

Aviation Emissions



A bi-weekly update on research, technology, and reduction strategies

Volume 14, Number 16

March 8, 2022

Hydrogen

AIRBUS, CFM PARTNER ON DEMO PROGRAM FOR HYDROGEN POWERED AIRCRAFT ENGINE

Airbus said Feb. 22 that it has signed a partnership agreement with CFM International – a 50/50 joint company between GE and Safran Aircraft Engines – to collaborate on a hydrogen engine demonstration program that will take flight around the middle of this decade.

The goal of the program is to ground test and flight test a direct combustion engine fueled by hydrogen in preparation for entry-into-service of a zero-emission aircraft by 2035.

The demonstration will use a A380 flying testbed equipped with liquid hydrogen tanks prepared at Airbus facilities in France and Germany. Airbus also will refine the hydrogen propulsion system requirements, oversee flight testing, and provide the A380 platform to test the hydrogen combustion engine in cruise phase.

CFM International (CFM) will modify the combustor, fuel system, and control system of a GE Passport turbofan to run on hydrogen. The engine, which is assembled in the US, was selected for this program because of its physical size, advanced turbo machinery, and fuel flow capability. It will be mounted along the rear fuse-

(Continued on p. 111)

Lead

N. CALIFORNIA REPS OPPOSE FAA INITIATIVE ALLOWING USE OF LEADED AVGAS THRU 2030

Four Northern California congressional representatives concerned about the serious health impacts of leaded aviation gasoline on their constituents will meet with Department of Transportation and FAA officials tomorrow (March 9) to express their concerns about a new FAA initiative that seeks to eliminate leaded avgas but would allow its use until the end of 2030.

FAA's new initiative comes on the heels of the Environmental Protection Agency's announcement in January that it will issue a final Endangerment Finding next year regarding whether emissions from piston-engine aircraft operating on leaded fuel contribute to air pollution that endangers public health and welfare. The Endangerment Finding is a necessary first step before EPA can regulate lead in aviation gasoline.

In a letter to Transportation Secretary Pete Buttigieg sent on Feb. 23 – the same day as FAA's Eliminate Aviation Gasoline Lead Emissions (EAGLE) initiative was announced – CA Reps. Zoe Lofgren (D), Anna Eshoo (D), Ro Khanna (D), and Jimmy Panetta (D) called on DOT to make the nationwide elimination of leaded

(Continued on p. 115)

In This Issue...

Hydrogen ... Airbus, CFM partner on hydrogen engine demo program - p. 110

... P&W developing hydrogen propulsion technology under DoE grant - p. 111

Lead ... Members of Congress, airport env. group oppose new FAA initiative allowing use of leaded avgas through end of 2030 - p. 110

Airlines ... Swiss Int'l is world's first airline to use solar fuel; first passenger airline to use shark-like aircraft skin tech - p. 111, 112

Canada ... Aviation industry in Canada launches Council for Sustainable Aviation Fuels (C-SAF) - p. 113

NASA ... Agency launches Sustainable Flight National Partnership to reach aviation goal of net-zero CO2 emissions by 2050 - p. 113

... NASA invites collaboration to define future of air travel by mid-21st Century - p. 114

Hydrogen, from p. 110

lage of the flying testbed to allow engine emissions, including contrails, to be monitored separately from those of the engines powering the aircraft. CFM will execute an extensive ground test program ahead of the A380 flight test.

“This is the most significant step undertaken at Airbus to usher in a new era of hydrogen-powered flight since the unveiling of our ZEROe concepts back in September 2020,” said Sabine Klauke, Airbus Chief Technical Officer. “By leveraging the expertise of American and European engine manufacturers to make progress on hydrogen combustion technology, this international partnership sends a clear message that our industry is committed to making zero-emission flight a reality.”

“Hydrogen combustion capability is one of the foundational technologies we are developing and maturing as part of the CFM RISE Program,” said Gaël MÈheust, president & CEO of CFM. “Bringing together the collective capabilities and experience of CFM, our parent companies, and Airbus, we really do have the dream team in place to successfully demonstrate a hydrogen propulsion system.”

CFM shares Airbus’ goal of fulfilling the promise they made in signing the Air Transport Action Group goal in October 2021 to achieve aviation industry net-zero carbon emissions by 2050 by developing and testing the technology necessary to make zero emissions aircraft a reality within the ambitious timeline defined.

Hydrogen

PRATT & WHITNEY AWARDED DOE PROJECT TO DEVELOP HYDROGEN PROPULSION TECHNOLOGY

Pratt & Whitney has been selected by the U.S. Department of Energy (DoE) to develop novel, high-efficiency hydrogen-fueled propulsion technology for commercial aviation, as part of DOE’s Advanced Research Projects Agency-Energy (ARPA-E) program.

