

PREPARING FOR TAKEOFF: EXAMINING EFFORTS TO ADDRESS CLIMATE CHANGE AT U.S. AIRPORTS

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REMOTE HEARING
BEFORE THE
SUBCOMMITTEE ON
AVIATION
OF THE
COMMITTEE ON
TRANSPORTATION AND
INFRASTRUCTURE
HOUSE OF REPRESENTATIVES
ONE HUNDRED SEVENTEENTH CONGRESS
SECOND SESSION

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MAY 17, 2022
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MAY 17, 2022

SUMMARY OF SUBJECT MATTER

TO: Members, Subcommittee on Aviation
FROM: Staff, Subcommittee on Aviation
RE: Subcommittee Hearing on “Preparing for Take-off: Examining Efforts to Address Climate Change at U.S. Airports”

PURPOSE

The Subcommittee on Aviation will meet on Tuesday, May 17, 2022, at 1:00 p.m. EDT in 2167 Rayburn House Office Building and virtually via Zoom for a hearing titled, “Preparing for Take-off: Examining Efforts to Address Climate Change at U.S. Airports.” The hearing will examine the different infrastructure, technologies, federal programs, and other initiatives U.S. airports and airport stakeholders are utilizing to mitigate and prepare for the effects of climate change. The subcommittee will hear testimony from witnesses representing Alaska Airlines, Allegheny County Airport Authority, Dallas-Fort Worth International Airport, General Aviation Manufacturers Association, Portland International Airport, SkyNRG Americas, and ZeroAvia.

BACKGROUND

I. AVIATION AND CLIMATE CHANGE

In 2018, commercial, business, and general aviation aircraft (including passenger and all-cargo flights) accounted for nine percent of the U.S. transportation sector’s carbon emissions and approximately three percent of all carbon emissions in the United States.¹ Between 1970 and 2016, the energy intensity of air travel decreased by 75 percent due to improved aircraft fuel efficiency, air traffic operation initiatives, and aircraft configuration changes.² However, additional steps are needed to reduce the growth in commercial aviation’s carbon emissions and to comply with international reduction and offsetting requirements.

For instance, since 2009, aggregate carbon emissions from all aircraft types have grown steadily, increasing by almost 22 percent between 2009 and 2018.³ This increase makes aircraft one of the fastest-growing sources of carbon emissions in the

¹ Environmental Protection Agency, *Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions 1990–2018*, available at: <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100ZK4P.pdf>. These figures do not include emissions from international flights departing the United States.

² Environmental and Energy Study Institute, *Fact Sheet: The Growth in Greenhouse Gas Emissions from Commercial Aviation*, (Oct. 17, 2019), <https://www.eesi.org/papers/view/fact-sheet-the-growth-in-greenhouse-gas-emissions-from-commercial-aviation>.

³ *Aviation, Air Pollution and Climate Change* (CRS Report No. IF11696; 2022). Retrieved from Congressional Research Service website: <https://crsreports.congress.gov/product/pdf/IF/IF11696/2>.

U.S. transportation sector over the past decade.⁴ As of 2019, global aviation emissions were on track to triple by 2050, potentially accounting for as much as a quarter of all carbon emissions.⁵

As carbon and other greenhouse gas emissions from aviation have grown, the international civil aviation community has made significant strides in recent years to address the impact of its emissions on the global climate. International advancements are being led by the International Civil Aviation Organization (ICAO), including the adoption of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which began in 2021 and is a market-based mechanism for offsetting future carbon emissions from aviation, and the adoption of the first-ever global design certification to measure carbon emissions from aircraft engines in 2017, to name a few.⁶ It is estimated that airport operations directly account for approximately two percent of the U.S. aviation sector's total carbon emissions.⁷

Furthermore, airports' roles as critical transportation hubs make them particularly vulnerable to severe weather events. According to the 2017 National Climate Assessment, 13 of the nation's 47 largest airports have at least one runway with an elevation within the reach of a moderate to high storm surge.⁸ The increasing intensity and frequency of severe storms, higher temperatures, and more frequent heat waves pose a significant risk to airports and have the ability to delay flights, interrupt supply chains, and disrupt airport operations if resiliency efforts are not properly undertaken in a timely manner.⁹

II. EFFORTS TO ADDRESS CLIMATE CHANGE AT U.S. AIRPORTS

A. Initiatives to Mitigate Airport Emissions and Increase Resiliency

The Airports Council International (ACI) World and five ACI regions, which together represent airports worldwide, committed to supporting the Intergovernmental Panel on Climate Change's call to reach net-zero carbon emissions by 2050 by implementing a number of measures to help their members decarbonize their operations.¹⁰ Below is a short description of a few of these decarbonization measures:

- *Implementing Airport Energy Efficiency Measures.* These include improvements in building design and materials, lighting upgrades, artificial intelligence-enabled control systems, and heating, ventilation, and air-conditioning upgrades.¹¹
- *Implementing On-Site Power Generation.* This includes combined heat and power plants, which recover waste heat from the generation of electricity, or on-site renewable energy, such as solar power or wind energy.¹²
- *Low and Zero Emission Airport-Owned Transportation and Ground Support Vehicles.* This can include the purchase or leasing of low and zero emission passenger buses, automated people mover systems, and ground support vehicles.¹³

In addition, U.S. airports—particularly those located near a coastline or large bodies of water—are susceptible to rising sea levels, flooding, and more intense, frequent severe weather patterns.¹⁴ In order to effectively prepare, prevent, and respond to extreme weather events, airports are investing in a wide range of resiliency measures.¹⁵ Such resiliency measures may include:

- *Performing Climate Change Risk Assessments.* This includes an assessment of climate risks, their impacts on airport infrastructure and operations, and incorporating response plans into an airport's master plan.¹⁶

⁴*Id.*

⁵ICCT, CO₂ Emissions from Commercial Aviation, (October 2020), available at: <https://theicct.org/wp-content/uploads/2021/06/CO2-commercial-aviation-oct2020.pdf>.

⁶Federal Aviation Administration, *2021 United States Aviation Climate Action Plan*, (November 2021), at 8, available at: https://www.faa.gov/sites/faa.gov/files/2021-11/Aviation_Climate_Action_Plan.pdf.

⁷Airports Council International (ACI), *Sustainability Strategy for Airports Worldwide*, (November 2021), at 10, available at: <https://aci.aero/2021/11/16/aci-world-launches-inaugural-sustainability-strategy-report-for-airports-worldwide/#:~:text=In%20June%202021%2C%20ACI%20member,management%20certification%20standard%20for%20airports.>

⁸FAA, *supra* note 6 at 27.

⁹*Id.*

¹⁰ACI, *Net Zero by 2050: ACI Sets Global Long Term Carbon Goal for Airports*, (June 8, 2021), available at: <https://aci.aero/2021/06/08/net-zero-by-2050-aci-sets-global-long-term-carbon-goal-for-airports/>.

¹¹ACI, *supra* note 7 at 18.

¹²*Id.*

¹³*See Id.*

¹⁴*Id.* at 17.

¹⁵*See Id.*

¹⁶*Id.*

- *Flood Mitigation Measures*. This includes increasing drainage capacity, infrastructure improvements to runways and taxiways, and the construction of sea walls to protect against the risk of flooding.¹⁷
- *Building Resilience to Extreme Temperatures*. This includes the installation of improved cooling systems for airport buildings and airfield changes, such as new tarmac materials and extensions to runways to accommodate the reduction in aircraft engine thrust that can result from high temperatures.¹⁸
- *Protection of Biodiversity*. This includes the prevention of deforestation and supporting the appropriate forest management practices to limit soil erosion and excess water runoff.¹⁹

B. Initiatives to Address Airport Stakeholder Emissions

Sustainable Aviation Fuels (SAF) and Other Alternative Fuel Infrastructure

In order to further reduce their carbon footprint and help achieve the aviation industry's goal of net zero greenhouse gas emissions by 2050, U.S. airports are collaborating with airlines and renewable fuel manufacturers to help facilitate the storage and distribution of low and zero emission aviation fuels.²⁰

SAF, a type of jet fuel refined from biomass, waste streams, or gaseous carbon oxides, has emerged as a leading contender to reduce aviation emissions.²¹ Depending on the feedstock, SAF offers a carbon lifecycle reduction of up to 80 percent when compared to conventional jet fuel.²² Unlike other lower emissions proposals, SAF is a drop-in fuel that works in existing aircraft and can utilize most of the fueling infrastructure already in place.²³

Several U.S. airports and airlines have started collaborating on expanding the use of SAF for commercial aircraft. For instance, SAF is currently being delivered to Los Angeles International Airport, where United Airlines has committed to using SAF for all departing flights.²⁴ San Francisco International Airport has signed a recent memorandum of understanding with several airlines and fuel producers to work cooperatively on expanding the use of SAF at the airport.²⁵

While SAF holds tremendous potential to help reduce carbon emissions in the aviation industry, significant barriers to widespread adoption remain. For instance, SAF is significantly more expensive to produce and purchase than conventional jet fuel.²⁶ These high costs lead to SAF being produced in smaller quantities, resulting in limited availability.²⁷ Today, SAF is estimated to account for just .05 percent of jet fuel use.²⁸ Additionally, SAF must currently be blended with conventional jet fuel, although the low availability of SAF mitigates this issue in the short term.

In order to fulfill President Biden's goal to reduce aviation emissions by 20 percent by 2030 and achieve a long-term goal of zero-carbon aviation by 2050, the administration initiated a government wide "SAF Grand Challenge" to scale up production of SAF to at least three billion gallons per year by 2030.²⁹

In addition to SAF, there are several other technological approaches currently being considered to help decarbonize the aviation sector. One of these approaches

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ See *Id.* at 18.

²¹ FAA, *Sustainable Aviation Fuels*, (March 10, 2021), available at: https://www.faa.gov/about/office_org/headquarters_offices/ang/redac/media/environment/2021/march/envandenergy_mar2021_SAFUpdate.pdf.

²² IATA, *Developing Sustainable Aviation Fuel (SAF)*, available at: <https://www.iata.org/en/programs/environment/sustainable-aviation-fuels/>.

²³ IATA, *What is SAF, at 1*, available at: <https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/saf-what-is-saf.pdf>.

²⁴ Los Angeles World Airports, *LAX Welcomes World's Most Eco-Friendly Commercial Flight as United Commits to LAX 'Eco-Hub' with Purchase of Biofuel*, (June 5, 2019), available at: <https://www.lawa.org/news-releases/2019/news-release-52>.

²⁵ San Francisco International Airport, *SFO Announces Landmark Agreement for Use of Sustainable Aviation Fuels*, (September 5, 2018), available at: <https://www.flysfo.com/media/press-releases/sfo-announces-landmark-agreement-use-sustainable-aviation-fuels>.

²⁶ Christina Brooks, *Sustainable Aviation Fuel Still in Short Supply Due to Cost*, HIS Markit (July 7, 2021), available at: <https://cleanenergynews.ihsmarkit.com/research-analysis/sustainable-aviation-fuel-market-still-in-infancy-due-to-cost.html#:~:text=SAF%20prices%20are%20currently%20about,issues%20even%20more%20prominent%20today>.

²⁷ *Id.*

²⁸ Elan Head, *Understanding the Path to 100% SAF*, The Air Current (April 13, 2022), available at: <https://theaircurrent.com/technology/path-to-100-saf-sustainable-aviation-fuel/>.

²⁹ Department of Energy, *Memorandum of Understanding Sustainable Aviation Fuel Grand Challenge*, (September 8, 2021), available at: https://www.energy.gov/sites/default/files/2021-09/S1-Signed-SAF-MOU-9-08-21_0.pdf.

includes the development of full or hybrid electric aircraft, which operate using battery-powered electricity for power, rather than standard liquid fuels.³⁰ Several airlines and advanced air mobility (AAM) companies are seeking to use this technology for smaller aircraft operating shorter flights.³¹ It is expected that existing airports and airport infrastructure, such as general aviation airports or heliports, will be utilized by these new, technologically advanced aircraft once deployed.³²

However, because battery-powered technologies aren't as energy dense as liquid fuels, and thus require additional bulk and weight to achieve a comparable amount of energy, battery-powered aircraft face significant aerodynamic challenges.³³ Such design and operational challenges are likely to affect the range and speed of battery-powered aircraft.³⁴ Therefore, further technological developments are needed before electrification can be safely and economically adopted for medium and long-haul flights.³⁵

Hydrogen is another alternative fuel source being considered as a long-term option to help decarbonize the aviation sector. Hydrogen-powered aircraft produce zero carbon emissions and, depending on the technology used, can substantially reduce or even eliminate air pollutants such as nitrogen oxide (the primary byproduct of hydrogen combustion is water instead of carbon dioxide).³⁶ A recent report on the potential of hydrogen-powered aviation found that such planes could enter the market as soon as 2035.³⁷ Airbus committed to such an idea in September 2021, announcing its plans to field such an aircraft by 2035, with a technology demonstrator as soon as 2025.³⁸ Then, in October 2021, Alaska Airlines announced a new partnership with ZeroAvia to develop a hydrogen-electric propulsion system capable of flying a 76-seat regional aircraft with a range of 500 nautical miles.³⁹ However, reaching these goals will rely on a number of factors, including developing effective storage technologies and new ways of transporting hydrogen to airports so planes can be refueled on the tarmac.⁴⁰

While electric and hydrogen-propulsion, along with other alternative fuel technologies, have the potential to play a significant role in decarbonizing short and regional commercial flights in the coming decades, it remains uncertain as to the role they will play in reducing carbon emissions for the medium- and long-haul commercial flights that are projected to generate most of the aviation sector's carbon emissions in the coming years.⁴¹ Moreover, airports may need to invest in new infrastructure if many of these new options are to become viable. In fact, the committee recently reported favorably to the House H.R. 6270, the Advanced Aviation Infrastructure Modernization (AAIM) Act, which seeks to establish a pilot program to assist with the planning, development, and deployment of infrastructure necessary to facilitate AAM operations in the United States.⁴²

³⁰ Elissa Garay, *Electric Planes Are Coming Sooner Than You Think*, AFAR (March 2, 2022), available at: <https://www.afar.com/magazine/electric-planes-are-coming-sooner-than-you-think>.

³¹ *Id.*

³² Community Air Mobility Initiative, *Airports and Advanced Air Mobility: Integrating the Third Dimension into Metropolitan Transportation Systems*, (September 3, 2020), available at: https://www.nctcg.org/nctcg/media/Transportation/Committees/ATAC/2020/Website-Presentations_9-3-20.pdf?ext=.pdf.

³³ Garay, *supra* note 30.

³⁴ *Id.*

³⁵ *Id.*

³⁶ Eurocontrol, *Are Hydrogen-Powered Aircraft the Future of Sustainable Aviation?*, (May 18, 2021), available at: <https://www.eurocontrol.int/article/are-hydrogen-powered-aircraft-future-sustainable-aviation>.

³⁷ *Id.*

³⁸ Bellamy, *Airbus CEO Keeps Commitment to 2035 Zero Emissions Airliner Timeline*, Aviation Today (Feb. 19, 2021) available at: <https://www.aviationtoday.com/2021/02/19/airbus-ceo-keeps-commitment-2035-zero-emissions-airliner-timeline/>.

³⁹ Alaska Airlines, *Alaska Air Group Collaborating with ZeroAvia to Develop Hydrogen Powertrain for 76-Seat Zero-Emission Aircraft*, (October 26, 2021), available at: <https://news.alaskaair.com/newsroom/alaska-air-group-collaborating-with-zeroavia-to-develop-hydrogen-powertrain-for-76-seat-zero-emission-aircraft/>.

⁴⁰ Jonathan O'Callaghan, *Quiet and Green: Why Hydrogen Planes Could be the Future of Aviation*, Horizon (July 8, 2020), available at: <https://ec.europa.eu/research-and-innovation/en/horizon-magazine/quiet-and-green-why-hydrogen-planes-could-be-future-aviation>.

⁴¹ See Garay, *supra* note 30.

⁴² U.S. House Transportation and Infrastructure Committee, *Transportation and Infrastructure Committee Leaders Release Statement On Passage of Aviation Bills*, (April 28, 2022) available at: <https://transportation.house.gov/news/press-releases/transportation-and-infrastructure-committee-leaders-release-statement-on-passage-of-aviation-bills>

Other Initiatives

In addition to facilitating the storage and delivery of alternative fuels for aircraft, U.S. airports have made necessary investments in infrastructure to help reduce emissions for airline-owned ground support vehicles, taxiing and parked aircraft, and other sources of emissions generated by an airport's stakeholders. Below is a brief description of these initiatives.

- *Gate Electrification*. Electric pre-conditioned air and ground power converter units can significantly reduce aircraft emissions associated with aircraft auxiliary power unit (APU) usage.⁴³
- *Alternative Fuel Infrastructure*. This includes providing charging stations and other refueling infrastructure for compressed natural gas, electricity, hybrid technologies, hydrogen, and other alternative fuel vehicles.⁴⁴
- *Remote Ground Power Units*. This includes electric ground power converter units that reduce aircraft APU emissions by providing clean electricity to remote parking positions.⁴⁵
- *Improved Airfield Design*. Improved airfield design can minimize aircraft taxi-times and minimize fuel burn.⁴⁶
- *Airspace Design*. Airports can collaborate with the Federal Aviation Administration (FAA) and airlines to provide fuel efficient standard departure and arrival routes for aircraft.⁴⁷

III. FEDERAL AIRPORT PROGRAMS AND INITIATIVES

A. Voluntary Airport Low Emission Program and Airport Zero Emission Vehicle and Infrastructure Pilot Program

Through participation in the Voluntary Airport Low Emissions (VALE) program, U.S. commercial airports can use FAA Airport Improvement Program (AIP) funds and Passenger Facility Charge (PFC) revenue to finance low-emission vehicles, refueling and recharging stations, gate electrification, and other airport air quality improvements.⁴⁸ The program is limited to commercial airports in “non-attainment” or “maintenance” areas for one of the National Ambient Air Quality Standards.⁴⁹ Since its creation in 2004, VALE grants have funded 133 projects at 59 airports and are expected to reduce ozone emissions by 1,703 tons per year for the next five years.⁵⁰

Similar to the VALE program, the Airport Zero Emissions Vehicle (ZEV) and Infrastructure Pilot program helps to reduce greenhouse gas emissions by facilitating the use of zero emissions technologies at airports.⁵¹ The program allows U.S. airports to use AIP funds to purchase zero emission vehicles and the necessary infrastructure to accommodate these vehicles.⁵² Since 2015, the program has funded 22 projects valued at over \$60 million at 15 airports across the country.⁵³

B. Energy Efficiency Grants

The FAA administers AIP funding to airports for energy assessments to identify and implement energy reduction measures to reduce energy consumption across airport operations.⁵⁴ Typical projects include light-emitting diode lighting or other energy efficiency measures.⁵⁵

C. Sustainability Planning

The FAA administers AIP funding to airports for the development of airport sustainability plans.⁵⁶ These plans address a broad array of environmental and energy activities, including recycling, green infrastructure, energy efficiency, renewable en-

⁴³ See FAA, *Voluntary Airport Low Emissions (VALE) Program*, available at: <https://www.faa.gov/airports/environmental/vale/media/VALE-brochure-2020.pdf>.

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ ACI, *supra* note 7 at 18.

⁴⁷ *Id.*

⁴⁸ FAA, *supra* note 43.

⁴⁹ *Id.*

⁵⁰ FAA, *Voluntary Airport Low Emissions Program (VALE)*, (April 22, 2022), available at: <https://www.faa.gov/airports/environmental/vale/>.

⁵¹ FAA, *Airport Zero Emissions Vehicle and Infrastructure Pilot Program*, (April 22, 2022), available at: https://www.faa.gov/airports/environmental/zero_emissions_vehicles/.

⁵² *Id.*

⁵³ *Id.*

⁵⁴ FAA, *supra* note 6 at 28.

⁵⁵ *Id.*

⁵⁶ FAA, *Sustainability Plans*, (April 22, 2022), available at: <https://www.faa.gov/airports/environmental/sustainability/>.

ergy, water quality, and climate resilience, among other things.⁵⁷ To date, the FAA has provided grants to 44 airports under the program.⁵⁸

D. NextGen

The FAA continues to develop and implement NextGen technologies and procedures to modernize the air traffic control system.⁵⁹ NextGen programs include Performance-Based Navigation procedures (GPS-satellite based flight paths) and Terminal Flight Data Manager (TFDM) deployment (a surface management solution), which will reduce aircraft fuel burn and create a more predictable and efficient flight and ground transportation system at airports.⁶⁰ The TFDM system alone is expected to create 313 million gallons of fuel savings and reduce more than three million metric tons of carbon emissions over the life of the system.⁶¹ While the FAA is primarily responsible for deploying these NextGen programs, the agency coordinates with airports and other affected stakeholders on implementation.⁶²

E. Continuous Lower Energy, Emissions, and Noise Program

The FAA's Continuous Lower Energy, Emissions, and Noise (CLEEN) program is the agency's principal environmental effort to accelerate the development of new aircraft and engine technologies.⁶³ It has been instrumental to the certification of alternative jet fuels for safe use in civil aviation.⁶⁴ In coordination with ASTM International, which oversees criteria for aviation jet fuels, CLEEN's combined efforts have led to the approval of seven alternative fuel types for use in civil aviation, as of April 2021.⁶⁵ The next phase of the CLEEN program aims to continue the testing and qualification of new alternative jet fuels, with a focus on supporting blend levels of at least 50 percent.⁶⁶

F. Infrastructure Investment and Jobs Act

The Infrastructure Investment and Jobs Act (IIJA) was enacted on November 15, 2021, and provides \$25 billion over a five-year period for airport development and air traffic control projects.⁶⁷ Specifically, the bill included \$15 billion in formula allocated funding for airport infrastructure projects, \$5 billion in competitive grants for airport terminal projects, and \$5 billion to upgrade and modernize FAA air traffic control towers and facilities.⁶⁸

While the IIJA has no dedicated funding for airport environmental projects, it does *allow* airports to use IIJA funds on an array of projects that could help airports meet their climate goals. For instance, the bill allows airports to use their airport infrastructure funding on VALE, ZEV, and other AIP eligible environmental projects.⁶⁹ Additionally, under the IIJA's airport terminal program, the FAA will consider projects that improve energy efficiency, including upgrading environmental systems, upgrading plant facilities, and achieving energy efficient building design accreditation standards.⁷⁰

Finally, the IIJA requires that any amount of unobligated funding remaining in fiscal year 2026 in excess of \$100 million be used to provide competitive grants for airport projects that "reduce airport emissions, reduce noise impacts to the surrounding community, reduce dependence on the electrical grid, or provide general benefits to the surrounding community."⁷¹ However, because this program relies on

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ FAA, *Next Generation Air Transportation System (NextGen)*, (March 8, 2022), available at: <https://www.faa.gov/nextgen/>.

⁶⁰ United States. Cong. House. Committee on Transportation and Infrastructure. Subcommittee on Aviation. Hearing on Putting U.S. Aviation At Risk: The Impact of the Shutdown Feb. 13, 2019. 116th Congress 1st sess. p. 12 (statement of Paul Rinaldi, President, National Air Traffic Controllers Association).

⁶¹ *Id.*

⁶² See FAA, Office of NextGen, available at: https://www.faa.gov/about/office_org/headquarters_offices/ang.

⁶³ FAA, Continuous Lower Energy, Emissions, and Noise (CLEEN) Program, (September 10, 2021), available at: https://www.faa.gov/newsroom/continuous-lower-energy-emissions-and-noise-cleen-program#_Toc80621753.

⁶⁴ *Id.*

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ Pub. L. No. 117–58, Div. J (2021).

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ *Id.*

the availability of a specified amount of unobligated funding, its implementation cannot be guaranteed.⁷²

WITNESSES

- Ann Ardizzone, Vice President, Supply Chain, Alaska Airlines
- Paul Hoback, Jr., Executive Vice President and Chief Development Officer, Allegheny County Airport Authority
- Robert Horton, Vice President of Environmental Affairs, Dallas-Fort Worth International Airport
- Pete Bunce, President and CEO, General Aviation Manufacturers Association (GAMA)
- Jennifer Bies, Director of Environmental Operations, Port of Portland
- John Plaza, President and CEO, SkyNRG Americas
- Val Miftakhov, Founder and CEO, ZeroAvia

⁷² *Id.*

PREPARING FOR TAKEOFF: EXAMINING EFFORTS TO ADDRESS CLIMATE CHANGE AT U.S. AIRPORTS

TUESDAY, MAY 17, 2022

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Washington, DC.

The subcommittee met, pursuant to call, at 2:15 p.m. in room 2167 Rayburn House Office Building and via Zoom, Hon. Rick Larsen (Chairman of the subcommittee) presiding.

Members present: Mr. Larsen of Washington, Mr. DeFazio, Ms. Davids of Kansas, Mr. Kahele, Ms. Williams of Georgia, Mr. Johnson of Georgia, Ms. Titus, Mr. DeSaulnier, Mr. Lynch, Mr. Stanton, Ms. Norton, Mr. Garamendi, Mr. Graves of Louisiana, Mr. Balderson, Dr. Van Drew, Ms. Mace, Ms. Van Duyne, and Mrs. Steel.

Mr. LARSEN OF WASHINGTON. The subcommittee will finally come to order.

I appreciate everyone's patience for the scheduling from this morning to this afternoon, DC time—still morning where I am from. So, good morning to all the people watching at home, and welcome this afternoon.

I ask unanimous consent that the chair be authorized to declare a recess at any time during today's hearing.

I might object to that after this morning, but without objection, so ordered.

I also ask unanimous consent that Members not on the subcommittee be permitted to sit with the subcommittee at today's hearing and ask questions.

Without objection, so ordered.

As a reminder, please keep your microphones muted unless speaking. Should I hear any inadvertent background noise, I will request the Member please mute the microphone.

To insert a document into the record, please remember to have your staff email it to DocumentsT&I@mail.house.gov.

I now recognize myself for an opening statement.

Good afternoon. Welcome to today's Aviation Subcommittee hearing entitled, "Preparing for Takeoff: Examining Efforts to Address Climate Change at U.S. Airports."

As chair of this subcommittee, I am focused on continuing the movement to a cleaner and greener air transportation system.

Aviation and aerospace are responsible for as much as 9 percent of carbon emissions in U.S. transportation and close to 3 percent of total emissions globally. Aviation emissions directly impact communities adjacent to the Nation's airports, as well, causing poor air quality, increased health risks, and reduced property values.

A 2019 study that the University of Washington conducted found that communities underneath and downwind of aircraft landing at Seattle-Tacoma International Airport are exposed to specific ultrafine particle pollution that is distinctly associated with aircraft. The study also found that affected communities are as far as 10 miles away from the airport itself.

In response to global aviation emissions projections, the FAA—Federal Aviation Administration—released its first Aviation Climate Action Plan in November 2021. The FAA's plan calls for achieving net-zero greenhouse gas emissions in the U.S. aviation sector by 2050 by implementing specific sustainability and environmental measures. Some of these measures already exist. For example, FAA's NextGen procedures such as performance-based navigation are already helping to reduce aircraft fuel burn and create more efficient flight routes.

Development of the Aviation Climate Action Plan's proposed tools will need the support of Congress. These tools include production and distribution of cleaner fuels, such as sustainable aviation fuel; the use of alternative propulsion systems like electrification and hydrogen-powered aircraft; and the adoption of international initiatives like ICAO's Carbon Offsetting and Reduction Scheme for International Aviation, also known as CORSIA.

Regarding SAF, I am working with Representative Nikema Williams on a discussion draft of legislation that would build off of language in the Build Back Better bill and provide Federal funding for SAF producers to build or scale up facilities and infrastructure for the production, storage, and distribution of SAF. This discussion draft has input from the FAA and an array of other aviation stakeholders, and I welcome input from subcommittee colleagues to help advance SAF as an emissions reduction tool.

As Congress prepares for the next FAA reauthorization bill, this subcommittee must evaluate existing programs and policies aimed at reducing emissions from U.S. airports, while also looking forward to developing new tools to reduce the carbon footprint of the aviation sector.

As airport emissions have come into sharper focus, airports themselves have taken steps to reduce emissions. The Airports Council International, or ACI, has adopted decarbonization and resiliency measures such as airport energy efficiency standards, use of low- and zero-emission transportation and ground support vehicles, climate risk assessments, and flood mitigation projects, among others.

The Federal Government also supports various initiatives to help foster emission reduction technologies and strategies.

The FAA's Voluntary Airport Low Emissions, or VALE, program allows airports to use Federal dollars to finance low-emission vehicles and related infrastructure, electric gate and gate equipment, and other airport quality improvements. FAA's Continuous Lower Energy, Emissions, and Noise, or CLEEN, program helps accel-

erate the development of new aircraft and engine technologies, as well as alternative jet fuels for use in civil aviation.

U.S. airports are also able to use Airport Improvement Program funds for energy reduction measures, sustainability planning, and the purchase of zero-emission vehicles and related infrastructure.

Emerging aviation technologies, such as alternative fuels and aircraft propulsion systems, can also help reduce emissions at airports. While several airports and airlines are working to expand the use of SAF, there are significant barriers to its widespread adoption. High production costs have led to lower availability and higher prices, rendering SAF difficult to access for many carriers and airports.

Another potential solution is the development of full or hybrid-electric aircraft, which operate using electric batteries for power. Several airlines and advanced air mobility companies are developing electric vertical takeoff and landing aircraft, or eVTOLs, for potential use for short-range flights. The full committee recently approved my bipartisan Advanced Aviation Infrastructure Modernization Act to help airports and local communities plan these new aircraft.

Finally, hydrogen is another option that may be a long-term solution to help decarbonize the aviation sector. Hydrogen-powered aircraft emit water instead of carbon dioxide, leading to substantially reduced air pollutants. Yet there are still problems to solve with this technology, particularly around storage and transport of hydrogen to fuel aircraft.

Today, we have a variety of witnesses who will speak about these ongoing efforts aimed at reducing aviation emissions, as well as needs for future reduction tools. I will just generally welcome our various airport representatives from Allegheny County Airport Authority, Dallas Fort Worth International Airport, and Port of Portland, who will discuss their strategies for mitigating the impacts of climate change.

I look forward to hearing from SkyNRG Americas on where SAF stands in the current market and what steps Congress can do to facilitate its adoption.

U.S. airlines must be proactive in developing strategies to reduce carbon emissions from the industry, and I am pleased to have Alaska Airlines, our hometown airline in Seattle, join us to discuss its efforts to reduce emissions and how other airlines could achieve similar results.

The General Aviation Manufacturers Association, or GAMA, is here as well to discuss advances in aviation manufacturing that can lead to reduced emissions.

And finally, emerging fuel sources like hydrogen present long-term options to help decarbonize the aviation industry in the future. I am pleased to welcome ZeroAvia, which is building a major research and development facility at Paine Field in my district, to testify on their efforts to bring hydrogen-powered aircraft into the mainstream.

I look forward to hearing from today's witnesses on where current efforts stand and the potential next steps to address these issues.

While Congress, the administration, and industry are working to reduce carbon emissions and fight climate change at U.S. airports, clearly there is more work to be done.

Thank you, and I look forward to today's discussion.

[Mr. Larsen of Washington's prepared statement follows:]

**Prepared Statement of Hon. Rick Larsen, a Representative in Congress
from the State of Washington, and Chair, Subcommittee on Aviation**

Good afternoon and welcome to today's Aviation Subcommittee hearing titled "Preparing for Takeoff: Examining Efforts to Address Climate Change at U.S. Airports."

As Chair of this Subcommittee, I am focused on continuing the movement to a cleaner and greener air transportation system.

