Use of Fuel Cell By-Products for Cargo Hold Fire Suppression

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Research on fuel cell technology takes place nearly worldwide to demonstrate the potential of fuel cells to provide electrical power for various applications on board aircraft.

Fuel cells are “clean”, silent and efficient and may help to reduce the environmental impact of aviation in future.

Current research mainly focuses on fuel cells as a new technology to provide electrical power – but fuel cell systems could bring an additional benefit to the aircraft. They could also support aircraft functions like fuel tank inerting and cargo hold fire protection.

Proton Exchange Membrane (PEM) fuel cells use hydrogen fuel and oxygen from the air to produce electricity. The exhaust of this type of fuel cell has a low oxygen concentration and could be used for fuel tank explosion protection and cargo hold fire suppression.

Lab-scale test have been conducted to investigate and specify the exhaust products of a PEM fuel cell system under varying operating conditions. Test results show that a residual oxygen concentration of 8.5vol% is achievable. Such Oxygen Depleted Air (ODA) could be used for the purpose of fire protection.

Implementing fuel cell systems on board future aircraft could not only make systems, such as the auxiliary power unit, obsolete on future aircraft, but also Air Separation Membrane based fuel tank inerting systems and to some extent halon-based cargo hold fire suppression systems.