The Hydrogen Steam Injected, Inter-Cooled Turbine Engine (HySIITE) project will use liquid hydrogen combustion and water vapor recovery to achieve zero in-flight CO₂ emissions, while reducing nitrogen-oxide (NO_x) emissions by up to 80 percent and reducing fuel consumption by up to 35 percent for next generation single-aisle aircraft.

“This truly is an exciting opportunity to start developing the key technologies that could bring the industry’s first hydrogen steam injected, inter-cooled engine from concept to reality,” Geoff Hunt, senior vice president, Engineering and Technology, at Pratt & Whitney, said in a Feb. 21 announcement. “For nearly 100 years, Pratt & Whitney has been at the forefront of innovating cutting-edge technologies to continually advance the efficiency of aircraft engines, and we are

thrilled to be selected to work on what could be the next breakthrough technology for aviation.”

The HySIITE engine will burn hydrogen in a thermodynamic engine cycle that incorporates steam injection to dramatically reduce emissions of NO_x, a greenhouse gas. The semi-closed system architecture planned for HySIITE will achieve thermal efficiency greater than fuel cells and reduce total operating costs when compared to using ‘drop in’ sustainable aviation fuels. This is the first direct collaboration between Pratt & Whitney and ARPA-E.

“Pratt & Whitney has a long legacy with hydrogen-fueled propulsion, and we are excited to advance this emerging technology as part of our comprehensive strategy to support the aviation industry’s ambitious goal of achieving net zero aircraft CO₂ emissions by 2050,” said Graham Webb, chief sustainability officer at Pratt & Whitney. “Partnerships with public agencies such as the Department of Energy have a vital role to play towards developing and maturing technologies that could have a global impact on reducing the environmental footprint of aviation.”

SAF

SWISS IS THE WORLD’S FIRST AIRLINE TO USE SOLAR FUEL

Swiss International Air Lines (SWISS) said March 1 that it will be the world’s first airline to use Synhelion solar fuel.

SWISS and the Lufthansa Group have concluded a strategic collaboration with the Swiss clean energy company Synhelion to bring its solar aviation fuel to market. This will make SWISS, the flag-carrier of Switzerland, the first airline in the world to use ‘sun-to-liquid’ fuel.

The process devised by Synhelion uses concentrated sunlight to produce carbon-neutral kerosene. With this collaboration, SWISS and Synhelion are playing a pioneering role in the production and the adoption of sustainable aviation fuels.

“Our team-up with Synhelion is founded on our shared vision to make carbon-neutral flying in regular flight operations possible through the use of solar fuel,” SWISS Chief Executive Officer Dieter Vranckx explained in a March 1 announcement. “We are proud that SWISS will be the first airline in the world to fly with solar kerosene. In partnering with Synhelion, we are supporting Swiss innovation and are actively pursuing and promoting the development, the market introduction and the scaling-up of this highly promising technology for producing sustainable fuels.”

“We believe in a globalized world connected by climate-friendly mobility,” added Dr. Philipp Furler, Synhelion’s co-founder and CEO. “Our next-generation carbon-neutral solar kerosene is an economically and ecologically viable substitute for fossil fuels. The commitment of SWISS and the Lufthansa Group underlines the aviation sector’s keen interest in our solar fuel. We are looking forward to the day the first SWISS aircraft takes off with our solar kerosene.”

Sunlight: the way to carbon-neutral flying

Synhelion said it has developed a key technology for manufacturing sustainable aviation fuel (SAF) from renewable energy sources. The unique procedure uses concentrated solar heat to manufacture syngas which can then be synthesized into kerosene using standard industrial processes. This sun-to-liquid fuel closes the fuel carbon cycle: when combusted, it will only produce as much CO₂ as went into its manufacture. The new fuel thus makes a major contribution to effectively decarbonizing air transport.

Synhelion will build the world's first-ever facility for the industrial production of solar fuel in Jülich (Germany) this year. SWISS is set to become the first customer for the solar kerosene in 2023. Under the collaboration now concluded, SWISS and the Lufthansa Group will support the development of Synhelion's planned commercial fuel production facility in Spain also.

Swiss pioneer Synhelion, SWISS, Edelweiss and the Lufthansa Group have been working together since 2020 to help reduce the carbon dioxide emissions of Swiss aviation through the use of solar fuels.

The Lufthansa Group and SWISS said they have been pursuing and promoting comprehensive measures to minimize their carbon dioxide emissions for several years now, and work closely with their partners to steadily further reduce the environmental impact of their business and operational activities. SWISS will be substantially increasing its use of sustainable aviation fuels in the next few years to help achieve its climate objectives. In view of the limited availability of biofuels, however, alternatives will be required.

"This is why we are actively supporting the development of solar fuels," stresses SWISS CEO Vranckx. "We want to be a pioneer in their use. So our involvement with Synhelion is a key element in our long-term sustainability strategy."