Aviation and aerospace are responsible for as much as 9 percent of carbon emissions in U.S. transportation and close to three percent of total emissions globally.

Aviation emissions directly impact communities adjacent to the nation's airports, causing poor air quality, increased health risks and reduced property values.

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The study also found that affected communities are as far as 10 miles away from the airport itself.

In response to global aviation emissions projections, the Federal Aviation Administration (FAA) released its first Aviation Climate Action Plan in November 2021.

The FAA's plan calls for achieving net-zero greenhouse gas emissions in the U.S. aviation sector by 2050 by implementing specific sustainability and environmental measures.

Some of these measures already exist. For example, FAA's NextGen procedures such as Performance-Based Navigation are already helping to reduce aircraft fuel burn and create more efficient flight routes.

Development of the Climate Action Plan's proposed tools will need the support of Congress.

These tools include:

- Production and distribution of cleaner fuels, such as Sustainable Aviation Fuel (SAF);
- Use of alternative propulsion systems like electrification and hydrogen-powered aircraft; and
- Adoption of international initiatives like ICAO's Carbon Offsetting and Reduction Scheme for International Aviation, also known as CORSIA.

Regarding SAF, I am working with Rep. Nikema Williams on a discussion draft of legislation that would build off language in Build Back Better and provide federal funding for SAF producers to build or scale up facilities and infrastructure for the production, storage and distribution of SAF.

This discussion draft has input from the FAA and an array of other aviation stakeholders, and I welcome input from my Subcommittee colleagues to help advance SAF as an emissions reduction tool.

As Congress prepares for the next FAA reauthorization bill, this Subcommittee must evaluate existing programs and policies aimed at reducing emissions from U.S. airports, while also looking forward to develop new tools to reduce the carbon footprint of the aviation sector.

As airport emissions have come into sharper focus, airports themselves have taken steps to reduce those emissions.

The Airports Council International (ACI) has adopted decarbonization and resiliency measures such as airport energy efficiency standards, the use of low and zero emission transportation and ground support vehicles, climate risk assessments, and flood mitigation projects, among others.

The federal government also supports various initiatives to help foster emission reduction technologies and strategies.

The FAA's Voluntary Airport Low Emission (VALE) program allows airports to use federal dollars to finance low emission vehicles and related infrastructure, electric gate and gate equipment and other airport quality improvements.

FAA's Continuous Lower Energy, Emissions and Noise (CLEEN) program helps accelerate the development of new aircraft and engine technologies, as well as alternative jet fuels for use in civil aviation.

U.S. airports are also able to use Airport Improvement Program (AIP) funds for energy reduction measures, sustainability planning and the purchase of zero emission vehicles and related infrastructure.

Emerging aviation technologies, such as alternative fuels and aircraft propulsion systems, can also help to reduce emissions at U.S. airports.

While several airports and airlines are working to expand the use of SAF, there are significant barriers to its widespread adoption.

High production costs have led to lower availability and higher prices, rendering SAF difficult to access for many carriers and airports.

Another potential solution is the development of full or hybrid electric aircraft, which operate using electric batteries for power.

Several airlines and advanced air mobility (AAM) companies are developing electric vertical takeoff and landing aircraft, or eVTOLs, for potential use for short-range flights.

The full Committee recently approved my bipartisan Advanced Aviation Infrastructure Modernization (AAIM) Act to help airports and local communities plan for these new aircraft.

Finally, hydrogen is another option that may be a long-term solution to help decarbonize the aviation sector.

Hydrogen-powered aircraft emit water instead of carbon dioxide, leading to substantially reduced air pollutants.

Yet, there are still problems to solve with this technology, particularly around storage and transport of hydrogen to fuel aircraft.

Today's witnesses can speak to ongoing efforts aimed at reducing aviation emissions, as well as needs for future reduction tools.

I would like to welcome our various airport representatives from the Allegheny County Airport Authority, Dallas-Fort Worth International Airport and Port of Portland, who will discuss their strategies for mitigating the impacts of climate change.

I also look forward to hearing from SkyNRG Americas on where SAF stands in the current market and what steps Congress should take to facilitate its adoption.

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I am pleased to have Alaska Airlines join us to discuss its efforts to reduce emissions and how other airlines could achieve similar results.

The General Aviation Manufacturers Association (GAMA) is here today to discuss the advances in aviation manufacturing that can lead to reduced emissions.

Finally, emerging fuel sources, like hydrogen, present long-term options to help decarbonize the aviation industry in the future.

I am pleased to welcome ZeroAvia, which is building a major research and development facility at Paine Field in my district, to testify on their efforts to bring hydrogen powered aircraft into the mainstream.

I look forward to hearing from today's witnesses on where current efforts stand and potential next steps to address these issues.

While Congress, the Administration, and industry are working to reduce carbon emissions and fight climate change at U.S. airports, there is more work to be done.

Thank you, and I look forward to today's discussion.

Mr. LARSEN OF WASHINGTON. And with that I now call on the ranking member of the subcommittee, Mr. Garret Graves, for an opening statement.

Mr. GRAVES OF LOUISIANA. Thank you, Mr. Chairman. Mr. Chairman, I have heard from a lot of constituents over the past several weeks about aviation, and I have heard a lot of concerns about congestion at the airports, the inability to get through security.

I have heard a lot about higher energy prices and how those are influencing higher ticket costs, which puts aviation travel out of reach for many of the constituents that we represent; the impact of the labor shortage that is resulting in canceled routes or canceled flights, and the adverse impact that that is having on families; and of course, things like new entrants into the aviation space,

like advanced air mobility or drones, and how those might be able to help improve convenience.

Mr. Chairman, today we are here to talk about the aviation sector's efforts to reduce emissions or to address climate change, and some of the efforts that have been undertaken by both airports and by airport stakeholders and airport operators, the aviation industry, new technologies. And it is interesting, because not too long ago, the committee had a hearing on noise pollution. And in that discussion, we talked about how, in recent years, we have seen extraordinary reductions, or great strides in reducing noise pollution as a result of aircraft, as a result of new engine technology, and as a result of quieter aviation systems.

In fact, we talked then about advanced air mobility and drones, and how those are going to transform our skies, both from an emissions perspective, as well as continuing to move in a direction of lower noise or noise pollution.

However, despite the fact that everyone was pretty excited about the rewrite of part 23, the FAA inexplicably has come in and decided that, instead of using that much-celebrated rewrite—as using it for the process by which we will be certifying advanced air mobility or drones, instead they have come in and totally reversed course, that they have opted instead to do everything in their power to get in their way, and instead to certify aircraft—these AAM vehicles—as special class aircraft. Baffling to me.

There is no safety justification for the certification. It is just bureaucracy getting in the way of results. There are plenty of safety items with AAM that need to be worked through, things that we need to be addressing, things like operations, pilot training, fire suppression, aircraft security, integration into airspace, and much more. But the FAA and industry now have to spend their time on paperwork exercises and trying to cut through bureaucracy as they push schedules or timelines to the right.

I would love to be talking about new technologies and how we are going to be able to use innovation and advanced technologies to reduce pollution as well as noise. But unfortunately, I think we are going to be continuing to talk about the bureaucracy that the FAA has created in this drone situation, and I think likely in many other situations moving forward.

Returning to the topic today of emissions and mitigation and reduction at U.S. airports, I want to build off the notion already laid on the table that progress is most often achieved when Government gets out of the way and fosters collaboration with industry and itself.

Aircraft engines are a great example of the collaboration. By working with industry, each successive generation of passenger aircraft and turbine engine has grown more and more efficient. As more Americans affordably and safely take to the skies, total emissions in the aviation industry have remained relatively static.

And we are going to hear today from airports like Pittsburgh International Airport, that has designed their own microgrid, the first one in the world, as a matter of fact, reducing emissions, improving resiliency, and taking advantage of local resources.

Looking at numbers, aircraft accounted for 9 percent—aircraft accounted for 9 percent—of the U.S. transportation sector's carbon

emissions and approximately 3 percent of all emissions overall in 2018. Airport operations are estimated to account for less than 2 percent of the aviation sector's total carbon emissions. And internationally, the civil aviation sector accounts for approximately 1.3 percent of global carbon emissions, and it is estimated the sector's contribution will increase in the coming decades.

It's a great news story, but it shouldn't be lost on anyone that the United States is the global leader in reducing emissions and improving efficiency. But it is important to note, Mr. Chair, that for every 1 ton of emissions we have reduced in the United States, that China has increased by 4, even under their commitments in the Paris Accords. What right now is emitting greater than the United States, European Union, Japan, South Korea, and whichever other countries, they are going to increase another 50 percent between now and 2030. That is a move in the wrong direction.

And I want to remind you, Mr. Chair, as we are seeing with Ukraine right now, countries like Russia, China, and others do not care about international norms, international commitments. There are differing opinions in the room on this issue, but I think we can agree that making smart and targeted investments in resiliency and aligning our policies accordingly are no-regrets moves. We should be doubling and tripling down on the successful policies that are helping to improve the resilience of airports and the resilience of our environment. And I look forward to hearing from our witnesses on how Congress can help airports do just that.

Thank you, I yield back.

Mr. LARSEN OF WASHINGTON. Thank you, Representative Graves. The Chair recognizes the chair of the full committee, Representative DeFazio of Oregon, for an opening statement.

Mr. DEFAZIO. Thanks, Mr. Chairman. This is a really important hearing examining different infrastructure, technologies, and other initiatives airports, stakeholders, and airlines are using to mitigate or, potentially in the future, mitigate the effects of aviation on carbon pollution and climate change.

The recent WHO numbers for climate change were in terms of the "single biggest health threat facing humanity," and the numbers we have had just this last week show that we are potentially going to exceed the 1.5 degrees Celsius goal, which was considered zero percent in 2015 by 2025. Things are accelerating.

Aviation is growing tremendously. So, we do need a major focus on aviation. I have a little different figure in terms of the total impact than Ranking Member Graves, but it is small. But given the projections in growth, and given the fact that other sectors have more available immediate, off-the-shelf alternatives to reduce carbon, aviation will grow very quickly as a percentage of emissions.

And I appreciate Alaska Airlines being here today, which is generally my go-to airline, being on the west coast, and the fact that they are working in many different ways, as are a number of the other airlines.

I met with the Transport Minister from Great Britain just last week, and they are going to offer—and any airline anywhere in the world is eligible to participate—a substantial prize for the first company—of course, I don't think that is a route Alaska Airlines flies, but one of your partners would—to fly from Great Britain to

the U.S. with 100 percent sustainable fuel. But the issue is, how are we going to produce those kinds of volumes? How are we going to distribute it?

In the INVEST Act, we had substantial funding for the technology and the infrastructure that would be needed at airports. And as we move toward sustainable aviation fuels, unfortunately, the totally dysfunctional Senate, in writing its version behind closed doors, left out that provision, among many others, that could potentially deal with climate change, since the bill was written by climate deniers. And that is a shame.

I hear the gentleman's frustration about the FAA. I share it. And I talked to Secretary Buttigieg last weekend and said we need a transformative manager, leader of the FAA.

I will just point to one thing that is really irksome. We put one sentence in the last FAA reauthorization: Flight attendants shall have the same duty rest time—I hope the FAA is listening—as pilots. Somehow that had to go through a major rulemaking. That wasn't clear what that meant. That is total BS, to begin with.

It is 4½ years later, and they haven't even forwarded that rule to the regulatory bureaucracy called OIRA and OMB, who should be eliminated. But it has got to go there before we can finally implement that one sentence. So, if they can't get something that simple done, how are they going to deal with these new complex issues? So, I share the gentleman's frustration with that.

So, we are going to hear a lot today that is very interesting from the witnesses on what can be done in the air and on the ground to mitigate carbon emissions that are related to aviation. I am excited to hear the testimony.

And with that, I would yield back the balance of my time.

[Mr. DeFazio's prepared statement follows:]

Prepared Statement of Hon. Peter A. DeFazio, a Representative in Congress from the State of Oregon, and Chair, Committee on Transportation and Infrastructure

Thank you, Chair Larsen, for calling this very important hearing today focused on examining the different infrastructure, technologies, and other initiatives U.S. airports and stakeholders are utilizing to mitigate and prepare for the effects of climate change.

According to the World Health Organization, climate change is the “single biggest health threat facing humanity.” In the decades ahead, the futures of our children and our grandchildren will directly depend on what we do today. But we shouldn't wait to act until we experience even more disastrous effects of climate change.

Whether it's the increasing nature of 100-year storms or the massive wildfires and blistering heat waves that plagued my home state of Oregon last year, climate change is here and continues to present a growing threat to millions of Americans each and every day. That's why it is vital we do everything in our power to mitigate and prepare for it. But we are running out of time.

Since signing the Paris climate agreement in 2015, the global community has focused on one climate goal: limiting global warming to 1.5 degrees Celsius above pre-industrial levels to avoid the most severe effects of climate change. But as greenhouse gas emissions continue to grow, a recent report from the World Meteorological Organization shows there is a 50 percent chance global temperatures could temporarily hit this critical threshold within the next five years.

The same report alleged that this probability is only increasing with time. For instance, in 2015, the chance of temporarily crossing that same threshold was zero, thus highlighting the frenetic pace of human-caused climate change.

Unfortunately, the aviation industry's contribution to climate change has grown in recent years. While aviation currently only accounts for nine percent of transpor-

tation emissions and three percent of total emissions in the United States, aviation emissions have grown by 22 percent over the last decade, quickly becoming one of the fastest growing sources of emissions in the transportation sector. If left unaddressed, carbon emissions are on track to potentially triple by 2050, accounting for a quarter of all carbon emissions.

To be clear, much is being done in this space. As we will hear from the witnesses today, there have been record investments in sustainable aviation fuels (SAF), hydrogen fuel sources, and other innovative technologies that aim to reduce or even eliminate the aviation industry's growing carbon emissions.

Moreover, the FAA has a range of programs designed to help airports, airlines, and other aviation stakeholders address climate change. This includes the Voluntary Airport Low Emissions (VALE) and Zero Emission Vehicle and Infrastructure Pilot programs, which help airports purchase low and zero emission vehicles, infrastructure, and other equipment to lower their carbon footprint and become more environmentally sustainable.

It also includes important research programs, such as the Continuous Lower Energy, Emissions, and Noise (CLEEN) program, which fosters partnerships with the private sector to conduct critical research on SAF, aircraft engine technologies, and other aviation environmental matters.

But we need to do more!

That's why last Congress I included a number of provisions in H.R. 2, the Moving Forward Act, specifically aimed at addressing climate change in aviation. This included the creation of a dedicated funding program for airport environmental projects, making airport resiliency projects eligible for AIP funding, expanding the VALE program to all commercial airports—not just those in non-attainment areas—and the development of the first-ever grant program for SAF infrastructure projects and other low emission aviation technologies.

While these provisions were not ultimately included in the Infrastructure Investment and Jobs Act (IIJA), I am hopeful that my colleagues consider these proposals—many of which are supported by the witnesses before us today—for inclusion in the next FAA reauthorization bill. I am also eager to learn how airports are using the record amount of IIJA funding they are set to receive to bolster their existing efforts to address climate change.

When it comes to climate change, the consequences of inaction cannot be overstated. More severe and frequent storms, flooding, extreme heat, wildfires, droughts, and other environmental disasters will have profound effects on every aspect of human life. But it is my hope that the testimony we hear today will provide the committee and the aviation industry with real solutions to help tackle the climate crisis and provide a healthier, more sustainable future for generations to come.

I look forward to hearing from the witnesses on this important issue. I yield back.

Mr. LARSEN OF WASHINGTON. Thank you, Mr. Chair. We will introduce the witnesses now for the record.

Ann Ardizzone, vice president of supply chain for Alaska Airlines.

Then we will hear from Paul Hoback, Jr., executive VP and chief development officer for the Allegheny County Airport Authority, which oversees developments at the Pittsburgh International Airport.

For Robert Horton, I want to turn and recognize Representative Van Duyne to introduce Mr. Horton.

Ms. VAN DUYN. Thank you very much. My district is home to DFW Airport, which is a great provider of thousands of jobs in our community. And this is one of the world's busiest international airports, and serves as the headquarters of one of the world's largest commercial airlines. DFW Airport is constantly at the forefront of innovation in leading the passenger experience.

It is my pleasure to introduce Robert Horton, vice president of environmental affairs and sustainability for Dallas Fort Worth International Airport. He also serves as the airport board's environmental and sustainability officer. Robert provides strategic and innovative leadership for DFW Airport's environmental and sustain-

ability programs. He holds bachelor of science and master of engineering degrees in agriculture and biological engineering from the University of Florida. And in December 2019, he received the Distinguished Alumni Award.

He has been formally recognized amongst trade and industry thought leaders as a champion for rapidly evolving aviation and sustainable operations, and he was selected to serve as a Commissioner for Alliance to Save Energy's U.S. Commission on Transportation Sector Efficiency for his leadership on environmental and sustainability issues.

A proven leader throughout his career, with more than 20 years of experience in the aviation and transportation industries, Robert's perspective will highlight the great work being done by DFW Airport.

Robert, thank you for taking the time to speak with the committee, and I yield back.

Mr. LARSEN OF WASHINGTON. Thank you, Representative Van Duyne. I am pleased to have Mr. Horton here.

Next, after Mr. Horton, we will hear from Pete Bunce, the president and CEO of General Aviation Manufacturers Association.

Then Jennifer Bies, the director of environmental operations for the Port of Portland.

John Plaza will follow. He is the president and CEO of SkyNRG Americas.

And then Val Miftakhov, who is the founder and CEO of ZeroAvia.

So, I want to thank everyone for joining us today. We will now move to witness testimony.

Without objection, witnesses' full statements will be included in the record.

Since the written testimony has been made part of the record, the subcommittee requests that you limit your oral testimony to 5 minutes.

With that, Ms. Ardizzone, finally, you may proceed.

TESTIMONY OF ANN ARDIZZONE, VICE PRESIDENT OF SUPPLY CHAIN, ALASKA AIRLINES; PAUL HOBACK, JR., EXECUTIVE VICE PRESIDENT AND CHIEF DEVELOPMENT OFFICER, ALLEGHENY COUNTY AIRPORT AUTHORITY; ROBERT HORTON, VICE PRESIDENT OF ENVIRONMENTAL AFFAIRS AND SUSTAINABILITY, DALLAS FORT WORTH INTERNATIONAL AIRPORT; PETER J. BUNCE, PRESIDENT AND CHIEF EXECUTIVE OFFICER, GENERAL AVIATION MANUFACTURERS ASSOCIATION; JENNIFER BIES, DIRECTOR OF ENVIRONMENTAL OPERATIONS, PORT OF PORTLAND; JOHN PLAZA, PRESIDENT AND CHIEF EXECUTIVE OFFICER, SKYNRG AMERICAS, INC.; AND VAL MIFTAKHOV, FOUNDER AND CHIEF EXECUTIVE OFFICER, ZEROAVIA

Ms. ARDIZZONE. Thank you. Chairmen DeFazio and Larsen, Ranking Members Graves and Graves, and members of the subcommittee, thank you for the opportunity to appear at today's hearing.

My name is Ann Ardizzone, and I am the vice president of the supply chain at Alaska Airlines, headquartered in Seattle. In this

capacity, my team and I work across the company to ensure that our employees and guests have what they need to get from place to place and experience an airline that people love.

In April 2021, Alaska Airlines announced sustainability goals. Near term, we aim to be the most fuel-efficient U.S. airline by 2025. We have been number-one before, and we plan to be there again. Longer term, we set an ambitious goal to achieve a net-zero carbon footprint by 2040. To get to net zero, we set a five-part path—

Operational efficiency: As one example, we are the first airline to use a new software system to help dispatchers optimize flightpaths for safety and efficiency. We also look for efficiencies on the ground with our airport partners, like Portland and Pittsburgh, to support electric ground service equipment, and urge Congress to expand programs like VALE.

Two, fleet renewal: We are modernizing our fleet with up to 145 Boeing MAX aircraft, which are 25 percent more fuel efficient on a seat-by-seat basis.

Three, sustainable aviation fuel, or SAF: This should be the immediate focus for carbon reduction and aviation, and I will talk more about this in a moment.

Four, new propulsion technology, such as electric and hybrid-electric aircraft, including those using hydrogen: To make this a reality, Alaska announced a collaboration with ZeroAvia. One particularly exciting aspect of this project was the potential to take existing aircraft and adapt to hybrid or zero-emissions technology, as we need solutions that can build on existing aircraft fleets and infrastructure, and make practical sense for the industry as a whole.

And five, carbon offsets: They play a role in our strategy, but we see them as a short-term solution. They will be necessary, depending on the pace and scale of our other efforts. We are focused on building a strategy for offsets that are credible, certified, and have offsetting capacity.

But more about SAF. SAF is safe. It is available now. We don't have to make any changes to aircraft. It is certified, drop-in fuel that meets all jet fuel standards. It is also effective. SAF reduces carbon emissions by as much as 80 percent on a life-cycle basis. With aviation's reliance on liquid fuels continuing, SAF is the critical lever the industry must use over the next several decades.

But there are obstacles we need to work through, and here is where we need your help—

There is a limited availability: We are proud of the SAF partners we have today, including SkyNRG, but the reality is SAF availability is well below 1 percent of total fuel demand.

Cost parity: We need SAF to be commercially viable, meaning cost competitive, appropriately scaled, and reliably supplied. Cost and scale are the big challenges. SAF can cost two to six times more than conventional jet fuel. Simply put, the economics of SAF don't work yet.

Alaska strongly supports those advocating for the SAF blender's tax credit to be the foundational Federal incentive policy. A meaningful SAF-specific tax credit is necessary to encourage investment in the sector, but also to eliminate the existing disincentives for

SAF production versus other petroleum-based fuels, namely renewable diesel.

Lack of infrastructure: Alaska also supports the AERO Act to create a grant program at DOT that would provide funding to enable SAF producers to construct facilities and scale up operations for production, transportation, and storage of SAF.

Lack of equitable access, which is crucial to scaling a stable supply: Public policy and positive incentives should support airports across the country and provide equal access to SAF fuel to all carriers, as well as encourage supplier diversification. Creating a robust domestic SAF market will benefit our Nation's energy independence and create jobs across the country.

In conclusion, Alaska Airlines is fully committed to this path. Sustainability is built into our values and is part of our commitment to communities. But we also know it is not possible on our own, and that is why we have articulated a long-term vision. But public policy is absolutely critical to enable the biggest steps forward to decarbonize aviation, particularly SAF.

With that, I look forward to your questions.

[Ms. Ardizzone's prepared statement follows:]

**Prepared Statement of Ann Ardizzone, Vice President of Supply Chain,
Alaska Airlines**

Chairman Larsen and Ranking Member Graves, and distinguished members of the House Transportation and Infrastructure Subcommittee on Aviation, thank you for the opportunity to appear at today's hearing. My name is Ann Ardizzone and I am the Vice President of Supply Chain at Alaska Airlines. In this capacity I work across our organization—and with our sister regional carrier Horizon Air—to ensure that our operation, employees and guests have what they need to not only get from place to place, but to experience an airline people love. It also means that my team and I are deeply engaged in helping the company meet its goals for the future and to ensure that we have a strong supply chain to support and drive innovations in aviation.

This year Alaska Airlines is celebrating our 90th anniversary. We have always taken a balanced, long-term approach to running our business, and that's why we are here today, ready to deliver for the next generation who depend on us. Alaska Airlines is the 5th largest U.S. carrier. We are the only major airline based on the West Coast, with our headquarters in Seattle and additional hubs in Los Angeles, San Francisco, Portland, and Anchorage. With more than 1,000 flights per day across North America—spanning from Hawaii to Washington, D.C.—we operate and employ people in urban centers and rural areas across the U.S., as well as in Canada, Mexico, Belize and Costa Rica. As a member of the oneworld alliance, our passengers, whom we call guests, can reach over 900 destinations in more than 170 countries and territories. We are also the only pre-deregulation passenger airline still operating a dedicated freighter fleet in the U.S.

We are committed to safety as our number one value, to exceptional caring service for our guests and communities, and to offering low fares enabled by maintaining low costs and running our business in a fiscally conservative way. We are proud to be one of the few airlines that has never filed for bankruptcy.

We brought those same historical commitments and values to addressing the challenges brought on by the pandemic. The entire aviation industry—labor, airports, airlines and government—collaborated in an unprecedented way to meet this moment.

Throughout the pandemic, Alaska Airlines didn't lose track of what is important: Leading with our values. As we return to growth, it is an opportunity to rebuild responsibly and embed these values even deeper in our culture and our business.

In April 2021, Alaska Airlines announced our new 2025 sustainability goals across the most important areas of impact for the company, including near-term goals to be the most fuel-efficient U.S. airline by 2025. The company also set an ambitious goal to achieve net zero carbon footprint by 2040. That strategy leverages oper-

ational best practices and next-generation disruptive technology to transform and reduce the long-term climate impact of aviation—another area we will continue to need to partner with government on as we modernize in this next age of aviation, and the topic of today’s hearing. To turn our sustainability commitment into real action, we tied company-wide performance-based pay to measurable progress—because that’s what creates deep organizational and cultural change. And we are proud that the sustainability efforts of our employees have been recognized among the TIME100 Most Influential Companies in 2022 and contributed to Alaska Airlines being named the worldwide 2022 Airline of the Year by Air Transport World.

This isn’t easy work—aviation is a difficult sector to decarbonize. We love airplanes and we know that connecting people is critical to businesses and families alike. We also know that we burned 656 million gallons of jet fuel in 2021 to get people and cargo from point A to point B—and we’ve got to do that more sustainably. Our “flight plan” as we call it includes five parts, each of which have an aspect related to our operations at U.S. airports as well as in our skies. [*See Exhibit 1*]. In 2021, Alaska Air Group also launched and funded Alaska Star Ventures LLC, an investment arm with a primary focus on identifying and supporting companies working on emerging green technologies, because we know that much of the path ahead relies on innovation and expanding access to new options—and that work will take all of us.

Here’s our five-part plan—I’ll describe what Alaska Airlines is working on with our partners but also the opportunity for government collaboration to advance each part for the industry, airports and communities we serve:

1. Operational efficiency
2. Fleet renewal
3. Sustainable Aviation Fuel
4. New propulsion technology
5. Carbon offsets

1. OPERATIONAL EFFICIENCY

At Alaska Airlines, we explore every opportunity to reduce fuel burn and emissions within our operation. Alaska Airlines has a long history of prioritizing operational efficiency and continues to stay laser focused on continual improvement in this area. In the air, Alaska Airlines is the first domestic airline to use a new software system that uses artificial intelligence and machine learning to help our dispatchers determine the safest and most efficient flight plans. So far, we’ve optimized 20,869 flights—about 10% of all flights—with a net savings of 241 pounds of fuel per flight optimized.

We also look to find efficiencies on the ground through company policies like turning off auxiliary engines and plugging in to preconditioned air at the gate, or single engine taxi when possible. Executing an efficient aircraft turn has the potential to save 469 pounds of CO₂ from being emitted which is the equivalent of driving a car 535 miles, or driving from Washington, D.C. to Detroit.

Working to address climate change impacts and find efficiencies on the ground requires close partnership with our airports and will require investment from the federal government. These projects are important not only for the broader impact on climate, but for impact to airport communities close to home. These relationships between airlines and airports work best when we have shared goals and commitments on reducing the carbon impact of travel and finding creative solutions together, without resorting to mandates or punitive policies.

There are success stories of airports working with airlines to simultaneously invest and seek funding for electric ground-service equipment (eGSE) and the required electric and charging infrastructure needed to support eGSE. A real challenge is not necessarily the procurement of eGSE equipment itself, it is insufficient charging stations and limited space for charging eGSEs. I need to know, as VP of Supply Chain, that the equipment is the right investment and will be able to be used.

Today Alaska Airlines’ GSE fleet is 34% electric and by 2025 our GSE fleet will be 50% more efficient than it was in 2020. We are working with airports across the country to meet this goal including the Port of Portland (PDX) and Pittsburgh International Airport (PIT) represented here today. We are actively supporting PDX on numerous projects that will result in lower carbon emissions, including gate electrification and ground equipment charging stations, as well as supporting their hydrothermal groundwater heating system. With regard to PIT, Alaska Airlines supported their FAA Voluntary Airport Low Emissions (VALE) grant application to provide electrical upgrades at gates, as well as purchasing preconditioned air for exist-

ing jet bridges which will allow Alaska Airlines to discontinue use of auxiliary power units (APUs) while at the gate and reduce fuel burn and emissions.

Ensuring that the electric capabilities at the airport and the infrastructure to the gate all the way to the charging stations are an airport function but can be costly. Many airports in the U.S. are over 50 years old and will require electrical infrastructure upgrades. These projects often are in excess of \$10 million, depending on the airport. When the electrical infrastructure is available, bringing the electricity outside of the terminal to install charging ports can cost between \$65,000 to \$80,000 per gate.

One way that Congress can continue to support the industry-wide adoption of electric ground service equipment is through an expansion of FAA's VALE program to support this critical airport infrastructure. Currently the VALE program allows airports to take proactive steps to improve air quality and reduce emissions in non-attainment (poor air quality) and maintenance areas according to the National Ambient Air Quality Standards (NAAQS). Eligible projects include eGSE like bag tugs and belt loaders, natural gas refueling stations, electric gates and terminals, and electric preconditioned air and ground power converter units. This program should be expanded to allow eligibility at airports not just airports based on limited air quality metrics. There are many airports around the country that would benefit from this expansion and is something Alaska Airlines supports, along with our trade association, Airlines for America (A4A).

2. FLEET RENEWAL

The second component of our flight plan is fleet renewal to modernize our aircraft and improve efficiency. We currently operate a mainline fleet of 227 aircraft. Last year, we placed a large order with Boeing and have added 21 new 737 MAX to our fleet, with orders and options for 124 more through 2026 as we transition to a single fleet. The new aircraft are more than 20% more fuel efficient on a seat-by-seat basis than the aircraft they are replacing, and we continue to work with Boeing and other manufacturers on ways to improve efficiency over time.

When it comes to working with our manufacturers to improve the efficiency of modern aircraft, we have seen great examples of government funded research turn into development of new designs and we urge continued investments. Back in 2017, Alaska Airlines retrofitted all eligible 737s with split-scamitar winglets (turned up extensions at the tips of the wings). These increased our fuel efficiency by 3% to 5% per aircraft, and winglets are now standard on all new aircraft ordered and delivered.

Continued and enhanced Congressional support for the various research and development programs supporting advancement in aviation are key to continued modernization of aircraft—winglets are just one example. These programs include both the Center of Excellence for Alternative Fuels and Environment (ASCENT)—which is funded by the Federal Aviation Administration (FAA), National Aeronautics and Space Administration (NASA), the Department of Defense, Transport Canada and the Environmental Protection Agency (EPA)—and the FAA's Continuous Lower Energy Emissions and Noise (CLEEN) Program, among other programs at FAA, NASA, Department of Energy (DOE), etc.

3. SUSTAINABLE AVIATION FUEL (SAF)

With aviation's reliance on liquid fuels continuing for the coming decades, SAF must be the immediate focus for carbon reduction in aviation. It is the critical lever the industry must utilize over the next several decades. SAF is a safe, certified drop-in fuel that meets all jet fuel standards and reduces carbon emissions by as much as 80% on a lifecycle basis. Alaska Airlines has been engaged with SAF development, testing and deployment for over a decade through our partnerships with Gevo (development and test flight), Neste (SFO utilization), Boeing (delivery flights), and Washington State University and the Port of Seattle (feedstock research and delivery). In addition, Alaska Airlines participates in several industry workgroups that help advance the research, development, demonstration, and production of SAF.

