March 30, 2021

A4A CLIMATE CHANGE COMMITMENT AND FLIGHT PATH
Innovative Industry and Government Action to Achieve Net-Zero Carbon Emissions

U.S. airlines have a strong climate change record and a continuing commitment to further reduce our greenhouse gas (GHG) emissions footprint. Before COVID-19 struck, we were transporting a record 2.5 million passengers and 58,000 tons of cargo per day and helping drive $1.7 trillion in annual economic activity and 10 million jobs, while contributing just 2 percent of our nation's GHG emissions inventory.

The primary reason our airlines have been able to deliver such value to the economy while maintaining a low carbon footprint has been and remains their keen focus on fuel efficiency, which translates directly into GHG emissions savings. For 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 have improved their fuel efficiency over 135 percent since 1978, saving over 5 billion metric tons of carbon dioxide (CO_2), 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 CO_2-emissions efficiency by 40 percent between 2000 and 2019.

Additionally, recognizing that fuel efficiency improvements with today's petroleum-based energy supply can only take us so far, Airlines for America (A4A) and our members have helped launch the nascent sustainable aviation fuel (SAF) industry and committed to two international aviation climate agreements reached in 2016 under the International Civil Aviation Organization (ICAO).

In addition to the airlines' innate drive for fuel efficiency, our progress and initiatives have been driven by ambitious climate goals. Since 2009, A4A and our members have been active participants in a global aviation coalition that committed to 1.5 percent annual average fuel efficiency improvements through 2020, with goals to achieve carbon-neutral growth beginning in 2020 and a 50 percent net reduction in CO_2 emissions in 2050, relative to 2005 levels.

We are proud of our record on climate change. But we know the climate change challenge our country and the world face has only continued to intensify. Today, we embrace the need to take even bolder, more significant steps to address this challenge. Our 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 the following stepwise goals:

1. Long-Term: Reduce net carbon emissions to zero by 2050 (i.e., net-zero carbon emissions by 2050).

2. Medium-Term: Many of our members are already investing in and supporting SAF development, but the aviation industry will need support from government policy makers, fuel producers, and others in the feedstock and fuel supply chain to rapidly expand the production and deployment of SAF so 2 billion gallons of cost competitive SAF are available for U.S. aircraft operators in 2030.

3. Near-Term: Reaffirmation of the global aviation industry goal to limit net carbon emissions to 2019 levels (i.e., carbon-neutral growth relative to the 2019 baseline), subject to critical aviation infrastructure and technology advances achieved by the industry and government, and to consider making the baseline more stringent taking into account longer-term emissions reduction goals and developments.

Bold and Complementary Government and Industry Action

All stakeholders must work hard and together to overcome the many barriers to success. The A4A airlines are committed to working in partnership across the commercial aviation sector and beyond to help advance and deploy commercially viable technology, operations, infrastructure and SAF to meet our ambitious climate goals. At the same time, it is imperative that the U.S. federal, state and local governments implement supportive policies and programs that enable innovation, scale-up, cost-competitiveness and deployment in each of these areas, while avoiding the implementation of policies that would limit the aviation industry's ability to invest in emissions-reducing measures.

Within that framework, we seek government support for the following policies that will support our near-term carbon-neutral growth goal, catalyze significant SAF scale-up, and complement our efforts to achieve net-zero carbon emissions by 2050:

1. Unleashing the Power of SAF to Fuel Emissions Reduction and Enhance U.S. Energy Security

Through initiatives such as the Commercial Aviation Alternative Fuels Initiative (CAAFI®), a public-private partnership with the Federal Aviation Administration (FAA) and other stakeholders, A4A and our members have been leaders in the development of SAF and in the establishment of rigorous processes to ensure that SAF is safe and environmentally beneficial. Although we have made significant progress in advancing the SAF industry, substantial challenges remain in scaling up cost-effective supply. At present, SAF is available in the U.S. (and globally) in extremely limited quantities. The U.S. Environmental Protection Agency (EPA) reports (under the Renewable Fuel Standard program) that just over 2.4 million gallons of neat (100%) SAF were produced in the U.S. in 2019, which compares to the 21.5 billion gallons of conventional jet fuel used by U.S. airlines in 2019 – thus indicating that SAF comprised just over 0.01% of the nation's total jet fuel supply that year. On top of this, the SAF that is available is typically 3-5 times more expensive than conventional jet fuel.

