

LTG(Ret.) Thomas P Bostick

NASEM Workshop:

Enhancing Federal Clean Energy Innovation

July 29, 2020

Innovation Themes

THEME 01

Military Requirements as
Drivers of Innovation



THEME 02

U.S. Army Corps of Engineers:
A Major Player in the
Energy Technology Space



THEME 03

Facilitating DOD/DOE
Collaboration and Building
Resilient/Innovative Teams



Theme 01: Military Requirements as Drivers of Innovation



“The Department of Defense (DoD) has **significantly reduced its fossil fuel consumption since the early 2000s**; it remains the **world’s single largest consumer of oil** – and as a result, one of the world’s top greenhouse gas emitters.”¹



“The Department of Defense (DoD) is the **U.S. government’s largest fossil fuel consumer**, accounting for between **77% and 80% of all federal government energy consumption** since 2001.”²



“The Department of Defense (DoD) maintains **over 560,000 buildings at approximately 500 domestic and overseas military installations**, which account for about 40% of its greenhouse gas emissions. The rest comes from operations.”³

Does DoD have Military Requirements that should Drive Innovation?

Theme 02: USACE – A Major Player in the Energy Technology Space



“The U.S. Army Engineer Research and Development Center (ERDC) helps solve our nation’s most challenging problems in civil and military engineering, geospatial sciences, water resources, and environmental sciences for the Army, Department of Defense, civilian agencies, and our nation’s public good.”¹



“Construction Engineering Research Laboratory (CERL) directs its research efforts toward increasing the Army's ability to more efficiently design, construct, operate, and maintain its installations and contingency bases and to ensure environmental quality and safety at a reduced life-cycle cost.”²



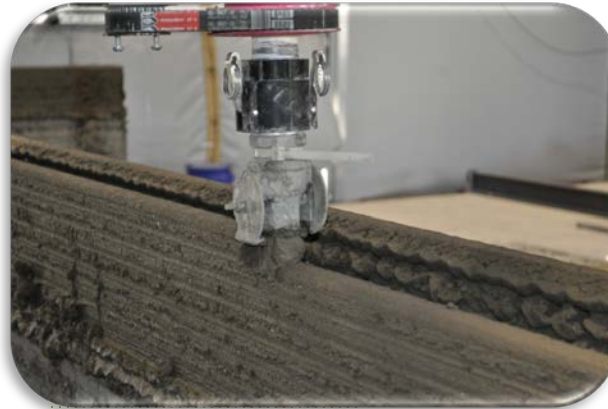
Does the U.S. Army Corps of Engineers have Requirements that should Drive Innovation?

Examples of Clean Energy Innovation – Additive Manufacturing

-  **40%** Reduction in Cost
-  **50%** Reduction in Construction Time
-  **44%** Reduction in Concrete Materials
-  **2.5X** Stronger Walls
-  **10X** Improved Energy Performance
-  **8 to 4** Reduction in Manpower
-  Reduction in Hard Labor

*Over conventional construction
Icons made by FreePik.*

First Printed B-Hut



ERDC: First to demonstrate a 3D-printed concrete barracks with a precast roof can be engineered to be structurally safe.



Improved structural strength through non-linear, irregularly shaped walls.

First Printed Bridge (USMC)



AMOC: First on-site 3D printed bridge rather than in a factory setting in the U.S. or western hemisphere.



Printing used an automated additive construction gantry printer.

Examples of Clean Energy Innovation - Assorted

Wright-Patterson Air Force Base, OH

BioMASON employs bacteria to “grow” a durable cement without requiring energy for heat or emitting greenhouse gases



DOD-DOE Collaboration on H2Rescue

- Fuel cell/battery hybrid truck
- Hydrogen: power, heat, potable water
- 25kW of exportable power
- 180 miles roundtrip
- Up to 72 hours of continuous power



Fort Hunter Liggett, CA

Net Zero: Waste-to-Energy project turns 50 metric tons per day of waste into valuable end products including electricity and hydrogen



ERDC Hybrid Power Trailer

- 83% fuel savings
- Generators run at max efficiency
- Power required load, then store energy
- Generator shuts off when storage is full



Theme 03: Facilitating DOD/DOE Collaboration & Teams



“[DoD] ... is not in the business of developing clean energy innovation programs. [...does not share a mandate with DOE EERE, for example.]”

How can we build on current successes and foster increased collaboration?



QUESTIONS?