In 2021 Alaska Airlines announced a Memorandum of Understanding (MOU) with SkyNRG Americas to collaborate on the advancement of SAF production. Under the MOU, SkyNRG Americas will initially focus on the development of dedicated SAF production facilities to supply Western U.S. airports. This collaboration builds on the industry leading Alaska Airlines-Microsoft partnership announced in October 2020, aiming to use SAF to offset Microsoft employee travel between Seattle and San Francisco, San Jose and Los Angeles.

However, current SAF availability is well below 1% of total fuel demand, and the cost can be two to six times more than the price of conventional jet fuel. Scaling this market requires concurrently addressing price and production in order to enable the commercial viability of SAF. In the attached infographic [*See Exhibit 2*] we identify six key areas that require industry and government involvement and collaboration to ensure a scalable and viable market for SAF to be developed successfully in the near future:

- 1) Commercial-Scale Feedstock Quantities
- 2) Facilities for Production, Refining, Blending
- 3) Transportation & Storage
- 4) Pricing, Purchase & Accounting
- 5) Engine Infrastructure
- 6) Operations & Customer Demand

Alaska Airlines is pleased to see the increased focus on SAF from this Administration and from bipartisan members of Congress to address many of these key areas. Both the Administration's Aviation Climate Action Plan and the SAF Grand Challenge recognize SAF's key role in decarbonizing aviation. It will take positive incentive policies and collaboration between government and industry to make these collective goals a reality.

There is a broad coalition of stakeholders that are actively advocating for a SAF blender's tax credit to be the foundational federal incentive policy to develop the SAF market, something Alaska Airlines strongly supports. I'd like to thank the bipartisan members of this Committee who are championing this effort with the Sustainable Skies Act (H.R. 3440/S. 2263). This is a SAF-specific blender's tax credit of \$1.50–\$2.00 per gallon and would promote and accelerate investment in the nascent domestic SAF industry. A robust SAF-specific tax credit is necessary to encourage investment in the sector and eliminate the existing disincentives for SAF production versus other ground-based alternative fuels, especially renewable diesel.

Alaska Airlines also supports the Aviation Emissions Reduction Opportunity (AERO) Act (S. 3125) which mirrors a provision the House has previously supported in past infrastructure bills to create a grant program at DOT that would provide funding to enable SAF producers to construct facilities and establish or scale up operations for production and storage of SAF, as well as support other low-emission aviation technologies.

In addition to these policies, the US government should continue to invest in research and development, as well as approvals and certifications, of new pathways and feedstocks for SAF. We are open to discussing additional policies that will ensure that infrastructure investments are made to support transport of SAF from production and blending facilities to airports, as well as policies that unlock private sector investment in this market.

Equitable access to SAF will be crucial to scaling a stable supply chain we can rely on in the future. We view this as a collective effort not only within the industry but with government. Public policy and positive incentives should support airports across the country, and carriers of all sizes, as well as a diversity of suppliers and producers in order to advance and scale a mature and competitive commercial SAF market. Creating a robust domestic SAF market will benefit our nation's energy independence, create jobs across the country, and ensure that the U.S. remains a global leader in aviation innovation.

I look forward to working with this Committee—and others—to explore additional ways to ensure the policies, capital, and infrastructure investments are in place to meet the challenge.

4. NEW PROPULSION TECHNOLOGY

SAF is the biggest opportunity to decarbonize aviation, particularly medium- and long-haul flying. But there are other propulsion technologies emerging for longer-term impact to aviation, starting with regional.

One example is the potential for electric and hybrid-electric aircraft, including those using hydrogen, to play a role in decarbonizing regional aviation within the next two decades. To help make that a reality, Alaska Airlines announced a collaboration with ZeroAvia to begin development on a hydrogen-electric powertrain engine capable of flying regional aircraft. The partnership will explore deployment of ZeroAvia's hydrogen-electric propulsion technology into a full-size 76 seat De Havilland Q400 aircraft, previously operated by Alaska Air Group subsidiary Horizon Air. To support this initiative, ZeroAvia will join Alaska Airlines in our new hanger at Paine Field Airport in Everett, WA so that our maintenance and engineering teams can support each other. One particularly exciting aspect of this project was the potential to take existing aircraft and adapt to hybrid or zero emis-

sions technology, as we need solutions that can build on existing aircraft fleets and infrastructure and make practical sense for the industry as a whole.

The AERO Act and new research and development investment opportunities and tax credits for electric vehicles will be essential to ensuring continued innovation in this space. When it comes to airports supporting these types of new aircraft in the future, Congress should consider policies that address already constrained airport infrastructure, airspace and capacity as well as the electric and other infrastructure support that would be needed to support new propulsion technologies and existing operations.

5. CREDIBLE CARBON OFFSETS

Finally, Alaska Airlines believes that carbon offsets should be a last resort effort to reach net zero, but we also know that they will likely be necessary—in volumes that depend upon the pace and scale of progress in the steps above. Knowing that aviation is one of the hardest sectors to decarbonize, we will leverage credible carbon offsets, within parameters we’re developing with scientific advisors, to close any remaining gaps to our targets. For now, for guests looking to offset their own carbon footprint we have partnered with The Good Traveler, a program founded by the San Diego International Airport and now used by over 20 airports, including Dallas Fort Worth International Airport (DFW).

CONCLUSION

In conclusion, Alaska Airlines is committed to creating a sustainable future for aviation, working with partners, including airports and government, on all aspects of our five-part path toward net zero by 2040. This is a long-term journey and it will take all of us. This work is exciting and critically important not only to those of us who are working on it, but it matters to our guests and corporate customers, people applying for jobs at our airline, and people who live in the communities we care about. Ultimately if we are going to be responsible to all those stakeholders—as well as our owners and others—we do feel pressure to make sure we are moving in the right direction.

While we no doubt have challenges that we need to work through, I have confidence we are on the right path. Thank you to the Subcommittee on Aviation and the House Transportation and Infrastructure Committee for holding today’s hearing and exploring best practices and policies to meet these challenges in a collaborative effort.

Exhibit 1—Alaska Airlines Flight Plan to Net Zero by 2040

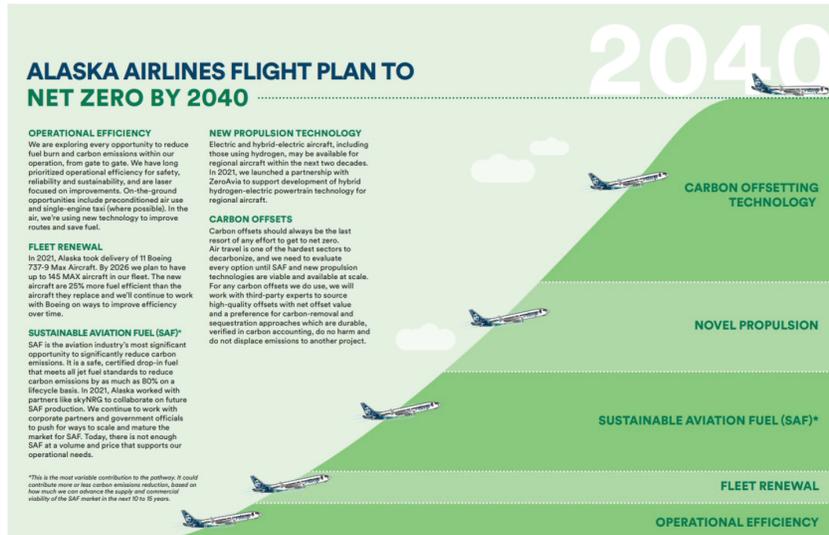
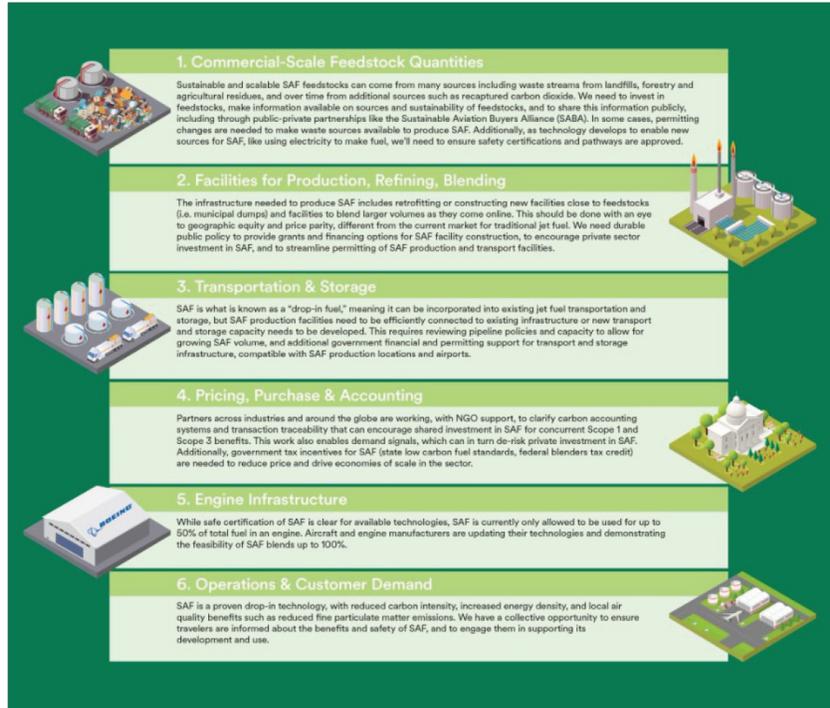


Exhibit 2—SAF—Meeting the Challenge



Mr. LARSEN OF WASHINGTON. Thank you very much.

I now turn to Mr. Paul Hoback, Jr., of the Allegheny County Airport Authority. Mr. Hoback, you are recognized for 5 minutes.

Mr. HOBACK. Good afternoon, Chairman Larsen. Thank you so much. And good afternoon, Ranking Member Graves and members of the Aviation Subcommittee. My name is Paul Hoback. I am executive vice president and chief development officer at the Allegheny County Airport Authority, which operates Pittsburgh International Airport.

We are a medium-sized hub airport with growing passenger traffic that reached nearly 10 million passengers in 2019. Likewise, our cargo operation has grown dramatically over the past several years as an alternative to congested large gateway airports. Our airport sits atop 8,800 acres of land and is among the largest airport campuses in the country. It enables us to be an economic driver for our region while providing opportunities to innovate.

Thank you for this opportunity to speak to you today about the efforts to address climate change at airports.

We know that the industry, like so many, needs to change. And at Pittsburgh International, we are leading the way through both broad and focused efforts. For us, the biggest is the installation of the world's first airport microgrid that makes us entirely self-sufficient for power generation while significantly decreasing our carbon footprint at the same time.

After seeing the impact of power failures at other airports, we identified four goals for this project: to improve airport resiliency and reliability; support our sustainability goals; lower our electricity costs; and support the local natural gas industry. We discovered the best way to do this was through an airportwide microgrid powered by natural gas and solar energy.

Our microgrid began operation in the summer of 2021, and the effects were immediate. The 23-megawatt microgrid serves as the primary electric power source for the terminal and airport campus. It includes 5 natural gas-fired generators and nearly 10,000 solar panels that produce energy equivalent to powering more than 13,000 homes. Any excess power not used onsite is exported to the grid. By utilizing cleaner energy versus importing it from the grid, our microgrid provides a yearly carbon reduction of over 8 million pounds, the equivalent of eliminating 9 million miles driven by passenger cars.

The solar array is constructed atop 8 acres of an old landfill site, a practice the Pennsylvania Department of Environmental Protection is looking to duplicate in other parts of the State. We are in plans right now to double the number of solar panels in the very near future by maximizing the available space used for solar on this landfill.

We understand the decarbonization goals within our industry, and we are fortunate to be able to tap into a natural resource of our campus, where we have 14 Marcellus Shale wells. We recognize that the industry must move incrementally, primarily due to safety and cost factors, and we view natural gas as a transitional step that will propel the aviation industry into the future.

As for the focused steps toward our goals, we make them everywhere. We are one of the few airports in the country with apiaries—ours with 200 colonies housing over 6 million bees—as we contribute to rebuilding the honeybee population across thousands of acres of airport land. We also house an innovation lab, in partnership with Carnegie Mellon University, our xBridge, where we are testing sustainable technologies to improve efficiencies in our airport.

While others in the industry may have slowed down in the face of the pandemic, we kept moving forward. In the fall of 2021, we broke ground to reshape the future of travel in our region through our terminal modernization program. Our 30-year-old facility, built to serve one major airline as a hub, will be right-sized and better aligned to meet the needs of the over 2 million people who call Pittsburgh home. We will reduce long-term costs through operating and maintenance efficiencies.

Our new terminal, the first to be designed in a post-pandemic world, will be built by Pittsburgh. Eighty-one percent of the construction contracts have been awarded to local companies that will utilize locally sourced and fabricated materials like steel, concrete, and wood.

Sustainability will be a key focus of the new facility into the future. The new facility will feature outdoor terraces, both pre- and post-security, to ensure access to fresh air for our passengers and employees. During construction, a minimum of 75 percent of waste generated will be recycled and reused, including concrete from ex-

isting airfield ramps that will be reused for new roads. Additional plans include rainwater harvesting, other water conservation efforts, and many more sustainable initiatives.

Airports play a valuable role in transforming the aviation industry through broad and focused initiatives. At Pittsburgh International Airport, we are leading the way through innovation and would welcome others to join us on that journey.

I appreciate the opportunity to appear before the subcommittee today. I look forward to answering any questions you may have. Thank you so much for your time and for all that you do.

[Mr. Hoback's prepared statement follows:]

Prepared Statement of Paul Hoback, Jr., Executive Vice President and Chief Development Officer, Allegheny County Airport Authority

Good afternoon, Chairman Larsen, Ranking Member Graves and members of the Aviation subcommittee. I am Paul Hoback, Jr., Executive Vice President & Chief Development Officer at the Allegheny County Airport Authority, which operates Pittsburgh International Airport.

We are a medium-size hub airport with growing passenger traffic that nearly reached 10 million passengers in 2019. Likewise, our cargo operation, particularly international cargo, has grown dramatically over the past several years as an alternative to congested large gateway airports. Our airport sits atop 8,800 acres and is among the largest airport campuses the country. It enables us to be an economic driver for our region while providing opportunities to innovate.

Thank you for the opportunity to speak to you today about the efforts to address climate change at airports.

We know that the industry, like so many, needs to change. And at Pittsburgh International Airport we are leading the way through both broad and focused efforts.

For us, the biggest is the installation of the world's first airport microgrid to become entirely self-sufficient for power generation while significantly decreasing our carbon footprint at the same time.

After reading reports of power failures within similar institutions, we identified four goals; to improve airport resiliency and reliability, support our sustainability goals, lower our electricity costs, and support the local natural gas industry. We discovered the best way to do this was through an airport-wide microgrid powered by natural gas and solar energy. The microgrid began operation in summer 2021, and the effects were immediate.

The 23-megawatt microgrid serves as the primary electric power source for the PIT terminal and airport campus. It includes five natural gas-fired generators and nearly 10,000 solar panels that produce energy equivalent to powering more than 13,000 homes. The airport's peak demand is approximately 14 megawatts. Any excess power not used on site can be exported to the grid. By utilizing cleaner energy, versus importing it from the grid, the microgrid provides a yearly carbon reduction of over 8 million pounds; the equivalent of eliminating nearly 800 cars from the road or 9 million miles driven by passenger cars.

The solar array is constructed atop eight acres of an old landfill site; a practice the Pennsylvania Department of Environmental Protection is looking to duplicate in other parts of the state. We are in plans to double the number of solar panels in the near future.

The microgrid offers us resiliency in the event of a grid blackout or cyber-attack and an opportunity to utilize cleaner forms of energy generated locally. The microgrid is also inspiring change in the industry: in 2020 it was recognized as a "World Changing Idea" by Fast Company magazine, and in 2021 it won both the American Association for Airport Executives' (AAAE) Outstanding Sustainability Infrastructure Development and the Airports Council International's (ACI) North America Environmental Achievement Award for Innovation.

We understand the decarbonization goals within our industry and we are fortunate to be able to tap into a natural resource of our campus, where we have fourteen Marcellus shale wells. We recognize that the industry must move incrementally, primarily due to safety and cost factors and we view natural gas as a transitional step that will propel the aviation industry into the future.

As for the focused steps toward our goals, we make them everywhere: from providing free electric vehicle charging stations to airport customers, to adding water bottle filling stations throughout our terminals—saving more than 300,000 plastic bottles in 2021. We are one of a few airports in the country with apiaries on site as we contribute to rebuilding the honeybee population across thousands of acres of airport land. We also house an innovation lab, in partnership with Carnegie Mellon University, the xBridge, where we are testing technology to improve efficiencies in our airport. One of those projects is a natural purifier that uses algae to reduce carbon dioxide and increase oxygen—a concept we are studying to bring to our terminals.

While others in the industry may have slowed down in the face of the pandemic, we kept moving forward. In fall 2021, we broke ground to reshape the future of our region through our Terminal Modernization Program. Our 30-year-old facility, built accordingly to serve one major airline and connecting travel as a hub, will be right-sized and better aligned to the needs of the over 2 million people who call Pittsburgh home. We will reduce long-term costs through operating and maintenance efficiencies. An updated design will allow for an expanded security checkpoint, the elimination of a costly train, a newly configured international arrivals process, the implementation of modern technology throughout the terminal and an efficient baggage delivery system, among other improvements. It will be also built by Pittsburgh—81% of the construction contracts have been awarded to local companies, that will utilize locally-sourced and fabricated materials like steel, concrete and wood.

Sustainability will be a key focus of the new facility into the future. The new facility will feature outdoor terraces—both pre- and post-security—to ensure access to fresh air for passengers.

During construction, a minimum of 75 percent of waste generated will be recycled or reused, including concrete from existing airfield ramps that will be reused for new roads. Additional plans include rainwater harvesting and other water conservation efforts. We will achieve, at a minimum, LEED Silver but striving toward Gold certification.

Airports play a valuable role in transforming the aviation industry, through broad and focused initiatives. At Pittsburgh International Airport, we are leading the way through innovation; and would welcome others with us on that journey.

I appreciate the opportunity to appear before the subcommittee. I look forward to answering any questions you may have.

APPENDIX



Pittsburgh International Airport Microgrid

Pittsburgh International Airport New Generation Microgrid

Pittsburgh International Airport is building a first-of-its-kind microgrid powered by natural gas and solar, ensuring greater power reliability, enhancing public safety and creating cost efficiencies.

Solar Power Integration
A peak of 2.5 megawatts of electricity will be generated from solar (equivalent to 333 residential homes) with no emissions.

Natural Gas Powered Electric Generators
Natural gas generators will create approximately 23 megawatts of electricity (equivalent to 13,233 typical residential homes).

Natural Gas Supply
Peoples distribution pipelines, natural gas transmission pipelines and on site production feeds the natural gas generators. **Three forms of supply provide redundancy and ensure reliability.**

Three forms of electric generation ensure reliability.

Traditional Electrical Grid
Connected to the traditional electric grid for backup power.

Supply from airport property

PITTSBURGH INTERNATIONAL AIRPORT
flypittsburgh.com

PEOPLES
MAKING YOUR LIFE BETTER.
peoples-gas.com



Solar Farm



Outdoor Terrace



Bees at our apiary



Wood paneling in our new terminal

Mr. LARSEN OF WASHINGTON. Thank you, Mr. Hoback. I now recognize Robert Horton of DFW.

Mr. Horton, you are recognized for 5 minutes.

Mr. HORTON. Thank you. Good afternoon, everyone.

Congresswoman Van Duyne, thank you for the kind introduction. Chairman DeFazio, Chairman Larsen, Ranking Member Graves, and members of the subcommittee, I appreciate the opportunity to testify about sustainability and resiliency programs at Dallas Fort Worth International Airport.

DFW's history of leadership on climate action has positioned the airport to articulate the unique challenges U.S. airports face. In 2016, DFW became the first carbon-neutral airport in North America, and 1 of 70 airports globally. Only three U.S. airports have achieved this distinction. Then, at the U.N. COP26 event in Glasgow last November, we announced an ambitious goal of achieving net-zero emissions by 2030, two decades ahead of the industry target.

Our holistic approach to sustainability complements business performance. For example, without purchasing 100 percent of our electricity from renewably generated sources, electricity would represent the largest component of our carbon footprint. So, when we transition to purchasing renewable electricity, we leverage innovative procurement methods to reduce electricity costs and our carbon footprint.

The largest remaining component of our carbon footprint, almost two-thirds, is facility heating from using natural gas boilers to heat our terminals. We developed plans for a new electric central plant, utility plant, that formed the cornerstone of our roadmap to net zero, and addressed our top emission source.

Another significant component of our carbon footprint is our fleet, including 700 gasoline, diesel, and compressed natural gas vehicles. Last August, DFW deployed the first electric airside buses. In addition, we accessed FAA's Zero-Emissions Vehicle and Infrastructure Pilot Program Grants to continue transitioning to electric-vehicle alternatives. Access to FAA's VALE program discre-

tionary grants support our decarbonization initiatives and those of our airline partners by increasing electric charging infrastructure.

Societal demands for airports are likely to surge in the coming years, especially in the fastest growing metropolitan area in the Nation.

In addition, the broad demand for mass electrification at airports may pose new and uncertain operational challenges. This is why funding research on stress testing for resilience is imperative to help identify the potential for cascading failures, risks, and impacts, and enhance resilience. Advancing resilience through stress testing allows airports to bounce forward and improve operations in an increasingly complex and threat-diverse world.

So, as critical economic hubs within our broader communities, investments in sustainable infrastructure at airports should demonstrate downstream benefits to other connected utilities, companies, and communities at large. To that end, DFW established a sustainability partnership with several tenants, including American Airlines and Hyatt Hotels, to purchase renewable electricity for their on-airport facilities, and add ground power units to reduce emissions from aircraft auxiliary power units.

Today's investments in research and development can accelerate airports' ability to achieve their long-term decarbonization and resilience goals. Therefore, our recommendations include, first, funding airport research on integrated systems-based stress testing to identify those critical links and the potential cascading failures, while strengthening our vital transportation infrastructure.

Second, creating a dedicated funding source for airport infrastructural and operational investments in sustainability, resilience, and climate to eliminate the need for eligible projects to compete against safety or efficiency targets.

U.S. airports have a rare opportunity to revolutionize how we operate, and provide value to the Nation and our communities. So, we must continue to innovate and invest in a sustainable future.

Thank you for the opportunity to testify before the committee. I look forward to your questions.

[Mr. Horton's prepared statement follows:]

Prepared Statement of Robert Horton, Vice President of Environmental Affairs and Sustainability, Dallas Fort Worth International Airport

Chairman Larsen, Ranking Member Graves, and members of the committee thank you for the opportunity to testify about the sustainability and resiliency programs at Dallas Fort Worth International Airport (DFW).

I am the Vice President of Environmental Affairs & Sustainability for DFW and the Airport Board's Environmental & Sustainability Officer. I have more than 20 years of experience within the aviation, transportation, and sustainability industries, successfully bringing together diverse stakeholders to drive global energy efficiencies, sustainable growth, and operational cost savings.

I have served as a Commissioner for the Alliance to Save Energy's U.S. Commission on Transportation Sector Efficiency, on the Board of Directors for Texan by Nature, and recently the National Renewable Energy Laboratory (NREL) External Advisory Board for Advanced Research on Integrated Energy Systems (ARIES), an effort to explore the possibilities of the nation's future energy systems.

I hold both a Bachelor of Science and Master of Engineering degree in agricultural and biological engineering from the University of Florida. I am currently working towards obtaining a Doctor of Philosophy in interdisciplinary ecology from the University of Florida as well.

DFW'S HISTORY OF CLIMATE ACTION AND NET ZERO CARBON ROADMAP

DFW's history of leadership on climate action has positioned the Airport to articulate the unique challenges U.S. airports face. DFW employs a holistic approach to sustainability, and smart business investments in renewables and energy efficiency have enabled us to reduce absolute carbon emissions by 80% since the 2010 baseline. Moreover, we have done this while increasing the resiliency of our systems and reducing energy costs.

In October 2020, DFW became the first Airport in the world certified at the highest level of Airport Carbon Accreditation, Level 4+ (Transition). In the same year, we also received a United Nations Global Climate Action Award, and we have received two EPA Climate Leadership Awards since 2016. DFW is also recognized as a Green Power Partner through the EPA Green Power Partnership Program and ranks as the highest transportation partner in the National Top 100. These awards recognize and validate our net zero carbon roadmap.

DFW is committed to achieving net zero carbon emissions by 2030—two decades ahead of the Intergovernmental Panel on Climate Change's (IPCC) global target of 2050. Our goals are also at the heart of the Federal Aviation Administration's (FAA) Airport Climate Challenge, which challenges airports to achieve net zero operating capabilities by 2050.

AIRPORTS AS KEY PLAYERS IN ADVANCING RESILIENCE AND DECARBONIZATION STRATEGIES

Today, about one-third of DFW's electricity use occurs at our Central Utility Plant, which provides cooling for our terminals. Without our investment in purchasing 100% of our electricity from renewably generated sources, electricity would represent the largest component of our carbon footprint. In addition, DFW's improvements towards sustainable infrastructure operations are not confined to the airport but contribute substantial downstream opportunities to the communities we serve.

The switch to purchased renewable electricity was a key initiative that enabled us to achieve carbon neutrality and eliminate our most significant source of emissions. When we transitioned to purchasing renewable electricity, we also reduced our electricity costs, demonstrating that sustainability makes business sense. Rather than competing goals, DFW was able to identify strategies to complement sustainability and economics and achieve both goals simultaneously.

Today, the largest component of our carbon footprint—almost two-thirds—is facility heating. These emissions come primarily from using natural gas boilers in our Central Utility Plant to provide heating for over 7 million square feet of terminal space. Therefore, our net zero goal is not achievable without a solution to decarbonize terminal heating. In 2020, DFW completed the design of a future Electric Central Utility Plant (e-CUP), which forms the cornerstone of our roadmap to net zero and addresses our top two sources of emissions. The future e-CUP will achieve an estimated 86% reduction in natural gas use from the baseline by transitioning terminal heating loads from natural gas boilers to electric heat pump chillers powered by purchased renewable electricity. In addition, DFW is planning for new chiller units utilizing next-generation refrigerants that will reduce atmospheric impacts from refrigerant losses.

DFW's e-CUP is an example of the challenges and opportunities facing many airports. Generational investments in infrastructure development, such as the Infrastructure Investment and Jobs Act (Bipartisan Infrastructure Law), will help us achieve net zero goals and simultaneously improve airport resilience. For example, DFW's existing Central Utility Plant was built in the early 1970s, and the heating and cooling systems have reached maximum capacity. The e-CUP will provide resilient heating and cooling capacity to meet our current needs and enable future terminal expansion.

Our fleet is another large component of our carbon footprint and includes over 700 gasoline, diesel, and compressed natural gas (CNG) vehicles and equipment. One successful initiative targeted our fleet of more than 150 buses. Two decades ago, DFW began converting its diesel buses to compressed natural gas to improve air quality. In 2017, DFW launched its renewable natural gas (RNG) initiative and began transitioning to RNG sourced from a local Dallas landfill.

RNG is a drop-in solution that is chemically identical to conventional CNG but produced from a renewable source rather than a fossil source. The RNG supplied to DFW is derived from biogas (methane) naturally generated by the decomposition of organic waste at the landfill. This initiative generates approximately \$1 million in annual O&M savings. DFW also receives annual revenue from the sale of renewable identification numbers (RINs) generated through RNG production for transpor-

tation use, further reducing our operating costs. In the fiscal year 2021, 79% of the compressed natural gas used in vehicles fueled at DFW facilities was renewable.

Last August, DFW deployed its first electric airside buses. DFW's investment in zero-emission vehicles and equipment will help the North Texas region reduce ozone pollution and meet federal air quality standards. DFW also purchased its first electric sedans and buses through 2020 and 2021 FAA Zero Emissions Vehicle (ZEV) and Infrastructure Pilot Program grants. Not all vehicles and equipment (e.g., air-field sweepers and snow removal equipment) will be easy to electrify, and currently available zero-carbon alternatives may not be capable of meeting airport demands or operating conditions. This scenario is particularly true for specialized equipment and vehicles with limited producer competition. However, DFW and others continue to evaluate new net zero technologies as they mature and reach the market.

Airports are 'safety critical' entities, where new technologies must be extensively evaluated for possible threats before they can be deployed at scale. As such, airports around the country must move slowly and cautiously to adopt new operating standards or technologies, given the resources and capabilities they possess on hand. For infrastructure resilience and sustainability programs and technology, DFW is an ideal testbed for innovation. We have a proven track record of successfully partnering with federal agencies and private industry to advance our own decarbonization and resilience efforts while creating a safe yet effective space for innovation. We also actively partner with other airports to exchange information on emerging best practices and lessons learned. We also share DFW's learnings in a variety of national public forums to ensure that the broadest benefits from the investments and research we make on behalf of the North Texas community inspire other organizations on their decarbonization journeys.

DFW continues to seek new ways to reduce risk, promote efficiencies, and generate system capacity for resilience. For example, DFW is partnering with the U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory (NREL) to use high-performance computing and digital twin technology to explore opportunities for airport modernization. With a digital twin of DFW operations, we can simulate the effects of investment decisions on customer experience, energy use, and airport revenue before committing to a particular approach. The DFW digital twin strategy leverages a larger effort, Athena, which was funded by the DOE Office of Energy Efficiency and Renewable Energy (EERE) Vehicle Technologies Office. Athena aims to create an interactive analysis virtual environment powered by NREL's supercomputers and customized with data from actual airport activities.

The virtual environment integrates models of traffic flow, socioeconomic behavior, and energy use so that airports can better understand and analyze their complex operations. The initial application with DFW is helping to frame the topics that will influence future operations, such as autonomous and electric vehicles, ride-hailing companies, congestion and emissions reduction, building energy efficiency, and bus route optimization. In one use case, NREL and partners are identifying behind-the-meter storage options that blend building efficiency measures and vehicle fast-charging to dramatically reduce energy costs. The program strategy involves an innovative approach to integrating thermal and battery energy storage solutions and all-system efficiency improvements while reducing costs and conserving energy. NREL and DFW have found that making even small changes to existing transit routes can substantially reduce energy use. For the first time, data science, modeling, and analysis are providing the world's busiest airport hubs with clear insights to help guide 20-plus-year investments in clean energy, efficiency, and resiliency.

We realize that maintaining carbon neutrality through offsetting is not an alternative to action. Societal demands of airports are likely to surge in the coming years, and broad demand for mass electrification (where airports are one of many actors) may pose new and uncertain challenges for airport operational resilience.

FOCUS ON ENERGY PERFORMANCE

Between 2006 and 2021, DFW Airport reduced energy costs by 48% and overall energy consumption by 13% while simultaneously increasing renewables. In addition, DFW has reduced annual energy costs by almost \$20 million through various innovative initiatives, including continuous commissioning of buildings, energy efficiency and storage, integration of renewables, and procurement practices.

In a recent blog, the *Alliance to Save Energy* captured the potential of energy efficiency efforts to reduce total energy usage, highlighting the importance of using flexible building loads to control the timing of energy use and reduce stress on the grid during periods of peak demand. DFW utilizes a thermal storage system to use electricity off-peak and is also looking to incorporate other technologies to increase

the flexibility of building loads, a critical strategy as demand on the grid increases with the shift to the electrification of vehicle fleets.