Airlines

SWISS ADOPTS AIRCRAFT SKIN TECH THAT MIMICS SHARK SKIN

Swiss International Air Lines (SWISS) will be the first passenger airline in the world to take advantage of the new AeroSHARK aircraft skin technology – which replicates the skin of sharks – to further reduce the carbon dioxide emissions and the fuel consumption of its flight operations.

AeroSHARK is a new biomimetic film which has been co-developed by Lufthansa Technik and chemicals and coatings manufacturer BASF. The film features millions of 'riblets' – small protrusions just 50 micrometers high – which replicate the highly hydrodynamic skin of sharks, and thus reduces an aircraft's aerodynamic drag wherever it is applied.

All 12 of the SWISS Boeing 777-300ER aircraft fleet will successively have the innovative riblet film applied to their fuselage and engine nacelles, the airline announced Feb. 23. The resulting significant reduction in aerodynamic drag will

make the SWISS Boeing 777 fleet more than 1 percent more fuel-efficient and this in turn will substantially further reduce its carbon dioxide emissions.

The airline said its investment in this new technology will enable it to substantially reduce its Boeing 777 fleet's carbon dioxide emissions and fuel consumption.

Annual CO₂ Savings of up to 15,200 Tons

By applying a total of 950 square meters of AeroSHARK riblet film to the fuselage and engine nacelle surfaces of a Boeing 777, fuel savings of some 1.1 percent can be achieved. This will reduce its annual fuel consumption by over 4,800 tons and the total annual carbon dioxide emissions of the SWISS Boeing 777 fleet by up to 15,200 tons – the amount emitted respectively by some 87 long-haul flights from Zurich to Mumbai.

"Reducing its environmental footprint is one of the greatest challenges ahead for the aviation sector, and being carbon-neutral in our flying by 2050 is a key SWISS strategic objective," said SWISS CEO Dieter Vranckx. "We put a major emphasis at SWISS on actively promoting and making targeted investments in new technologies. And we're delighted that, in becoming the world's first passenger airline to use the innovative AeroSHARK technology, as we'll be doing with our Boeing 777 fleet, we'll now be making a further substantial contribution to ensuring more sustainable travel."

SWISS will successively install the new AeroSHARK riblet film on its Boeing 777 fleet from mid-2022 onwards. The work will be performed when each aircraft's downtimes permit.

SWISS has also supported Lufthansa Technik and BASF in their development of the AeroSHARK film for the Boeing 777. In the summer of 2021, the aerodynamic performance of a Boeing 777 wing was precisely monitored throughout a scheduled SWISS Zurich-San Francisco flight. The data collected have enabled Lufthansa Technik to devise high-precision 3D airflow simulation models which will be used in the near future to develop the AeroSHARK riblet film for additional application to the Boeing 777's wings, to tap further fuel and emission savings potential.

SWISS said the adoption of the new AeroSHARK technology is a key initiative in its broader endeavour to minimize its carbon dioxide emissions. It also underlines the company's commitment to promoting the use of innovative technologies. SWISS has set a goal of halving its net CO₂ emissions from their 2019 levels by 2030 and of making its business and operations carbon-neutral by 2050.

SAF**CANADIANS LAUNCH SAF COUNCIL TO ACCELERATE DEVELOPMENT**

Canadian aviation industry leaders announced Feb. 23 that they are joining forces to create the Canadian Council for Sustainable Aviation Fuels (C-SAF) to accelerate the deployment of sustainable aviation fuels (SAF) in Canada to ensure that the Canadian aviation sector remains competitive as it transitions to a net-zero future.

Sustainable aviation fuels can reduce greenhouse gas emissions by up to 80% and can be used now without significant modifications to aircraft or supply infrastructure. Their use will allow for rapid results in achieving carbon neutrality in the sector, the Council said.

Created by a consortium of 60 airlines operating in Canada and comprised of key stakeholders in the Canadian aviation ecosystem including suppliers, aerospace manufacturers, airports, finance, and academia, the Council will aim to facilitate the production and supply of affordable, low-carbon, made-in-Canada SAF. The C-SAF will also act as the voice of its members with governments and stakeholders to develop an ambitious strategy and roadmap for a profitable and sustainable SAF market in Canada.

“Decarbonizing Canadian aviation requires collaboration between industry, governments, scientists and airlines. The C-SAF provides a space for a common dialogue to facilitate the exchange of ideas to reduce GHG emissions from aviation and we strongly believe that with everyone working together, change can happen faster,” said Geoff Tavette, Executive Director of the C-SAF.

Decarbonizing Canadian Aviation

The aviation sector will be one of the most difficult to decarbonize as electric and hydrogen technologies are in development and will not easily be used until sometime in the future, the new Council said. Thus, it is essential to put in place a set of coherent public policies that will encourage the establishment of a sustainable aviation fuel value chain to accelerate their commercialization and widespread use.

