# Laser-powered-drones may beat endurance hurdles

September 6 2018, by Nancy Owano

Credit: CC0 Public Domain

Hmm. Drones that can be recharged by a laser. So how long could they fly before having to land? How about "never mind"? We can look forward to seeing this idea in action. *New Scientist* had a story on

September 3 that the US Army was making a laser-powered drone to beast endurance hurdles.

The system in mind involves a laser shot from the ground that can power up a military drone mid-flight.

The *Daily Mail* said that this laser system would be beaming power to photovoltaic cells on the drone, and *Futurism* said that "The key is hitting a photovoltaic cell on the drone, which then converts the light from the laser into electricity. The Army hopes to be able to do this from up to 500 meters (.31 miles) away."

The project bears the ambitious name of Stand-off Ubiquitous Power/Energy Replenishment – Power BeamingDemo (SUPER PBD).

*Popular Mechanics* reported that DARPA chose the Silent Falcon, a solar electric, long range, long endurance UAS (Unmanned Aircraft Systems), for this experiment in laser charging.

"Silent Falcon has made a name for itself by making long endurance, long range, solar electric-powered drones," said *The Drive*.

What does the experiment hope to accomplish? The purpose is to prove the feasibility of "recharging an electric powered UAS while in flight using a laser light source, allowing for indefinitely long flight times by using concatenated 'Fly' and 'Fly & Charge' cycles removing the need to land to refuel," said UAS Vision.

The concept is one of drones operating in both the commercial and military sectors able to fly for weeks "fulfilling a contract or mission," in the words of Kyle Mizokami, *Popular Mechanics*, "not landing until the job is done."

The project's DARPA lead, Joseph A. Abate Ph.D., had this to say. "We believe that this project will demonstrate that remote electric refueling of DoD systems via high energy laser power beaming to extend mission operation time in contested and remote environments can be delivered to the war fighter in the near future."

As for more comments on applications, Marco Margaritoff in *The Drive* pointed out that "The potential use cases for this technology are endless and range from extended search and rescue missions and large-scale surveying of disaster areas to military operations and internet access-spreading initiatives."

Margaritoff fleshed out use cases. "Instead of the Air Force deploying a reaper twice a day to help the California Air National Guard combat the disastrous Carr Fire, for instance, the above technology could provide continuous, unfettered assistance. For rural or remote areas with a complete lack of infrastructure, a drone like this could feasibly be leased by local governments to provide cellular and internet access to facilitate more efficient reconstruction on the ground. By adding a drone that never has to land or refuel, a whole new box of building blocks appears."

But how does it work? Mizokami explained how in *Popular Mechanics*. He said, "drone operators aim a laser beam at the solar panels. Regular shots of laser power can recharge the aircraft to the point where it can stay aloft indefinitely."

Mark Prigg, *Daily Mail*: "The system works by firing a laser at the drone's photovoltaic cell, which then converts the light into electricity in the same way a solar power panel does."

Great idea or not? David Hambling in *New Scientist* described drones, being valuable to the military for intelligence gathering, as "incredibly

power-hungry, meaning their flying time is limited to half an hour or less." Endurance is a concern for unmanned aircraft. Obviously, a proposed solution to the power-hungry problem would be met with interest.

*Futurism*, though, mentioned "several hurdles to overcome before its drone-powering laser system is ready for the battlefield." The big hurdle would be in not melting the drone.

"The process creates a lot of heat, which could risk melting the drone," said Erin Winick in *MIT Technology Review*.

*Futurism* said that the Army's research team was working on a way to ensure excess heat can dissipate without causing damage to the drone. This would involve making sure the beam hits where intended.

What's next? Kristin Houser in *Futurism* reported the Army was working toward being able to power a drone on the ground by early 2019. The next step will be to power a drone in the air. Houser said that may occur in 2020. "Once it has an operational system in place, the Army will just need to get regulators' blessing, and its laser-powered drones will be ready for take-off."