AIRPORTS PARTNERING FOR CHANGE

While DFW's net zero goal relates to the carbon emissions under the direct control of the Airport, our climate action strategy includes a commitment to support the decarbonization efforts of the broader aviation industry through partnerships with airport stakeholders, including airlines and tenants.

We are working closely to assist our aviation partners. For example, DFW and American Airlines worked together to reduce emissions from aircraft auxiliary power units through gate electrification. As a result, we established a sustainability partnership with several tenants, including American Airlines and Hyatt Hotels, to procure renewable purchased electricity for their on-airport facilities (e.g., terminals, hangars, and other buildings). In addition, DFW helped American Airlines purchase 100% renewable electricity for its off-airport campus and other facilities.

DFW has installed highly efficient plumbing fixtures throughout all five terminals, lowering customer water usage by 50% and saving over 5 million gallons of water each month. In addition, DFW has partnered with neighboring cities to create a Reclaimed Water Delivery System. The use of reclaimed water has reduced potable water use by 100 million gallons per year since the baseline in 2010.

DFW has launched a Zero-Waste goal to divert 90% of waste from landfills. DFW has achieved early success with construction and demolition waste. Last year, we recycled, reused, or salvaged approximately 1.9 million tons of construction waste from airfield and landside construction projects. This effort translated to a 96% diversion of construction waste from landfills.

DFW has implemented a successful program to recycle 100% of the waste cooking oil generated by over 50 restaurants in our terminals. Over 670,000 pounds of waste cooking oil have been recycled since April 2019 and used as a feedstock to generate approximately 61,000 gallons of renewable fuel.

Last March, DFW implemented an organic waste sortation and collection services contract with Turn Compost, a local company. This service allows the airport to collect food waste from terminal concessions and divert the food waste to local farms and compost facilities. Over 198,000 pounds (99 tons) of food waste has been diverted from 25 restaurants in three terminals in just one year. DFW plans to expand the composting program to additional airport facilities, including aircraft catering kitchens, hotels, and offices.

DFW has received discretionary grants through the Federal Aviation Administration's (FAA's) Voluntary Airport Low Emissions (VALE) Program. The grants supported the installation of 23 ground power units (GPUs), five pre-conditioned air (PCA) units, and two PCA chillers at DFW's Central Utility Plant. These projects allow aircraft operators to shut down auxiliary power units while parked at the gate, reducing fuel consumption and associated emissions. As a result, over 200 tons of ozone precursor emissions (NOx and VOCs) are expected to be avoided over the project's lifecycle. In addition, all of DFW's 172 gates provide access to GPU and PCA units to aid all airlines in their decarbonization journeys.

The VALE program has also supported purchasing and installing ten electric ground support equipment (GSE) charging stations. The charging stations enabled airlines to replace a combined total of 20 conventional fuel (i.e., diesel and gasoline) baggage tugs, belt loaders, and aircraft tractors with electric alternatives. This project further reduces ozone-precursor emissions in the Dallas-Fort Worth region, which is classified as "Serious" nonattainment under the 2008 National Ambient Air Quality Standards for ozone (ozone NAAQS).

Our objective is to enable our partners to achieve their decarbonization goals. In addition, as critical infrastructure hubs within our broader communities, investments in sustainable infrastructure at airports should demonstrate downstream benefits to other connected utilities, companies, and communities at large.

RESEARCH AND DEVELOPMENT NEEDS

Given the expansive growth of airport usage in the coming decades, it is more important than ever that airports demonstrate safety, efficiency, sustainability, and resilience. Safety and efficiency are longstanding staples amongst U.S. airports, while environmental sustainability and resilience are relative newcomers. This leaves considerable opportunity for research and development of airport capacity to (a) recover from and adapt to adverse disruption posed by climatic and environmental stressors and (b) 'lean forward' to address environmental sustainability challenges such as net zero preemptively. In addition, airports need funding capacity to 'stress test' current and proposed airport infrastructure and functions from an ecosystem (or integrated

system) perspective. Stress testing will help airports evaluate resilience capabilities against myriad disruptions or scenarios (e.g., cyber and energy systems, supply chains) rather than rely solely upon historical data or tabletop exercises.

Today's investments in research and development can accelerate airports' ability to achieve their long-term decarbonization and resilience goals. However, this challenge cannot be borne by airports alone and thus requires continued partnership with federal and state governments as well as private companies to (a) identify, (b) rigorously test and evaluate, and (c) implement changes made to airport operations or equipment in furtherance of decarbonization and resilience objectives. More specifically, we recommend:

- Fund airport research on integrated systems-based stress testing to identify critical links within their complex networks. This research would ensure there are active efforts to bolster resilience capabilities within mission-critical supply chains and de-risk investments ahead of any significant operational or equipment change.
- Create a dedicated funding source for airport infrastructural and operational investments in sustainability, resilience, and climate to eliminate the need for eligible projects to compete against safety or efficiency targets.
- Augment entitlement funding to include resilience and decarbonization targets as eligible projects for investment.

AIRPORTS AS KEY PLAYERS IN ADVANCING RESILIENCE AND DECARBONIZATION STRATEGIES

The Covid pandemic demonstrated the importance of well-maintained, reliable, and resilient airports to meet the nation's economic, health, and security demands. These demands will only increase in the coming years, and airports will need to evolve to deliver value to the communities and companies that rely upon them. As such, investment in innovative and resilient airport management, operations, and infrastructure is needed today to ensure our airports will be able to meet tomorrow's challenges.

U.S. airports have a rare opportunity to revolutionize the manner in which we operate and provide value to the nation and our communities. Through the Infrastructure Investment and Jobs Act, the U.S. has committed to historic investments toward modernizing its airports and ensuring their ability to address the burgeoning needs of their communities for the coming decades. It is imperative that we continue transforming travel by investing in a sustainable future.

As we expand our knowledge of climate risks and mitigation strategies, we see an opportunity for improved collaboration, where airports can share better information about managing risks and improving system resilience. We are excited at the opportunity but require continued partnership from government and industry partners to bring our resilience and decarbonization aspirations to reality. Nevertheless, it is a worthy challenge and one that we can and should tackle collaboratively and immediately.

Thank you for the opportunity to testify before the committee.

Mr. LARSEN OF WASHINGTON. Thank you, Mr. Horton, and I turn to Pete Bunce, president and CEO of General Aviation Manufacturers Association.

Mr. Bunce, you are recognized for 5 minutes.

Mr. BUNCE. Chair Larsen, Ranking Member Graves, Chair DeFazio, and Ranking Member Sam Graves, and all the committee members, thank you for having this opportunity to present in front of you.

In my whole time at GAMA—now over 17 years—I have never seen an issue that binds all the civil aviation industry together as sustainability does. We all recognize that our industry is dependent upon getting this right. Our survival as an industry, and to be able to produce globally, and be global leaders counts on us and all of these factors to work together with this committee and your Senate colleagues to be able to get it right. And we are very gratified that you have been able to help us in so many ways, and we look forward to the legislation that you have already talked about that is

still pending to help us with things like SAF and advanced air mobility and other areas.

We recognized in business and general aviation that this was coming back in 2009. And we started working on two things, to be able to go and analyze our large fleet of business aviation aircraft, both turboprop and jets, which is about 38,000 flying globally, along with 22,000 turbine helicopters, to see whether or not this gigantic fleet could be properly mapped, to be able to see if we can make at that time a carbon goal of basically carbon-neutral growth after 2020, and then by 2050 having a 50-percent reduction toward a 2005 baseline for emissions.

What we learned, once we did that, is that technology, especially in aircraft design, was able to advance, and we set a goal of advancing it at 2 percent per year over the following decade.

Well, last year, in 2021, we were able to look back and analyze and remap the fleet to be able to see did we achieve that along with the goals that we had set for infrastructure, and NextGen, and other programs like that, to be able to give us some efficiencies there. And we found out that we were able to do it.

So, we set a new goal for the next decade of, again, 2 percent until the technology pillar starts to blossom larger as we bring on some of these new technologies that we have already talked about and that you are going to hear from in just a second.

So, as we looked at technology—and these are things like fly-by-wire that make aircraft lighter, they are advanced processes like additive manufacturing that allows you to reduce parts and pieces, new wing design, lighter weight structures, more efficient engines—all of that, of course, is dependent upon the certification process at the FAA and other global regulating bodies, and ability to validate those products back and forth. And that is why all of your comments about how critical the certification pathway is, and also validation, is the lifeblood of being able to have technological advancements in the industry.

So, as we went and set this new goal of being able to achieve basically net zero by 2050, along with our commercial brethren, as was mentioned by my colleague from Alaska Airlines, you have to make sure that sustainable aviation fuel is a high priority because we simply cannot get there, no matter what type of technology we are looking at now for the next 30 years out there, unless we really put sustainable aviation fuel as a very strong pillar in our effort towards sustainability.

And we have to do other things. We have to be able to provide electric battery storage capability at airports, and allow for the grid to be able to power some of these new aircraft out there, and also to be able to develop our hydrogen infrastructure all over the planet, but especially in the U.S. and Europe, to be able to go and utilize these new technologies. So, there is a lot of work in front of us. But again, SAF is a huge pillar for that, and we definitely thank the committee for focusing on that.

I would also like to commend the committee for what you all did on the Advanced Aviation Infrastructure Modernization Act that is moving forward, and then congratulate all of you for the passage of the Advanced Air Mobility Coordination and Leadership Act. Because, as we saw with 5G, if the FAA isn't leading coordination be-

tween Federal entities, we are not going to get this right. And that legislation was extremely important. So, I commend the committee.

We look forward to continuing to work with you, and I look forward to your questions.

[Mr. Bunce's prepared statement follows:]

Prepared Statement of Peter J. Bunce, President and Chief Executive Officer, General Aviation Manufacturers Association

Chair Rick Larsen and Ranking Member Garret Graves, on behalf of the General Aviation Manufacturers Association (GAMA) and its member companies, thank you for convening this hearing today, which will be vital to understanding the efforts which business and general aviation manufacturing companies and maintenance and service providers have undertaken to support environmental sustainability and address climate change.

We want to state the deep appreciation we have for this Committee and Congress for their support of the aviation industry. We look forward to working with you, House Transportation and Infrastructure Chair Peter DeFazio and Ranking Member Sam Graves, members of the House Aviation Subcommittee, and the membership of the Full Committee on issues of critical importance to the future strength of the United States (U.S.) aviation and transportation system.

GAMA represents more than 130 of the world's leading manufacturers of general aviation airplanes, rotorcraft, engines, avionics, components, and related services and technologies. GAMA members are also providers of maintenance and repair services, fixed-based operations, pilot and maintenance training, and aircraft management. Additionally, GAMA represents companies in the emerging sector of advanced air mobility, which includes the development of vertical take-off and landing aircraft as well as electric propulsion, hydrogen-powered aircraft and autonomous systems for civil purposes. GAMA companies have facilities in 47 U.S. states and 15 countries. A recent economic impact study determined that the general aviation industry supports \$247 billion in economic output and 1.2 million jobs in the U.S.¹

Our membership appreciates the opportunity to highlight the work being done to strengthen our record on addressing climate change. In addition to detailing our efforts, we would like to depict what can be done in the near- and long-term to further bolster the industry-government partnership to environmental sustainability and to slow climate change.

Our manufacturers, service providers, and operators are steadfast in their commitment to improve efficiency and mitigate our industry's impact on the environment. While we are focused today on climate change issues, it is important to understand our success and continued commitment to reducing other environmental impacts from aviation such as aircraft noise and NOx for all types of aircraft. We appreciate and respect the work that all our partners in the aviation ecosystem have also undertaken to address climate change. It is clear that we will need to all work together to achieve meaningful results in reducing the aviation sector's contribution to climate change.

MANUFACTURING AND TECHNOLOGY ADVANCEMENTS

On behalf of the membership of GAMA, we are proud to highlight some of the advancements that are in place today that promote sustainability. Our members are committed to producing and delivering products that are sustainable and more efficient than their predecessors. In fact, the Federal Aviation Administration (FAA) states there has been more than a 70 percent improvement in fuel efficiency over the past 50 years with a vast majority of gains due to improved airframe and engine design.² We anticipate that by 2050, the new generation of aircraft benefitting from these improvements will generate on average 50 percent less CO₂ emissions compared to current levels. Examples of these gains on aircraft include changes in aircraft configuration, aerodynamics, systems, structural concepts, materials, and pro-

¹ General Aviation's Contributions to the U.S. Economy [https://gama.aero/wp-content/uploads/General_Aviation_s_Contribution_to_the_US_Economy_FINAL_20200219.pdf], 2018 Price Waterhouse Coopers Study on behalf of Aircraft Electronics Association (AEA), Aircraft Owners and Pilots Association (AOPA), Experimental Aircraft Association (EAA), General Aviation Manufacturers Association (GAMA), Helicopter Association International

² <https://www.faa.gov/newsroom/continuous-lower-energy-emissions-and-noise-clean-program?newsId=22534>

pulsion. Ground support equipment at airports, including refueling vehicles, are increasingly electric-powered, and installation of charging stations is growing in availability. In addition, many of our fixed-base operators (FBOs) have undertaken LEED-certified construction projects and installed solar panels at their facilities to reduce their demand on the electrical grid. Finally, several of our member companies are working toward or have announced environmental sustainability goals which demonstrate their commitment to sustainability.

One critical part of bringing sustainable products and technologies to market is the FAA's certification process. For the general aviation manufacturing industry to deliver safer and more sustainable aircraft, engines, and other aviation products in the global economy, an effective FAA certification process is vital. This Subcommittee, its counterpart Senate subcommittee, and the respective full committees devoted significant time and attention to reforms of the certification process which culminated in enactment of the Aircraft Certification, Safety and Accountability Act³. We remain appreciative of these efforts, and the industry and FAA continue to implement the law's requirements. An effective, reliable certification process is critical to the industry's ability to introduce innovative technologies and more sustainable products into the market. Simply put, certification is integral to the environmental commitments our industry has made.

In order for FAA to keep pace with innovation in the development of new products and technologies, FAA must issue new and updated regulations, policies, and guidance necessary to support certification for airworthiness and operations. Currently, there is a large backlog including regulations, policy and guidance. For example, at least 19 advisory circulars, technical standard orders (TSOs), and other documents that implement standards developed by RTCA to improve aviation safety and allow the certification of modern technologies are stalled. There are also more than 100 additional FAA actions needed in the form of policy memos, orders, advisory circulars, and TSO's that are currently in the bureaucratic process. Improvements are needed to the overall process in order to get these important FAA actions to advance, including for the new generation of electric propulsion, vertical takeoff and landing aircraft, and advanced air mobility operations. Successful development of these new sustainable technologies and aircraft requires that FAA establish a clear path for certification of aircraft and air carrier operations. The regulations for operations must either be updated to enable these new aircraft or the FAA will need to process several deviations and exemptions from existing rules—both of which depend on FAA being able to promulgate rulemaking, policies and guidance expeditiously to enable these operations.

Sustainability efforts are also critical to competitiveness and energy security. In 2017, the International Civil Aviation Organization (ICAO) adopted the first-ever international standards to regulate CO₂ emissions from airplanes, and almost every nation has since adopted those same standards. However, the U.S. has yet to implement the standards, and we look forward to finalized rules by the Environmental Protection Agency to implement the ICAO standards as soon as possible to meet international deadlines. Adoption of these standards is vital to aerospace manufacturers, ensuring that their products can be accepted worldwide. Further, the U.S. must retain its leadership in shaping safety and environmental standards at ICAO to ensure the adoption is technically feasible, environmentally beneficial, and cost-effective standards in the global marketplace.

BUSINESS AND GENERAL AVIATION'S COMMITMENT TO ADDRESS AVIATION SUSTAINABILITY

The Business Aviation industry has a strong background in leading efforts to decarbonize aviation. In 2009, the GAMA and the International Business Aviation Council (IBAC) jointly announced the Business Aviation Commitment on Climate Change (BACCC)⁴, a program to address the industry's carbon emissions, through three main objectives:

- Reducing CO₂ emissions 50 percent by 2050 relative to 2005 levels;
- Improving fuel efficiency 2 percent per year on average from 2010 until 2020; and
- Achieving carbon-neutral growth from 2020.

The industry achieved a 1.9 percent annual improvement in fuel efficiency on average since 2010, in line with our goal of a 2 percent improvement. At the time the BACCC was released, business aviation had already seen a 40 percent improvement

³Division V, Consolidated Appropriations Act, 2021 (P.L. 116-260)

⁴<https://gama.aero/wp-content/uploads/GAMA-IBAC-Joint-Position-on-Business-Aviation-Tackling-Climate-Change-1.pdf>

in the fuel efficiency of our aircraft over the past 40 years.⁵ The industry recently evaluated progress on meeting these goals and found that mainly through technology improvements and alternative fuels we are on track to meet the long-term goal of reducing CO₂ emissions by 50 percent in 2050 relative to 2005 levels.

After reviewing our progress toward meeting these objectives, the business aviation community committed itself to more aggressive goals. On October 12, 2021, a renewed effort to address climate change was announced with an updated goal of net-zero carbon emissions by 2050.⁶ The three primary objectives were also refreshed and include:

- Achieve net-zero carbon emissions by 2050.
- Continue to improve fuel efficiency 2 percent per year on average from 2020 to 2030.
- Commit to carbon-neutral growth beyond 2020.

To meet these commitments, we are focused on four key pillars which are crucial to meeting these goals. They include:

Technological Advancements—As stated previously, the aviation manufacturing industry is at the forefront of developing technological improvements to aircraft configuration, aerodynamics, systems, materials, and engine technologies which result in more efficient wing, rotor, fuselage, engine design, and operations. We are also furthering revolutionary innovations like hybrid, electric, and hydrogen-powered aircraft. These technological advancements are advancing our industry's sustainability commitments to improve the fuel efficiency of aircraft and reduce emissions.

Alternative Fuels—The business aviation industry, along with other industry stakeholders and energy producers, has driven the research, development, and deployment of commercially viable, sustainable aviation fuels (SAF). The increased use of SAF will play a key role in reducing business aviation's CO₂ emissions. Relative to petroleum-based conventional fuels, SAF blending components will deliver a net reduction in CO₂ emissions across its lifecycle.

Operations & Infrastructure—More efficient operations, stemming from continued progress on air-traffic management, along with measures including reduced payload, streamlined flight planning, and single-engine taxiing can play a significant role in reducing CO₂ emissions. Improving and enhancing air traffic and airport infrastructure can have multiple benefits for the business aviation industry including system-wide efficiencies that reduce CO₂ emissions.

Global Market-Based Measures—As business aviation continues to improve technologies, advance the production and uptake of alternative fuels, and push for operational efficiencies, it will also utilize market-based measures to offset emissions to fulfill its commitments. It is essential that global market-based measures are environmentally meaningful, and the administrative and implementation costs do not exceed the environmental benefits from compliance, particularly for small operators.

Business aviation industry partnerships with other industry players, governments, and regulators will be crucial to achieving our goals. Our commitment to addressing climate change is dependent on the support that authorities can provide to implement policies to help accelerate the uptake, distribution, and use of SAF as well as investments in research, development, and deployment projects to advance technology and facilitate operational improvements. Additionally, it will take buy in from all sectors of the industry to follow through to achieve the sustainable aviation future the aviation sector seeks.

CURRENT SUSTAINABILITY POLICY EFFORTS AND NEXT STEPS

While these are industry-led objectives, we appreciate the fact that this Committee and others have considered and supported an array of policy efforts to facilitate our endeavors. Within the FAA's current authorization, an example includes the work of the Continuous Lower Energy, Emissions, and Noise (CLEEN) program as well as the FAA's ASCENT (Aviation Sustainability Center) program. By way of background, CLEEN is a cost-sharing effort with industry which aims to accelerate technology maturation that will reduce noise, emissions, and fuel burn and enable the aviation industry to expedite integration of these technologies into current and future aircraft. ASCENT is a coalition of 16 leading U.S. research universities and more than 60 private sector stakeholders conducting research to reduce aviation's environmental impact. These two partnerships have made significant contributions

⁵ <https://gama.aero/wp-content/uploads/GAMA-IBAC-Joint-Position-on-Business-Aviation-Tackling-Climate-Change-1.pdf>

⁶ <https://ibac.org/app/ibac/files-module/local/documents/Declaration%20on%20NZE%202050%20210922%20Final.pdf>

to address climate change within aviation and we look forward to leveraging their work further.

These efforts have yielded important advancements in areas like SAF. Once it was made available for use, GAMA, along with other general aviation associations, conducted a significant education campaign to ensure operators understood that SAF is safe and viable to put in their aircraft. As a result, today, FBOs are distributing SAF at airports and fueling aircraft with SAF, and aircraft are flying and conducting flight testing with SAF.

Work remains to deploy SAF on a broader scale, and we strongly support efforts that incentivize increased production and distribution of this more sustainable fuel. In fact, efforts are ongoing to incentivize SAF production where the fuel is currently not available particularly given it is not ideal to produce SAF in one part of the country and then transport it to another part of the country. GAMA is also a strong advocate for the SAF Blender's Tax Credit, which would provide a clear incentive to boost the production and distribution of SAF. This is particularly important given the comprehensive network of U.S. airport infrastructure. Finally, several of our member companies have been conducting R&D work on engines that would safely operate on 100 percent neat SAF, furthering our sustainability efforts.

We are also pleased that the Administration has taken several steps to support and promote SAF, including the SAF Grand Challenge. The initiative is intended to increase SAF production, accelerate research and development to improve aircraft fuel efficiency, improve air traffic and airport efficiency to reduce fuel use, and eliminate lead exposure. We recognize that many members of this committee have been strong leaders in many of these areas, and we look forward to continuing to partner in these efforts.

An additional legislative proposal that we would like to highlight is the "Aviation Emissions Reduction Opportunity Act" which has been introduced in the U.S. Senate (S. 3125) by Senator Raphael Warnock (D-GA), Senator Maria Cantwell (D-WA), Senator Gary Peters (D-MI), and Senator Alex Padilla (D-CA). Referred to as the "AERO Act," the intent of the measure complements ongoing efforts to accelerate the uptake, distribution, and use of SAF while simultaneously spurring investments in innovation and technological advancements. The measure proposes \$1 billion over five years in grants, with 30 percent of grants going to entities focused on developing, demonstrating, or applying low-emission aviation technology, and 70 percent of the funding dedicated to producing, transporting, or storing SAF. Airport sponsors are specifically listed as eligible entities to receive funding under this program.

Another initiative to highlight is the FAA's Voluntary Airport Low Emissions (VALE) program. The program allows airport sponsors to finance low emission vehicles, refueling and recharging stations, gate electrification, and other air quality improvements. As previously noted, electric vehicles are being used at airports now and aircraft of the future will rely on electric, electric hybrid propulsion and other technologies as well. Expanding the VALE program's eligibility would allow more communities to benefit from these low emission technologies and contemplating additional efforts to encourage and expand this effort merit consideration.

THE NEXT ERA OF AIRCRAFT

GAMA has been a leader in advocating for the advanced air mobility (AAM) sector, and a significant portion of our membership is involved in this emerging sector, which envisions highly automated electric aircraft and electric vertical take-off and landing (eVTOL) aircraft to transport passengers or cargo at low-to-medium altitudes in urban, suburban, rural, and regional environments. We appreciate the attention and focus policymakers have placed on AAM and the opportunity it may provide for increased transportation connectivity.

Under the leadership of Full Committee Vice Chair Sharice Davids (D-KS), Ranking Member Garret Graves (R-LA), Senator Jerry Moran (R-KS), and Senator Kyrsten Sinema (D-AZ), and many others who have supported this effort, we want to thank both bodies again for passing the "Advanced Air Mobility Coordination and Leadership Act" (H.R. 1339 and S. 516). The measure is intended to ensure the federal government is effectively engaged and coordinated internally, as well as with industry stakeholders, to support the evolution of AAM. It directs the creation of an interagency working group, led by the Secretary of Transportation, to review and make recommendations on policies and investments to facilitate AAM beyond initial aircraft certification and operations. This includes a focus on economic and workforce opportunities, potential physical and digital security risks and mitigations, and energy and transportation infrastructure. We encourage policymakers to complete

consideration and send this bill to the president's desk in the near-term to further coordination and collaboration and enhance industry competitiveness.

As our industry moves toward introduction of AAM into the national airspace, enactment of either the House or the substantially similar Senate version of that legislation will also help facilitate a closer working relationship between the FAA, Department of Transportation, and other interagency partners. For example, the Department of Energy will have a significant role to play in the future of airport infrastructure and its work with FAA will be crucial to the success of this endeavor. This legislation is a good bridge to highlighting several new aviation propulsion technologies that have tremendous potential to significantly reduce aviation's CO₂ emissions in the long term.

Ultimately, the future of electric aircraft, including eVTOL aircraft, depends to a great extent on infrastructure investment, such as investment in charging stations for electric propulsion and in vertiports for eVTOL aircraft. As the aircraft that will populate AAM networks are still undergoing the FAA's certification process, much of their operational features, such as charging mechanisms and related infrastructure requirements, are proprietary or not yet known. As Congress contemplates how to encourage the growth of this fledgling sector of the industry, we encourage flexibility given the scope and breadth of aircraft and airports' needs.

Propulsion types like electric, hydrogen and electric-hybrid propulsion will continue to advance. GAMA is privileged to represent companies working in each of these areas and the progress they are making are tangible. As these concepts move forward, focus on issues like airport infrastructure needs, operations, maintenance, and ground support and emergency preparedness will be critical. Moreover, and consistent with the conversations with other segments of the aviation industry and broader economy, the importance of workforce needs among these products' manufacturers, operators, and regulators will be critical, particularly in view of the fact that these technologies may require additional skills or competencies to ensure safety.

Finally, we commend the Committee's recent consideration and approval of "The Advanced Aviation Infrastructure Modernization (AAIM) Act" (H.R. 6270) and applaud Chair Rick Larsen (D-WA), Ranking Member Garret Graves (R-LA), and Representative Dina Titus (D-NV) for their leadership. As these vehicles move through the certification process, concurrent planning for their infrastructure needs should be contemplated to facilitate the needed local planning and infrastructure to prepare for future operations, and the AAIM Act is intended to encourage this collaboration. This is also increasingly relevant as regulators and industry work to define consensus standards on vertiports which would serve as an additional infrastructure capability that is envisioned for use by AAM aircraft.

ADDRESSING PISTON FLEET FUEL

Finally, given the topic of this hearing is sustainability we wanted to highlight the collaborative efforts of numerous stakeholders to address fuel for piston-engine aircraft. The FAA has joined with aviation and petroleum industry stakeholders to work toward transitioning to lead-free aviation fuels for piston-engine aircraft by the end of 2030. The Eliminate Aviation Gasoline Lead Emissions (EAGLE) initiative will expand and accelerate government and industry actions and investments as well as establish the necessary policies and activities to permit both new and existing general aviation aircraft to operate lead-free, without compromising aviation safety and the economic and broader public benefits of general aviation.

We recognize that this is very ambitious, and each of the organizations involved are fully committed to EAGLE's success with work well underway. A key component of the EAGLE initiative will include an assessment of airport infrastructure needed to foster distribution of any certified and commercially viable replacement unleaded fuel or fuels.

The importance of this initiative to general aviation and U.S. general aviation infrastructure cannot be understated. There are more than 13,000 different airports which service the roughly 170,000 piston engine general aviation fleet. We expect the EPA to move forward with an endangerment finding this year which will trigger regulatory activity to ban leaded avgas. The clock is ticking, and we need to move quickly so that manufacturers have time to design, develop, certify, and build products that can operate safely on whichever unleaded fuel or fuels reach the market.

This work is consistent with the findings of a National Academies of Sciences, Engineering, and Medicine Study requested in the 2018 FAA Reauthorization Act.⁷

⁷ Section 177, FAA Reauthorization Act of 2018 (P.L. 115-254)

The resulting report, *Options for Reducing Lead from Piston-Engine Aircraft*⁸, was published last year and indicates that a multi-pathway approach ultimately might be needed since there is currently no single known technical solution available in the near-term.

CONCLUSION

On behalf of our membership, we want to thank Chair Rick Larsen and Ranking Member Graves for convening this hearing and allowing GAMA to testify on industry efforts to mitigate the general and business aviation's impact on the environment. General and business aviation remains committed to ensuring our segment of the aviation industry plays a positive role in achieving a sustainable and competitive future for this essential industry. We are grateful that the Subcommittee and Committee has prioritized this issue and is working, on a bipartisan basis, with aviation stakeholders to provide the resources and programs needed to achieve a sustainable aviation future. Thanks to all committee members who participated today.

Mr. LARSEN OF WASHINGTON. Thank you very much for your testimony. I appreciate it. I now want to turn to Jennifer Bies, the director of environmental operations for the Port of Portland.

Ms. Bies, you are recognized for 5 minutes.

Ms. BIES. Chairman DeFazio, Chairman Larsen, Ranking Member Graves, and members of the subcommittee, thank you for convening this important hearing. My name is Jennifer Bies, and I am the director of environmental operations for the Port of Portland.

Climate change represents one of the most important challenges for my generation and for generations to come. And I am grateful for the opportunity to share with you the work we are doing at PDX, as well as what more is needed to help us achieve our collective goals.

The port owns three airports, four marine terminals, five business parks, and operates dredge equipment to maintain the navigation channel of the Lower Columbia and Willamette Rivers. PDX International Airport is the largest commercial airport in Oregon and southwest Washington, serving nearly 20 million passengers in 2019.

As we look forward to a full recovery and continued growth of air travel post-pandemic, we must do so in a responsible manner. The evidence of climate change in Oregon is clear: Portland and the region we serve have experienced unprecedented weather events. Portland is in the midst of the wettest spring on record, it snowed in mid-April, and last June we experienced 117-degree heat. Unprecedented summer heat waves have also spawned wildfires, burning millions of acres. It is past time to get serious about this threat to our existence.

We believe that significant investments in infrastructure must prioritize projects that increase resilience in the face of extreme weather events and natural disasters, and address environmental and social inequities, all while decreasing dependence on fossil fuels.

PDX accounts for over three-quarters of the port's total greenhouse gas emissions, and it also generates air toxics from diesel emissions, which impact airport workers and low-income commu-

⁸National Academies of Sciences, Engineering, and Medicine. 2021. *Options for Reducing Lead Emissions from Piston-Engine Aircraft*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/26050>.

nities and communities of color living in close proximity to the airport. We reduced PDX emissions by about 60 percent below 1990 levels, while at the same time passenger travel had increased by 162 percent by investing in energy efficiency and moving away from fossil fuels to cleaner energy and renewable fuels.

Significant emission reduction projects completed to date include transitioning diesel-powered vehicles and equipment to renewable natural gas and renewable diesel; incorporating state-of-the-art energy efficiency design into our headquarters building; airportwide energy efficient lighting upgrades; and installation of pre-conditioned air and ground power units on all loading bridges.

Moving forward, the port is prioritizing four strategies to achieve additional meaningful greenhouse gas emission reductions, address environmental justice inequities, and invest in regional resiliency.

Sustainable aviation fuel, or SAF, is one priority.

We support a blender's tax credit, but additional funding is necessary to support modifications to infrastructure, including the off-airport last-mile facilities needed to receive, blend, and deliver SAF to PDX.

Electrification of diesel-powered ground support equipment is another priority. We have made great strides in making the terminal plug-in ready, and we are partnered with the California Airport Council and several California airports to develop carbon intensity values needed to participate in our State Clean Fuels Program. These program incentives will support our airline partners in transitioning to electric ground support equipment.

Lastly, we need to secure funding for two major projects: a ground source heating and cooling system in our terminal, which will reduce the energy use per square foot by 54 percent; and a seismically resilient runway that would establish a lifeline for the western, most highly populated part of Oregon to deliver aid and support recovery efforts after a cataclysmic earthquake.

