



DEFENSE TECHNOLOGY MONITOR

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Related Categories: Energy Security; Military Innovation; Missile Defense; Science and Technology

MICROSOFT'S NUCLEAR GAMBLE

Microsoft is moving toward clean energy solutions to satiate its growing energy needs. The global tech giant has inked a contract with Helion Energy to obtain power from a 50-megawatt commercial nuclear fusion generator, the world's first, by 2028. Unlike fission, in which energy is released by splitting atoms, Helion's innovative approach involves using a plasma accelerator to fuse two elements with extreme heat and a pulsed magnetic field, thereby generating a fusion reaction — and hopefully producing more power than was consumed. However, Helion has yet to even reach the first step of "fusion ignition," something another company achieved for the first time in late 2022. Assuming it can overcome the hurdles that have plagued others for the past half century, however, the implications are enormous, with the potential to reduce the price of electricity to just one cent per kilowatt hour, a fraction of today's rates. (*The Verge*, May 10, 2023)

BUILDING RENEWABLE ENERGY SOLUTIONS, BRICK BY BRICK

While renewable energy generated by wind and solar power is all the rage, what happens during times when the sun is not shining and the wind is not blowing? Dallas based company Energy Vault believes it has a storage solution that can address the issue of intermittent power and boost the reliability of renewables. Imagine a 300-foot-tall building that uses an elevator (powered by solar energy) to haul 24-ton cartons full of dirt (bricks) to its top floors during the day. At night, there is no energy from the sun, but the bricks situated near the top of the building nonetheless possess significant amounts of potential energy — which can be tapped through gravity. To access that energy, an automated system lowers the bricks, and as they descend the cables spin electric generators, releasing more power.

The system is advantageous because it is able to provide power without relying on gas or coal when renewables are not available. Essentially, the entire building functions as a battery, using gravity instead of a chemical reaction to store energy. Proof of concept has already been demonstrated, and China has several sites under construction. (*CNET*, May 7, 2023)

A SUCCESS FOR THE AIR FORCE'S SWARM STOPPER

The threat of adversary drone swarms is increasing, and several branches of the U.S. military are designing solutions to this problem (see *Defense Technology Monitors* 63, 64, and 72). Two years ago, the U.S. Air Force Research Laboratory built the Tactical High-power Operational Responder (THOR) to defend bases from drone swarms using a high-powered microwave technology. Recent tests pitted THOR against several types of drones using swarming tactics, to considerable success. Notably, the system was developed for only \$18 million, and can be easily transported in a 20-foot container and rendered operational within 3 hours with minimal training. (*Airforce Technology*, May 17, 2023)

THE SEARCH FOR SPEED-OF-LIGHT SENSORS

In the event that an adversary (or an ally) decides to test or use a nuclear weapon, the United States needs to be prepared. To this end, researchers with the U.S. Air Force are searching for ways to upgrade existing nuclear detection capabilities through the Next Generation Speed of Light Sensors project. The new high-speed sensors are expected to carry out nuclear detonation forensics derived from electromagnetic spectrum emissions, and transmit for instantaneous review. The goal is to find a multi-domain sensor package with that is low maintenance, weighs little, has a small footprint, is physically robust and is built with parts that are largely commercially available. (*Military and Aerospace Electronics*, May 4, 2023)

THE ARMY'S NEW DIGITAL RECRUITMENT

The United States military needs to recruit a new generation of soldiers, with all services posting deficits in recruitment numbers in recent years. The shortfall in the U.S. Army is especially pronounced, totaling 15,000 in 2022. Rather than relying on traditional TV and print campaigns for its appeal, however, the Army is pivoting to the virtual domain. According to Lt. Gen. Maria Gervais, Deputy Commanding General of Training and Doctrine Command (USTRADOC), "recruiting the next generation of soldiers and leaders will take the Army investing in modernizing the way it operates... They interact differently, and they desire to be engaged differently. And we must transition from our Industrial Age accessions processes and policies and move towards a digital-informed accessions and training process." "The metaverse," Gervais notes, "could be a way to extend our reach, improve our brand awareness through advertisement placement, and creating an experience, which could pique the interest and expand the awareness of serving in the military for our youth." (C4ISR.net, May 22, 2023)