

Electric bus maker Arrival schedules first UK road trial

Electric buses built by Arrival, the UK-based manufacturer, will be tested on British roads for the first time later this year in a trial with the transport company FirstGroup.

The tests will begin in the autumn of this year, starting with four of the first production vehicles produced at Arrival's research and development facility in Banbury, Oxfordshire. Discussions are under way about further trials with other companies, the Guardian reported.

The trials are the latest step in the rapid expansion of Arrival, which has attracted investment worth hundreds of millions of pounds to build battery-powered vans and buses with zero exhaust emissions. The company, still yet to start full production, hopes that by 2024 it will make revenues of about \$3.1b (£2.2b) from bus sales, along with about \$10.9b from vans.

Arrival is also looking at an undisclosed number of new sites for factories within the UK, a signal of its intent to ramp up output as it prepares a reverse listing on the Nasdaq stock exchange in New York at a valuation of \$5.4b (£3.9b). The company's main operations will remain in the UK.

Bus companies are hurrying to cut carbon emissions to meet clean air regulations in cities. FirstGroup will not buy diesel buses after 2022, and it plans to eliminate exhaust emissions by 2035.



ARRIVAL

A prototype Arrival bus and van

First Group is also running separate trials of electric buses made by the rival manufacturers BYD ADL, Optare and Yutong, as well as a trial of hydrogen fuel cell buses in Aberdeen, its home city.

Arrival hopes to roll out bus production quickly to target big cities around the world. It aims to produce 1,000 buses in 2022 and 11,000 in 2024. As well as a facility at Bicester, also in Oxfordshire, Arrival has started work on a factory in Rock Hill, South Carolina.

Arrival, which now employs more than 1,400 people, was founded in secret in 2014 by Denis Sverdlov, a Russian telecoms entrepreneur. The company is using "microfactory" facilities that break with the traditional logic of making cars on big production lines, instead using robots to assemble vehicles in "cells".

Arrival's first publicly announced product, an electric van for "last-mile" delivery in cities, will begin trials with United Parcel Service (UPS), a US courier, at the end of February. UPS last year ordered 10,000 vans in a deal worth €100m (£350m).

Avinash Rugoobur, Arrival's president, said built-in tracking, information screens and internet connections could allow the buses to connect better with other modes of transport and provide better user experiences. The flat floor also makes accessibility easier.

"We're really at the start of what's possible just within the bus platform," Rugoobur said. Buses in use today "definitely do the job, but similar to the van market we're talking about technology that hasn't moved to the world is today."

The electric buses will be priced much like diesel buses, although Arrival estimates that the total cost of ownership will be significantly less because of lower fuel and maintenance costs. It has not disclosed the buses' range, but Rugoobur said they should be able to handle most urban routes.

Arrival buys its batteries from Korea's LG Chem, but Rugoobur said the company would be glad to source batteries in the future from a UK-based factory, if one could be successfully launched.

The company is also working on driverless operations for controlled situations such as within company depots, although Rugoobur cautioned that driverless buses on roads were some way off.

"For driverless buses to be a reality you need true, fault-tolerant road-going autonomy," he said. "We're not there."

Life from Earth could temporarily survive on Mars

Some microbes on Earth could temporarily survive on the surface of Mars, finds a new study by NASA and German Aerospace Center scientists. The researchers tested the endurance of microorganisms to Martian conditions by launching them into the Earth's stratosphere, as it closely represents key conditions on the Red Planet, phys.org reported.

Published in *Frontiers in Microbiology*, this work paves the way for understanding not only the threat of microbes to space missions, but also the opportunities for resource independence from Earth.

"We successfully tested a new way of exposing bacteria and fungi to Mars-like conditions by using a scientific balloon to fly our experimental equipment up to Earth's stratosphere," reports Marta Filipa Cortesão, joint first author of this study from the German Aerospace Center, Cologne, Germany. "Some microbes, in particular spores from the black mold fungus, were able to survive the trip, even when exposed to very high UV radiation."

Microbial hitchhikers

Understanding the endurance of microbes to space travel is vital for the success of future missions. When searching for extra-terrestrial life, we need to be sure that anything we discover has not just travelled with us from Earth.

"With crewed long-term missions to Mars, we need to know how human-associated microorganisms would survive on the Red Planet, as some may pose a health risk to astronauts," says joint first author Katharina Siems, also based at the German Aerospace Center. "In addition, some microbes could be invaluable for space exploration. They could help us produce food and material supplies independently from Earth, which will be crucial when far away from home."

Mars in a box

Many key characteristics of the environment at the Martian surface cannot be found or easily replicated at the surface of our planet, however, above the ozone layer in Earth's middle stratosphere the conditions are remarkably similar.



The picture shows MARSBox payload in the Earth's middle stratosphere (38km altitude). The shutter is open exposing the top layer samples to UV radiation.

"We launched the microbes into the stratosphere inside the MARSBox (Microbes in Atmosphere for Radiation, Survival and Biological Outcomes experiment) payload, which was kept at Martian pressure and filled with artificial Martian atmosphere throughout the mission," explains Cortesão.

"The box carried two sample layers, with the bottom layer shielded from radiation. This allowed us to separate the effects of radiation from the other tested conditions: Desiccation, atmosphere, and temperature fluctuation during the flight. The top layer samples were exposed to more than a thousand times more UV radiation than levels that can cause sunburn on our skin."

"While not all the microbes survived the trip, one previously detected on the International Space Station, the black mold *Aspergillus niger*, could be revived after it returned home," explains Siems, who highlights the importance of this ongoing research.