In conclusion, the port has accomplished a lot already, and we are highly motivated to do more. But we need help. Airports are faced with a dilemma regarding AIP funds. We must first address the backlog of deferred asset renewals to maintain safe and effective functioning of the airport. This leaves limited funding available for transformational projects to meet our responsibilities as a public agency in addressing climate change, environmental justice, and regional resiliency.

The Bipartisan Infrastructure Law is a huge step forward, but the need far outweighs available funding. Climate change has created an urgency to quickly transition away from fossil fuels and better prepare for natural disasters before it is too late. We stand at the ready to work in partnership to pave the way towards a more resilient, sustainable, and equitable future for U.S. airports.

Thank you to subcommittee members for convening this hearing and for your continued work on these important matters. I look forward to answering your questions.

[Ms. Bies' prepared statement follows:]



Prepared Statement of Jennifer Bies, Director of Environmental Operations, Port of Portland

Chairman Larsen, Ranking Member Graves, and members of the Subcommittee, thank you for the opportunity to speak with you today about the issue of climate change at U.S. airports. Climate change represents one of the most important challenges for my generation, and for generations to come, and I'm grateful for the opportunity to share with you our work at the Port of Portland.

INTRODUCTION

I am the Director of Environmental Operations for the Port of Portland (Port). Established in 1891 by the Oregon Legislature, the Port today owns three airports—Portland International (PDX) and two general aviation airports. We also own and operate four marine terminals that handle imports and exports, business parks that provide industrial and manufacturing jobs, and operate dredge equipment that helps maintain the navigation channel on the lower Columbia and Willamette rivers. The Port's mission is to build shared prosperity for the region through travel, trade, and economic development.

PDX is the largest commercial airport in Oregon and SW Washington, serving nearly 20 million passengers annually in 2019. Travel levels at PDX are still recovering from the pandemic but we're looking forward to a busy summer travel season, including the recent return of transatlantic flights. PDX is both a beloved local landmark and a perennial favorite of travelers worldwide as well as a source of significant economic value to the region. We're in the midst of a capital construction program at PDX—*PDX Next*—which is designed to allow for significant growth (to accommodate 45 million passengers per year by 2045) while greatly improving the resilience and sustainability of the airport.

We know we need to make infrastructure investments in a way that prepares for and protects us from climate change and natural disasters, and that addresses longstanding inequities regarding who benefits from and who is negatively impacted by our work. For transportation systems to function and have long-term reliability, we must prepare to be more resilient in response to unpredictable disruptions from extreme weather events due to climate change and natural disasters.

The past is no longer a reliable predictor of the future. The evidence of climate change in Oregon is clear. Portland and the region we serve have experienced unprecedented weather events including record heat, cold, and precipitation. For example, Portland is in the midst of the wettest spring on record, and it snowed in mid-April. Last June we experienced 117-degree heat, exceeding the previous all-time record high temperature by nearly 10 degrees.

Unprecedented summer heat waves have spawned wildfires which have burned millions of acres. The summer 2020 wildfires were the most destructive on record in Oregon and triggered five days of "hazardous" air quality for the first time in Portland. It is past time to get serious about this threat to our existence. It is essential to invest more resources in proactive preparation and progress to lessen the magnitude of destruction and associated recovery expenses.

WHERE WE'VE BEEN

The Port actively works to implement climate change solutions by measuring our greenhouse gas (GHG) emissions footprint, investing in energy efficiency, and moving away from fossil fuels to cleaner energy and alternative fuels.

The Port of Portland has long had our own emissions reductions goals, reducing GHG emissions by over 60% below 1990 levels at the same time as passenger growth increased by 162%. We achieved this accomplishment via several projects. We've made significant energy efficiency investments, including an airport-wide lighting upgrade. The Port's headquarters building located at PDX is LEED Platinum-certified and uses about 36 percent less energy than a typical building of its size. We also installed preconditioned air and ground power units on all loading bridges at PDX—eliminating onsite emissions from parked aircraft.

The Port has supported Oregon's Clean Fuels legislation and participates in the Clean Fuels Program for PDX shuttle buses that run on renewable natural gas and for electric vehicle charging. Most diesel-powered vehicles and generators at PDX use R99 renewable diesel made from sustainable feedstocks. PDX also has one of the largest collections of electric vehicle parking spaces among airports in the U.S. with 125 spaces installed. These charging stations serve Port fleet, maintenance, Airport Rescue & Firefighting and employee vehicles as well as passengers and Transportation Network Companies (i.e., Uber, Lyft, taxis.) An additional 38 charging stations are coming soon which will include communications infrastructure for

monitoring, analyzing, and evaluating system electricity usage for each charging station to help us maximize use and improve reporting.

Diesel exhaust is one of the most significant contributors of health impacts from air toxics in the Portland region and construction equipment is the largest source of those emissions. In collaboration with other public agencies in the Portland region, the Port created and is implementing a Clean Air Construction Program to reduce diesel emissions on construction projects. Beginning in 2021, the program implemented a standard set of cleaner equipment requirements on job sites and a regional program to verify compliance with the requirements. Many larger construction companies have already transitioned to cleaner equipment. Small businesses, however, cannot afford to replace their typically older and dirtier diesel construction equipment with new equipment or install costly retrofits. The small businesses can apply for a temporary exemption or meet program requirements through the use of renewable diesel. The Port is working to facilitate small business access to renewable diesel at a reasonable cost, to lessen the continued air toxics impacts from exempted diesel equipment.

WHERE WE'RE HEADED

We know we can do more. We are prioritizing operations with the highest GHG emissions to start and investing in strategies that meaningfully and swiftly reduce our carbon footprint. We are also taking action to prioritize emission reductions that have the greatest benefit to addressing environmental justice inequities. Like a small city, PDX operates around the clock and consequently accounts for over three-quarters of the Port's total GHG emissions. PDX also contributes to air toxic emissions (diesel particulates in particular) impacting airport workers and surrounding historically marginalized communities.

We believe any new, significant investment in infrastructure must prioritize projects that increase the resilience against climate change, extreme weather, and natural disasters while decreasing our dependence on fossil fuels. We recognize that our growth at PDX could result in a higher environmental impact. Sustainability was the focus of the PDX Master Plan developed 10 years ago and that's why we chose to renovate and expand the existing terminal structure instead of building a new terminal, relying on the use of wood, steel, and other salvaged materials, and incorporating a new efficient heating and cooling system.

Ground Source Heating & Cooling System

The current heating and cooling system at the airport relies on natural gas boilers and chillers with diesel generators as backup. A new energy efficient ground source heat pump system will instead rely on electricity to generate heated and chilled water for building heating and cooling. The system will extract heat from an underground aquifer for heating, and, to cool, it will reject heat back into the same aquifer. Traditional boilers and chillers will be retained as backups, and to augment the ground source system's performance during periods of extreme temperatures. By adding a ground source heat pump system, the terminal's energy use per square foot will be reduced by approximately 54% and 130,000 MMBtu of annual natural gas will be electrified—a major step away from fossil fuel use. GHG emissions will be reduced by a minimum of 6,800 metric tons of CO₂e/year, and those emissions reductions will improve over time as the electric grid continues to transition away from coal to renewable sources.

Electrification

The Port is pursuing electrification of ground support equipment as a key strategy to address air toxics that have a direct impact on PDX airport workers and surrounding residential communities while reducing our carbon footprint. We have made significant progress in building out the electrical infrastructure needed for charging ground support equipment. The electrical backbone is in place across the airport and branch conduit and wiring has been installed to make our two newest concourses—Concourse B and E—plug-in ready for charging stations. The remaining infrastructure needed to make Concourses C and D plug-in ready is planned in the capital project queue.

The Port partnered with the California Airport Council and several California airports on development of carbon intensity values needed for electric ground support equipment to qualify for Oregon's Clean Fuels program. Leveraging Oregon Clean Fuels Program financial incentives will be essential to support our airline business partners in advancing the transition to electric ground support equipment at PDX. Additional federal support made available in the Infrastructure Investment and Jobs Act (IIJA) will also be needed to fully electrify the ground support equipment at PDX.

We're also investing over \$12 million to increase electrical infrastructure between a substation and the PDX terminal to accommodate future increases in demand/load from electrification of fossil fuel powered equipment and systems.

Sustainable Aviation Fuel (SAF)

Securing a reliable and affordable local or regional supply of SAF is a significant priority for the Port because GHG emissions from jet fuel account for 78% of Port emissions. PDX completed a SAF Infrastructure Study in 2018 to help facilitate discussion on what it would take to implement this technology. Since then, the Port has supported acceleration of SAF supply chain development in the following ways:

- On-going discussions with developers, airlines and other supply chain partners to look at SAF demand and logistics (i.e., transportation, storage and delivery to PDX).
- Co-funded with SkyNRG Americas a Bioeconomic Development Opportunity Zone (BDO Zone) Designation for municipal solid waste supply in Arlington, Oregon. 'A' and 'AA' BDO Zone Ratings identify areas in the country best positioned for low-risk bioeconomy project development and provide much-needed market intelligence to facilitate investment decisions. Arlington's 'A' rating will hopefully lead to increased production of SAF and R99 in Oregon.
- Participation on the Oregon Clean Fuels Program Rulemaking Advisory Committee to advocate for measures to make Oregon competitive with other West Coast fuel markets and attract clean fuels such as renewable diesel, sustainable aviation fuel and renewable natural gas.
- Participation in the federal agency SAF Grand Challenge which is working to develop a roadmap to reduce the cost and expand the production and use of SAF.

Adaptation to Extreme Weather

The Port also recognizes that in the face of climate change we need to adapt how we work, how we build, and how we operate to protect human and environmental health and safety and prolong the life of our capital investments.

Recently, the Port used the Airport Cooperative Research Program's Airport Climate Risk Assessment Tool (ACROS) to evaluate likely climate impacts to PDX. The analysis found, and is verified by Oregon and national climate assessments, that PDX is likely to experience hotter, drier summers with more high heat days than before. The 2020 heat wave was a public health crisis: more than 60 people in Multnomah County lost their lives. Increasing temperatures and peak heat waves are a critical concern for the aviation industry. In response to the 2020 extreme heat events, Oregon OSHA adopted emergency rules addressing wildfire smoke to protect employee and worker health and safety. PDX convened an internal task force and established a process to alert employees who work outdoors of poor air quality conditions during wildfire events and requires the use of personal protective equipment to protect worker health. PDX is committed to protecting the health and safety of our employees, contractors, and travelers.

In addition to efforts to support worker health and safety, airports need to mitigate harm to building roofs, strain on HVAC systems, reduced water availability, increase in emergency service calls, and loss of integrity of runway pavement. To be more resilient in the face of potable water shortages, the Port has been focusing on water conservation strategies such as installing low flow fixtures throughout the PDX terminal as well as securing municipal water rights to authorize use of non-potable water in place of potable water. The non-potable water can be used for our operations as well as for tenants and other potential commercial and industrial customers within our non-potable water service areas.

For example, the construction of the new rental car ready return facility at PDX includes a non-potable water well, collects rainwater and stores it in an underground cauldron as wash water, and deploys reverse osmosis for vehicle washing. Leveraging non-potable water for car washing and toilet flushing has reduced potable water use by more than 70% as compared to the LEED baseline for a typical office building. This facility received Envision certification, which provides a consistent, consensus-based framework for assessing sustainability, resiliency, and equity in civil infrastructure.

Climate assessments and the ACROS tool also indicate that PDX should prepare for more heavy precipitation events. Primary vulnerabilities to heavy precipitation include internal and external facility damage, failure of drainage systems, operational disruptions, undermining of pavement and impacts to ground transportation and parking. In order to mitigate the impacts from extreme weather events the Port is focused on the following priorities:

- Upgrading building efficiency to reduce demand and strain on the power system.
- Reducing our reliance on the electricity grid with on-demand renewable power and independent micro-grid infrastructure at PDX.
- Securing funding for on-going asset management to keep pavement, stormwater, HVAC and building systems in good order and extend their useful lives.

Natural Disaster Resilience

The Port is deeply committed to providing public services that meet local and regional resilience needs. Recent examples of our commitment are illustrated by the Port's role in:

- Addressing health and safety of passengers and employees via modified PDX operations in response to COVID-19.
- Partnering with the Oregon Health Sciences University to stand up a drive-through COVID-19 vaccination clinic at PDX, where more than 250,000 doses were administered.
- Sending Port of Portland Firefighters every year to help g communities around Oregon fight deadly wildfires.

Our ability to respond to these types of emergencies is made greater because of our commitment to increasing our resilience to hazards. The Port has been systematically identifying hazards and Port-specific vulnerabilities and developing and implementing plans and projects to improve the strength and flexibility of our facilities and operations. We take a holistic, programmatic approach to resilience; designing the flexibility needed to perform well under a variety of potential disruptions and challenging conditions.

In addition to climate change, we have to prepare for other natural disasters, particularly earthquakes. Given Oregon's geography and the vulnerability of critical infrastructure to earthquake and landslide damage, and the likelihood of a coastal tsunami, Oregon will be isolated following a major earthquake. The planned major response hub for Oregon is located on the east side of the Cascade Mountain range. This means that aid to Oregon's most populous region in the western part of the state will need to be brought in via helicopters and small planes until the mountain passes are cleared and road travel restored. Marine routes will need to be cleared, and maritime support will take some time to arrive. Lack of road and marine transportation, and very limited aviation options will hamper medical evacuations and response and will make it exceedingly difficult to bring in basic aid for days, if not weeks.

PDX has made significant investments to prepare for a Cascadia Subduction Zone catastrophic event. We have a new concourse built on a resilient structural foundation and our PDX communications and emergency operations center has an independent emergency power supply. The Terminal Core expansion project also includes numerous seismic improvements.

The most transformational seismic investment in the Port's resilient infrastructure work is a seismically resilient runway at PDX. A resilient runway, one that can withstand the ground motion caused by a major earthquake will provide an essential lifeline connection to supplies, aid, and support during a catastrophic event. According to an analysis of the National Institute of Building Sciences, the runway could help avoid about \$7 billion dollars in losses in today's dollars.

The Port is incredibly grateful to have secured \$3.75 million in FY22 Congressionally Directed Spending for a FEMA pre-disaster mitigation grant. This is from FEMA's Building Resilient Infrastructure and Communities (BRIC) program. Combined with additional funding provided by the state of Oregon, the Port will finalize the design of the seismically resilient runway over the next two years. Construction of the runway will require significant additional federal funding support.

HOW WE CONTINUE TO MAKE PROGRESS

Infrastructure Funding

The Port relies upon investments in nearly every kind of infrastructure imaginable: obviously airports, but also waterways, bridges, marine terminals, transportation safety, levees, locks, roads, transit, and rail. So, we were very pleased with the passage of the IIJA last year. We believe the IIJA investments will both address the backlog of infrastructure needs nationwide, while prioritizing investments that reduce reliance on fossil fuels, increase resilience, and mitigate community impacts. We also welcome the law's focus on equity and job creation. In particular, we are deeply grateful for the \$25 billion in airport infrastructure investments provided by IIJA.

- We expect PDX to receive approximately \$20 million each year for the next five years in Airport Infrastructure Grants, a significant increase in our annual Airport Improvement Program (AIP) grants. It will immediately be applied to address key airfield pavement needs that are essential to maintaining a safe, efficient and resilient airport.
- The Port has also applied for funding for the first year of the Airport Terminal Program (ATP) competitive grant. We're seeking funding for the ground source heating and cooling system at PDX discussed above. The current reality of capital construction projects—significant cost escalations, supply chain limitations and staffing shortages—means difficult choices for capital projects. These federal funds will help ensure the Port can meet its environmental and job creation goals.
- We also know the need for investment at airports far exceeds the funding available. We understand there were more than 650 applications totaling \$14 billion for the first \$1 billion provided in FY23 for the ATP grants. We know the need is great and we will continue to work with Congress and the Administration on other funding sources for airports, including an increase in the Passenger Facility Charge (PFC).

Expand Funding for Airport Resiliency Projects

We support a specific expansion of the FAA Airport Improvement Program (AIP) to allow funding to be used for natural disaster and climate resilience. H.R. 2, the Moving Forward Act, included a provision allowing airports to use AIP grant funding for “critical airport infrastructure” projects that increase the resiliency of the airport against “earthquakes, flooding, high water, hurricane, storm surge, tidal wave, tornado, tsunami or wind driven water.” (H.R. 2, SEC. 10103, Airport Resiliency Projects).

We also believe the FEMA BRIC program should continue to be funded at robust levels. This program is an essential source of funding for communities to invest in advance of disasters and is one of the likely sources of funding for construction of our seismic runway.

SAF Blenders Tax Credit

The Port is committed to being prepared to offer SAF at PDX as the fuel becomes available. We know additional government incentives are required to support growing this industry to scale given the considerable cost difference with conventional jet fuel. We strongly support a new, long-term tax incentive for sustainable aviation fuel. We believe a blender's tax credit specifically aimed at incentivizing the production of sustainable aviation fuel is critical to support the decarbonization of the aviation sector.

SAF Infrastructure Grant Program

We also strongly support a SAF infrastructure grant program to further support the development and deployment of SAF, such as Senator Warnock's Aviation Emissions Reduction Opportunity Act (AERO) and the Alternative Fuel and Low Emissions Aviation Technology Program and related provisions in H.R. 2 (Sections 10201–10204). We are particularly in need of funding mechanisms to help offset the costs of off-airport SAF infrastructure as will be needed at PDX.

Expand the Voluntary Airport Low Emissions Program

The Voluntary Airport Low Emissions (VALE) Program allows airports to use AIP funds and PFC revenue for low emission vehicles, charging stations, and other projects that help improve air quality. More flexibility is needed in this program at airports like PDX that are already in air quality attainment areas, but where federal funding for additional carbon and air toxic emissions reduction programs is needed. We support both increased funding for the VALE program and allowing it to expand airports outside of non-attainment areas to help more airports improve air quality.

Federal Agency Aviation Fuel Usage

Key federal agencies such as the U.S. Department of Defense (DoD) can play a more active role in SAF uptake for their own aviation fuel needs. The House-passed 2021 National Defense Authorization Act (NDAA) included a provision that would require the Defense Department to conduct a pilot program at two or more DoD facilities exploring the use of sustainable aviation fuel. While this provision was not included in the final 2021 NDAA, we are hopeful that this year will result in successful passage of the program.

Thank you for this opportunity to address you today about our work at PDX to address climate change and natural disaster resilience. I look forward to continuing to work with the Subcommittee on these issues going forward.

Mr. LARSEN OF WASHINGTON. Thank you very much for your testimony, and I will turn to Mr. John Plaza, president and CEO of SkyNRG Americas.

Mr. Plaza, you are recognized for 5 minutes.

Mr. PLAZA. Good afternoon, Chairman Larsen, Ranking Member Graves, and members of the Aviation Subcommittee. My name is John Plaza, and I appreciate the opportunity to tell you a little bit more about our focus on sustainable aviation fuel.

I am the CEO of SkyNRG Americas, and we are focused on, as I mentioned, really bringing scale to the new industry of sustainable aviation fuel. And the opportunity that we have in front of us as a country is quite exciting. I have been involved in aviation for over 40 years and have been leading the development of sustainable aviation fuel, or SAF, since 2006. I am excited to discuss the role that SAF can play in decarbonizing aviation and enhancing energy independence for our Nation.

I also want to thank this committee and you, Chairman Larsen, for your continued leadership and support of domestic renewable fuels production specifically in this hard-to-decarbonize industry.

At SkyNRG, we are a team of industry-leading professionals who build and develop commercial-scale SAF projects. Our planned facilities in North America will increase SAF supply for a network of aviation users, including both U.S. airlines and our U.S. defense needs. Critically, SkyNRG is committed to sourcing SAF from waste-based feedstocks that achieve, at a minimum, an 80-percent reduction in greenhouse gases over traditional petroleum jet fuel.

We are particularly excited about the recent partnerships we formed with some of the leading innovators in sustainability, including Alaska Airlines, Boeing, Microsoft, and Bank of America. These agreements and partnerships advance our collective goals to drive the aviation industry's transition to clean energy through the commercialization of a domestic energy source, sustainable aviation fuel.

As we all know, aviation is essential to modern life. Flying has been my lifelong passion. I started really obsessing about airplanes at the age of 5, and by the time I was 18, I was learning how to become a commercial pilot and flew for over 20 years. I have flown everything from bush planes in the remote parts of Alaska to Boeing 747s.

My time as a pilot has provided me with some key insights in how aviation can grow sustainably. The amount of fuel required to power an aircraft is immense, as are the emissions that result from burning fossil-based jet fuel. In addition, without timely action, the aviation sector's emissions footprint could grow from 3 percent to 27 percent of the global carbon budget by 2050, due to the electrification of on-road transportation and other solutions.

In 2004, I retired from the airline industry to start a biodiesel company called Imperium Renewables, located in Washington State. We built one of the world's largest commercial-scale biodiesel facilities in rural Washington, Hoquiam, in 2007. In 2008, we also produced the very first volume of sustainable aviation fuel used in

the landmark demonstration with Boeing, Virgin Atlantic, and General Electric on a 747, showing that an airplane really, truly could fly on something besides petroleum jet fuel.

The market and political landscapes around SAF are much different today than they were 14 years ago. Demand for SAF has skyrocketed, as companies across the U.S. economy seek to foster greater sustainability.

I am also thrilled and thankful for the attention that U.S. policymakers and this subcommittee in particular have focused on our nascent industry. With the right policies in place, SAF can achieve scale quickly, and in a manner to both increase volume and decrease costs. A number of these actions can be met through this subcommittee.

In addition to reducing emissions as much as 80 percent, a robust North American sustainable aviation fuels industry would attract private-sector investment and create jobs, especially in rural America or communities throughout the Nation that need these sort of innovative opportunities; ensure nationwide energy security by creating domestic fuel supply chains; and finally, help stabilize fuel prices by reducing the U.S. reliance on volatile global markets, as we see today.

To be clear, SAF is not the only means to achieve net zero by 2050, but it is a tool for fostering job growth and economic security and energy security today, while meeting the goals of the aviation sector. Congress can champion three policies to support SAF and capture its economywide potential.

First, Congress should advance the bipartisan Sustainable Skies Act. This is a critical blender's tax credit that would help reduce the costs.

Second, Congress should create a SAF infrastructure grant program like the Senate AERO Act.

And finally, Congress should support the administration's SAF Grand Challenge, a whole-of-Government effort to reduce the cost and expand the SAF supply.

Thank you for the opportunity to participate today, and I look forward to questions as we continue the discussion.

[Mr. Plaza's prepared statement follows:]

**Prepared Statement of John Plaza, President and Chief Executive Officer,
SkyNRG Americas, Inc.**

Chairman Larsen, Ranking Member Graves, and Members of the Aviation Subcommittee: Good afternoon. My name is John Plaza, and I'm CEO of SkyNRG Americas. Thank you for holding this important and timely hearing. I'm excited to discuss the opportunities and challenges associated with U.S. airports' efforts to address climate change—and the key role that sustainable aviation fuels (or "SAF") can play in decarbonizing aviation and enhancing energy independence. I also want to thank this committee and you, Chairman Larsen, for your continued leadership in support of domestic renewable fuels production.

At SkyNRG, we are a dedicated team of industry-leading professionals who develop and execute commercial scale SAF production projects. Our planned production facilities in North America seek to increase SAF supply for a global network of aviation fuel users, including airlines and civil aviation, as well as national defense needs.

Critically, SkyNRG is committed to sourcing SAF from waste-based feedstocks that uphold the highest sustainability standards and achieve, at a minimum, an 80 percent reduction in greenhouse gas emissions.

We are particularly excited about the recent partnerships we've formed—with some of the leading global innovators in sustainability—including Alaska Airlines, Boeing, Microsoft, and Bank of America. These agreements advance our overarching aim: to create sustainable, scalable, and cost-competitive solutions that will lead to the commercialization of SAF production and drive the aviation industry's transition to clean energy.

As we all know, aviation is essential to modern life. Flying has been my lifelong passion since the age of five. I was a commercial airline pilot for more than 20 years and have flown everything from bush planes in Alaska to Boeing 747's.

My time as a pilot provided me with some key insights in how aviation can grow sustainably. The amount of fuel required to power an aircraft is immense, as are the greenhouse gas emissions that result from burning fossil-based jet fuel. In fact, without timely action, the aviation sector's emissions footprint could grow from 3 percent to 27 percent of the global carbon budget by 2050.¹ We must find creative ways to decarbonize aviation, and we must do so in a way that supports fuel quality, aircraft safety, and cost-effectiveness, all while creating good-paying domestic jobs and an energy resilient economy.

After retiring from commercial flying in the early 2000s, I founded a biodiesel production company based in Seattle called Imperium Renewables. We built one of the largest commercial scale biodiesel production facilities in the United States. This facility, at 100 million gallons per year of biofuel production, was built in a rural community in Washington state that continues to benefit significantly from these new energy transition jobs and investments. Notably, Imperium was also the first producer of SAF used in a landmark demonstration flight by a Virgin Atlantic Airlines Boeing 747 in 2008.

The market and political landscapes around SAF are much different today than they were 14 years ago. Demand for SAF has skyrocketed, as aviation-centric companies across the U.S. economy seek to reduce their greenhouse gas emissions and achieve sustainability objectives. Additionally, I am both thrilled and thankful for the attention that U.S. policymakers—and this subcommittee in particular—have focused on our nascent industry. We are on the cusp of a historic growth opportunity.

With the right federal policies in place, the U.S. SAF industry can achieve scale quickly enough to meet several key goals of this Subcommittee. A robust North American SAF industry would:

- (i) reduce emissions from flights by as much as 80 percent relative to fossil-based jet fuel;
- (ii) attract substantial private sector investment and create high-tech jobs, especially in rural communities across the country, including Washington state;
- (iii) meet the substantial consumer demand for low-carbon fuels while ensuring flight safety and reliability;
- (iv) promote U.S. innovation, leadership, and jobs in an industry with vast global potential;
- (v) ensure nationwide energy security by creating clean, domestic fuel supply chains to power commercial and defense-related aviation; and
- (vi) help stabilize aviation fuel prices by reducing U.S. reliance on global oil markets that have increasingly faced price volatility and supply disruptions.

To be clear, SAF is not only a means to achieve net zero by 2050—it is also a tool for fostering job growth and energy security today.

Congress can champion three key policies to support SAF and capture its economy-wide potential. First, Congress should advance the bipartisan Sustainable Skies Act. The Act would create a blenders tax credit starting at \$1.50 per gallon for SAF that achieves a 50 percent or greater lifecycle emissions reduction in greenhouse gas emissions, as compared to fossil-based jet fuel. This legislation represents a pragmatic way to help the SAF industry attract greater private sector investment and realize price-parity with fossil-based fuels. This initiative also maintains broad industry support, including from others on this panel today, like Alaska Airlines.

Second, Congress should formulate an infrastructure grant program dedicated to projects that will produce, transport, or store SAF. The Senate's Aviation Emissions Reduction Opportunity (AERO) Act, for example, would provide \$1 billion over five years for infrastructure and technology grants. As many airports nationwide lack essential SAF infrastructure, these public investments would help accelerate and de-risk investments across the supply chain by making SAF more available to airlines and bringing efficiency to the market.

It is my hope that both of these crucial policies can be enacted this year.

¹ See International Civil Aviation Organization. *ICAO Environmental Report 2016*. (available here: <https://www.icao.int/environmental-protection/Documents/ICAO%20Environmental%20Report%202016.pdf>)

Finally, Congress should support the Administration's SAF Grand Challenge and identify ways to collaborate with federal agencies in this initiative. The SAF Grand Challenge is the result of DOT, DOE, USDA, and EPA launching a government-wide Memorandum of Understanding (MOU) that aims to reduce the cost and expand the supply of SAF. The administration's central target is to reach a SAF supply sufficient to meet 100 percent of aviation fuel demand by 2050.

The SAF Grand Challenge is a recognition of the fact that any serious national effort to address climate issues must incorporate ambitious strategies to put downward pressure on aviation emissions. The Grand Challenge also offers the nation an opportunity to develop an entirely new energy industry that meets the needs of this critical sector. The U.S. must have an ambitious, whole-of-government plan in place to help guide successful policy and industry outcomes for the future of American aviation.

One key element of the MOU is DOT's commitment to "collaborating with EPA ... on steps to expedite regulatory approvals of new SAF feedstocks that achieve significant lifecycle GHG reductions."² For the past decade, regulatory backlogs have plagued SAF industry innovation, expansion, and long-term capital investment, so this will be a critical step in achieving industry goals. This Subcommittee can play a key role—through collaboration and oversight—in DOT's implementation of this and other elements of the Grand Challenge.

Lastly, it is important to note that SAF represents only .0005 percent of total aviation fuel consumption in the U.S. today, a small drop in the sea of existing fossil jet fuel supply. Thoughtful, targeted policies are needed for the SAF industry to scale quickly enough to meet our nation's energy challenges. The return on investment, in the form of energy security, jobs, and environmental benefits, will be well worth it.

I look forward to working with all members of this Subcommittee and the broader House Transportation and Infrastructure Committee to make sure this innovative American industry is successful. Thank you.

Mr. LARSEN OF WASHINGTON. Thank you, Mr. Plaza. Good to see you again.

And finally we have the founder and CEO of ZeroAvia, Val Miftakhov, and you are recognized for 5 minutes.

Mr. MIFTAKHOV. Thank you, Chairman Larsen, Ranking Member Graves, and the members of the subcommittee. Thank you for the opportunity to speak with you today. My name is Val Miftakhov. I am CEO and founder of ZeroAvia. We are a U.S.-headquartered leader of sustainable aviation powertrains that we build for commercial aircraft. And it is my privilege to speak to you today about airports and aviation sustainability.

I started the company in 2017. I am a pilot myself, rotorcraft, fixed-wing, really passionate about aviation. And the reason I started the company was to, of course, address the growing challenge of climate change that was already mentioned in this forum; health outcomes that were already mentioned within a certain distance of the airports; 3 percent today of the carbon emissions worldwide.

But of course, aviation climate impact is not just about carbon. We also have high-altitude particulate emissions; we have high-altitude NOx emissions; we have high-altitude, high-temperature water vapor. And, as been mentioned already before, these types of pollutants may result in significant increase of the total climate impacts on top of the CO₂ alone. And it is not inconceivable to see that aviation may become up to 50 percent of total human climate impact in the business-as-usual trajectory if nothing is done, and

²The White House, *FACT SHEET: Biden Administration Advances the Future of Sustainable Fuels in American Aviation*, Sept. 9, 2021 (available at: <https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/09/fact-sheet-biden-administration-advances-the-future-of-sustainable-fuels-in-american-aviation/>)

all of these components are recognized, and the rest of the industries are cleaned up.

So, ZeroAvia was set up to address this problem. We focus on large, fixed-wing aircraft. We have looked at all the technologies early on in terms of how to solve it. We decided that batteries are too heavy, hybrid electric is too incremental, biofuels cannot really scale to full 100 percent of aviation. Synthetic fuels start with green hydrogen. So, therefore, we thought that going after hydrogen combustion, or hydrogen-electric would be the most efficient way to move aviation to a clean future in the long term.

So, out of those two, hydrogen-electric or hydrogen fuel cells are the most efficient way to address the problem. And so, they can really scale to the large size of aircraft. So, we focus on hydrogen fuel cells, zero emission, long range, low cost. And a number of third-party research suggests now that that can achieve abatement of 90 to 95 percent, and maybe even beyond of total human climate impacts from aviation, which is really, really important.