“The aviation industry is in constant evolution to ensure a greener future for our planet. With the launch of the Canadian Council for Sustainable Aviation Fuels, Canada’s aviation sector will remain competitive and will create jobs for Canadians while reducing pollution. This initiative will help in Canada’s goal in achieving net-zero emissions by 2050 and is a step in the right direction for the aviation industry,” stressed the Minister of Transport, the Honorable Omar Alghabra.

“We want to promote and implement sound public policies to address aviation’s need for a sustainable, made-in-Canada, affordable supply of aviation fuel. I salute the vision of the industry players and thank all of our partners who will enable Canada to become a leader in the decarbonization of

global aviation,” said Geoff Tavette.

C-SAF noted that sustainable aviation fuels are produced from renewable feedstocks that are widely available in Canada, such as forest and agricultural residues, industrial fats, oils and grease, municipal solid wastes and CO2 captured from industrial processes or the air.

“Canada has all the ingredients to create an affordable and reliable SAF market: an abundance of renewable feedstocks, low-carbon energy sources, climate policies and evolving carbon pricing,” C-SAF said, adding “Currently, sustainable aviation fuels can cost up to 8 times more than traditional jet fuel and are not produced or imported in significant quantities into Canada.”

GTAA Is Launch Member

The Greater Toronto Airports Authority (GTAA) is a launch member of the newly formed Canadian Council for Sustainable Aviation Fuels (C-SAF).

“The GTAA is focused on rebuilding the air travel experience by creating the airport of the future – one that is healthier, more innovative, greener and more effective,” said Deborah Flint, President and CEO, GTAA.

“Sustainable aviation fuels will play an important role in achieving that objective, and the C-SAF, in turn, will help guide industry by helping to establish a sustainable aviation fuel value chain to accelerate its commercialization and widespread use.”

She noted that the goals of the C-SAF and its constituents align well with those of the GTAA. Last year, the GTAA committed to net-zero carbon emissions and waste from its terminal buildings by 2050 and released a new environmental policy that sets forth ambitious goals in seven key areas, including climate change resiliency, carbon neutrality and emissions, strategic energy use, water management, natural environment, waste management and noise management.

NASA**SUSTAINABLE FLIGHT NATIONAL PARTNERSHIP**

[NASA issued the following news release on Feb. 7.]

NASA Aeronautics is engaging with industry, academia, and other agencies through our Sustainable Flight National Partnership (SFNP) to accomplish the aviation community’s goal of net-zero carbon emissions by 2050.

Through our collective work in three areas — advanced vehicle technologies, efficient airline operations, and sustainable aviation fuels — we are committed to contributing viable solutions for achieving the extreme challenge of aviation decarbonization.

This includes enabling 25-30 percent energy efficiency improvements in next-generation transports with the capabil-

ity to utilize 100 percent sustainable aviation fuel and also fly optimal trajectories.

The iconic centerpiece of the partnership will be a full-scale technology demonstrator X-plane built to test an ultra-efficient aerodynamic design and possibly other new technologies, to solve the challenges of integrating those technologies and proving their predicted benefits in flight.

NASA plans to solicit industry in early 2022 for preliminary designs of aircraft configurations that could be tested, with the potential for first flight of the demonstrator no earlier than late 2026. This achievement will be key to ensuring that we are able to slow the growth of CO₂ emissions in the future and achieve net zero by 2050.

SFNP Activities

We are focused on multiple synergistic commercial transport vehicle technologies, which include airframe configurations, manufacturing, propulsion and electrification, airspace operations, and sustainable aviation fuels. These include:

- The Transonic Truss-Braced Wing is a unique design of the aircraft's wings which reduces drag during flight and so reduces fuel consumption by up to 10 percent. NASA is testing this innovative configuration as an option for future airliners.

- The Sustainable Flight Demonstrator will be a full-scale technology demonstrator X-plane built to test an ultra-efficient aerodynamic design and possibly other new technologies, to prove their predicted benefits in flight to inform industry decisions associated with next generation single-aisle seat class product.

- Hybrid Thermally Efficient Core is accelerating the development and demonstration of advanced turbine engine technologies in a high-power-density core to enable next-generation commercial transport aircraft.

- Electrified Aircraft Propulsion offers new possibilities for reducing fuel and energy usage in aviation from small passenger aircraft to single-aisle transports. Innovative technologies, aircraft concepts, test aircraft, and ground test facilities will turn this vision of efficient flight from science fiction to reality.

- The Electrified Powertrain Flight Demonstration project will enable megawatt-class power systems to propel short-range and regional aircraft. The project will integrate and demonstrate components and systems in flight to accelerate the transition of these technologies into practical use to benefit the flying public.

