to help reduce 1 billion metric tons of CO2 equivalent from its customers' footprint by 2030, a figure roughly equal to the annual emissions of Italy, France and the UK combined. The company is also working

internally to reduce its own carbon footprint. At the end of last year, it installed an electrified thermal-management system at its manufacturing facility in Charmes, France. The new system is expected to cut out 1,800 tonnes of carbon emissions annually. The company has committed to reach net-zero greenhouse gas emissions across its value chain by 2050 with its emission-reduction targets validated by the Science Based Targets Initiative (SBTi).

The growth of new technologies is also playing a key role in the rise of the new combined system. In 2019, a new district heating system – the first of its kind in the UK – buzzed into life in Stirling, Scotland. It uses Trane's heat-pump technology to extract heat from sewage and wastewater. The technology has the potential to save over 380 tonnes of carbon a year, says Donald MacBrayne, business development manager for Scottish Water Horizons.

The network, which is operated by Stirling Council, supports a number of key public buildings including a leisure centre and high school. Such has been the success of the project that the council is now looking to expand the network and connect more customers to low-carbon heat. Four similar projects have since been launched in Scotland and there has also been interest from across Europe.

Innovation is part of the solution, says La Loggia, "but we need to change the traditional way of thinking that says heating and cooling are separate things."

By creating better connections between the grid and the entities that use electricity, from cooling systems to transportation, and with the increasing efficiency of battery storage, the amount of energy that needs to be generated in the future may be far less than is needed to power today's less-efficient systems, he explains.

"The future is where infrastructure is no longer siloed but seen as one organism. Cities will become better inter-connected, so that everything is electric and fossil fuels become a thing of the past."

For more information please visit www.tranetechnologies.com