The commercial aviation sector needs the SAF industry to scale up rapidly so that it can become a reliable provider of exponentially larger quantities of reasonably priced fuel to airlines. Successfully scaling up production of SAF in quantities necessary to meet our goals will require the federal government (as well as state and local governments) to take bold, ambitious steps. As described below, this should include (but not be limited to) sustained implementation of positive incentives like a SAF-specific blender's tax credit, grants and loan guarantees so existing and prospective SAF producers can rapidly increase production from current levels, and enhanced governmental support for SAF research and development.

- **SAF-Specific Blender's Tax Credit –** Federal approval of a 10-year performance-based SAF blender's tax credit, at $1.50/gallon for SAF that achieves a 50% lifecycle

GHG emissions benefit and additional credit up to $2/gallon for SAF with GHG emissions savings above 50%.

- **Grants and Loan Guarantees for SAF Production –** Enable SAF producers to construct facilities and establish or scale up operations by creating a new Department of Transportation (DOT)/FAA competitive grant program and a new loan guarantee program specific to SAF producers.

- **SAF-Specific Research and Development –** Interagency review and update of the 2016 *Federal Alternative Jet Fuels Research and Development Strategy* to prioritize and accelerate federal research and development initiatives to address key scientific and technical challenges that inhibit the development, widescale production, and use of economically viable SAF; enhanced federal support for FAA's SAF research and development work, with at least $30 million in annual appropriations for at least five fiscal years.

- **Enhanced Department of Energy (DOE) Focus on SAF –** Provide additional financial support for SAF production/manufacturing (and/or SAF research and development) through DOE's Bioenergy Technologies Office, with the goal of ensuring aviation and SAF are not disfavored vis-à-vis on-road vehicles and alternative fuels used in ground transportation.

- **Support for the ASTM International Review and Approval Process for SAF Pathways –** Direct funding assistance for the FAA-established ASTM D4054 Clearinghouse, which seeks to increase the efficiency of the SAF qualification process.

- **SAF-Specific Production Tax Credit –** Establish a tax credit for the annual production of SAF, in addition to a SAF blender's tax credit, akin to the credit in Internal Revenue Code Section 40(b)(6) for the production of second-generation biofuels, or the credit in Section 40A(b)(4) for the production of small agri-biodiesel quantities, or the credit in Section 45H for the production by small business refiners of low sulfur diesel fuel.

2. Enhancing Partnerships for Evolutionary and Revolutionary Airframe and Engine Technology Advances

Historically, airframe and engine technology advancements have been the primary contributor to improved environmental performance in aviation. But research and development into continued emissions improvements come with significant risk. The COVID-19 pandemic has hit aerospace manufacturers particularly hard, constraining available resources and the risk appetite for research and development investment. Even in normal circumstances, government resources are crucial to support foundational research and development and mitigate risk to spur manufacturer investment in cleaner technologies. Today, the availability of government resources and positive government support will determine whether the aviation industry can achieve the airframe and engine technology improvements needed to reach our aggressive climate goals. Necessary policy support includes:

- **Enhanced Support for FAA's Environmental Research and Development Programs –** Maintain FAA's Continuous Lower Energy, Emissions and Noise (CLEEN) program and Center of Excellence for Alternative Jet Fuels and the Environment (also known as

the “Aviation Sustainability Center,” or “ASCENT”) and increase funding authorization and appropriations levels.

- **Grants for Low-Emission Aviation Technologies –** Create a new grant program administered by DOT/FAA (or NASA) for projects that develop, demonstrate, or apply low-emission aviation technologies.