- The Hi-Rate Composite Aircraft Manufacturing project seeks a dramatic 400-600 percent improvement in manufacturing rates for composite airframe structures, so that lighter, more fuel-efficient airframes can meet market demand and

replace heavier aircraft.

- The Air Traffic Management – eXploration project will transform the air traffic management system to safely accommodate the growing demand of new air vehicles to enter the airspace to perform a variety of missions.

- NASA researchers will continue sampling and characterizing the makeup of sustainable aviation fuel emissions to verify performance, and to ensure compatibility of sustainable aviation fuels with existing and future aircraft.

'Sky for All'

NASA INVITES COLLABORATION TO DEFINE FUTURE OF AIR TRAVEL BY MID-21ST CENTURY

[NASA issued the following announcement on Feb. 23.]

We've long held dreams of what the future of air travel could look like.

Something out of the Jetson's TV show or a Star Wars movie is generally the "go to" vision for most people: aircraft of all types and sizes – including those without pilots onboard – safely flying anywhere at all altitudes anytime for many different reasons.

The use of innovative new aircraft in fighting wildfires is one of many possible visions for a mid-century future in which aircraft of all sizes and types provide air travel services of all types. Through "Sky for All," NASA is seeking input from interested stakeholders to help more clearly define what this future will look like.

But there's more to it than that. It's a future that could include a distributed digital backbone to seamlessly integrate innovation and tradition in aeronautics, expanding the idea of what commercial air travel looks like while enabling it to grow safely and sustainably.

Now, thanks to technology developed by NASA Aeronautics and its research partners during the past decade or so, more of those dreams than ever before are nearly ready to be turned into reality.

So, the big question is: what's next?

While personal flying cars might sound like the next best thing since sliced bread, it may not be a product that industry is ready to offer for any number of reasons – but maybe it is? Perhaps wildfire management or emergency medical transport aircraft could come first? Or smaller package delivery drones? There are all kinds of possibilities.

But even more importantly, what additional research and development will be required to fully realize those selected dreams? How soon do we need to begin that work and what technology still needs to be perfected?

To answer those questions, NASA is looking for expert counsel from anyone and everyone with a stake in what the

future of air travel should look like by mid-century. Their input will help define that future vision – a vision we are calling ‘Sky for All.’

“Sky for All is all about that articulation of where we want to be during the mid-21st century and what we need to do to get there,” said Shawn Engelland, NASA’s lead for Sky for All.

Sky for All will include some specific examples of what the future will look like, but it’s not meant to provide a concept of operations for some large-scale air transportation system. Nor is Sky for All the name of a specific research program or project.

The idea is that information compiled for Sky for All will be able to guide decisions on where NASA should invest its research resources during the coming years.

This information also will help the Federal Aviation Administration make its research investment decisions as it pursues a similar effort known as “Charting Aviation’s Future: Operations in an Info-Centric National Airspace System (NAS).”

While the FAA’s effort is focused on a sooner 2035 timeframe, Sky for All seeks to describe what air travel will look like beyond 2035 in the mid-21st century.

“It’s important that we collaborate on this vision we’re developing for the mid-century NAS and understand how the NAS needs to transform in order to enable operations that are flexible, sustainable, secure, and connected,” said Kurt Swieringa, NASA’s deputy manager for technology of the Air Traffic Management - eXploration project.

Website Is Centerpiece of Collaboration

The centerpiece of this collaboration with industry, academia, and other government agencies is a publicly accessible website (<https://nari.arc.nasa.gov/skyforall/>) in which the Sky for All vision is explained in much more detail, and input is invited on nearly every page.

In fact, since the website went live late last year to an initial round of invited stakeholders, the aviation community has continued to provide inputs that result in changes to the ever-evolving vision.

“This input is very important to us. We realized from the outset that listening to our stakeholders was going to be the best way for us to get to where we want to go with this vision,” Engelland said.

Upcoming Events

Two upcoming online gatherings will provide more information about Sky for All to anyone who is interested – especially those who might want to offer input and contribute to the future vision for aviation that will guide NASA’s research during the next three decades or so.

The first is *imaginAviation*, a free three-day virtual event that will be held March 1-3, 2022. Many of NASA’s aeronautical innovators will present updates on the programs and projects they are working on. Sky for All will be featured as well. For more information and to register, go to

<http://nari.arc.nasa.gov/imaginaviation/>

The second event is a free webinar dedicated to the “Sky for All” vision. The online event will be held March 28, 2022. For more information about the webinar and to register, go to <http://nari.arc.nasa.gov/skyforall-webinar-registration/>

Lead, from p. 110

aviation gasoline a priority in order to protect vulnerable communities.

Calling exposure to lead from avgas “an environmental justice crisis,” they are raising questions about the Biden administration’s commitment to environmental justice at a time when support from minority communities is critical to the outcome of the upcoming mid-term elections later this year.

