1. ABOUT SUSTAINABLE AVIATION

1.1 Sustainable Aviation is a coalition of the main players from UK airlines, airports, manufacturers and air navigation service providers who have come together to set out a collective and long-term strategy to ensure a sustainable future for UK aviation.

1.2 Sustainable Aviation is focused on finding collaborative ways to improve environmental performance and ensure the industry develops sustainably, with the guiding principles of being cleaner, quieter and smarter. The industry is committed to making a positive contribution to UK society and its economy, and meeting the need for air transport whilst minimising its environmental impacts.

2. AIR QUALITY AND AVIATION

2.1 Air quality is an issue that is rightly at the top of the political agenda, given the concerns about the health impacts of poor air quality. While aviation is only a small contributor, largely outside of areas where there is poor air quality, the aviation industry is determined to play its role where possible.

2.2 The Sustainable Aviation Air Quality Report set out the emissions from aviation and how they impact air quality at and around airports. The pollutants of most concern are small particulate matter (PM) and oxides of nitrogen (NO\textsubscript{X}), in particular nitrogen dioxide (NO\textsubscript{2}).

2.3 Nationally, emissions of air pollutants are falling and are below legally binding emission ceilings. Aviation is a small emitter: the UK Government’s national emission inventories show that emissions from aircraft contribute around 1% to total UK NO\textsubscript{X} emissions and 0.1% to total UK PM\textsubscript{10} emissions.

2.4 Where emissions are concentrated, they have an impact on local air quality. Across the UK over 600 locations have been identified for not meeting health-based air quality objectives. Just one top ten UK airport is located within such an Air Quality Management Area (AQMA) and four are
near to one. In Scotland, only Edinburgh Airport is within one kilometre of an AQMA but is itself not included in the AQMA.

2.5 The relatively small contribution from aviation does not mean the industry is not working to lower overall emissions and improve air quality around airports further. At airports aircraft operations are the most significant source of emissions on the airfield but these disperse quickly and thus have a limited impact on air quality immediately outside of the airfield. The International Civil Aviation Organisation (ICAO) has identified that emissions from aircraft operations are only a ground-level air quality concern when they occur below 1,000 feet above the ground (ICAO, 2011) – typically within or in close proximity to an airport.

2.6 From an air quality perspective near to an airport, road transport is the emission source of greatest concern. This includes traffic to and from an airport, but not exclusively. Airports are often located near to major conurbations and airport-related traffic is only part of the traffic passing near to an airport. This is, for example, the case with the M8 near Glasgow Airport and the A8 near Edinburgh Airport serve: both are major arterial roads in their own right.

2.7 Sustainable Aviation believes that it is important to focus on aggressively reducing emissions to improve air quality where it matters most. The UK and Scottish Governments’ focus on reducing road transport emissions is therefore very welcome. On top of that national work, the UK aviation industry has already delivered a wide range of emission-reduction initiatives. They include:

2.7.1 Since 2005, airlines have invested in 470 new aircraft with engines that generate fewer emissions by burning cleaner and more efficient fuel use, representing an investment of nearly $50bn.

2.7.2 Airports promote public transport as an alternative to the car and are introducing consolidation centres to reduce airport deliveries, investing in cleaner power and heat generation equipment and introducing on-stand electricity and pre-conditioned air for aircraft so they can switch off auxiliary power units while parked on stand.

2.7.3 Air traffic control is improving coordination of aircraft movements to reduce delays and emissions, e.g. through reduced taxiing and holding of aircraft.

2.7.4 More aircraft are now taxiing to and from the runways without using all their engines and, when safe to do so, pilots adjust power for each take-off to reduce noise and emissions.

2.7.4.1 There is an interdependency in this area: despite a significant air quality benefit, the impacts of this procedure on noise are complex. The reduction in power setting reduces noise close to the airport but means that an aircraft will be slightly lower along its flightpath. As a result, whilst the overall noise impact will reduce, the noise levels under the flightpath may be slightly increased.

2.8 Industry will continue to invest and improve technology and operating procedures. Examples of future opportunities include:

2.8.1 In February 2016 easyJet unveiled plans to use hydrogen fuel cells on its aircraft to save up to 50,000 tonnes of fuel a year, cutting both carbon and air quality emissions. The airline hopes to trial technology in the next few years. This “hybrid plane” originates from a competition run with Cranfield University and would use a hydrogen fuel cell stowed in the aircraft’s hold. This would capture energy generated
by brakes on landing and could charge the system’s lightweight batteries on the ground. The aircraft would also use electric motors in their main wheels when taxiing.

