Secure Alternative Fuel Environment (SAFE) Concept: Fuel for Contested Logistics, in an Era of Climate Change Adaptation

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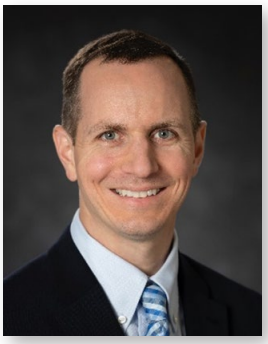

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Abstract

For over 100 years, armies and navies have depended on petroleum fuel for their operations. In the last century both Japan and Germany went to war to secure additional oil supplies. Today, the Marine Corps' Expeditionary Advance Base Operations (EABO) concept document warns us that, "war games indicate that sustainment is the pacing function for EABO, with fuel being the pacing commodity."

What if we could avoid transporting petroleum fuel thousands of risky miles across the open ocean by instead sourcing and producing safer, alternate fuels regionally and locally? Historical precedent exists: 47% of Nazi Germany's oil was synthetically-produced fuel, not drilled crude. The U.S. Army Air Service flew nearly 6,000 missions in hydrogen-fueled aircraft in the First World War, with compressed hydrogen transported from French factories to the front. The barrage balloons that protected the beaches of Normandy from air attack were filled with hydrogen produced locally using mobile, wheeled fuel production systems.

This presentation will introduce the Secure Alternate Fuel Environment (SAFE) concept, which addresses the DoD's contested fuel logistics challenge. We will explore how developments over the past decade enable this dramatic change for the DoD. Learn how heavy investments by our Pacific and European allies in regional hydrogen production, storage, and transport capacity; growing availability of hydrogen-fueled commercial products that perform better than legacy platforms; mature synthetic fuel production plants; bold moves by a few forward-thinking DoD acquisition managers; and a fortunate lab accident at MIT will enable us to fulfil Gen. Jim Mattis' request to "unleash us from the tether of fuel."

Abridged Biography

Erik Limpaecher leads the Energy Systems Group at MIT Lincoln Laboratory (MIT LL), a Department of Defense Federally Funded R&D Center. His team focuses on energy security of tactical military sites, domestic military bases, and U.S. communities. They have engineered advanced non-fossil fuels for distributed military operations, hybrid power system for remote forward operating bases, developed testbeds and written the new military standard for tactical microgrids, and performed power outage exercises of large defense installations. Erik has led the development of community microgrids for domestic energy resilience in the city of Boston and a real-time hardware-in-the-loop power systems integration testbed. Erik's team at MIT LL won two R&D 100 awards for transitioning Department of Defense technology to industry.

Erik has co-founded two companies developing power electronics and power systems products, backed by investors including Gates, Khosla, and Olsen. Combined, these firms have installed commercial-scale solar and battery systems globally, some of the first microgrids in the U.S., and motor controllers afloat U.S. Navy ships and carriers. During Erik's time as CTO, his company grew to profitability, a staff of 50, became a Nationally Recognized Test Laboratory, was named the 2005 New Jersey Early Stage Company of the Year, and won a third R&D 100 award.

Erik holds degrees in electrical engineering and finance from Princeton University, is a senior member of the IEEE, and a member of the U.S. Naval Institute. An avid runner and cyclist, Erik lives in Massachusetts with his wife and two Cub Scouts.