# 15th Annual Electric Aircraft Symposium Is Another Great Success

**By David Diller**

The 15th Annual Electric Aircraft Symposium (EAS) took place virtually from July 20–22, 2021, with more than 450 registrants. Organized by the Comparative Aircraft Flight Efficiency (CAFE) Foundation and the Vertical Flight Society (VFS), this event analyzed the rapid development in the electric aircraft industry and looked into the challenges that remain in effectively fielding this technology. The three-day symposium consisted of 15 panels, each highlighting an expert moderator and three panelists providing expertise in various aspects of electric aviation.

## Day 1

CAFE Foundation Executive Director Yolanka Wulff was the overall moderator for the program and gave the opening remarks. VFS Director of Strategic Development Jim Sherman and Bremerton Aviation Center for Education (BACE) Director Mike Friend provided an overview of their respective organizations and the support they provide to advancing electric aviation.

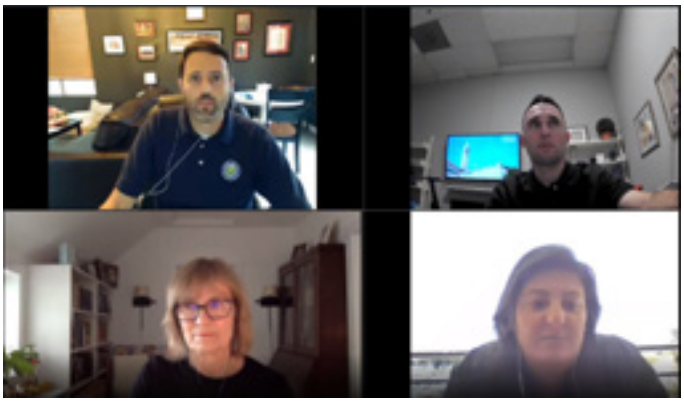
The opening session provided a global overview of electric flight developments around the world. The panel was moderated by Wulff, and featured VFS Executive Director Mike Hirschberg presenting an overview of electric vertical takeoff and landing (eVTOL) advancements over the past year. Willi Tacke and Xin Gou of Flying Pages focused on electric conventional takeoff and landing (eCTOL) and eVTOL advancements in Europe and Asia, respectively, highlighting the breakthrough certification of the Pipistrel Alpha as a milestone in electric aviation. A key point made by Gou was that China already has infrastructure in place that will yield advantages in national implementation.

The Regional Air Mobility Business Case panel was moderated by Charles Alcock of *Aviation International News*, with panelists Kevin Antcliff of Xwing, Darrell Swanson of Swanson Aviation Consultancy, and Michael Dyment of NEXA Advisors. This session focused on the extent of regional air mobility, especially around major metropolitan areas and their suburbs with short- to medium-range eVTOL and eCTOL aircraft.

The second session, Aircraft Conversions and Supplemental Type Certifications panel, focused on companies that have converted existing aircraft to electric or hybrid-electric propulsion. The session was moderated by *Vertiflite*'s Ken Swartz, with Lee Human of AeroTEC detailing their successful effort to convert a Cessna Caravan to fly fully electric.


CAFE Foundation Executive Director Yolanka Wulff was the overall organizer and moderator.

The Electric Aircraft for Public Services and Defense panel was moderated by Hirschberg and featured speakers from International Vehicle Research, AFWERX and Jump Aero.



Community integration is a key challenge for electric aviation, as discussed by speakers from the FAA, UC Berkeley, Hyundai Air Mobility and CAFE/CAMI.


NAA announced its Pulitzer Electric Aircraft Race for May 2022.


The second annual CAFE hydrogen panel featured speakers from Universal Hydrogen, Urban Aeronautics and Pipistrel, moderated by Danielle McLean of Happy Takeoff.


A panel of experts from GAMA, FAA and Jaunt discussed the challenges of Electric Aircraft Certification, moderated by Kelsey Reichmann of *Avionics International*.


AeroTec, Ampaire and Tier 1 Engineering are working on aircraft conversions and STCs for electric aircraft.

McLean, Hirschberg and VFS Technical Director Dr. Marilyn Smith spoke of the talent crisis, as well as diversity and inclusion to address the engineering shortage.

Kevin Noertker of Ampaire presented the work his team has done over the last few years in developing the Electric EEL, a hybrid-electric testbed. Noertker ended by highlighting their recent acquisition by Surf Air Mobility. Finally, Glen Dromgoole of Tier One Engineering talked about the company's second-generation electric Robinson "eR44" (see "Tier 1 Engineering Reveals its Second Battery-Electric Robinson R44 Helicopter," pg. 76), demonstrating that electric propulsion could be a viable replacement for a piston engine in helicopters.