2.8.2 Airbus Group Innovations and Rolls-Royce, with Cranfield University as a partner, are jointly engaged in the Distributed Electrical Aerospace Propulsion (DEAP) project. The project is co-funded by InnovateUK (an executive non-departmental public body, sponsored by the Department for Business, Energy & Industrial Strategy). The project researches innovative technologies to enable improved fuel economy, fewer exhaust gases and reduced noise for aircraft of the future by incorporating Distributed Propulsion (DP). DP will require a higher level of integration with airframe designs than that of today’s aircraft. The DEAP project is working to deliver a breakthrough in future aircraft design, significantly reducing air emissions and other environmental impacts. Rolls-Royce will develop an optimum electrical system propulsion plant, while Airbus Group Innovations will design the electrical system and work with Airbus to optimise airframe design.

2.8.3 Each year, Rolls-Royce spends £1bn on research and development and designing engines that reduce noise and emissions. This investment has already advanced combustion technology on Trent 900, Trent 1000, and Trent XWB engines – reducing NO\textsubscript{X} emissions well below international standards. Rolls-Royce continues to innovate, currently developing two new generation engine designs. The first, Advance, will offer at least 20% better fuel burn and CO\textsubscript{2} emissions than the first generation of Trent engine and could be ready by 2020. The second, UltraFan™, could be ready for service from 2025, offering at least 25% improvement in fuel burn. A new combustion system which drastically reduces emissions is currently being developed by Rolls-Royce. ALECSYS, the Advanced Low Emissions Combustion System, builds upon existing fuel injector technology, developing it further. The result is a significant reduction in NO\textsubscript{X} and PM emissions. ALECSYS technology has been selected as an integral part of the Rolls-Royce engine strategies. Rolls-Royce is now preparing for flight demonstration to mature the system, which will lead to a smooth service introduction on the next new large civil engine product.

2.8.4 Current UK airspace structures are over 50-years old and have evolved over time to meet growing air traffic demand at UK airports. There is now an urgent need to redesign this airspace structure to make better use of the current aircraft performance capabilities and air traffic technologies. NATS have developed a new iTEC system which makes use of data from many sources, including from aircraft, giving very precise 4D trajectories. By understanding where an aircraft will be, and when it will be there, NATS are able to plan optimal profiles, potentially increasing UK capacity by 40%, by enabling aircraft to pass each other with minimum separation. This evolution, combined with airport collaborative decision making (A-CDM), will present opportunities to reduce delays and emissions from aircraft both in the air and also taxiing, or queueing on the ground. Optimising the benefits will require close collaboration with neighbouring air traffic control bodies, particularly those throughout Europe.

2.9 On top of that, more can be achieved with UK and Scottish Government support:

2.9.1 With its focus on tackling emissions from road transport, all governments should also look at improving surface access to airports, such as high-quality 24-hour public transport options. In this regard, investment in the Edinburgh Gateway and Edinburgh tram as well as planned investment in the Glasgow Airport Rail Link are examples of good practice. It is important these public transport services are
available before and after the last flight for passengers but earlier and later for airport workers, enabling them to sustainably travel to their place of work.

2.9.2 UK Government policy currently supports ‘off-the-shelf’ ultra-low emission road vehicles. Airport provide an attractive environment to use ultra-low emission vehicles and this support should be extended to specialist airport vehicles and equipment, enabling them to replace or convert existing equipment to more sustainable options. This will require the right infrastructure at and near to airports to support, for example, electric vehicle charging.

2.9.3 Industry is investing in developing sustainable aviation fuels but needs UK Government policy certainty to commercialise these. The recent UK Government announcement to extend support through the Renewable Transport Fuel Obligation to jet fuel was welcome. The Scottish Government could consider policy support for fuel producers to encourage them to set up in Scotland, similar to the UK Government’s recent announcement of £22m match-funding for waste-based fuel projects.¹

2.9.4 UK and Scottish Governments should ensure that R&D programmes continue to be supported during and after the process of the UK leaving the European Union to continue the excellent work we have underway.

2.9.5 Airports will work with local communities and stakeholders to ensure the modernisation of airspace will be done in full consultation with those affected. However, some people will continue to be affected by aircraft noise. Support from the UK and Scottish Government on how to balance the needs of those affected with the need to reduce aviation’s overall impact through modernising the UK’s critical invisible infrastructure in the skies will be vital.