I also want to highlight this is happening now. We already have flown the world's largest hydrogen-electric aircraft ever flown, and in the coming weeks, we will fly even larger aircraft with a new prototype, 20-seat aircraft that we are preparing for flight now. Economics are great, as well, so, it is good business. Capital expense is similar to turbines, operating expenses even lower, lower maintenance because of lower stresses. Fuel is potentially less expensive—\$3 per kilogram of hydrogen cost is equivalent to \$1.50 per gallon of jet fuel because of the efficiencies. And of course, that is already below wholesale price today. And with DOE targets like \$1 per kilogram by the end of the decade, this definitely means good business.

So, what does it mean for likely adoption? Rapid change. I witnessed with my previous company a rapid disruption in auto transportation. In 2010, EVs were a novelty. In 2017, when I sold my previous company that built the world's largest smart charging network for electric vehicles, we didn't see any new internal combustion cars in any of the car shows anymore. So, over just 7 years, Tesla, the U.S. manufacturer, has become the largest manufacturer of new cars in that market.

So, now we see commercial aviation on the brink of a similar overtaking. Already, ZeroAvia has partnered with Alaska Airlines, United Airlines, British Airways, Amazon, and several large manufacturers to bring this technology to the market. Infrastructure is needed and possible, as well, and that is where we get to the airports. It is entirely possible to support this aviation undertaking with on-airport fuel production, and we need the infrastructure programs that would support it.

Elsewhere, where we at ZeroAvia have presence—for example, the U.K.—there are several different programs by Innovate UK, Aerospace Technology Institute, and the Department for Transport that drive that infrastructure need. And we are looking forward to working together with the subcommittee and with the fellow companies in this field to help bring similar programs and cross-agency collaboration to this field and work on these problems.

And I am looking forward to answering your questions. Thank you.

[Mr. Miftakhov's prepared statement follows:]

Prepared Statement of Val Miftakhov, Founder and Chief Executive Officer, ZeroAvia

Chairman Larsen, Ranking Member Graves, and Members of the Subcommittee, thank you for the opportunity to speak with you today. My name is Val Miftakhov, and I am the Founder and CEO of ZeroAvia, the US-headquartered leader in designing and building zero-emission, hydrogen-electric powertrain systems and deploying them to commercial aircraft. It is my privilege to speak to you about airports and sustainability, the work we are doing at ZeroAvia, and the steps we can take to facilitate the transition to a green hydrogen economy.

ZERO-EMISSION AVIATION IS HAPPENING.

In 2017, after years of building—and eventually selling—the largest smart charging network for electric vehicles, I launched ZeroAvia with one purpose: to tackle the mode of commercial transportation where it has proven most difficult to deliver emissions abatement: aviation.

Aviation is responsible for just under three percent of global carbon emissions, but its footprint goes much deeper than just carbon.¹ A number of recent climate modeling techniques and associated published papers suggest that total aviation emissions are warming the climate at about three times the rate of CO₂ aviation emissions alone.² Combustion creates and releases airborne nitrogen oxides (NOx), particulate emissions (soot), and high-temperature water vapor at high altitudes where they all contribute significantly to overall climate impact from aviation. These non-CO₂ emissions, as well as contrails, are known to have a 'multiplier effect' on climate change.³ Science also tells us that around 10 percent of aircraft emissions come during taxi, takeoff, initial climb, and during the approach and landing, amplifying the impact on local populations.⁴ Some studies have shown adverse respiratory health outcomes for residents within 10 km of the major airports, for example.

When we started ZeroAvia, we took an open approach to finding the most scalable solution that would mitigate the greatest share of aviation's climate impact, and, given my prior company was focused on electric vehicle charging, we certainly looked at battery-electric approaches. Battery-electric propulsion, which is currently leading the vehicle industry, can eliminate most of the emissions, but unfortunately batteries are just too heavy for commercial-scale larger aircraft, and battery-life constraints mean frequent—and costly—replacement, which would also significantly disrupt any high-utilization commercial applications of such aircraft.

Alternative combustion fuels like Sustainable Aviation Fuels are a good starting point, and a good first step in *reducing* carbon emissions. With predicted demand growth in aviation, however, we need to develop technologies to *eliminate* carbon emissions and tackle other remaining types of emissions. ZeroAvia is focused on that goal. We look at it in stages of evolution, with SAF, as noted above, helping to reduce carbon output as we transition to hydrogen. Even hydrogen combustion, while of course zero-carbon, still carries negative effects of NOx and high-temperature water vapor emissions. Finally, all combustion technologies suffer from lower efficiency compared to the electrified powertrains, including hydrogen fuel-cell based.

So, for a holistic solution, the answer must be electrification, and this can be achieved through electric propulsion using hydrogen fuel-cells. This technology eliminates CO₂, NO₂, SOx, and soot. Its only emission is the water vapor by-product of the fuel-cell, but even that occurs at low temperature (below 200C vs. 1,000C+

¹Graver, B., Zhang, K., Rutherford, D., 2019. CO₂ Emissions from Commercial Aviation: 2018. *ICCT Working Paper 2019-16*. International Council on Clean Transportation. https://theicct.org/wp-content/uploads/2021/06/ICCT_CO2-commercl-aviation-2018_20190918.pdf

²Arrowsmith, S., Lee, D., Owen, B., Faber, J., 2020. Updated Analysis of Non-CO₂ Climate Impacts of Aviation and Potential Policy Measures. *Report from the European Commission to the European Parliament and the Council*. European Union Aviation Safety Agency. https://eur-lex.europa.eu/resource.html?uri=cellar:7bc666c9-2d9c-11eb-b27b-01aa75ed71a1.0001.02/DOC_1&format=PDF

³Lee, D., Fahey, D., Forster, P., Newton, P., Wit, R., Lim, L., Owen, B. and Sausen, R., 2009. Aviation and global climate change in the 21st century. *Atmospheric Environment*, 43(22-23), pp. 3520-3537.

⁴Overton, J., 2019. The Growth in Greenhouse Gas Emissions from Commercial Aviation. *Fact Sheet*. Environmental and Energy Study Institute. <https://www.eesi.org/papers/view/factsheet-the-growth-in-greenhouse-gas-emissions-from-commercial-aviation>

for the combustion engines), which allows clever management of this output to avoid all negative climate effects. Additionally, the hydrogen-electric approach is truly scalable, as ZeroAvia has been demonstrating.

A number of third-party research efforts now support these findings. For example, in a study published in June 2020, Clean Sky, the largest European research program, estimated that direct-burn hydrogen systems can reduce the global warming effect of flying by between 50 and 75 percent, and SAFs can reduce it by between 30 and 60 percent. The study’s authors believe that the fuel cell has the potential to reduce *full* climate impact by 75 to 90 percent.⁵ Further, the most recent output of the landmark FlyZero project by the UK’s Aerospace Technology Institute points to hydrogen as a primary vector to fight the climate impact of aviation, with hydrogen-electric approaches achieving the highest—at least 90%—levels of abatement. In a table below, I summarize these various factors for all six major approaches to aviation climate impact.

	Reduction in Climate Impact				Technology Scalability	Net Impact	Key Challenges
	Direct CO ₂	NO _x	Water vapour & contrails	Total			
Battery Electric	● Limited	● Limited	● Limited	● Limited	● Limited	● Limited	<ul style="list-style-type: none"> ● Weight of battery precludes large aircraft use ● Frequent replacement
Hybrid-Electric	● Limited	● Limited	● Limited	● Limited	● Limited	● Limited	<ul style="list-style-type: none"> ● GHG pollutants
Sustainable Aviation Fuels	● Limited	● Limited	● Limited	● Limited	● Limited	● Limited	<ul style="list-style-type: none"> ● Feedstock sustainability ● High cost of synthetic fuels ● Same in-flight emissions
H ₂ Combustion	● Limited	● Limited	● Limited	● Limited	● Limited	● Limited	<ul style="list-style-type: none"> ● Produces NO_x & contrails ● High volume of fuel tanks
H ₂ Electric	● Complete	● Complete	● Complete	● Complete	● Complete	● Complete	<ul style="list-style-type: none"> ● Weight of the powerplant (short-term issue)

● Complete ● Moderate ● Limited

Figure 1: H₂-Electric is the only scalable, zero-emission solution.

To be clear, we are not talking about technology for 2050 or even 2035. In September 2020, ZeroAvia flew a 6-seat aircraft equipped with our ZA600, 600-kilowatt powertrain, the largest H₂-electric aircraft ever flown. In the coming weeks, we will fly a 19-seat, twin-engine aircraft powered by one of our hydrogen-electric ZA600s. By 2024, we expect to see commercial service with aircraft powered by ZA600 powertrains, delivering true zero climate impact flights. And, by 2026, we anticipate 40–80 passenger commercial aircraft flying with our next-size ZA2000 2-to-5 megawatt powertrains, also currently in development and with partnerships in place with the likes of Alaska Airlines and United Airlines as early adopters.



Figure 2: ZeroAvia’s flight path—all segments, starting with 500-mile range, 10–20 seat capacity

Importantly, aviation is a great use case for hydrogen fuel-cell adoption, not just because it is a practical solution to aviation’s climate change impacts, but also because the economics are attractive. With significantly lower material stresses compared to modern combustion turbines, major overhaul and repair costs will be significantly lower than they are for combustion engines. It is a common misconception that hydrogen fuel costs will be a barrier to aviation uptake when it is, in fact, likely to be a key selling point. Green hydrogen—which is made using only renewable

⁵ Hydrogen-powered aviation: A Fact-Based Study Clean Sky May 2020—https://www.fch.europa.eu/sites/default/files/FCH%20Docs/20200507_Hydrogen%20Powered%20Aviation%20report_FINAL%20web%20%28ID%208706035%29.pdf

energy and water—can have a cost today as low as \$3 per kg, which is equivalent to \$1.50 per gallon of jet fuel and which is, of course, already substantially below the current wholesale cost of jet fuel. For smaller operators in sub-regional and regional sectors, hydrogen-electric operation can already deliver dramatic cost savings. We calculate rapidly falling green hydrogen prices with \$2.2/kg in the near term, and major governments, including the recently announced U.S. DOE effort, target \$1/kg by the end of the decade. So, the environmental and economic cases are strong, but what does that mean for likely adoption?

Consider the example of the motor vehicle industry. After decades of efforts to make engines for passenger cars and heavy trucks more efficient, those incremental steps were quickly overtaken by a fundamental shift to electric-drive vehicles. In 2010, I saw that change coming and started a company to build the charging infrastructure those vehicles would need. Today, a relatively new US-based car manufacturer—Tesla—virtually controls this new vehicle market, and is one of the most valuable companies in the world. Now, commercial aviation is on the brink of a similar overtaking.

Of course, a large-scale transition to hydrogen-electric aircraft presents airports with the similar challenge of preparing their infrastructure for a more sustainable future. However, given the concentration of flights in commercial aviation, the infrastructure challenge is not nearly so daunting as it would be for migrating ground transport to a new drive technology. Consider the fact that 97% of all commercial traffic in the US is concentrated in just 150 airports. To repower aviation, the industry would therefore need about a hundred hydrogen fueling locations—contrast that with the more than 100,000 automobile gas stations in operation in the US today.

Furthermore, because of the hydrogen volume required by hydrogen-electric aircraft propulsion, airports also have an enormous opportunity to become centralized hydrogen hubs. ZeroAvia calculates, for example, that Houston Airport (IAH) would require 10 tons of hydrogen per day to operate just 50 percent of its sub-250 nautical mile flights. Given the volumes required as the system converts to hydrogen propulsion at scale across the sizes of aircraft and ranges of travel, the case for on-site production becomes quite compelling. And, economies of scale can deliver low hydrogen production costs, creating a big opportunity to convert ground operation vehicles, onward transportation, and proximate industry to hydrogen fuel where it can deliver further emissions reductions. This more deeply reduces the climate change impact of the aviation sector at large, and improves air quality for the airport and its neighboring residents.

ZeroAvia is already demonstrating this potential on a small scale. In addition to our aircraft, we operate multiple hydrogen fuel-cell road vehicles as part of our operations at Cotswold Airport in the UK and at Hollister Municipal Airport in California, demonstrating the value of hydrogen fuel cells for ground transport and ground operations. Airports that leverage this opportunity by producing low-carbon hydrogen on-site will create a new and valuable airport revenue stream and set the stage for true zero-emission aviation in the United States.

AIRPORTS NEED SUPPORT TO BUILD INFRASTRUCTURE FOR SUSTAINABLE AVIATION.

Transitioning to a green-hydrogen economy will require support. Airport funding programs in their current incarnations do not help airports make these investments. While the Department of Energy Hydrogen Hub program should prioritize supporting a handful of airports (especially given the impacts that airports can have as Hubs in themselves), that program alone will not be enough to facilitate widespread adoption of this game-changing technology.

In the United Kingdom, ZeroAvia's expanding operations are supported by grants from the UK's Aerospace Technology Institute and Innovate UK. In addition, our landside-to-airside hydrogen airport pipeline, Europe's first, received support from the UK Government's Department for Transport and the Connected Places Catapult as part of the Zero Emission Flight Infrastructure program to enable airports and airfields to prepare for the future of zero-emission operations.

The U.S. lacks such a zero emission airport infrastructure program. But, modifying existing Federal Aviation Administration airport funding and other financing programs can make a significant difference, encouraging adoption and helping restore the U.S. leadership in new aviation technologies. Historically, the FAA's airport programs and aircraft programs have been fully separated. Programs to develop more sustainable aviation are walled off from programs that help airports develop more sustainable ground operations. A solar array that generates the energy needed for the electrolysis that produces hydrogen will serve both aircraft *and* ground vehicles, but to which FAA office does the airport director apply? The transition to hydrogen will require leadership to open those silos.

Amending aspects of the Passenger Facility Charge (PFC), Airport Improvement Program (AIP), and Voluntary Airport Low-Emission (VALE) tools to include hydrogen production projects that supply airport vehicles and aircraft will be a great step forward. For example, in the current VALE Technical Report (version 7), published 12 years ago, both fuel-cell technology and transport of hydrogen are labeled as being “in the R&D stage and not yet commercially viable.” Given the advancements we and others are making technically and commercially, this urgently requires revision. Bringing program guidelines up to date will result in tools that better serve today’s airports.

Credit programs like the U.S. Department of Transportation’s TIFIA program will also help. In the Infrastructure Investment and Jobs Act (IIJA) enacted last year, airport landside TIFIA eligibility, which was not prohibited in TIFIA’s initial parameters, was explicitly included in the program, but the language does not encourage an airport project that supports ground transportation as well as aviation. Whether this takes the form of expanded TIFIA eligibility or a new aviation-specific credit program, the same investment-friendly terms will incentivize the transition to sustainable aviation. When airports use renewable energy sources to produce hydrogen that can be both used in their ground operations vehicles and sold to air carriers, they will have access to new revenue streams that can be used to service loans in the same way that highway tolling provides a loan service stream for a traditional TIFIA loan.

Infrastructure credits offer another approach to incentivize airports toward on-site green-hydrogen production. Within a new Federal clean fuel program, for example, airports investing in green-hydrogen would earn credits that can be sold to fuel providers whose products garner deficits by exceeding a statutory carbon-intensity (CI) standard. This is one aspect of California’s successful Low Carbon Fuel Standard (LCFS) program. In the LCFS, an entity that provides electric-vehicle charging stations earns credits that can be sold to a transportation fuel supplier whose fuel mix does not meet State CI standards.

These are just a few avenues toward timely development of airport green-hydrogen production to support more sustainable ground operations as well as zero-emission aviation. We at ZeroAvia look forward to working with the Subcommittee, with our colleagues in sustainable aviation, and with America’s airports to expedite this crucial transition.

COMMERCIAL AVIATION EMISSIONS CAN BE ABATED.

Under the right conditions, a path to initial safe, zero climate impact commercial flight by 2024 and large-scale removal of emissions from regional aviation by 2030 are absolutely achievable. The costs of failure in this pursuit far outweigh the costs of implementation. First and foremost, failure means that, as other sectors successfully reduce their footprints, aviation will contribute a larger and larger proportion of climate impact, with many estimates suggesting a 25–50% share for aviation by 2050 in the business-as-usual scenario. Sustainable aviation technology already developed will languish on the shelf, benefiting no one. Air carriers will not be able to lower their emissions beyond the incremental improvements made possible by Sustainable Aviation Fuels and engine efficiencies. And, U.S. skies will suffer. In that scenario, either people stop flying—as the growing pattern of European travel demonstrates—or the climate crisis worsens.⁶

Additionally, while some airports find the resources to make the necessary investments in green-hydrogen and begin to benefit from the new revenue streams it creates, other airports will be unable to compete and will lose service. The immediate cost of airport closures is that travelers will have to drive longer distances to access air routes. Over time, however, the lack of air carrier access will impinge on communities’ economic competitiveness.

The technology for zero-emission aviation exists today, and we will see commercial hydrogen-electric service before this decade is halfway through. Congress and the FAA have positioned the U.S. aviation system to lead the world. Those of us pursuing sustainable aviation welcome the opportunity to work with you to continue that leadership.

Thank you for the opportunity to speak with you today, and I look forward to answering your questions.

⁶Garay, E., 2022. How Short-Haul Flight Bans Are Transforming European Travel. Conde Nast Traveler. <https://www.cntraveler.com/story/how-short-haul-flight-bans-are-transforming-european-travel>

Mr. LARSEN OF WASHINGTON. Thank you. Thank you. All the witnesses have given us great food for thought, and we move to questions now. And I am going to start by recognizing the chair of the full committee, Representative Peter DeFazio.

Mr. DEFAZIO. Thanks, Mr. Chairman.

Ms. Bies, can Portland access the VALE program in order to reduce its emissions?

Ms. BIES. Chairman DeFazio, thank you for that question. No, we are in attainment, meaning that we have reduced our air toxics—

Mr. DEFAZIO [interrupting]. Right, but you can't access that program, is that correct?

Ms. BIES. Exactly—

Mr. DEFAZIO [interrupting]. You are not eligible.

Ms. BIES. Correct.

Mr. DEFAZIO. That is right?

Ms. BIES. Yes.

Mr. DEFAZIO. OK. I tried to correct that in H.R. 2 and want to bring it to the attention of the committee and see if we can do something this year to make all airports eligible, because carbon is not an attainment issue, EPA attainment issue. It is an overall issue in terms of climate change.

One other quick question. I was there with the President, and someone made a presentation on your new earthquake-resistant runway because we are anticipating a major quake in the Northwest, and that would be our one supply route left. Were you eligible for AIP funds for the extra costs to make that resilient, so the Government won't have to rebuild it after an earthquake?

Ms. BIES. We have only successfully secured funding to complete the design at this point, not for construction.

Mr. DEFAZIO. OK, thank you. That is pretty damn shortsighted, and we will see what we can do to help with that.

And then, to Val Miftakhov—did I get that right, sir? Yes?

What is the range we are talking about here? I am very intrigued by what you are looking at, in partnership with Alaska Airlines and United, in terms of the—you were projecting in the not too distant future to have a commuter aircraft, I think, 2026.

Mr. MIFTAKHOV. That is correct. Thank you for the question.

We are projecting a 2024 or 2025 launch of a 10- to 20-seat aircraft with our engines. In 2026 or 2027, a 50- to 70-seat aircraft. And the partnership with United is about the regional jets that we are looking to deploy before the end of the decade.

Mr. DEFAZIO. And what would the—OK, I see that. That is 3,000 nautical miles. It didn't say for the 40- to 90-seat one, the range. It said, UAM. I don't know what that means.

Mr. MIFTAKHOV. Yes, so, the initial range in 2024–2025 is about 300–400 nautical miles plus reserves. So, this is with reasonable commercial reserves. And 2026 is 700 miles.

Mr. DEFAZIO. You also mentioned—I mean, obviously, now—right now you are using what would be brown hydrogen, or even what the industry likes to call blue hydrogen, which is still a fossil-fuel pollutant. You mentioned green hydrogen. Is any airport currently producing green hydrogen?

I know of one transit district in America that is cracking water to produce hydrogen for their fuel cell buses. Are there any airports doing anything like that, or anyone anticipating doing anything like that?

[No response.]

Mr. DEFAZIO. OK, I guess we lost him there somewhere.

OK. Well, I would be interested in the answer if we can get it at a later time.

And let's see, I think I have one other question, Mr. Chairman. I still have a minute here. Let me go back to my questions. Yes. I was going to ask—again, Mr. Hoback, the microgrid.

What advice would you give to other airports on doing the microgrid?

And again, was the microgrid AIP-eligible?

Mr. HOBACK. Thank you for the great question, Chairman DeFazio. The microgrid was not AIP eligible.

And what advice would I give to other airports? It is so important, when planning big transformational projects like this, to make sure that you are securing those partnerships. The biggest thing that we saw that made our project, our microgrid project, so successful was the tremendous local partnerships through our public-private partnership. We didn't put a dime of capital into building our microgrid.

So, having those partners right from the start to help come up with the solutions that help you achieve your goals is so very important. Thank you.

Mr. DEFAZIO. But again, another shortcoming of the AIP program. I think that is the third one we have just mentioned. So, thank you. Thanks for the work you are doing there.

Thanks to all the witnesses. This is a great hearing, and I am looking forward to this new future for aviation.

Thank you, Mr. Chairman.

Mr. LARSEN OF WASHINGTON. Thank you. The Chair recognizes Representative Graves of Louisiana for 5 minutes.

Mr. GRAVES OF LOUISIANA. Thank you.

Colonel Bunce, I appreciate you being back before the committee again. And as I covered in my opening statement, I am a little bothered that we are not here today talking about some of the new technology, new entrants into the market. I know that your association represents a lot of the big names in AAM.

Can you talk a little bit about how the FAA's decision to abandon the part 23 and go into the special aircraft category is impacting your members' ability to move forward?

Mr. BUNCE. Absolutely. As you mentioned, we passed the part 23 rewrite back in 2016, and that followed the unanimous vote by Congress on the Small Aircraft Revitalization Act in 2013.

Since 2016, we were going forward with this process of being able to certify these aircraft as airplanes with a vertical capability. And even the previous FAA Administrator announced publicly that is the way we were going in a very—what I would consider very non-transparent process. They only talked to just certain applicants that were the most further advanced in the area to tell them that we were going to shift course. They now have reversed the way we are going to certify.

So, what is the impact? We don't know, because we haven't had the meetings with the FAA, whether we could even validate these machines. And you know we have got to be able to validate with other authorities to be able to fly these as global products.

But the other thing—and I heard your frustration, as well as Chair DeFazio's frustration—it does concern me about rulemaking. Because in the previous path, we were going to go under some deviations and waivers until a rule was done. Now, if there is not going to be a delay, we have got to hold the FAA to their word that there won't be a delay, and they have to pass what is called an SFAR, which is Special Federal Aviation Regulation.

Right now, if you go on the website, the agency is 50 rules behind, and one of those is an omnibus rule with 10 rules in it. And these are pretty significant rules. There are cybersecurity rules that were done back in 2016. There are rules that came out of ACSA. There are also rules on just flight training, the way we do flight training in this country.

And so, we are now—we have created this funnel. And for us to be able to meet the timelines we want with advanced air mobility, something has to give. We have got to get through this process very quickly. So, with a 2-year timeline to be able to get these machines in the air, the FAA has a lot of work to do. And we hope that you will help us hold them accountable to work their processes and make some changes so that we can get through the system.

Mr. GRAVES OF LOUISIANA. Sure. And Colonel, look, we are excited about the conveniences and the advances that the new technology provides. But if the approval system is going to be the throttle, then we are going to run into some pretty significant problems in regard to being able to realize those benefits.

Mr. HOBACK, I appreciate you being here and with us today and covering some of the efforts of the Pittsburgh Airport. Obviously, what you are doing with the microgrid is amazing, not just powering airport operations, but also a hotel and a gas station. And importantly, you are producing energy onsite, covering your own energy needs, which includes, I think, some of the criteria we have advocated for: reliable, affordable, clean, exportable, and secure supply chains.

Can you talk about how your strategy moving forward will be able to facilitate some of the new technology we just discussed with Colonel Bunce, specifically some of the charging stations and others?

Mr. HOBACK. Yes, yes, sure. Thank you so much for the question, Ranking Member Graves.

We believe it is critically important to both be looking at the long-term future from a renewable energy standpoint, but also really having some transitional time to really focus on things that we can do right now by utilizing some of the energy resources that we have right here on the airport property.

We are very fortunate to be sitting atop the Marcellus Shale, and have partners that are certainly providing those natural gas resources and utilizing them in projects like our microgrid. But certainly, looking at some of the other opportunities that we have to utilize technology right now by working with those partners is something that we are pursuing right now.

Obviously, looking at the electrical vehicles and utilizing some of that 7 megawatts of capacity to be able to support electric-vehicle charging stations is something that we are looking at, among many other things.

So, yes, we are absolutely looking at some of those technologies. So, thank you very much for the question.

Mr. GRAVES OF LOUISIANA. Great, thank you. I am out of time, but I am going to submit for the record—I am very curious about what you see as being some of the obstacles or impediments to your ability to meet your net-zero goal. And I would also love to hear a little bit about some of your thoughts on price thresholds. So, I will submit that for the record, and look forward to you all's answer.

I yield back.

Mr. LARSEN OF WASHINGTON. All right. I recognize myself for 5 minutes.

Mr. Plaza, your testimony referenced the lack of essential SAF infrastructure at airports across the country. What types of essential SAF infrastructure do airports need?

Our impression is that SAF is really a drop-in fuel. So, what else do airports need for sustainable aviation fuel?

Mr. PLAZA. Well, thank you for the question, Chairman Larsen, and I think it is a complex topic because every airport is different.

But fundamentally, SAF is approved for blending up to 50 percent with kerosene or petroleum jet fuel. And so, often, one of the challenges for airports is that blending needed, and the, sort of, the distributed tank storage that would allow for that blend to then enter into the facility.

I think the other item that we are seeing is this ties into resilience. And there are certain airports along the west coast where resiliency of supply due to weather, earthquakes, and other, sort of, challenges complement the ability to bring in SAF blending at those regional airports.

So, infrastructure at airports is a key component for the industry to enable these new fuels to then get to our customers like Alaska Airlines and others.

Mr. LARSEN OF WASHINGTON. Ms. Ardizzone, could you address that a little bit? You have signed an MOU with SkyNRG to increase investment in SAF, but what does that MOU entail? And what limitations do you see still, other than the blended—other than the tax credit?

Ms. ARDIZZONE. Sure. So, related specifically to the infrastructure, I would really like to call out a couple of things.

Commercial scale quantities of sustainable feedstock, I think we have covered that quite a bit today; feedstock processing and transportation facilities; facilities to convert feedstock into SAF; facilities to blend SAF with Jet A; confirmation that the fuel quality and environmental standards have been met; transportation of the SAF purchased by the airline to the airport; and receipt and deployment of blended SAF at airports.

There is really quite a bit of infrastructure that needs to be in place.

Mr. LARSEN OF WASHINGTON. How much can be used through existing infrastructure?

I mean, right now, Jet A is delivered by refineries through pipelines to Seattle-Tacoma International Airport, as a for-instance.

Ms. ARDIZZONE. So, for one thing, we are going to need everybody to produce SAF, not just folks that are dedicated to new forms of biomass, but we are going to need traditional fuel suppliers to get into the SAF business if we are going to meet demand.

Knowing that we have an existing infrastructure today is fantastic. We can use a lot of it. But because we will have geographic diversity, it means we are going to have new forms of infrastructure to supply that to airports, particularly if we want to get to the smaller airports.

One thing I want to really call out is, to me, SAF is like the Triple Crown. It is going to have economic advantages because it is going to produce jobs, because we are going to see an explosion of the market. It is going to provide energy security. And lastly, substantial greenhouse gas emissions reduction. So, Triple Crown.

Mr. LARSEN OF WASHINGTON. Thanks.

Mr. HORTON, can you explain a little bit more for me—and maybe it is in your written testimony in more detail—what you meant by stress testing for resilience, and why that is important?

Mr. HORTON. Yes. Thank you again, Chairman Larsen.

A lot of us in the industry focus on stress testing through tabletop exercises and other measures that are designed to really think through how an event cascades.

What we are really looking at, when you look at modern research or current research on resilience, there needs to be an emphasized focus on recovering quickly and adapting to changes. So, the stress testing is really designed to determine how potential failures can cascade through an airport system.

We know that the airports are very complex systems, and they have a lot of dependencies that link each component together. So, our desire is to, again, put more emphasis on conducting the stress testing, much like the financial industry has seen, so that we can uncover some of those critical links.

Mr. LARSEN OF WASHINGTON. What would you determine are the causes of those links breaking up, according to the tests that you have done?

Mr. HORTON. So, some of what we have seen is that our industry has prioritized—and justifiably so—safety and efficiency, but not really an indepth focus on resilience, on the recovering quickly. And so, when you harden those systems from a risk perspective, you are looking at preventing the systems from failing, because the consequences can be catastrophic.

But in resilience thinking, the idea is to—again, as I mentioned before—allow you to preserve a critical function. One of the things we learned through COVID is that the role of the airport is continuing to increase in importance. And when people weren't flying, we did see that we were shipping freight and critical supplies around the world.

So, again, hardening to prevent failure is not as beneficial as enabling resilience capabilities.

Mr. LARSEN OF WASHINGTON. Thanks. I will now recognize Representative Kahele from Hawaii for 5 minutes.

Mr. KAHELE. Aloha, Chair Larsen, Ranking Member Graves. Mahalo for holding his hearing to discuss this important issue at the Aviation Subcommittee today.

As a lifetime pilot, I also share the chair's enthusiasm with sustainable aviation fuels.

The State of Hawaii, isolated in the middle of the Pacific, is dependent on air travel. As a result, Hawaii is trying to do its part by focusing on reducing its dependency on fossil fuels and exploring various avenues to reduce greenhouse gas emissions. Currently, nearly one-third of the energy consumed in the State of Hawaii is used for jet fuel, which is a higher proportion of petroleum consumption than any other energy sector in the islands.

As the State moves towards sustainable aviation fuels, this will allow our State to reduce fossil fuel impacts on the environment, improve the health of the State's communities, and provide sustainable new business opportunities. This measure will shift the State towards sustainable aviation fuels, and I believe develop and establish new economic opportunities, creating jobs and establishing a sustainable aviation fuel program in the State to fuel the large number of domestic and international aircraft that operate and transit the Hawaiian Islands each and every day.

My question is for Mr. Plaza. Last year, the Biden administration launched the SAF Grand Challenge, which aims to reduce aviation emissions by 20 percent, and produce 3 billion gallons of SAF annually by 2030. What would your recommendations be to help ensure this effort can support newer SAF developers for places like Hawaii, where we have a tropical environment?

We have and can grow an abundance of biomass feedstock. We have the potential for hydrogen, and we need to make the necessary investments to scale SAF production in Hawaii. How would we do that, Mr. Plaza?

Mr. PLAZA. Thank you, Congressman. I will give you a short answer, and will follow up, certainly, with more details, because I think you bring a really important point to the table, how do communities like Hawaii sort of prosper in this new area.

Fundamentally, the SAF Grand Challenge requires a continuation of focus on tax credits, as we have talked about. I won't belabor that point any more, other than to say there is wide-scale support for the BTC, or the SAF blender's tax credit. That is a key enabler.

The other component that I think is worth mentioning, which is not necessarily in the committee's, sort of, focus, but it is the recognition that programs like the Renewable Fuel Standard, which support the development of clean fuels, need to have embraced these new solutions, such as hydrogen as a source for energy for the production of sustainable aviation fuel, such as new feedstocks like renewable natural gas that we are focused on. So, today, the only fuel that is approved for the program under the RFS are crop-based fuels. And as we all agree, those are limited in scale, and we really need to focus on these new solutions.

