



Contribution ID: 628

Type: **Invited Oral**

M2Or2G-03: [Invited] Hyper Tech Perspectives on Cryo-fuels and the Impacts for Superconducting Wind Turbines and Electric Aircraft

Tuesday 11 July 2023 11:50 (20 minutes)

In this presentation we point out where are the opportunities for cryofuels (LH2 and LNG) and impact on our superconducting industry applications, primarily wind turbine generators and electric aircraft. We will point out the opportunities for growing the hydrogen economy, reducing CO2 emissions and thus help to reduce global warming. Our discussion will focus on the potential of superconducting wind turbine generators to lower the LCOE (electricity) and the potential to help enable low-cost gaseous hydrogen, and liquid hydrogen. This same low-cost electricity from wind energy (and other sources) is what can also enable the low-cost compression and liquification of hydrogen for transportation.

There is the potential use of cyrofuels (LH2 and LNG) for electric aircraft. Besides using the cryofuel to burn in turbines to reduce emissions, there is also the potential to use the cryofuels for thermal management within the aircraft. Using the cryofuels for thermal management can potentially enable the increase in power density for the drivetrain components such as generators, cables, and motors. We will discuss the potential of increased power density and efficiency by using the cryofuels for thermal management of hybrid electric aircraft.

For both wind turbine generators and rotating equipment for electric aircraft (motors and generators) the technical drive has been to use rare earth permanent magnets. The present prediction is for shortages and rising prices for rare earth permanent magnetic materials between now and 2035, if we are going to implement all the wind energy and E-transportation desired. The issue is can superconducting offer a better price/performance than using rare earth permanent magnets. We ask the question? Can superconductivity play a greater role to enable and reduce the cost of offshore wind energy, and enable better price/performance drive trains for electric aircraft.

Author: TOMSIC, Michael (Hyper Tech Research Inc.)

Presenter: TOMSIC, Michael (Hyper Tech Research Inc.)

Session Classification: M2Or2G: Special Session: Cryogenic Clean Energy and Mobility II