“For the communities suffering daily from lead exposure due to avgas emissions, federal leadership to address this environmental justice crisis is long overdue,” the Members of Congress wrote.

In their letter, they condemned the FAA’s lack of cooperation with local governments, such as Santa Clara County, CA, to protect low-income communities of color from lead poisoning. On Jan. 1, the County banned the sale of leaded avgas at its general aviation airports, including Reid-Hillview Airport where a recent study showed increased lead blood levels in children living near the airport (14 AER 9).

FAA informed the County in a 10-page letter sent in December that it is investigating whether the ban violates federal law or grant agreements and strongly recommended that the County suspend the effective date of the ban.

“We are concerned that the FAA’s actions are hindering local governments’ attempts to discontinue sale of the very fuel that is poisoning disadvantaged communities of color with lead, rather than assisting with efforts to protect these communities from harm,” the Members of Congress wrote.

Reps. Lofgren, Eshoo, Khanna, and Panetta requested that the DOT swiftly direct the FAA to take four concrete actions to protect communities, including specific coordination with the U.S. Environmental Protection Agency to adopt a nationwide ban on leaded avgas as soon as possible.

Safety of EAGLE Initiative Questioned

In announcing the new EAGLE initiative, FAA Administrator Steve Dickson asserted that it outlines “a safe and practical path to a lead-free aviation system” and that his agency looks forward “to starting a new partnership with aviation stakeholders and the communities that host airports to achieve this important goal.”

While the EAGLE initiative has the strong support of major aviation trade groups, it has no endorsements from community groups and appears unlikely to get them. AER asked Miki Barnes of the environmental group Oregon Aviation Watch, to comment on the EAGLE initiative. She said, in part:

“FAA Administrator Steve Dickson characterized the EAGLE proposal as ‘a safe and practical path to a lead-free aviation system.’ Apparently knowingly poisoning and compromising the health of children, low-income communities, and people of color who are disproportionately impacted by lead poisoning is acceptable to him; however, those bearing the brunt of this treatment might be far more inclined to describe the initiative as cruel, abusive, racist, discriminatory, and environmentally irresponsible.”

FAA said its effort to remove leaded aviation fuels will be based on four pillars of action that involve the FAA, the Environmental Protection Agency, fuel suppliers and distributors, airports, engine and aircraft manufacturers, research institutions, associations, environmental experts, communities and other key stakeholders. The four pillars are:

- **Develop Unleaded Fuels Infrastructure and Assess Commercial Viability:** Industry stakeholders will coordinate production of commercially viable unleaded fuels and establish necessary infrastructure, efficient distribution channels and widespread usage of these fuels.

- **Support Research & Development and Technology Innovations:** The FAA and industry stakeholders will support research and testing of piston engine modifications and/or engine retrofits necessary for unleaded fuel operations. They will also focus on new technology development and the application/adaptation of those technologies, including electric/hybrid engine technologies to enable transition to a lead free General Aviation fleet.

- **Continue to Evaluate and Authorize Safe Unleaded Fuels:** The FAA will address fleet-wide authorization of unleaded aviation fuels of different octane levels. Piston Aviation Fuel Initiative will continue to evaluate, test and qualify high-octane aviation unleaded fuels with the objective to ultimately transition the fleet to unleaded aviation fuel.

- **Establish Any Necessary Policies:** The EPA is evaluating whether emissions from piston-engine aircraft operating on leaded fuel contribute to air pollution that endangers public health or welfare. EPA plans to issue a proposal for public review and comment in 2022 and take final action in 2023. If the EPA issues regulations on lead emissions from piston-engine aircraft, the FAA would subsequently publish regulations that certify piston engine modifications, new piston engines that do not require leaded aviation fuel, and regulate fuel components for aviation fuels. The FAA will consider policies/programs to support unleaded fuel infrastructure.

Text of Letter to Buttigieg

Following is the text of the letter from Reps. Lofgren, Eshoo, Khanna and Panetta to Transportation Secretary Buttigieg:

As Members of Congress representing the residents of Santa Clara County, California, we write to express our grave concerns regarding the harms of leaded aviation gasoline ("avgas"), and the Federal Aviation Administration's (FAA) lack of cooperation with local governments, such as the County of Santa Clara ("Santa Clara County"), to protect low-income communities of color from lead poisoning.

Lead exposure from avgas is an environmental justice crisis. We urge you to make nationwide elimination of leaded avgas a priority, and to instruct the FAA to take the necessary actions to support efforts by local governments, like Santa Clara County, to protect vulnerable communities from exposure, rather than interfering with these efforts. Lead exposure from avgas is an environmental justice crisis.

