eVTOL Air Vehicles –
The “Killer App” for Hydrogen?

Everyday Air Mobility. Fueled by Hydrogen. Powered by Simplicity.

Dr. Bruce J. Holmes, D.E., FAIAA, FRAeS, NASA SES (Ret.)
H2@Airports Workshop (Virtual)
U.S. DOE - HFTO / FAA / USAF
November 4-6, 2020
Liquid Hydrogen – Fuel Cell Powertrain eVTOL
Topics

The state of the art for electric fuel cell VTOL aircraft.

Air-Portals as energy stations.

Technology gaps and collaborative R&D opportunities to raise Technology Readiness Levels.
KEY TECHNOLOGY DIFFERENTIATORS:

RANGE + PAYLOAD

FUELING TIME, LIFE-CYCLE IMPACT, LOW OPEX, MISSION FLEXIBILITY

© 2020 Alakai Technologies. All Rights Reserved.
On-Site H2 Generation

Near Term Plan
Flight Testing & Certification

- Liquid H2 from commercial suppliers
- Local storage tank
- Mobile storage tank and refueling nozzle

Long Term Plan

- Onsite LH2 Generation
- LH2 & GH2 storage tanks
- Automated fuel dispensers for hydrogen cars & buses

The Skai H2 Ecosystem

Copyright © 2020 ALAKA'I Technologies

Fueled by Hydrogen, Powered by Simplicity
Technology Readiness Levels (TRL)

HFC Systems R&D:
- Electro-Chem-Physics modeling
- Stack efficiencies
- Balance of Plant optimization
- Fuel Cell Plate materials
- Life cycle modeling and testing
- FAA compliance for certification
- Stack instrumentation
- Digital twin systems
- LH2 crash dynamics and design
- PPE-free fueling system safety
- GH2 and LH2 storage systems

Predicting Development Costs with TRL*

At TRL 4, predicting “Most Likely Cost” is between about -30% and +30%

Aeronautical Industry
Pre-Competitive Collaboration needed to accelerate pace of Aeronautics applications commercialization and share risks.

Hydrogen

Clean. Power.
Backup Slides
Skai is Alakai’s Advanced Air Mobility (AAM) system built with a core focus on reliability and simplicity. The first hydrogen fuel-cell powered vertical take-off and landing air vehicle.

Skai is comprised of patent protected technology, air mobility services, and innovations in power and redundancy. Its unique brand position and market entry strategy ensures it is ready for long term leadership, with broad application and mass accessibility.
An energy solution with **UNIQUE BENEFITS** for flight

Hydrogen fuel cells have **8X TO 12X THE DISTANCE AND DURATION** of today’s best battery technologies

Boston to Manhattan, 196 miles by Skai
Hydrogen Coming Of Age

• Ten nations have committed to advancement toward hydrogen economies over the coming years.
• Primary drivers are environmental sustainability and Total Cost of Ownership (TCO).
• Aeronautical H2 ecosystem includes OEMs and suppliers across the enterprise.
Skai is an air mobility system built with a focus on simplicity. The first hydrogen fuel cell powered e-VTOL.

Skai’s ambition is to solve one of the most pressing global challenges, transportation (gridlock and traffic), while simultaneously reducing its impact on the environment.

Skai is now working to certify this dream...

...by making a simple and safe air mobility system accessible for everyone.

...by implementing a truly clean end to end solution on a global scale.

Key Facts & Differentiators

- First filer for FAA certification
- Simplest: an ultra smart platform with low complexity
- Safest: airframe parachute, fault tolerant systems
- Cleanest: Hydrogen fuel cells - zero emission, recyclable

Management:
- Experienced aerospace team
- IP Protection: over 40 patents
- Design: by BMW Designworks
- Rapid Scale: automotive approach to volume manufacturing
One Platform, Many Applications

SkaiMed

SkaiCargo

SkaiCraft

SkaiCab

Fueled by Hydrogen, Powered by Simplicity