Next was a session on Electric Aircraft for Public Services and Defense, moderated by Hirschberg. The panel started off with Col. Nathan Diller, US Air Force, who spoke about the AFWERX Agility Prime program that has helped more than 200 eVTOL companies with contracts since it was started in Spring 2020. Katerina Barilov of Jump Aero announced that they are close to unveiling their eVTOL vehicle, being designed for emergency medical services. Johnny Doo of International Vehicle Research completed the panel by covering the activities of the NASA-VFS Transformative Vertical Flight Working Group #4 on Public Services.

The final panel for Tuesday addressed community integration of electric aircraft. Wulff, who is also executive director of the Community Air Mobility Initiative (CAMI), moderated a session featuring Scott Gore, US Federal Aviation Administration (FAA); Adam Cohen, University of California Berkeley, and Adrienne Lindgren, Hyundai Air Mobility. The panel tackled the big issues that government and industry must confront to gain public acceptance, with safety and noise topping the list.

## Day 2

When the second day kicked off, Eric Lindbergh (grandson of the legendary Charles Lindbergh) was supposed to discuss the Lindbergh Foundation's Forever Flight Alliance to foster sustainable aviation, but was unable to participate in the event. However, Scott Neumann of the National Aeronautic Association announced the Pulitzer Electric Aircraft Race from Omaha to Kitty Hawk for May 2022. The air race is a resumption of the Pulitzer air races first held in the early 1920s. The winner of the race will be awarded the Pulitzer Trophy, on display at the Smithsonian National Air and Space Museum in Washington, DC (see **www.PulitzerAirRace.org** for more information).

While some may feel that hydrogen as a viable fuel for transportation has been "just 10 years away" for at least 30 years, it seems that the time may finally have arrived. The first panel of the second day, Hydrogen Integration as a Propulsion Source, was led by Danielle McLean, CEO of Happy Takeoff and co-chair of the VFS Hydrogen Council, who moderated a discussion on hydrogen propulsion system's bright future.

First, Dr. Tine Tomažič of Pipistrel gave an overview of his company's mission to integrate hydrogen-propelled vehicles into their fleet to increase performance as battery technology is still maturing. Next, J-P Clarke of Universal Hydrogen talked about the future of hydrogen powerplants and sustainable production of hydrogen as a fuel. Lastly, Nimrod Golan-Yanay of Israel-based Urban Aeronautics presented his company's CityHawk eVTOL design, and interest in using hydrogen propulsion.

The second panel was moderated by *Vertiflite's* Nicolas Zart and focused on the essential question of the UAM Business Case. Panelists Felipe Varon of Varon Vehicles, Seyed Mohseni of SAMAD Aerospace, and David Rottblatt of Eve Air Mobility spoke of a

common misperception that Advanced Air Mobility (AAM) and Urban Air Mobility (UAM) is limited to air taxi missions, which is in fact only one of many use cases. The delivery of supplies to rural places, medical personnel and equipment to accident sites, and fresh food delivery to marketplaces are among the numerous use cases that will contribute greatly to the success of UAM.

The program continued with a session to discuss the use case of electric aircraft in coastal communities, moderated by Wulff and with panelists Shawn Braiden of Harbour Air, Billy Thalheimer of REGENT, and Bill Peterson of Flying Ship. Harbour Air updated progress in certifying converted seaplanes as part of its fleet of local electric air taxis. Both REGENT and Flying Ship are working on wing-in-ground-effect sea gliders for both cargo and passenger traffic. An interesting feature of these designs is the ability to gain maritime certification, rather than aircraft certification.

To balance the UAM/AAM business case, the next session addressed Regional eCTOL and Electric Short Take Off and Landing (eSTOL). This panel was moderated by Graham Warwick of *Aviation Week* and consisted of Drew Jacoby Lemos of the Regional Airline Association, Dan Wolf of Cape Air, and Fredrik Kampfe of the Swedish Aviation Industry Group. This overall discussion highlighted the high hopes of the electric regional air mobility industry, elaborating on how the electrification of aircraft could help boost the regional market to fulfill the electric aviation industry's potential.

Wednesday closed with the all-important topic of Certification of Electric Aircraft. Kelsey Reichmann of *Avionics International* moderated a panel that included Lowell Foster of the General Aviation Manufacturers Association (GAMA), Gary Horan of the FAA, and Martin Peryea of Jaunt Air Mobility. With a broad view of the whole process, from regulatory, trade association advocacy and industry representation, certification was laid out, noting the changes to compliance and that there are still many questions that will need to be addressed before industry-wide adoption is achieved.