The U.S. Environmental Protection Agency (EPA) and Centers for Disease Control and Prevention (CDC) agree that there is no safe blood lead level in children. At even the lowest detectable levels, childhood lead exposure can cause irreversible cognitive impairment, harm academic performance, and increase risk for behavioral disorders and adult-onset physical health problems. In adults too, lead exposure is associated with a host of physical impairments, including harm to cardiovascular, reproductive, and immune systems and kidney damage.

Avgas, the fuel used by piston-engine aircrafts, is the last remaining leaded transportation fuel and accounts for a shocking 70% of lead air pollution nationwide. The impacts of avgas fall hardest on communities surrounding the 20,000 general aviation airports where piston-engine aircraft operate, as well as on workers who service them. Some 16 million people live within a kilometer of a general aviation airport - a distance linked to increased blood lead levels - and over 160,000 children attend school nearby.

Over 60% of the 50 highest emitting airports are located in communities with larger racial minority populations than the national average. Reid-Hillview Airport in Santa Clara County - one of the busiest general aviation airports in the nation - embodies this trend. Of the 52,000 people living within 1.5 miles of the airport, 97% identify as nonwhite and 79% speak a primary language other than English at home. A recent peer-reviewed study found that children living nearby the airport experienced blood lead level increases on par with or even worse than those found at the height of the Flint Water Crisis.

Ending lead exposure from avgas requires leadership from the FAA.

The FAA has an opportunity to take a leadership role in ending the avgas environmental justice crisis. To date however, the FAA's response to local efforts to protect communities from the harms of avgas has been contrary to these efforts. For example, when Santa Clara County eliminated sales of leaded avgas at the airports it operates effective January 1, 2022, the FAA initiated an investigation and suggested that it may take legal action to block the ban on avgas sales. This apparent retaliation is unconscionable and is seemingly intended to deter other airport proprietors from

instituting protective measures. Similarly, in a 2017 settlement, the FAA prohibited the City of Santa Monica from restricting the sale of leaded fuel

We are concerned that the FAA's actions are hindering local governments' attempts to discontinue sale of the very fuel that is poisoning disadvantaged communities of color with lead, rather than assisting with efforts to protect these communities from harm.

This flies in the face of the Biden Administration's Justice40 Initiative, which directed the U.S. Department of Transportation (DOT), along with other federal agencies, to work with local governments to prioritize investments in disadvantaged communities to advance environmental justice.

Santa Clara County joined a nationwide coalition of community groups led by Earthjustice, in August of 2021, petitioning the U.S. Environmental Protection Agency (EPA) to make an endangerment finding under section 231 of the Clean Air Act that avgas contributes to air pollution that harms public health and welfare. Recognizing the damage caused by airborne lead, the EPA announced on January 12, 2022 that it would open a long overdue rulemaking to propose an endangerment finding for leaded avgas. This is a necessary and important step in removing lead from aviation fuel nationwide, and it is critical that the FAA coordinate with the EPA to adopt a nationwide ban on leaded avgas as soon as possible. While this is a welcome development, communities of color that continue to suffer from leaded avgas cannot wait years for new rules to take effect - the harms to their health will persist as long as they are exposed.

We respectfully request that you work with the FAA to assist efforts to protect communities from leaded avgas exposure with all possible speed. This includes:

- Closing the investigation and related administrative actions involving Santa Clara County's restrictions on leaded avgas storage, sales, and dispensation.
- Coordinating with and supporting airport proprietors in taking measures to mitigate lead exposures from piston engine aircraft operations.
- Supporting the EPA in issuing an affirmative endangerment finding for avgas and coordinating with the EPA to expeditiously issue emission and fuel composition standards that will ban use of lead in aviation fuel as soon as feasible.
- Accelerating research, development, testing, and certifications for unleaded fuels to ensure access for all piston-engine aircraft.

For the communities suffering daily from lead exposure due to avgas emissions, federal leadership to address this environmental justice crisis is long overdue. Thank you for your attention to this matter. We look forward to receiving responses to our abovementioned requests by or before April 1, 2022.

Barnes Comments on FAA Initiative

AER invited Miki Barnes of the environmental group Oregon Aviation Watch to comment on FAA's EAGLE initiative. Following are her remarks:

Piston-engine aircraft (fixed wing and helicopters) are used primarily by flight training schools as well as private and recreational pilots based out of general aviation airports. Many also fly out of commercial facilities. Of the 20,000 airports in the U.S., 500 (2.5%), serve commercial airline passengers. The remaining 97.5% are categorized as general aviation (GA). The primary purpose of GA airports is to cater to the less than 1/4 of one percent of the U.S. population certified to fly out of these facilities.

For 70 years the use of leaded aviation gasoline (avgas) has remained unchanged. Though the damaging effects of this toxin prompted the removal of lead from automotive fuel more than 25 years ago, GA pilots continue to release 468 tons (936,000 lbs) of this neurotoxin into the atmosphere every single year.