"Microorganisms are closely-connected to us; our body, our food, our environment, so it is impossible to rule them out of space travel. Using good analogies for the Martian environment, such as the MARSBox balloon mission to the stratosphere, is a really important way to help us explore all the implications of space travel on microbial life and how we can drive this knowledge towards amazing space discoveries."

Chinese state fund invests in gene firm BGI

The Chinese government has made an investment in BGI Genomics Co., a listed Chinese company that has supplied millions of COVID-19 tests globally as the gene firm seeks to fund exponential growth driven by the pandemic.

BGI Group, which runs a massive gene databank in China and has DNA sequencing contracts with health firms and universities worldwide, has in the past responded to claims from US security agencies that it is closely linked to the Chinese government by saying it has no Chinese government capital. Reuters reported.

BGI Genomics, the company's subsidiary listed on the Shenzhen stock exchange, raised the equivalent of just over \$300m in a private placement to investors including China's biggest state investment vehicle, the State Development and Investment Corp (SDIC), filings to the exchange on Feb. 1 show.

SDIC is wholly owned by the Chinese central government, which appoints its board, and has focused on strategic emerging industries – including biotechnology and artificial intelligence – and infrastructure that serve China's national interest, according to its public statements.

The Central SOE Poverty Area Industrial Investment Fund, which is managed by SDIC Chuangyi, the wholly owned venture capital subsidiary of SDIC, paid 200 million renminbi (\$30.8m) for 1.4m



STRINGER/REUTERS

A technician works at a genetic testing laboratory of BGI, formerly known as Beijing Genomics Institute, in Kunming, Yunnan Province, China.

shares in BGI Genomics, a spokesman for SDIC Chuangyi told Reuters.

The investment gave SDIC Chuangyi a shareholding of about a third of one percent in BGI Genomics, BGI said.

The aim of the investment was to advance China's interests in alleviating poverty through improved healthcare and in fighting the COVID-19 pandemic, Wang Weidong, chairman of the board of SDIC Chuangyi told Reuters in a statement.

"Epidemic prevention and control is also a social benefit," Wang said.

US security officials have warned American labs against using Chinese tests for COVID-19 because of concern China was seeking to gather foreign genetic data for its own research. BGI has denied that.

The Central SOE Poverty Area Industrial Investment Fund that invested in BGI has invested in a pharmaceutical distribution company, a supplier of critical

lithium battery materials, and restructured China's biggest railway materials company in recent months.

BGI Genomics filings said the funds raised will be used to ease pressure on working capital, to upgrade storage capacity for genetic data and to build a biological sample bank.

Two large Chinese state-owned securities firms, Huatai Securities and China Merchant Securities, also took stakes in BGI Genomics, Huatai becomes the fifth-largest shareholder in BGI Genomics after the placement.

BGI Genomics said in a statement to Reuters that its controlling shareholders remained private enterprises and individuals.

"At present, the shareholding ratio of SDIC Chuangyi in BGI Genomics is 0.3332%, which does not play a decisive role in the voting of motions," BGI Genomics said in the statement.

A shareholder with this ownership "may not be able to appoint a director to participate in the decision-making of BGI Genomics, nor does it have any significant influence over BGI Genomics' operations, strategies or other matters," the company said.

BGI founder and chairman Wang Jian holds 0.46% of BGI Genomics directly. Two private companies associated with BGI Group control 45% of BGI Genomics shares.

Global tech firms in Australia launch anti-disinformation code



DENIS CHARLETTA/FP

Global tech firms in Australia unveiled a new code of practice Monday to curb the spread of disinformation online, following pressure from the government.

The lobbying group DIGI – representing Facebook, Google, Twitter, Microsoft, TikTok and Redbubble – committed under the code to a range of actions including labelling false content on their platforms, demoting fake content and prioritizing credible sources of information. AFP reported.

They also agreed to suspend or disable offending and fake accounts, including "bots" that automatically disseminate information across their platforms.

The measures – which largely codify existing practices – are said to target paid and

political advertising as well as content shared by users.

"All signatories commit to safeguards to protect Australians against harm from online disinformation and misinformation, and adopting a range of scalable measures that reduce its spread and visibility," the group said in releasing the 29-page code.

The voluntary code was developed in response to an Australian government inquiry into the role of online platforms in the spread of misinformation and disinformation.

The problem became particularly acute during historic bushfires that swept the country in late 2019 and 2020 and during the coronavirus pandemic, when social media platforms were flooded with false information on

the origins of the disease and efforts to curb its spread.

The government's Communication and Media Authority (ACMA), which will oversee the code's implementation, said Monday that in 2020 more than two-thirds of Australians expressed concern over the extent of online misinformation.

"False and misleading news and information online – like that spread through the 2020 bushfires and the Covid-19 pandemic – has the potential to cause serious harm to individuals, communities and society," it said in a statement.

ACMA chair Nerida O'Loughlin welcomed the code as a "flexible and proportionate approach" to the risk of harm posed by

misinformation.

Signatories agreed to report to the government on initial compliance with the code by the end of June, and then issue annual reports after that.

Communications Minister Paul Fletcher warned the tech firms Monday that the government would be "watching carefully" to ensure they follow through on the measures.

The conservative government's pressure for online companies to act against misinformation coincided with a more controversial campaign to force the biggest of them – Facebook and Google – to pay for news content they show on their platforms.

Legislation governing those payments is expected to pass Parliament this week.