

## **Low Energy Nuclear Reaction Aircraft**

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### **Purpose**

The purpose of this research is to investigate the potential vehicle performance impact of applying the emergent Low Energy Nuclear Reaction (LENR) technology to aircraft propulsion systems. LENR potentially has over 4,000 times the density of chemical energy with zero greenhouse gas or hydrocarbon emissions. This technology could enable the use of an abundance of inexpensive energy to remove active design constraints, leading to new aircraft designs with very low fuel consumption, low noise, and no emissions. The objectives of this project are to gather as many perspectives as possible on how and where to use a very high density energy source for aircraft including the benefits arising from its application, explore the performance impacts to aircraft, and evaluate potential propulsion system concepts.

### **Background**

LENR is a type of nuclear energy and is expected to be clean, safe, portable, scalable, and abundant. The expected benefits make it an ideal energy solution. When it is applied to aircraft, LENR removes the environmental impacts of fuel burn and emission from combustion. Excess energy could be used to reduce noise so that all three of NASA's technology goals for future subsonic vehicles are either eliminated or addressed. Furthermore, aviation impacts almost every part of our daily lives, civilian and military. A revolutionary technology like LENR has the potential to completely change how businesses, military, and the country operate as a whole, giving a tremendous financial, tactical, and resource advantage to anyone that utilizes it in the most effective way.

High density energy sources create some unique capabilities as well as challenges for integration into aircraft. An LENR concept that has reported some success generates heat in a catalyst process that combines nickel metal (Ni) with hydrogen gas (H). The initial testing and theory show that radiation and radioisotopes are extremely short lived and can be easily shielded. Although nuclear fission has been looked at for use in aircraft, LENR is different. LENR has a higher energy density and no radioactive by products.

Success of this research will provide a firm foundation for future research and investment for high density energy source technology integration into aircraft.