On Feb. 23, 2022, the Federal Aviation Administration (FAA) and industry stakeholders announced their Eliminate Aviation Gasoline Lead Emissions (EAGLE) initiative – a proposal that involves continuing to blanket communities across the country in aviation-generated lead emissions until the end of 2030. The FAA's choice of acronyms is both ironic and noteworthy in light of a Feb. 17 article published in the journal *Science* revealing “Almost half of bald and golden eagles in the United States have lead poisoning.”

A review of past history suggests that the likelihood the FAA will identify an unleaded aviation fuel by the end of 2030 strains credulity. Eight years ago, the FAA announced its Piston Aviation Fuels Initiative (PAFI). At the time, it claimed an unleaded drop-in alternative would be available by 2018. Five years have elapsed since the agency failed to meet their deadline. The FAA is now saying it needs an additional nine years. Based on current emission levels, during that nine-year timeframe, an additional 4,212 tons (8,424,000 lbs) of lead will be released over homes, neighborhoods, schools, daycare centers, preschools, parks, churches, recreational areas, waterways and prime farmland.

In light of the many decades of inaction, postponement, and delay exhibited by the FAA, the time has come to immediately ban all aircraft that cannot use an unleaded fuel alternative. According to the National Academy of Sciences February 2021 Consensus Study Report, *Options for Reducing Lead Emissions from Piston Engine Aircraft*, “At least 57 percent, and perhaps as much as 68 percent, of the current piston engine fleet could use UL94, which is the only existing grade of unleaded avgas.” (Pg. 82). The remaining lead emitting aircraft should be grounded until an unleaded option is available.

Per the Centers for Disease Control, “No safe blood lead level in children has been identified. Even low levels of lead in blood have been shown to affect IQ, ability to pay attention, and academic achievement. And effects of lead exposure

AER EDITORIAL ADVISORY BOARD

Lori D. Ballance, Esq.

Gatzke Dillon & Ballance LLP
Carlsbad, CA

Sean Newsum

Director, Environmental Strategy
Boeing Commercial Airplanes

Mary L. Vigilante

President
Synergy Consultants, Inc.

Nancy N. Young, Esq.

Vice President, Environmental Affairs
Airlines for America

Stories reported in AER do not necessarily reflect the views of all Editorial Advisory Board members.

cannot be corrected.” Other negative health impacts include damage to the brain and nervous system, slowed growth and development, learning and behavior problems, hearing and speech problems, and increased juvenile delinquency. Adverse impacts in adults include coronary heart disease, reproductive problems, kidney ailments and increased violence.

FAA Administrator Steve Dickson characterized the EAGLE proposal as “a safe and practical path to a lead-free aviation system.” Apparently knowingly poisoning and compromising the health of children, low-income communities, and people of color who are disproportionately impacted by lead poisoning is acceptable to him; however, those bearing the brunt of this treatment might be far more inclined to describe the initiative as cruel, abusive, racist, discriminatory, and environmentally irresponsible.

In closing, the FAA has a lengthy history of forcing local communities to knowingly expose impacted residents with lead if the offending airport has received grant money from the FAA. This must stop! No government entity should have the right to use federal grant assurance obligations as an excuse for disempowering local communities and undermining democracy while relentlessly poisoning vulnerable residents with leaded aviation fuel emissions.

Conferences

JOBY OFFICIAL TO GIVE KEYNOTE AT MAY 1-3 UC DAVIS ANE SYMPOSIUM

Gregor Veble Mikić, chief aerodynamicist for California-based Joby Aviation, will give the keynote address at the 35th annual University of California at Davis Aviation Noise and Emissions Symposium, which will be held on May 1-3.

The theme of his keynote presentation is “designing for a sustainable future of aviation.”

Joby has spent more than a decade developing and testing an all-electric vertical take-off and landing vehicle. Its five-seat air taxi is quiet when it takes off and is nearly silent in flight, opening up unprecedented opportunities for traveling in both congested cities and underserved rural communities. Through sustainable manufacturing, key partnerships, and alignment with several aviation sustainability initiatives, Joby looks forward to its planned start to commercial passenger flights in 2024.

Further information about the symposium program and registration is at <https://anesymposium.aqrc.edu/>

April 22 is the deadline for registering for the symposium, which will be held both at the UC Davis campus and virtually.

AVIATION EMISSIONS REPORT

Anne H. Kohut, Publisher

Published 22 times a year at 43978 Urbancrest Ct., Ashburn, Va. 20147; Phone: (703) 729-4867; FAX: (703) 729-4528.
e-mail: editor@aviationemissionsreport.com; Price \$550.

Authorization to photocopy items for internal or personal use, or the internal or personal use of specific clients, is granted by Aviation Emissions Report, provided that the base fee of US\$1.03 per page per copy is paid directly to Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. USA.