## Day 3

The last day started with a "monitor-side chat" with Mike Hirschberg of VFS, Danielle McLean of Happy Takeoff, and Marilyn Smith of the Georgia Institute of Technology on Growing the Workforce and Incorporating Diversity. A VFS study found that the expansion of the future vertical flight engineering workforce, primarily due to the rapid growth in eVTOL, will result in the need for approximately 1,000 additional engineers per year for the next decade. The panel also spoke of the necessity of bringing unrepresented minorities in the growing market, including attracting a larger number of women, racial minorities and students from rural areas.

Sherman moderated the Electric Motors and Systems panel, which explored the conversion of electric power to quiet propulsion. Eric Bartsch of VerdeGo highlighted that current battery density in aviation is analogous to the automotive industry's battery density in the mid-1990s, calling it unfeasible for current applications in eVTOL and long-range eCTOL. Olaf Otto of Rolls-Royce provided a roadmap ranging from UAM and commuter applications, to eventual commercial transport. Jean Botti of VoltAero presented the latest update on the Cassio eCTOL aircraft, which is also hybrid and has just completed a promotional tour around France. The consensus of the panel was that hybrid should be the focus in electric aircraft until battery energy density reaches an acceptable level, and enables conversion from hybrid to fully electric.

**The Society's Jim Sherman moderated the Electric Motors and Systems panel, with experts from VerdeGo, Rolls-Royce and VoltAero.**


**Olaf Otto of Rolls-Royce provided a roadmap for electric propulsion from UAM to commercial transportation.**


**Joshua Portlock of Electro.Aero presented the DC charging standards — past, present and future.**

Taking the lead from the previous session, the next panel stressed the advancements and readiness in battery technology. Mike Friend of BACE moderated the panel, which began with Michael Duffy of Electric Power Systems (EPS) discussing the balance necessary in producing batteries that are safe, light and affordable, and with sufficient energy density. Joshua Portlock of Electro.Aero presented the details of a new SAE International standard that will enable the rapid fielding of charging technology and equipment. Finally, Friend stressed the importance of robust off-the-shelf battery packs in sport aviation.


**VFS Infrastructure Advisor Rex Alexander led the session on Vertiport and GA Airports, which featured speakers from Black & Veatch, HMMH and Skyports.**

One of the topics that VFS has been working to advance is eVTOL infrastructure and the next panel, Vertiports and General Aviation Airports, focused on the various requirements from physical take-off and landing sites, to weather prediction and air traffic management. This panel was moderated by Rex Alexander, VFS Infrastructure Advisor and was led off by Black & Veatch's Paul Stith discussing energy and communication challenges to widespread use of AAM vehicles. Timothy Middleton of HMMH spoke about the need to control noise in the development of the vehicles and the necessity of gaining community acceptance. Addison Ferrell of Skyports closed out the panel by emphasizing the necessary attributes for vertiports for efficient operations, and highlighting the prototype facility that Skyports built in Singapore.

Cargo delivery is one of the expected early use-cases for AAM. The Cargo panel included Marc Ausman of Airflow, Kyle Clark of Beta Technologies, and Dave Merrill of Elroy Air, with Swartz again moderating. Ausman explained the efficiency of eSTOL aircraft in carrying cargo, with its higher payload and longer range, less noise, lower operating and development costs, and less risk for certification. Merrill elucidated Elroy's hybrid VTOL "middle mile" eVTOL cargo drone for same-day delivery systems. And finally, Clark spoke last about Beta's Alia eVTOL aircraft and its mission of point-to-point logistics. Logistics is seen by many as the initial operational business case for electric aircraft and these companies are each taking different approaches to meet this need.

To close out the event, a session on the Pilot Pipeline was moderated by Jason Pritchard from eVTOLinsights.com. George Bye of Bye Aerospace spoke along with Joseph Oldham of the Sustainable Aviation Project and Timothy Schoenauer of CAE, who each discussed the current issues with pilot training in aviation and the need to streamline for UAM/AAM. The panel addressed the specific electric aircraft training program requirements and utilizing electric aircraft trainers.

## The Once and Future EAS

The 15th Annual Electric Aircraft Symposium covered a lot of topics with great detail in a short time, and attendees came away from the event energized and motivated to build the next generation of safe, sustainable low-altitude air transportation. All of the panels were video recorded. The first day is available for free, while the second two days are available for $140; see **www.vtol.org/videos**.

Next year's 16th Annual EAS is expected to be a hybrid event, held in person as well as virtually, once again prior to the Experimental Aircraft Association's AirVenture in Oshkosh, Wisconsin, in July 2022.

**About the Author**
David Diller is a high-school student in the Washington, DC, area with a keen interest in aviation.