- **Enhanced Support for NASA’s Aviation Environmental Research and Development Programs –** Maintain NASA’s Advanced Air Vehicles Program (AAVP) and Transformative Aeronautics Concepts Program (TACP), which include the Advanced Air Transport Technology (AATT), and Transformational Tools and Technology (TTT) projects, and increase funding authorization and appropriation levels.

- **Creation of a New NASA Initiative Focused on Advancing Turboelectric, Hybrid Electric and Electric Aircraft Propulsion Technology –** Establish a new NASA initiative, additional to existing programs, to build upon and accelerate previous or ongoing work to develop and demonstrate new technologies in aircraft propulsion concepts (e.g., turboelectric, hybrid electric, electric) that are capable of substantially reducing both emissions and noise from aircraft.

3. Greening the Air Traffic Control System by Harnessing 21st Century Communications, Navigation and Surveillance Technologies

An optimally functioning air traffic management (ATM) system is not only indispensable to ensure safety and the wellbeing of our industry, our nation’s economy, the air traffic control workforce and airline customers, it is also critical to our emissions reduction efforts. While A4A member airlines are doing what they can to promote efficiencies within the current ATM system, completing the transition to a satellite-based system is projected to significantly reduce the inefficiencies that are inherent in the outdated, radar-based air traffic control system – saving up to 12 percent of fuel burn and emissions. As recognized by the Future of Aviation Advisory Committee in 2010, “NextGen will enable the [National Airspace System] to safely and efficiently accommodate greater numbers of aircraft . . . while reducing the overall environmental impact and energy use of civil aviation.” Unfortunately, the federal government, which controls the ATM system, has been sluggish to date in fully realizing the benefits of modernizing it. To address this, the government needs to prioritize the optimization of the system and provide additional resources to do so. Specifically, funding is needed to improve implementation of the performance-based navigation (PBN) procedures that enable efficient routing, transition the sector to modern avionics, and deploy space-based ADS-B in oceanic airspace to enable greener operations.

- **Improve Implementation of the PBN Procedures that Enable Efficient Routing –** Unlike other NextGen implementations such as ADS-B and DataComm, PBN does not have a specific point of accountability responsible for leading efforts inside the FAA to work closely with the industry in transparent ways to identify issues, exchange ideas, develop strategies and implement for the successful resolution. To ensure successful implementation of this high priority technology initiative, **the FAA should establish and fund a program management office (PMO) to oversee the program** elements such as procedure design, community outreach, and the suite of controller “tools” that enable the management and sequencing of aircraft, and aircraft equipage.

- **Accelerate Implementation of 21st Century Technologies through Grants, in Particular for Regional Aircraft, to Purchase PBN and DataComm Avionics Equipage –** Air traffic controllers have identified mixed equipage as a significant barrier to implementing modern procedures. Ensuring that all aircraft are similarly capable of utilizing procedures will significantly accelerate implementation of these capabilities.

- **Accelerate Safer and Greener Operations in Oceanic Airspace –** A4A supports funding to improve safety and efficiency and to reduce environmental impacts in oceanic airspace through deployment of Space-Based ADS-B. FAA should proceed with plans to implement planned initial operating readiness for Alaska, select oceanic airspace in Hawaii, Pacific Islands, and the Atlantic as well as the preparation to fully exploit this capability to maintain U.S. leadership in aviation.

4. 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). Deployment of electric GSE (eGSE) requires access to reliable electric infrastructure (e.g., electric substations, transformers, charging stations and 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.

- **Support for Lower Carbon-Emitting GSE and Necessary Airport Infrastructure –** Establish a DOT/FAA grant program that would provide funding to airlines to acquire low-carbon GSE and install infrastructure that displaces traditional GSE; and/or

  Revise the existing FAA Voluntary Airport Low Emissions (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; and/or

  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.