So, I think Hawaii can be a meaningful participant in this space. You do have the resources that can enable these new technologies like companies that are here today are talking about, whether that be sustainable aviation fuel and/or green hydrogen. And I think it

is a really exciting opportunity. But we do need leadership and new policy, both from the tax side as well as the regulatory side under EPA. Thank you.

Mr. KAHELE. Mahalo, Mr. Plaza, and I will yield back the remaining balance of my time.

Thank you, Mr. Chairman.

Mr. LARSEN OF WASHINGTON. Thank you. The Chair recognizes Mr. Balderson of Ohio for 5 minutes.

Mr. BALDERSON. Thank you, Mr. Chairman. And I know the ranking member, Mr. Graves, talked about this, but I am really fascinated with this. So, this is for Mr. Hoback.

On your Pittsburgh International's energy production apparatus that you have there, your airport has the world's first microgrid that is entirely self-sufficient. What are the changes you have seen in cost and reliability for the airport's energy supply since implementation of onsite natural gas and solar energy production?

Mr. HOBACK. Yes, so, thank you so much for the question, Mr. Representative.

We have seen significant changes. In the first year of operation, we have saved over \$1 million from our previous electric bills, which is significant and amounts to over 12 percent of our total cost to operate here.

From a resiliency standpoint, we are completely off the grid. So, the actual electrical grid is our backup power. So, we have tested this with our partners, and it is a tremendous opportunity for an airport like us, who relies so importantly on maintaining power during critical operations, that we have that type of resiliency. So, it has been a tremendous addition, from an infrastructure standpoint, to our campus.

Mr. BALDERSON. OK, thank you.

Mr. HOBACK. Thank you, sir.

Mr. BALDERSON. A followup: is it feasible? Is implementation of a self-sufficient power grid something all commercial airports should consider?

Mr. HOBACK. We absolutely believe that it is. It is absolutely feasible.

I mean, we do use some of the gas that we produce right here on the property. But it is absolutely 100 percent feasible that it would be a great addition, from a microgrid standpoint, and to be—especially for those airports that have less resilient power grids, for them to take control of their own destiny by putting in something like a microgrid. Yes, sir.

Mr. BALDERSON. All right.

Mr. HOBACK. Thank you.

Mr. BALDERSON. Thank you, Mr. Hoback. I will ask you one more question.

In 2014, your airport entered into an agreement with CONSOL Energy—it is right across the border from me, so, I am familiar with this company—regarding natural gas production. Can you speak to what benefits that partnership has had for the airport and the community as a whole?

I mean, I am sure they appreciate it.

Mr. HOBACK. Yes, certainly. So, that has been very important.

If you know anything about Pittsburgh International Airport, we were a former major hub of U.S. Airways. So, when I started at the airport back in the year 2000, we had 21 million passengers, most of which were connecting traffic. And then you had 9/11, two U.S. Airways bankruptcies, and the dehubbing of Pittsburgh. So, that led to much fewer passengers using Pittsburgh International Airport and much less access to capital and to capital expenditures.

So, us taking control of our own destiny, relying on some revenue that is produced from this energy resource that is right here on the airport property, has been critical to us really making some transformational changes that we have made over the last 6 or 7 years here at Pittsburgh International Airport. So, it has been absolutely very important, frankly, for us as an airport.

Mr. BALDERSON. Well, thank you very much. And thank you for your time today.

And, Mr. Chairman, I yield back my remaining time.

Mr. LARSEN OF WASHINGTON. Thank you, Representative Balderson.

The Chair recognizes Representative Mace of South Carolina for 5 minutes.

Ms. MACE. Thank you, Mr. Chairman. In a little over a century of the airline industry, aviation has gone from learning to fly to learning to fly faster, and learning to fly further, learning to fly heavier planes. And now, having over 100,000 commercial flights occurring around the world each and every day, that is over 400 departures per hour. Aviation is at the forefront of innovation to become—and is—one of the safest, most reliable modes of transportation in the world today.

I have learned a lot in my first year in Congress, learned a lot about the aviation industry trying to become greener and cleaner with fuels. And so, I have a few questions today for Ms. Ardizzone.

Thank you for being here this afternoon. Aviation is a particularly difficult transportation sector to decarbonize, despite the incredible advances that we have had over the last century. What else can Congress do to support the aviation and airline industry in meeting its climate goals?

Ms. ARDIZZONE. Thank you very much. And I do want to again call out the fact that we have had significant improvements over the last couple of decades, particularly from aircraft manufacturers and engine manufacturers.

I have called them out today, but I want to call it that again. First and foremost, support the Sustainable Skies Act that creates the blender's tax credit. It is really constructed very well. It is available for the next 10 years. It makes SAF commercially viable by accelerating production. And that, in turn, will drive down the price by rewarding fuels with improved environmental benefit. So, we think the way it is structured is really smart.

Secondly, support an infrastructure grant program designed to produce, transport, and source SAF. That is the AERO Act.

Third, expand the VALE program by allowing more airports to participate. For example, both Seattle and Portland cannot participate today.

Four, work to expedite regulatory approvals of new SAF feedstocks. The current process is crushing innovation, expansion, and capital investment.

Thank you.

Ms. MACE. Thank you. Yes, thank you. That was very detailed, and it actually answers my second question I had this afternoon of what else we could be incentivizing or considering. And thank you for that detail.

If a sustainable aviation fuel market becomes more competitive, if costs go down, quantity increases so it is more affordable. Could you describe what is the next step after that for the airline industry to be greener, to address climate issues within aviation?

Ms. ARDIZZONE. Well, I do think it is going to take several decades for SAF to be prevalent enough to support the industry. But we also know we have to meet long-term obligations of changing to, probably, some kind of energy-based or electric-based systems.

In the meantime, we are doing everything we can to, I will say, change the culture and operational performance of the airline. So, one thing we have done is that we have added a carbon emissions goal to our performance-based pay. And this isn't just available to our leadership. It is available to all of our frontline employees. So, everyone starts thinking, all 23,000 employees, what can we be doing every day to make sure we reduce carbon emissions?

But long term, we believe it is important for us to start working with and signaling to the market, particularly folks like SkyNRG and our friends with—I am sorry—ZeroAvia—my apologies—that are doing things to actually transform the industry.

Ms. MACE. Thank you.

Thank you, Chairman Larsen. I yield back.

Mr. LARSEN OF WASHINGTON. Thank you. I will recognize now Representative Williams of Georgia for 5 minutes.

Ms. WILLIAMS OF GEORGIA. Thank you, Mr. Chairman. As you mentioned earlier, we are working on a discussion draft of the Aviation Emissions Reduction Opportunity Act, or AERO Act. Our discussion draft builds on the Senate's AERO Act by not only investing in sustainable aviation fuel, but also funding the Continuous Lower Energy, Emissions, and Noise, or the CLEEN program. It will keep our skies quieter and our air cleaner. And I look forward to getting feedback on this discussion draft today, and hope that all members of the subcommittee will join us in cosponsoring it once it is introduced.

I would like to start with the CLEEN program component of the bill, because, you all, I am deeply invested, because I live really close to the world's busiest and most efficient airport down in Georgia's Fifth Congressional District in Atlanta. I live so close to the airport that I can hear the planes fly over every 60 seconds, you all. And I hear from constituents in the same position that I am in all the time: We have to reduce noise pollution for our people to thrive.

Mr. Bunce, what would a substantial investment in the CLEEN program mean for my constituents who are lying awake at night or are awakened very early in the morning by planes flying overhead, and how would this improve their daily lives?

Mr. BUNCE. Well, thank you, Representative. We have been working on technology to be able to make aircraft quieter for many, many decades. And really, the proof is in the pudding. If you look at how quiet aircraft are in this day and age versus even 20 years ago, the improvement has been fantastic.

NextGen has helped a lot in ways to be able to have, instead of this dive and drive type of approach, we have been able to do continuous descent type of approaches. And your help, along with the FAA's, in being able to push NextGen forward has helped us with this.

Now, as we find more precise approaches, we fly over the same spot on the ground all the time versus more diffused flightpaths that we had previously. And of course, we know when people see an aircraft they hear it, even though it could be quieter. Some of the new technology that we have out there, electrical augmentation, but also some of these new vehicles out there are extremely quiet. And if you watched the recent "60 Minutes" special, they just could not even believe how quiet some of this technology was. So, we keep working on the cells, and the efficiency of these aircraft will help with noise.

Also, if you look at mobility in the future—and we are able to use some of the reliever airports—we have an infrastructure that no other nation on the planet has. We have over 5,000 public use airports, over 13,000 airports out there. As we start to diffuse some of that traffic out to tertiary airports to allow people to use those with advanced air mobility machines and that, we will be able to reduce some of the congestion that we see at some of our major hubs. And I think that will help a lot, as well.

Ms. WILLIAMS OF GEORGIA. Thank you. And now, turning to the AERO Act's investments in sustainable aviation fuel, could you elaborate on how much investments help us achieve a transition to 100 percent clean energy, while also providing for growth in the aviation industry, Mr. Bunce?

Mr. BUNCE. Well, part of that AERO Act that you mentioned that we are very excited about is that 30 percent of that also goes towards advancing technology. So, as we look, there are things that you can do. As we talked previously about hydrogen, the electrification, we are learning more and more from our engine companies about how we can go and generate more electricity.

You use a lot of energy when you ascent an aircraft. You have just got to have more. It is just like a rocket. You have got to have a lot of thrust to get up there. But once you are getting up to stable flight, you don't need as much energy. So, if you are able to augment that with electric generation and other technologies that we have on the horizon, it actually reduces the amount of fuel burn. You add that to the lighter weights that we are making all of our aircraft out there, and you really can see some significant improvements.

So, if you look at the [inaudible] charts that represent both on commercial and business aviation aircraft as we go past 2030 and beyond, that technology piece starts to blossom out there because we see some of these technologies really starting to mature and, of course, we have to have SAF blossom as well to be able to make our net-zero goals by 2050.

Ms. WILLIAMS OF GEORGIA. Thank you so much.

And Mr. Horton, as someone who also is a representative of a large airport like myself, you know that achieving environmental sustainability takes time, effort, and investment, and intentionality. So, what extent does robust public investment in things like sustainable aviation fuel infrastructure accelerate the timetable for a large airport to decarbonize?

Mr. HORTON. Thank you for the question, Congresswoman. The investments in sustainable aviation fuel are critical to enable airlines to decarbonize.

We all know about CORSIA and the need to invest in offsetting international emissions. However, at the airports there are a lot of opportunities that exist. For example, we know that we generate a lot of waste, and some of that waste can be converted into sustainable aviation fuel. We are hoping to see the challenges that were put up by the administration help to bring the economics within range. The two to six times the cost of conventional jet fuel is going to be an inhibition to airlines from adopting and transitioning to sustainable fuels.

So, we hope to be part of the solution. We want to complement the efforts. We want to make sure that the enabling infrastructure works. I know that we have tested a lot of the partnerships and tested the strategies. We know it is a drop-in solution, it is easy to action on. All we need to do is work on bringing the development and the processing closer to the area that is being used, and leverage the resources within the region.

So, we hope to see more progress made here in the next few years.

Ms. WILLIAMS OF GEORGIA. Thank you.

And Mr. Chairman, I have no time to yield back.

Mr. LARSEN OF WASHINGTON. Thank you very much, Representative Williams. We will now go to Representative Steel of California for 5 minutes.

Mrs. STEEL. Thank you, Mr. Chairman.

I believe the Federal Government has an important role to play in cutting redtape where new, safe technology can be approved, yet avoid the pitfalls of using taxpayer dollars to pick winners and losers.

I am happy to be a member of the Quiet Skies Caucus and to work here in Congress to help reduce noise and pollution from air travel. I believe the best way to do this is to create a fair playing field where innovation can flourish, and airlines, manufacturers, and travelers can make the best choices for their businesses and, most importantly, for the health and well-being of their passengers and the communities in which they operate.

Ms. Ardizzone and Mr. Bunce, in your testimonies, you mentioned the CLEEN—C-L-E-E-N, Continuous Lower Energy, Emissions, and Noise—program to help speed up the adoption of technologies that will reduce aviation noise and emissions. Can you discuss some of the progress being made toward adopting these technologies?

Mr. LARSEN OF WASHINGTON. Representative Steel, could you clarify who you are asking, please? Thank you.

Mrs. STEEL. Mr. Bunce and—actually, both of them—Ms. Ardizzone.

Mr. LARSEN OF WASHINGTON. Oh, OK, Mr. Bunce, OK.

Mr. BUNCE. As we look toward these technologies—and I think that, Representative Steel, you’ve got it exactly right—reducing redtape and allowing manufacturers to compete on a level playing field becomes extremely important. It doesn’t take a whole lot of Government investment just to make processes smooth. And we are very concerned with all of the changes at the FAA and personnel, but also all the new people that have come on board.

There needs to be more training out there to allow us to get through the process. Right now two of our aircraft certification offices have gone and told the manufacturers that go in their specific regions that to get an answer back is going to be moved from 30 days to 90 days. Industry just can’t work like that.

So, if you put forward something like to get a project approval or a test plan approved, to have a 90-day turnaround is just unacceptable. One of our companies wanted to switch from one LED landing light to another landing light. They put a submission in—and this was an Oregon company—in September. They didn’t hear back until April. And they are almost out of the old lights, because they can’t get it through supply chain.

So, again, those types of things to allow technology to go forward has to come with efficient processes for certification by the regulatory authorities, and then validation and using the bilateral safety agreements we have with other states of design, like Europe and Canada and Brazil, to be able to leverage the safety competencies of the other regulatory bodies.

Mrs. STEEL. Mr. Bunce, so, is there any progress being made, or is it just not really progressing? It is kind of slow, or instead of 30 days, it takes 90 days. How can we adopt these technologies, and it just takes forever, how are we going to progress after that?

[No response.]

Mrs. STEEL. Mr. Bunce, you are muted.

Mr. BUNCE. Sorry. We are throwing more activity at the FAA with the addition, obviously, of advanced air mobility.

But also, just as technology is advancing we have to have specialists, and we are competing, obviously, with the FAA in hiring specialists. Most of our factories are down about 20 percent in engineers and 20 percent in technicians out there. So, we have got to be smarter. Like to appeal to young people, it was very good to see the report come out for women in aviation recently. That gave us some tools to be able to recruit more women into our workforce.

But we—it is getting worse. It isn’t getting any better. And whether it is between authorities on either side of the Atlantic, or whether it is just in the FAA right now, things are bogging down, slowing down. As I talked about that funnel, we cannot do things without policy and guidance and regulations. There are other industries that can. We are not allowed to. And so, if everything has to go through this funnel, and everything has to have legal review, it all bogs down.

And I can give you a list of over 200 policy and guidance areas that the FAA isn’t able to issue right now, and some of those are

very important standards for us to be able to employ this technology. So, it is very concerning.

Mr. LARSEN OF WASHINGTON. We will have to move on.

Mrs. STEEL. Thank you so much, Mr. Bunce.

I yield back.

Mr. LARSEN OF WASHINGTON. Thank you very much.

I recognize Congresswoman Holmes Norton for 5 minutes.

Ms. NORTON. Thank you, Mr. Chairman. I appreciate this hearing on climate change and airports. Climate change is maybe the most important issue of our times. My first question is for Mr. Hoback.

I have been leading the charge here in the House to combat climate change in surface transportation, that sector.

I notice that you said that you view natural gas as a transitional step to move the industry incrementally. What do you see as the next step after natural gas?

I am concerned about how long the airport industry should rely on natural gas, given it is not a renewable resource.

Mr. HOBACK. Yes. So, thank you so much for the question, Representative Norton.

We are certainly looking long term at this problem. We are looking at all of those renewable resources. That is why we have invested significantly in our solar farm that we have on the property. And we are prepared to actually double that in size in the next year to continuously work towards additional renewable resources.

But we also know that it is going to take them some time to have that transition. So, we are utilizing some of the resources that we have available to us today to significantly reduce our impact today, like with our microgrid, like with the reductions that we have had in the carbon footprint based on producing all of our own electricity right on the property.

So, we think that it is very important to look at both the long-term and the immediate impacts that we can have on this problem that we are all facing right now.

Ms. NORTON. I appreciate that.

Mr. Bunce, I am one of the chairs of the Quiet Skies Caucus, so, I want to thank you for bringing up aircraft noise in your testimony. It impacts the lives, of course, of our constituents daily, affecting their sleep and their health.

Since the primary focus of our hearing today is addressing climate impacts, do any of the current emission reduction innovations in the aviation industry also reduce aviation noise?

Mr. BUNCE. Representative Holmes Norton, yes, I think they do.

As we are able to go ahead and do what is called additive manufacturing—the term that most of us are familiar with is, basically, 3D printing. But you can do it with metal now. And as you start to do that, and you put the layers on, you can come up with designs that we couldn't even think about before, because we had to put pieces and parts together. So, we not only make it lighter, but it is also able to change total flow control that you can have in an engine and in a cell.

So, as we go in and promulgate these new types of technology in the aircraft, we are able to make them quieter. And as we get more of these new production aircraft and retire older systems, obviously

we are able to go—the older hardware is louder, and the newer ones, coupled with these new procedures that we have, really do help. If we are able to go and do these continuous descent type of approaches that we have been working very closely with the FAA on promulgating, it really does help to drive noise down.

And of course, when you do configure the aircraft, and you put out flaps, and you put out gear and that, you do change the noise profile, as well. So, you can do some things with aircraft structures to be able to reduce that noise when what we call getting dirty, putting all these extra drag devices and slowing down the land happen. So, there is progress being made there, as well.

Ms. NORTON. Well, thank you very much.

I do have a question for Ms. Ardizzone, because in your testimony, you mentioned that Alaska Airlines is the first domestic airline to utilize a new software system to determine the safest and most efficient flight plans. What is the scalability of that software?

Could it be utilized by all major domestic airlines to increase efficiency of flight plans?

Ms. ARDIZZONE. Yes, it can. We are very excited to have partnered with the company that developed it over the last year. We have it in place today. It is working extremely well. It really optimizes the flightpath. So, it provides the most efficient—so, it reduces the amount of emissions. It is also extremely safe. I know other airlines are looking at it now. I think another is soon to launch it.

But much like our viewpoint is on all safety-related items, we would like to see the industry adopt it.

Ms. NORTON. Thank you. My time is expired.

Mr. LARSEN OF WASHINGTON. Thank you. We will now turn to Representative Johnson of Georgia for 5 minutes.

Mr. JOHNSON OF GEORGIA. Thank you. I want to thank you, Mr. Chairman, for holding this hearing. And I want to thank the witnesses for their testimony.

Over the next few decades, climate change will affect every part of American life: our health, our economy, and even our geography. We must all work to avoid the steep human and economic costs of a worsening climate crisis, and to guide the transition to a low-carbon economy.

The Infrastructure Investment and Jobs Act provides an opportunity for airports to make just such a transition, as well as to mitigate some impacts of climate change. New Government initiatives will help to ensure some of the most harmful aviation pollutants are removed from aviation fuel.

And while the aviation industry has made substantial progress in reducing emissions in the past, much more needs to be done.

Over 25 years ago, lead was banned from all gasoline due to the severe health consequences of lead exposure, especially to young children. But despite the known dangers of lead pollution, lead continues to be used in aviation fuel for piston engine aircraft. This is now our country's primary source of lead emissions.

Mr. Bunce, in your testimony you spoke of the joint Government and industry Eliminate Aviation Gasoline Lead Emissions, or EAGLE, initiative, which will remove lead from piston engine aircraft fuel by 2030. The EAGLE initiative is long overdue. And the

delay begs the question, given that lead is so toxic, why has it taken so long for aviation manufacturers to remove the need for leaded gasoline?

Mr. BUNCE. Representative Johnson, excellent question. If you look back at the history of lead in an aircraft engine, if you go back to World War II, it actually helped us win World War II. We had a secret formulation that allowed the boost of the octane up to 100 octane.

Mr. JOHNSON OF GEORGIA. No doubt it has worked well in the past for us. But, I mean, this is now 2022.

Mr. BUNCE. Right.

Mr. JOHNSON OF GEORGIA. It is almost 80 years since World War II. Why has it taken so long to remove lead from piston aircraft fuel?

Mr. BUNCE. So, a piston engine is much smaller and lighter. Remember that we can't have the weight that we have in the automotive sector. If you don't put a couple drops of lead per gallon in there, you have what is called detonation: an airplane basically—and the cylinder head—explodes.

So, we have been working since 2012 on what is called the PAFI initiative, Piston Aviation Fuel Initiative, to find an alternative fuel. It has been very elusive, and some of the fuels that we have come forward with have bogged down due to some of their chemical content as we have gone into some major robust testing.

So, now what we have done is we have partnered with the Federal Aviation Administration on what you mentioned, the EAGLE initiative, and we put a stake in the ground and said if we can't find the 100 percent drop-in solution like we have with SAF for jet fuel, we are going to have to just regulate the lead away, and do that in a very methodical process because there is a safety component.

We have got to remember that there are 170,000 piston aircraft out there, and they are the first responders when we have a national disaster—

Mr. JOHNSON OF GEORGIA [interrupting]. Well, thank you. My time is going by.

Are you and the general aviation manufacturers committed to ensuring that the EAGLE initiative succeeds? Let me ask that question.

Mr. BUNCE. Absolutely, sir. We—

Mr. JOHNSON OF GEORGIA [interrupting]. And let me ask you what actions by Congress would you recommend to ensure success of the EAGLE initiative?

Mr. BUNCE. The funding of the program, to be able to go ahead and allow us to do adequate testing to buy—there are five different formulations that are out there by different companies. We want them all to compete. We want them to be successful. But we have got to test a lot of these fuels, whether it is over at the FAA tech center or by an independent testing cell.

So, support for those programs in the initiative each year through appropriations with your colleagues there would help us a lot.

Mr. JOHNSON OF GEORGIA. OK. Well, I thank you so much. I only have 15 seconds left, so, I will yield that back.

Mr. LARSEN OF WASHINGTON. Thank you, Representative Johnson. We are going to go with Representative Titus of Nevada.

You are recognized for 5 minutes.

[Pause.]

Ms. TITUS. I wasn't expecting to be next, but thank you very much, Mr. Chairman. I was going to ask Mr. Bunce a couple of questions about AAM, advanced air mobility.

Next year, we are going to be facing reauthorization of the FAA. And by then I think we will have an increased focus on AAM, and also on unmanned systems.

Now, we have said in this committee and today and on other days how hidebound the FAA is, and how hard it is to get them to change things. You mentioned electric vertical takeoff and landing, and you admonished us to provide flexibility in this sector, especially when including both aircraft and airport structures. So, I wonder if you would keep in mind our FAA reauthorization, and could offer us any advice or suggestions, either for Congress or the administration, that could help promote continued innovation in these areas.

Mr. BUNCE. Representative Titus, just some of the work that you have done on advanced aviation infrastructure modernization will help us there.

I mean, we do have to think about battery storage. How do we store that energy at airports to be able to do these rapid recharges for these types of machines, but also for the ground electric vehicles that are out there?

So, thinking about that, of what you are already doing with some of the acts that this committee has been very, in a bipartisan nature, supporting us have been really helpful.

And I think, as we go toward reauthorization, that we look at the whole sustainability picture in total, and also see what the FAA is going to bring forward with their proposal for reauthorization, because we have a great partnership with the environmental side of the FAA, and we are working on those ideas right now. We are very hopeful that the Department of Transportation will allow the FAA to come forward with a proposal that will have a lot of these rock solid initiatives in it that I think that you will support very well during reauthorization.

Ms. TITUS. Well, thank you. And I was pleased to work with our chairman, Mr. Larsen, and also Mr. Graves on that Advanced Aviation Infrastructure Modernization Act that passed out of our committee.

But, it is kind of a two-way street. We can get the industry perhaps to be regulated by FAA and the things that they need to do to be successful. What about grant programs to local communities?

What can they do on the ground, through the State or local governments or airport authorities, that will also help complement our efforts?

Mr. BUNCE. There are a lot of initiatives of just looking at planning of the power grid.

We all know how difficult it is, especially in a city structure, to dig up concrete or asphalt to be able to put in the right type of electrical infrastructure out there. But the other things that we do need to think about is how to monetize electricity.

So, think about it. In today's world, a lot of airports, they make money out of selling fuel. They add a margin on top of that to sell it. We have got to think ahead of how they are going to sell electric, and will that—right now, if you put solar in some of our airports out there—and each district with their own utility sector regulates a little differently. But a lot of times the utility company gets the credit for being able to sell that back. We would love to be able to see the airports be able to take the power that they generate, whether it is through solar or the co-generation that we have talked about previously, and be able to monetize that, and sell it as a profit center.

And I think that would really help our infrastructure within the country, and then help us utilize this, as I mentioned, something that no other nation on the planet has, this great network of airports.

Ms. TITUS. That is great, because in some of these other fields, we have fallen behind the rest of the world because it has taken us so long to develop the timely regulation. You don't want to give up safety, but you don't want to also be so regulated you can't do anything.

I know airports have a lot of flat roofs around the country that you could take advantage of, and maybe set up some kind of net metering program, or something with the local utilities.

Mr. BUNCE. Yes, ma'am.

Ms. TITUS. Well, thank you.

And I will yield back, Mr. Chairman.

Mr. LARSEN OF WASHINGTON. Thank you, Representative Titus. I have some further questions for the witnesses. I want to start with Mr. Miftakhov regarding infrastructure at airports to support hydrogen fuel.

What is your thinking with regards to hydrogen fuel infrastructure and support at airports?

Mr. MIFTAKHOV. Thank you, Chairman Larsen. This is a very important issue, of course.

This is the first question that our airline partners ask when we go to them with our solutions. And our answer to that is that the concentration of demand for hydrogen at the airport is so strong that it warrants onsite production.

So, we are hoping to bring infrastructure together with our partners like Shell aviation fuels and Shell sustainable fuels, who is also an investor in the company, we are hoping to bring that onsite infrastructure to all the airports, and we are already working with a number of airports on this.

When we use renewable electricity—

[Audio malfunction.]

Mr. LARSEN OF WASHINGTON. All right, Mr. Miftakhov, you froze. And so, we will just come back to you. Just hold that thought.

Where was I? Oh, yes, Ms. Ardizzone, could you discuss your relationship with Microsoft, the MOU you have with Microsoft, and how that plays into the topic today?

Ms. ARDIZZONE. Yes, we are super fortunate to have Microsoft in our backyard, based in Seattle, and they have a very strong interest in being able to provide travel for their employees that is carbon-neutral. So, I would say they are one of the leaders out there,

and we have been working with them for, gosh, 1 or 2 years now, to try to get SAF availability. And in particular, they are very interested in high-quality SAF.

So, much of our discussions with SkyNRG and others have involved Microsoft.

Mr. LARSEN OF WASHINGTON. To what extent? Is it just because they provide a concentration of folks who can fly? What is—how has it—

Ms. ARDIZZONE [interrupting]. Yes, so, Microsoft does a tremendous amount of business travel, worldwide, actually, but certainly out of the Pacific Northwest.

Gosh, I lost my thought on that.

Mr. LARSEN OF WASHINGTON. In terms of their role that they play in the emissions control, or anything like that.

Ms. ARDIZZONE. Yes. Well, there is a lot of interest in just having corporations help contribute to the cost of SAF, particularly in the near term until we can get the market more viable. So, it is extremely expensive, as I mentioned, two to six times more than the cost of conventional jet fuel.

So, you might look at Microsoft and say they have higher margins, certainly higher than the airline world does. And they are in a position to really take a leadership role in making commitments to travel using SAF.

Mr. LARSEN OF WASHINGTON. I see, I see.

I think we are just trying to get Mr. Miftakhov back.

Mr. MIFTAKHOV. Yes, I am here.

Mr. LARSEN OF WASHINGTON. There we go, great. So, I forget exactly where you were when you froze, but if you can just pick up where you were.

Mr. MIFTAKHOV. Exactly. So, on the infrastructure side, this is very important. We are working with a number of airports on this already, and we are expecting that the future infrastructure on hydrogen is actually under a lot of airports' control and will involve a lot of renewable power coming in, possibly with—on the airport generation, like we have heard from Pittsburgh, and generation of hydrogen onsite at the airport so that we avoid transportation. And that can give airports a lot of control, economic control over fuel supply.

Mr. LARSEN OF WASHINGTON. Let me ask perhaps a challenging question. This for Mr. Horton or Mr. Hoback.

We have got the infrastructure to support aviation fuel. Now we are talking about the infrastructure to support SAF. We are talking about the infrastructure to support electric, and now hydrogen. How is the choice going to be adjudicated?

How would the money be adjudicated? How would we decide, like, this airport is going to put X in for electricity, but then later discovers maybe they want to do hydrogen instead. So, Mr. Horton, have you thought through some of those challenges, and Mr. Hoback?

[Pause.]

Mr. LARSEN OF WASHINGTON. Mr. Horton first, please.

Mr. HORTON. Oh, yes, sorry. Chairman Larsen, thank you for the question.

A lot of that is driven by the type of operations that we have. And we have to look at the availability of what resources are within our region. So far, most of the demand we have seen is for electric, the eVTOL aircraft, and we are preparing for that future.

But again, as you can imagine, there is a tremendous stress that that demand places on the grid. So, we are conscious about the unintended consequences of adding new entrants into the space. And so, we are hoping to plan judiciously.

Mr. LARSEN OF WASHINGTON. Mr. Hoback, how are you thinking about that?

Mr. HOBACK. Yes, thank you so much for the question, Chairman Larsen.

We are thinking about the infrastructure preparation in the form of, what are the airlines really ready to—and what are our airline partners really ready for. That's who we work closely with, our airline partners here at Pittsburgh to make sure that we are providing them the infrastructure of the future that they really need. So, that is what we are thinking about in Pittsburgh.

Mr. LARSEN OF WASHINGTON. Just a moment.

[Discussion off the record.]

Mr. LARSEN OF WASHINGTON. I think, for me, that is good. And we have no other Members?

OK, all right. So, I want to thank the witnesses for your patience today. I am in a second booster fog, so, I appreciate everyone's patience with me today, as well. I am trying to work through the second booster.

But this has been enlightening. It has been helpful to us on the committee, as we prepare for next year's FAA 2023 reauthorization, helping us think through the kinds of actions and language we will need in the bill to support this work.

So, I want to thank our witnesses for their testimony. The comments and insights have been informative and very helpful.

I ask unanimous consent that the record of today's hearing remain open until such time as our witnesses have provided answers to any questions that may be submitted to them in writing.

I also ask unanimous consent the record remain open for 15 days for any additional comments and information submitted by Members or by the witnesses to be included in the record of today's hearing.

Without objection, so ordered.

With that, the subcommittee stands adjourned.

[Whereupon, at 4:13 p.m., the subcommittee was adjourned.]

SUBMISSIONS FOR THE RECORD

Prepared Statement of Hon. Sam Graves, a Representative in Congress from the State of Missouri, and Ranking Member, Committee on Transportation and Infrastructure

Thank you, Chair Larsen and Ranking Member Graves, and thank you to today's witnesses.

Ensuring that airports and the aviation community work together with nearby communities and the general public is critical to the growth of the aviation industry.

Over the years this Committee has given the FAA a number of tools to help set performance goals and mitigate the impacts of emissions, which is the focus of our hearing today.

Keep in mind, today's aircraft are more efficient than ever.

That is why we have seen air carrier fuel consumption decrease by 39 percent from 2005 to 2019.

