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Technology

Smart scheduling for computer tasks cuts emissions by a third

Matthew Sparkes

SHIFTING large computing jobs to nights or weekends could reduce their associated carbon emissions by a third.

The International Energy Agency (IEA) found that data centres, which are used by businesses including banking and social media firms, consumed around 250 terrawatt hours of power in 2019, or about 1 per cent of global electricity use. The IEA predicts this will rise to around 270 terrawatt hours in 2022.

Philipp Wiesner at the Technical University of Berlin says that in order to lower associated carbon emissions, this energy use needs to be reduced, and could also be scheduled at times when renewable sources make up the largest amount of the energy mix on power grids. He and his colleagues simulated the effect of changing the timing of large computing jobs to hours when the energy mix is skewed towards renewable power.

In one set of tests, the researchers simulated a company running a nightly task every day for the year 2020. In the baseline experiment, the task was scheduled to run each night at 1 am, but in other tests the task could be completed at any point during a 16-hour window. The model was given real-world historical energy mix information from each region during that year and told to minimise carbon emissions.

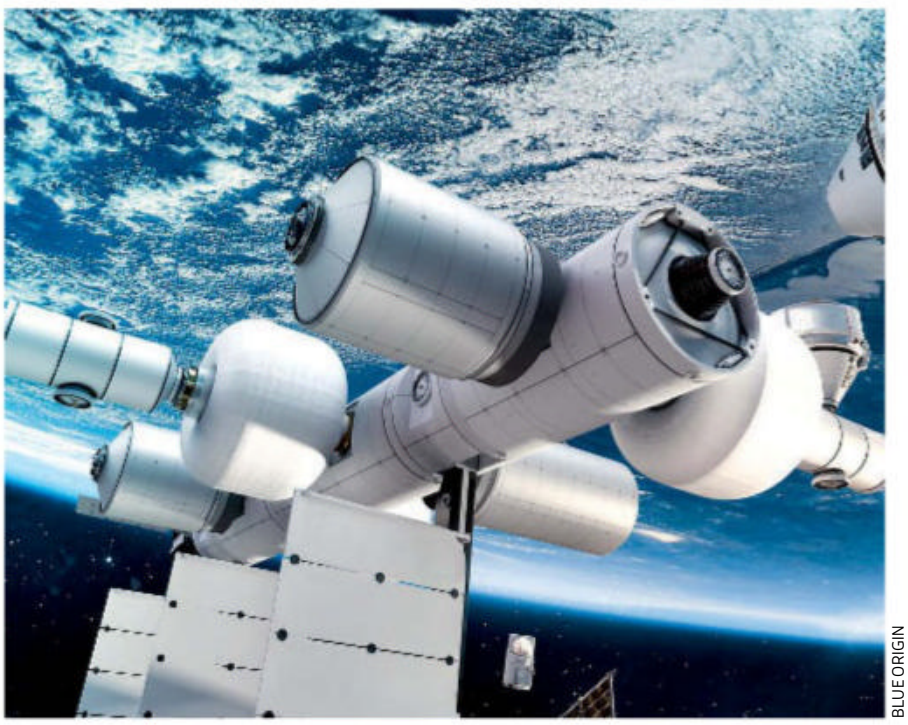
The simulation showed that in Great Britain, running the task when emission potential was lowest during the window would save 7.4 per cent of its carbon emissions over the year. In California, the savings exceeded 33 per cent (arxiv.org/abs/2110.13234).

Ralitsa Hiteva at the University of Sussex, UK, says that "such solutions are exactly the type of thing that we need more of… to move closer to net zero". ▮

Analysis Space exploration

Can Blue Origin replace the International Space Station?

The space-flight firm owned by Amazon founder Jeff Bezos is hoping to build a new orbital outpost, says **Leah Crane**



BLUE ORIGIN

An artist's impression of the Orbital Reef space station

THE Orbital Reef space station, which Blue Origin is developing in partnership with other space firms including Sierra Space and Boeing, is intended to be a multipurpose destination in orbit. Different companies and governments could pay to send their own astronauts and experiments there, and space tourists could visit, says the firm. The station is proposed to be slightly smaller than the International Space Station (ISS), with capacity for 10 astronauts. The ISS generally carries seven crew members, but it has had as many as 13 at a time.

"We will expand access, lower the cost, and provide all the services and amenities needed to normalize space flight," said Blue Origin's Brent Sherwood in a statement. "A vibrant business ecosystem will grow in low Earth orbit, generating new discoveries, new products, new entertainments, and global awareness."

So would the private station be a viable replacement for the ISS? The ageing station, which is a partnership between the US, Russia and other nations, is only funded until 2024, with an extension to 2028 looking probable, but it can't last forever.

Blue Origin says its space station will be fully operational in the late 2020s, but deadline slippage is common when it comes to huge space-related projects like this one. "They can dream of being fully operational in the late 2020s, but in the space sector they often aim for aspirational targets and if they miss it by a year or two or three then they at least have something they're aiming for until then," says space analyst Laura Forczyk. "It's almost inevitable that things take longer and are more expensive than planned."

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Number of astronauts that could be housed on Orbital Reef

Blue Origin and its set of commercial partners aren't the only companies with space station ambitions – Nanoracks and Lockheed Martin announced their plans on 21 September for a smaller station called Starlab that could host up to four astronauts, and Axiom also has a station under development. Still, it is unclear if any of these will be ready in time, meaning the late 2020s could see a period in which China's space station will be the only human habitat in orbit, although the country has promised to let other nations use its facility.

"I am alarmed by what I see as the potential for a gap [in the US orbital presence]," said Axiom executive Mary Lynne Dittmar in a US Congressional hearing on 21 October. Because of US legislation preventing cooperation between NASA and China, if there is a gap, it will ground NASA astronauts and make it difficult to test crucial technologies for the agency's other space missions, including the Artemis programme to send humans back to the moon.

NASA hasn't awarded any funding to Blue Origin or Nanoracks – Axiom has a contract to attach a module to the ISS as part of its station's development – so the businesses themselves are putting up the money for now. That is a double-edged sword, because a lack of government investment could introduce delays, but also shows that the commercial sector is keen to push ahead.

"These two new concepts are not only serious concepts with serious partnerships, they're also contributing their own internal funds," says Forczyk, "That signals that they're serious about this, that they're not just waiting for NASA to provide funds – when a company gets serious about something, that's when they put in their own money." ▮