5. Implementing the Groundbreaking International Aviation Climate Agreements Reached in 2016

A4A and our members remain committed to advancing climate action under the International Civil Aviation Organization (ICAO) and as countries coordinate overlapping policy pursuant to the United Nations Framework Convention on Climate Change and Paris Agreement

(including as provisions are refined and aligned for facilitating Internationally Transferred Mitigation Outcomes (ITMOs) under Article 6 of the Paris Agreement).

A4A strongly supported Congress' directive under Public Law 112-200 that U.S. officials should conduct international negotiations to pursue a global approach to address aircraft emissions. We have strongly supported implementation of both ICAO agreements reached in 2016 as a result of this directive: the agreement for the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), and the ICAO fuel efficiency and CO_2 certification standard for future aircraft, which the EPA has now adopted into U.S. law. The U.S. played a leading role in securing the CORSIA agreement and the ICAO CO_2 certification standard for future aircraft in 2016. The U.S. also strongly urged the ICAO Member States to undertake a process to establish a long-term goal for aviation climate action and is now taking a strong leadership role in that effort. We were pleased to see that EPA was finally able to adopt the agreed aircraft CO_2 standard into U.S. law as that is a clear signal that the United States stands by its international agreements. We urge the U.S. to further secure support for implementation of CORSIA by all ICAO Member States as we implement CORSIA in our own country. Further, we welcome U.S. engagement in the discussions at ICAO to come to consensus on a long-term climate goal at the ICAO Assembly in 2022. Simply put, aviation is a global industry, and we need globally agreed standards that ensure safety of flight while advancing environmental progress.

6. Catalyzing Government and Industry Climate Innovations in Other Sectors that Can Be Amplified by Aviation Action

While A4A and our members are keenly focused on means to further reduce GHG emissions within the aviation sector, synergistic innovations in other sectors to support deployment of cleaner energy and carbon removals that can be leveraged by airlines are critical. These include emerging technologies (such as carbon capture and sequestration/storage (CCS) and direct air carbon capture and sequestration (DACCS)) and proven nature-based solutions that remove and sequester carbon. A few examples of synergistic policies include:

- **Expansion of CCS Opportunities and Improvements in Price Competitiveness –** Emissions avoidance and sequestration opportunities must be maintained in the short to medium term, with aviation's use of them tied to ensuring environmental integrity (for example, through rigorous emissions unit criteria, such as that established under CORSIA). Given the emissions levels required to meet aggressive carbon emissions reduction goals, sources of removals associated with aviation activity and offsets from other sectors will need to evolve dramatically. In the future, now-emerging CCS and DACCS technologies and proven nature-based solutions that remove and sequester carbon must become more abundant and cost-effective. Government support for research and development and through positive incentives such as tax credits, further grant funding, accelerated depreciation, concessional loans, loan guarantees and other mechanisms are necessary to boost this emerging sector and attract additional private capital.

- **Expansion and Decarbonization of the Electric Power Grid** – As other sectors (e.g., on-road vehicles) become increasingly reliant on electric power, the reliability and resilience of the electric power grid will be increasingly tested. Commercial aviation continues to expand its use of eGSE and other electric vehicles to support operations,

and as such will also increasingly rely on the development of clean, abundant electricity in these applications. In addition, a great deal of research is trained on development of commercially viable electric-powered aircraft. If this effort is successful, airlines' dependence on a clean, reliable power grid would only intensify.

- **Establishment of Infrastructure to Support Alternative Energy Sources (e.g., Production of Clean Hydrogen and Transportation and Delivery Infrastructure)** – Similarly, significant resources are being devoted by private entities (and European governments) to develop hydrogen-powered aircraft. Successful development of such aircraft would be welcomed, but the challenges will extend far beyond developing the underlying aircraft technology to the creation and successful deployment of hydrogen production, storage, and delivery infrastructure necessary to support their operation. In addition, such aircraft may have novel configurations, requiring significant alteration of airport infrastructure to support their deployment. Although it likely will take decades before such novel energy sources and configurations may be realized, fundamental research and development to assess their potential and anticipate infrastructure needs should begin now so these options may be available to support a net-zero 2050 future.