It is important to remember that the FAA's primary responsibility is as the aviation safety regulator and provider of safe and efficient air traffic services.

Not only do we have to keep the FAA focused on these missions, but we also have to ensure that concerns about emissions are not used as a weapon to curtail aviation growth or shut down airports.

I look forward to hearing from our witnesses today about how we can work to mitigate the effects of aviation emissions without compromising American leadership in aviation safety, operations, and technology.

Thanks again, Mr. Chairman, and I yield back.

Discussion Draft, Aviation Emissions Reduction Opportunity Act

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[DISCUSSION DRAFT]117TH CONGRESS
2D SESSION**H. R.** _____To establish an alternative fuel and low-emission aviation technology program,
and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Ms. WILLIAMS of Georgia introduced the following bill; which was referred to
the Committee on _____**A BILL**To establish an alternative fuel and low-emission aviation
technology program, and for other purposes.1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*3 **SECTION 1. SHORT TITLE.**4 This Act may be cited as the “Aviation Emissions
5 Reduction Opportunity Act” or the “AERO Act”.6 **SEC. 2. ALTERNATIVE FUEL AND LOW-EMISSION AVIATION**
7 **TECHNOLOGY PROGRAM.**8 (a) ESTABLISHMENT.—The Secretary of Transpor-
9 tation, in consultation with the Secretary of Agriculture,

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1 the Secretary of Energy, and the Administrator of the En-
2 vironmental Protection Agency, shall establish a competi-
3 tive grant program to provide grants to eligible entities
4 to carry out projects located in the United States that
5 produce, transport, blend, or store sustainable aviation
6 fuel, or develop, demonstrate, or apply low-emission avia-
7 tion technologies.

8 (b) CONSIDERATIONS.—In carrying out subsection
9 (a), the Secretary shall consider, with respect to a pro-
10 posed project—

11 (1) the capacity for the eligible entity to in-
12 crease the domestic production and deployment of
13 sustainable aviation fuel or the use of low-emission
14 aviation technologies among the United States com-
15 mercial aviation and aerospace industry;

16 (2) the projected greenhouse gas emissions
17 from such project, including emissions resulting
18 from the development of the project, and the poten-
19 tial the project has to reduce or displace, on a
20 lifecycle basis, United States greenhouse gas emis-
21 sions associated with air travel;

22 (3) the capacity to create new jobs and develop
23 supply chain partnerships in the United States;

24 (4) for projects related to the production of sus-
25 tainable aviation fuel, the projected lifecycle green-

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1 house gas emissions benefits from the proposed
2 project, which shall include feedstock and fuel pro-
3 duction and potential direct and indirect greenhouse
4 gas emissions (including resulting from changes in
5 land use); and

6 (5) the benefits of ensuring a diversity of feed-
7 stocks for sustainable aviation fuel, including the use
8 of waste carbon oxides and direct air capture.

9 (c) FUEL EMISSIONS REDUCTION TEST.—For pur-
10 poses of clause (ii) of subsection (f)(7)(E), the Secretary
11 shall, not later than 1 year after the date of enactment
12 of this section, adopt at least 1 methodology for testing
13 lifecycle greenhouse gas emissions that meets the require-
14 ments of such clause.

15 (d) FUNDING.—

16 (1) AUTHORIZATION OF APPROPRIATIONS.—Out
17 of any money in the Treasury not otherwise appro-
18 priated, there are authorized to be appropriated for
19 each of fiscal years 2023 through 2027,
20 \$200,000,000 to carry out the purposes of this sec-
21 tion, to remain available until expended.

22 (2) FUNDING DISTRIBUTION.—Subject to para-
23 graph (4), of any amount made available under
24 paragraph (1)—

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1 (A) 30 percent of such amount shall be
2 awarded for projects that develop, demonstrate,
3 or apply low-emission aviation technologies; and

4 (B) 70 percent of such amount shall be
5 awarded for projects that produce, transport,
6 blend, or store sustainable aviation fuel.

7 (3) FEDERAL SHARE.—The Federal share of
8 the cost of a project carried out using a grant pro-
9 vided under this section may not exceed 90 percent
10 of the total cost of the project. The Secretary shall
11 consider the extent to which a proposed project
12 meets the considerations described in subsection (b)
13 in determining the Federal share under this para-
14 graph.

15 (4) ADMINISTRATION.—The Secretary may re-
16 serve not more than 2 percent of the amount appro-
17 priated under paragraph (1) for expenses related to
18 administering this section.

19 (e) APPLICATION OF LAW.—

20 (1) BUY AMERICAN.—The requirements of sec-
21 tion 50501 of title 49, United States Code, shall
22 apply to a project funded by a grant under this sec-
23 tion.

24 (2) PREVAILING WAGES.—A project carried out
25 under a grant agreement under this section shall re-

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1 quire contractors to pay labor minimum wage rates
2 as determined by the Secretary of Labor under sec-
3 tions 3141 through 3144, 3146, and 3147 of title
4 40, United States Code.

5 (f) DEFINITIONS.—In this section:

6 (1) ELIGIBLE ENTITY.—The term “eligible enti-
7 ty” means—

8 (A) a State or local government, including
9 the District of Columbia, other than an airport
10 sponsor;

11 (B) an air carrier;

12 (C) an airport sponsor;

13 (D) an accredited institution of higher edu-
14 cation;

15 (E) a research institution;

16 (F) a person or entity engaged in the pro-
17 duction, transportation, blending, or storage of
18 sustainable aviation fuel in the United States or
19 feedstocks in the United States that could be
20 used to produce sustainable aviation fuel;

21 (G) a person or entity engaged in the de-
22 velopment, demonstration, or application of low-
23 emission aviation technologies; or

24 (H) nonprofit entities or nonprofit con-
25 sortia with experience in sustainable aviation

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1 fuels, low-emission aviation technologies, or
2 other clean transportation research programs.

3 (2) FEEDSTOCK.—The term “feedstock” means
4 sources of hydrogen and carbon not originating from
5 unrefined or refined petrochemicals.

6 (3) INDUCED LAND-USE CHANGE VALUES.—
7 The term “induced land-use change values” means
8 the greenhouse gas emissions resulting from the con-
9 version of land to the production of feedstocks and
10 from the conversion of other land due to the dis-
11 placement of crops or animals for which the original
12 land was previously used, as calculated using appro-
13 priate modeling techniques such as the methods
14 adopted by the International Civil Aviation Organi-
15 zation for fuels eligible for the Carbon Offsetting
16 and Reduction Scheme for International Aviation.

17 (4) LIFECYCLE GREENHOUSE GAS EMIS-
18 SIONS.—The term “lifecyle greenhouse gas emis-
19 sions” means the combined greenhouse gas emis-
20 sions from feedstock production, collection of feed-
21 stock, transportation of feedstock to fuel production
22 facilities, conversion of feedstock to fuel, transpor-
23 tation and distribution of fuel, and fuel combustion
24 in an aircraft engine, as well as from induced land-
25 use change values, as calculated using appropriate

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1 modeling techniques such as the methods adopted by
2 the International Civil Aviation Organization for
3 fuels eligible for the Carbon Offsetting and Reduc-
4 tion Scheme for International Aviation.

5 (5) LOW-EMISSION AVIATION TECHNOLOGIES.—
6 The term “low-emission aviation technologies”
7 means technologies, produced in the United States,
8 that significantly—

9 (A) improve aircraft fuel efficiency;

10 (B) increase utilization of sustainable avia-
11 tion fuel; or

12 (C) reduce greenhouse gas emissions pro-
13 duced during operation of civil aircraft.

14 (6) SUSTAINABLE AVIATION FUEL.—The term
15 “sustainable aviation fuel” means liquid fuel, pro-
16 duced in the United States, that—

17 (A) consists of synthesized hydrocarbons;

18 (B) meets the requirements of—

19 (i) ASTM International Standard
20 D7566; or

21 (ii) the co-processing provisions of
22 ASTM International Standard D1655,
23 Annex A1 (or such successor standard);

24 (C) is derived from biomass (in a similar
25 manner as such term is defined in section

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1 45K(e)(3) of the Internal Revenue Code of
2 1986), waste streams, renewable energy
3 sources, or gaseous carbon oxides;

4 (D) is not derived from palm fatty acid
5 distillates; and

6 (E) achieves at least a 50 percent lifecycle
7 greenhouse gas emissions reduction in compari-
8 son with petroleum-based jet fuel, as deter-
9 mined by a test that shows—

10 (i) the fuel production pathway
11 achieves at least a 50 percent reduction of
12 the aggregate attributional core lifecycle
13 emissions and the induced land use change
14 values under a lifecycle methodology for
15 sustainable aviation fuels similar to that
16 adopted by the International Civil Aviation
17 Organization with the agreement of the
18 United States; or

19 (ii) the fuel production pathway
20 achieves at least a 50 percent reduction of
21 the aggregate attributional core lifecycle
22 greenhouse gas emissions values and the
23 induced land-use change values under an-
24 other methodology that the Secretary de-
25 termines is—

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1 (I) reflective of the latest sci-
2 entific understanding of lifecycle
3 greenhouse gas emissions; and

4 (II) as stringent as the require-
5 ment under clause (i).

6 **SEC. 3. AUTHORIZATION OF APPROPRIATIONS.**

7 Section 47511 of title 49, United States Code, is
8 amended by adding at the end the following:

9 “(d) AUTHORIZATION OF APPROPRIATIONS.—There
10 is authorized to be appropriated to the Secretary of Trans-
11 portation \$100,000,000 for each of fiscal years 2023
12 through 2027 to carry out this section. Such sums shall
13 remain available until expended.”.

Statement of Airlines for America and Letter to Congressional Leadership

Airlines for America (A4A) appreciates the opportunity to provide written testimony regarding efforts to address climate change at U.S. airports.

U.S. airlines have a strong climate change record and a continuing commitment to further reduce our greenhouse gas (GHG) emissions footprint. Prior to the pandemic, we were transporting a record 2.5 million passengers and 58,000 tons of cargo per day, driving \$1.7 trillion in annual economic activity and supporting 10 million jobs, while contributing just 2 percent of our nation's GHG emissions inventory.

Our airlines have been able to deliver such value to the economy while maintaining a low carbon footprint primarily due to their keen focus on fuel efficiency, which translates directly into GHG emissions savings. Over the past several decades, U.S. airlines have dramatically improved fuel efficiency and reduced GHG emissions by working with other stakeholders and investing billions in fuel-saving aircraft and engines, innovative technologies like winglets (which improve aerodynamics) and cutting-edge route-optimization software. As a result, U.S. airlines improved their fuel efficiency over 135 percent from 1978–2019, saving over 5 billion metric tons of carbon dioxide (CO₂), which is equivalent to taking more than 27 million cars off the road on average in each of those years. Taking a more recent snapshot, data from the Bureau of Transportation Statistics confirm that U.S. airlines improved their fuel- and CO₂-emissions efficiency by 40 percent between 2000 and 2019.

We are proud of our record on climate change. As leaders of a global aviation coalition, we have been committed to aggressive emissions goals for many years. In March 2021, A4A and our carriers announced a significant strengthening of our goals: we pledged to work across the aviation industry and with government leaders in a positive partnership to achieve net-zero carbon emissions by 2050. A4A carriers also pledged to work with the government and other stakeholders toward a rapid expansion of the production and deployment of commercially viable Sustainable Aviation Fuel (SAF) to make 2 billion gallons available to U.S. aircraft operators in 2030. On September 9, 2021, as a complement to the federal government's announcement of a SAF "Grand Challenge," A4A and its members increased the A4A SAF "challenge goal" by an additional 50 percent, calling for 3 billion gallons of cost-competitive SAF to be available for use in 2030. These new goals were adopted in the midst of the most severe economic crisis the commercial aviation sector has ever faced, demonstrating the strength of the airline industry's commitment to the environment and the depth of our recognition that environmentally responsible growth is essential to the vitality of our sector. We also recognize that federal, state and local governments hold many of the keys to unlocking the innovation and deployment enablers necessary to achieve additional GHG emissions reductions. Accordingly, A4A and our member airlines commit to working with government leaders and other stakeholders in a positive partnership to achieve these goals.

A4A also supports broader stakeholder efforts, including those with our airport partners. In particular, A4A continues to support expanding electric infrastructure at airports and greener ground support equipment.

Electrification is a well-understood and proven means of lowering emissions for many types of airport ground support equipment (GSE) and from aircraft while parked at gates that supply electric power. Providing electric power at gates and deployment of electric GSE (eGSE) requires access to reliable electric infrastructure (e.g., electric substations, transformers, charging stations, electrified gates and hard stands) and, in some cases, other infrastructure improvements needed to ensure deployment of eGSE is operationally feasible. In addition, commercially viable and operationally feasible eGSE and other low/no-carbon GSE are not widely available in certain applications (e.g., large cargo-loaders or push-back tractors for large, twin aisle aircraft). Government funding to support the acquisition of such GSE and enabling airport infrastructure would help accelerate its deployment. Funding to support commercialization of eGSE and other low/no-carbon GSE in more demanding applications would also be helpful.

One proven program of great importance is the Federal Aviation Administration's (FAA) Voluntary Air Low Emissions (VALE) program. The VALE program allows airport sponsors to take proactive steps to improve air quality and reduce emissions in non-attainment and maintenance areas according to the National Ambient Air Quality Standards (NAAQS). Eligible projects under the VALE program include electric ground support equipment like bag tugs and belt loaders; natural gas refueling stations; electric gates at terminals; and electric preconditioned air and ground power converter units.

As Congress considers policies to lower carbon-emitting GSE and other necessary airport infrastructure, A4A recommends the following:

- Establish a Department of Transportation (DOT)/FAA grant program to provide funding to airlines to acquire low-carbon GSE and install infrastructure that displaces traditional GSE;
- Revise the existing FAA VALE program by striking the statutory requirement that only airports in non-attainment and maintenance areas would be eligible to use VALE funds for cleaner GSE, vehicles and fuel and reduce restrictions on airline access to VALE funds;
- Amend the Diesel Emissions Reduction Act (DERA) program to include airline non-cargo handling GSE or expand it to include, in addition to the national and state programs, a new airport GSE-specific program; and
- Provide dedicated funding to DOE's Vehicle Technologies Office's Clean Cities program for airline acquisition of electric or other alternative fuel GSE and associated infrastructure.

The U.S. aviation industry has taken a leadership role in on-airport sustainability measures, which as noted, A4A strongly supports. However, we would be remiss not to mention the importance of development and deployment of sustainable aviation fuel (SAF) as the most effective tool we have in addressing the overall aviation sector emission reductions.

Attached is a letter sent to Congressional leadership last month by a broad coalition of aviation industry stakeholders—including passenger and cargo carriers, clean fuel producers, engine and aircraft manufacturers, labor unions, airports, business and general aviation, airline passengers, trade associations and think tanks—who are committed to decarbonizing aviation through a new, long-term, technology and feedstock-neutral tax incentive for SAF. We believe the most important action Congress can take to support the decarbonization of the aviation sector is to enact a blender's tax credit specifically aimed at incentivizing the production and use of SAF and appreciate the Committee's consideration of this topic as a component of the overall hearing.

ATTACHMENT: LETTER TO CONGRESSIONAL LEADERSHIP

APRIL 22, 2022.

The Honorable NANCY PELOSI,
Speaker of the House,
U.S. House of Representatives, 1236 Longworth House Office Building, Washington,
DC 20515.

The Honorable CHARLES SCHUMER,
Senate Majority Leader,
U.S. Senate, 322 Hart Senate Office Building, Washington, DC 20510.

The Honorable RICHARD NEAL,
Chairman,
House Committee on Ways & Means, U.S. House of Representatives, 1102 Longworth
House Office Building, Washington, DC 20515.

The Honorable RON WYDEN,
Chairman,
Senate Committee on Finance, U.S. Senate, 219 Dirksen Senate Office Building,
Washington, DC 20510.

DEAR SPEAKER PELOSI, MAJORITY LEADER SCHUMER, CHAIRMAN NEAL, AND CHAIRMAN WYDEN:

As a broad coalition of aviation industry stakeholders—including passenger and cargo carriers, clean fuel producers, engine and aircraft manufacturers, labor unions, airports, business and general aviation, airline passengers, trade associations, and think tanks—committed to decarbonizing aviation, we write to express our strong support for a new, long-term, technology- and feedstock-neutral tax incentive for sustainable aviation fuel (SAF). We believe the most important action Congress can take to support the decarbonization of the aviation sector is to enact a blender's tax credit specifically aimed at incentivizing the production and use of SAF.

SAF is a low-carbon, drop-in replacement for conventional jet fuel derived from biomass or other sustainable feedstocks, including wastes and residues, cellulosic feedstocks, waste gases, and captured CO₂. SAF can reduce lifecycle greenhouse gas (GHG) emissions by 80 percent or more compared to fossil jet fuel, while also significantly reducing conventional emissions like particulate matter and improving air quality and public health.

SAF is widely considered to be the most critical driver of aviation decarbonization, as electrification and other advanced propulsion technologies are currently infeasible for the medium- and long-haul flights that account for the vast majority of aviation's GHG emissions. With aviation's reliance on liquid fuels continuing for the coming decades, the Administration's Aviation Climate Action Plan and SAF Grand Challenge appropriately recognize the need to rapidly scale the SAF industry this decade. Doing so will enable the Administration's goal of 3 billion gallons of SAF by 2030 and 100% SAF by 2050, representing an estimated 35 billion gallons.¹ As outlined in the Grand Challenge, a SAF tax credit is the foundation of the Administration's whole-of-government approach to building a domestic SAF industry and leading the energy transition for the global aviation industry. Indeed, last week President Biden stressed the importance of SAF and reiterated his support for a SAF tax credit to enable a zero-carbon aviation sector in 2050.²

Our organizations share the Administration's goal of rapidly scaling the SAF industry to enable aviation decarbonization. The SAF-specific blender's tax credit of \$1.50 to \$2.00 per gallon that was introduced in the Sustainable Skies Act (H.R. 3440/S. 2263) would promote and accelerate investment in the nascent domestic SAF industry while upholding rigorous environmental standards and ensuring that fuels that achieve the greatest reduction in emissions are eligible for the greatest tax incentive.

We believe Congress should address several principles as it considers a SAF tax credit. First, the value of the credit should be sufficiently robust to both eliminate significant existing SAF production disincentives as well as encourage rapid investment in the sector. Second, so as not to unintentionally create new disincentives for SAF, the same lifecycle GHG emissions models should be used for all fuels to determine environmental benefits. Finally, Congress should apply equivalent environmental criteria, including minimum lifecycle GHG emissions thresholds, to all transportation fuels.

SAF is of critical importance to the aviation sector, and the SAF blender's tax credit is an important foundational policy to establish a new domestic SAF industry and create tens of thousands of jobs. It is imperative that we act today to ensure that our energy sources are cleaner, more sustainable, and more secure. Our organizations stand ready to work with Congress to ensure we meet our shared goal of a net-zero aviation industry by 2050. Thank you for your leadership and consideration.

Sincerely,

AEROSPACE INDUSTRIES ASSOCIATION.	BIOTECHNOLOGY INNOVATION ORGANIZATION.
AIRBUS.	THE BOEING COMPANY.
AIR COMPANY.	BOMBARDIER.
AIRCRAFT OWNERS AND PILOTS ASSOCIATION.	BOOM.
AIRLINE PASSENGER EXPERIENCE ASSOCIATION.	BUSINESS AVIATION COALITION FOR SUSTAINABLE AVIATION FUEL.
AIR LINE PILOTS ASSOCIATION.	CARBON ENGINEERING.
AIRLINES FOR AMERICA.	CARGO AIRLINE ASSOCIATION.
AIRPORTS COUNCIL INTERNATIONAL-NORTH AMERICA.	CINCINNATI/NORTHERN KENTUCKY INTERNATIONAL AIRPORT.
AIR TRANSPORT SERVICES GROUP.	DELTA.
ALASKA AIRLINES.	DHL.
ALDER FUELS.	EMBRAER.
ALGAE BIOMASS ORGANIZATION.	FEDEX EXPRESS.
AMERICAN AIRLINES.	FULCRUM BIOENERGY.
AMERICAN ASSOCIATION OF AIRPORT EXECUTIVES.	GE AVIATION.
AMERICAN EXPRESS GLOBAL BUSINESS TRAVEL.	GENERAL AVIATION MANUFACTURERS ASSOCIATION.
ASSOCIATION OF FLIGHT ATTENDANTS-CWA.	GEVO.
ATLAS AIR WORLDWIDE.	GLOBAL BUSINESS TRAVEL ASSOCIATION.
AVFUEL.	GREEN PLAINS.
	GROWTH ENERGY.
	GULFSTREAM.
	HAWAIIAN AIRLINES.

¹ https://www.faa.gov/sites/faa.gov/files/2021-11/Aviation_Climate_Action_Plan.pdf;
<https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/09/fact-sheet-biden-administration-advances-the-future-of-sustainable-fuels-in-american-aviation/>

² <https://www.whitehouse.gov/briefing-room/speeches-remarks/2022/04/12/remarks-by-president-biden-on-lowering-energy-costs-for-working-families/>

HELICOPTER ASSOCIATION INTERNATIONAL.	PORT OF SEATTLE/SEATTLE-TACOMA INTERNATIONAL AIRPORT.
HONEYWELL.	PRATT & WHITNEY.
INFINIUM.	RED ROCK BIOFUELS.
INTERNATIONAL AIR TRANSPORT ASSOCIATION.	REGIONAL AIRLINE ASSOCIATION.
INTERNATIONAL FLIGHT SERVICES ASSOCIATION.	RENEWABLE FUELS ASSOCIATION.
JETBLUE.	ROLLS ROYCE.
LANZAJET.	SAN FRANCISCO INTERNATIONAL AIRPORT.
LANZATECH.	SHELL AVIATION.
MARQUIS SUSTAINABLE AVIATION FUEL.	SIGNATURE AVIATION.
NATIONAL AIR CARRIER ASSOCIATION.	SKYNRG AMERICAS.
NATIONAL AIR TRANSPORTATION ASSOCIATION.	SOUTHWEST AIRLINES.
NATIONAL ASSOCIATION OF STATE AVIATION OFFICIALS.	SOUTHWEST AIRLINES PILOTS ASSOCIATION.
NATIONAL BUSINESS AVIATION ASSOCIATION.	THIRD WAY.
NESTE.	TRAVELERS UNITED.
NETJETS.	UNITED AIRLINES.
NETJETS ASSOCIATION OF SHARED AIRCRAFT PILOTS.	UNITED PARCEL SERVICE.
PORT OF PORTLAND.	U.S. TRAVEL ASSOCIATION.
	VELOCYS.
	VERIJET.
	WORLD ENERGY.
	WORLD FUEL SERVICES.

**Statement of Ed Bolen, President and Chief Executive Officer, National
Business Aviation Association**

Chairman Larsen, Ranking Member Graves, and members of the Subcommittee on Aviation thank you for holding this hearing to address and build upon the impressive sustainability efforts underway at our nation's airports. On behalf of the National Business Aviation Association's (NBAA's) 11,000-member companies, we are pleased to provide this statement for the record.

NBAA's members, many of which are small businesses, rely on business aircraft to meet some portion of their transportation challenges. Business aircraft provide connectivity to communities in nearly every Congressional district, many of which are not served by commercial airlines. While the airlines serve only around 500 airports, business aviation can reach 5,000. The general aviation industry supports 1.2 million American jobs and \$247 billion in economic output.

Through the Business Aviation Commitment on Climate Change, our industry has pledged to achieve net-zero CO₂ emissions by 2050. This goal builds on our proven track record of leading the way on fuel-saving technologies from winglets to highly efficient engine technology and advanced avionics. To achieve our 2050 goal, business aviation is making significant investments in zero-emission electric aviation, sustainable aviation fuel (SAF), optimizing GPS technology to fly the most direct and efficient routes and utilizing sustainable infrastructure at airports. These initiatives will lead to a sustainable future for business aviation while maintaining the jobs our industry provides to American workers.

Through programs such as NBAA's Sustainable Flight Department Accreditation Program, which has a specific focus on infrastructure and ground support equipment, business aviation is taking measurable steps to address climate change at U.S. airports. This comprehensive accreditation program will stimulate, document, and audit how operators are making widespread investments and progress towards a carbon-neutral future. For airport operations, participants will work towards measurable reductions in CO₂ emissions through the modernization of hangars and other facilities, concentrating on reduced electric and water consumption. In addition, the program focuses on ground vehicles that support business aviation, such as aircraft tugs. To achieve the CO₂ reduction goals through the accreditation, operators will make investments in electric-powered ground support vehicles or utilize more sustainable fuel sources.

EXPANDING SAF AVAILABILITY AND UTILIZATION

As a drop-in fuel, SAF is a low carbon synthetic jet fuel derived from sustainable feedstocks, which is available now but not at the levels to meet demand. With SAF able to reduce lifecycle greenhouse gas emissions by up to 80% compared to conven-

tional jet fuel, significantly scaling up production is critical to achieving emissions reduction goals under programs like NBAA's Sustainable Flight Department Accreditation.

NBAA and our coalition partners in the *Business Aviation Coalition for Sustainable Aviation Fuel*, continue to educate the airport and operator community about the benefits of SAF, which has led to broad acceptance and demand for the fuel. For example, NetJets, one of the largest operators of business aircraft, has committed to purchasing 100 million gallons of SAF over the next ten years. Signature Flight Support, the world's largest chain of Fixed Based Operators, has SAF available at a growing list of general aviation airports and has supplied more than 6 million gallons of renewable fuel since 2020.

While these are impressive accomplishments, the SAF market is still in a nascent stage and requires a long-term, technology- and feedstock-neutral tax incentive to meet growing demand. We appreciate the Subcommittee's leadership in supporting H.R. 3440, the Sustainable Skies Act, and want to underscore that a blender's tax credit specifically aimed at incentivizing the production of SAF is the most important action that Congress can take to support decarbonization of the aviation sector. The Administration's Aviation Climate Action Plan and SAF Grand Challenge also recognize the need to rapidly scale the SAF industry this decade. Policies like the blender's tax credit are crucial to achieving the Administration's goal of 3 billion gallons of SAF by 2030 and 100% SAF by 2050, representing an estimated 35 billion gallons. With aviation being one of the most challenging transportation sectors to decarbonize, building a thriving domestic SAF industry is crucial to our energy security and will put airports and operators on a path to achieving their shared sustainability goals.

INVESTING IN SUSTAINABILITY AT GENERAL AVIATION AIRPORTS

Across our nation's diverse system of general aviation airports, business aircraft operators and airport management are investing in a more sustainable future. For NBAA members participating in our Sustainable Flight Department Accreditation program, investments in emerging technologies, alternative fuels, building efficiency and resiliency, and employee training are underway to reduce CO₂ emissions at their airport facilities. Beyond the 10% CO₂ reduction over their baseline accreditation year, on a path to net-zero carbon emissions by 2040, program participants will need to provide information in a sustainability strategy document addressing their short and long-term goals.

This strategy is leading to significant investments at airports. For example, a leading air charter operator in California has completed the installation of a 500-kilowatt solar array covering approximately 30,000 square feet of roof space. This project will offset the equivalent of 530 metric tons of CO₂. Also, in California, a well-respected flight department is committed to being net-zero emissions as a company by the end of 2022 and carbon neutral by the end of this year 2021. To help achieve these goals, the company will also utilize all-electric vehicles and aircraft ground power units.

In addition to its leadership on SAF, Signature Flight Support recently completed its 29th LEED certified construction project at the Atlanta Hartsfield-Jackson International Airport. The company is pivoting to the use of biodiesel to power its vehicles and increasing its electric-powered ground service equipment across its fleet. Independent FBOs, such as Gary Jet Center in Chicago, are also committed to sustainability by constructing a new facility to LEED standards.

As sustainable technologies for airports and ground support equipment advance, the business aviation community is committed to being a leader and early adopter. Our broad industry goal for net-zero emissions by 2050 and more detailed goals for Sustainable Flight Department Accreditation participants provide a measurable framework for emissions reductions. Our airport partners are a crucial part of the equation. Through forums such as the Business Aviation Coalition for Sustainable Aviation Fuel, we have the framework to decarbonize the aviation sector together.

LEADING IN ELECTRIC AVIATION AND ADVANCED AIR MOBILITY

Electric aviation and Advanced Air Mobility (AAM) represents the next generation of air transportation in the United States. Through electrification and next-generation battery technology, AAM will advance the nation towards sustainable, zero-emission aerospace and open new transportation opportunities to move people between and within urban, suburban, and rural areas. AAM has the potential to directly connect communities that legacy infrastructure investments may have left behind. The technology will improve mobility, leverage existing public transportation systems, create workforce opportunities, reduce congestion, and support emissions

reductions. AAM has the potential to create nearly 300,000 jobs and become an annual \$115 billion market by 2035.

General aviation airports will be an essential part of electric aviation's future. Companies like ZeroAvia, Ampaire, and Tencam are developing all-electric or hybrid-powered aircraft that will have zero emissions and drastically reduced noise and frequently operate at general aviation airports. These same airports will also support AAM operations as they are often located closer to communities and provide the existing infrastructure that can readily support electric aviation. In a 2020 Electric Aircraft Feasibility Study, the State of Washington identified its 124 general aviation airports as ideal locations for charging infrastructure. The study also analyzed infrastructure at each general aviation airport and found that 72 airports are currently well situated to support electric aviation operations.

A vital element of the push to expand AAM will be the large-scale rollout of charging infrastructure for these electric aircraft, especially charging facilities at existing airports. Without the necessary charging infrastructure in place, it is difficult for private businesses and individuals to be confident enough to switch to cleaner, electric aviation. We have seen a similar dynamic with the transition to electric vehicles in automobiles, and policymakers have responded appropriately by providing tax incentives for businesses and individuals to install EV charging stations.

The Alternative Fuel Vehicle Refueling Property Tax Credit (section 30C of the Internal Revenue Code) allows for a 30% tax credit for the cost of any qualified alternative fuel vehicle refueling property, which includes electric vehicle charging stations and hydrogen refueling stations. Recognizing the challenges posed by climate change and the need to accelerate the transition to a decarbonized future, the Administration and Congress have released proposals to enhance and extend the section 30C tax credit for EV charging stations.

NBAA and our AAM Roundtable support a simple technical change to modernize the section 30C tax credit to ensure that the critical investments necessary for AAM, or electric aviation, charging infrastructure are covered and similarly deployed. Leveraging private investment with an expanded Sec. 30C tax credit is key to the successful rollout of charging stations for electric aviation across our existing network of more than 5,000 public-use airports.

Finally, thanks to the dedication of Chair Larsen, Ranking Member Graves, and their committed staff, we are proud that H.R. 6270, the Advanced Aviation Modernization Act, was approved by the full Transportation & Infrastructure Committee. The AAIM Act authorizes funding to plan for and eventually build critical new AAM infrastructure by leveraging existing public transportation facilities to support AAM operations and fostering engagement programs to introduce the latest technologies to diverse communities. This legislation, which has nearly 30 bi-partisan co-sponsors, will position the United States to maintain its global leadership in aviation while providing the tools to create thousands of new green jobs for our skilled aviation workforce.

CONCLUSION

This hearing and similar discussions with policymakers are critical because they bring together aviation stakeholders around solutions for a sustainable future. The United States has a general aviation airport network second to none, and these facilities are rapidly embracing emissions reductions and a more sustainable operating model. Equally important is that general aviation airports will support electric aviation by providing locations for charging infrastructure and connecting AAM to communities.

We look forward to engaging with the Aviation Subcommittee on policy solutions, such as the SAF blender's tax credit and AAIM Act that provide the tools for aviation's sustainable future.