VINTAGE AIRCRAFT AND THE ENVIRONMENT.

1. INTRODUCTION

The VAC and its members are all environmentally conscious and as such we acknowledge the potential impact that our operations may have on the environment. The whole of the transportation sector is coming under increasing scrutiny in terms of its environmental performance. While some of this may be driven more by political rhetoric than fact, it is in all of our interests to properly define the challenges, and offer positive and proactive means of mitigating any environmental impact we might generate via our activities. We need to get ahead on this before we get left behind or become a target.

2. A QUESTION OF PROPORTION

The UK contributes approximately 1% of world greenhouse gas emissions. The major UK contributor is road transport. Within the UK aviation sector, which in total generates about 0.059% of global emissions, the GA contribution is miniscule.

The DfT Aviation Strategy 2050 document (rightly) reports that the principal impact of aviation on the environment comes from the commercial air transport (CAT) sector. A single Boeing 777 burns around 7,000kg, or 8,800 litres of fuel per hour.

The active GA fleet in the UK comprises some 15,500 aircraft, including helicopters, gliders, microlights and balloons. Of these, around 2,000 aircraft, almost all propeller-driven and piston-engined, can be classified as vintage or classic.

Clearly the fuel consumption and emissions of aircraft in the vintage fleet varies widely. However, assuming c. 200 active vintage light aircraft owned by VAC members each fly for an average of 25 hours per year, each burning 25 litres per hour; that adds up to 125,000 litres of fuel.

Therefore, the entire VAC members' fuel utilisation for a year likely equates to about 15 hours, or one typical long-haul round trip for just one Boeing 777.

3. THE CHALLENGES

i. LEADED AVIATION FUELS

Light aviation is the last area of the transport segment to use leaded gasoline with a significant proportion of the piston engined GA fleet continuing to use 'Avgas 100LL' aviation fuel. It is the only remaining lead-containing transportation fuel.

Lead was used as an additive in automotive petrol from the 1920s through to the beginning of 2000 when it was banned by European Regulation. The primary concern with leaded automotive fuels is that lead is a cumulative toxin found to adversely affect human health. The majority of this build-up was in high density road traffic areas, particularly in areas of queuing traffic in urban environments.

However, while the total fuel volume used in aviation is less than 0.5% of that used in the automotive sector in Europe, it is seen as beneficial to seek removal of the tetra-ethyl lead (TEL) in avgas. A programme is currently underway with DfT, CAA, AOPA and LAA to develop mechanisms to enable the greater take-up of 91UL unleaded aviation fuel at UK airfields. It is estimated that over 75% of UK light aircraft can safely use this fuel. In the vintage light aircraft segment, this number rises to close to 90%.

While some higher-performance WW2 types will continue to require 100LL to prevent damaging engine knock, or detonation that can result in a sudden engine failure, the majority of aircraft owned by VAC members benefit from the use of unleaded aviation fuel. 100LL's aggressive burn characteristics can cause cylinder head attrition, lead deposits fouling spark plugs and can cause sticking valves. Effectively we are currently running our Cubs and Tiger Moths on Spitfire fuel.

The VAC therefore supports the introduction of unleaded aviation fuel so long as legacy 100LL fuels remain available for those that need it and that 91UL fuel does not contain additives such as ethanol which can attack components in fuel systems not designed to accommodate it.

ii. CARBON DIOXIDE EMISSIONS

All internal combustion engines burning hydrocarbon fuel generate Carbon Dioxide, which is known as a 'greenhouse gas' as it traps heat in the upper atmosphere and makes the planet warmer.

The Climate Change Commission has calculated that UK aviation makes up around 5.9% of UK greenhouse gas emissions. As these emissions are directly proportionate to the amount of fuel burned, light aircraft generate only a tiny proportion of this total, and as these aircraft traditionally fly lower, their radiative forcing effect on the upper atmosphere is less than for other aircraft which operate at higher altitudes. Greenhouse gases deposited at higher levels through jet aircraft have a 1.9 times higher impact on global warming for a given volume owing to this altitude effect.

It should be noted that Carbon Dioxide is not the only greenhouse gas, nor is it potentially the most damaging. Methane, which is generated naturally by the breakdown of vegetable matter is around 25 times more damaging.

Nitrogen Oxide (NOx) is another by-product of the combustion process and can mix with moisture and particulate pollution in the atmosphere reduce air quality. A Government survey found that around airports the main sources of NOx air pollution were airport-related traffic on local roads. UKAC studies have shown that NOx emissions from aviation-related operations reduce rapidly beyond the immediate area around a runway and the overall contribution to NOx and particulate pollution by light aircraft is minimal.

iii. NOISE

Noise from light aircraft has returned to the agenda in the periods following Covid lock-downs when flying has been less prevalent and therefore the sound of an aircraft becomes more obvious. The majority of aircraft in the vintage and classic segment use lower powered engines which turn more slowly and are therefore quieter. **Good airmanship and VAC advice to pilots advocates that pilots avoid flying at low levels over habitation wherever possible.**

4. CARBON OFFSETTING AND WIDER ENVIRONMENTAL PROTECTION

Emitted CO2 (eCO2) is regarded as the prime normalising factor and is used by companies and individuals around the world for carbon offsetting, based on calculating how much CO2 is emitted by a certain activity that you are doing, and then funding a project designed to reduce carbon emissions by the same amount elsewhere, such as renewable energy or planting forestry, which absorbs CO2.

Many airfields are already carbon-neutral due to natural planting and the significant areas of grass which absorb more CO2 than is generated by flying. The curtilage of many airfields is also recognised as an important 'open green space' in ecological terms and there is increasing evidence from local nature and environmental surveys that **airfields are important as a low-insecticide, low-herbicide, sanctuary for plants, insects and associated wildlife**.

Even when an airfield is surrounded by what looks like 'green' farmland, that surrounding land is often the result of quite intensive agriculture with just one or two crop species being grown on ground which is regularly sprayed with fertilisers, herbicides or insecticides. In terms of wildlife diversity, it is little better than some urban environments. In contrast, **airfields offer a wide range of sustainable and diverse wildlife habitats.** There is no incentive to an airfield operator to use fertilisers to make the grass grow faster, or to use herbicides to increase crop yields.

At airfields with grass runways, the mixture of mown runways and longer grass margins is a proven wildlife sanctuary, with the grass around the runway providing nesting cover for birds such as skylarks and lapwings, and animals such as hares and voles. At the grass airfield at Stow Maries in Essex, an English Nature survey listed no fewer than 105 species of plant and nectar-giving flowers. These drive added populations of butterflies, bees and moths, which in turn create an eco-system, with other protected species such as sparrow hawks and owls taking advantage of the food chain.

There is further scope for environmentally-friendly development, including tree planting in airfield peripheries to act as additional carbon offsetting, while areas such as disused runway beds and hangar roofs can be used as the basis for solar power arrays, which can operate without creating any safety impact on flying operations. A typical example of this is Turweston Aerodrome where the 720-acre site has had over 10,000 trees and shrubs planted, an 18.4mW solar farm, and its main tower building and adjacent offices are powered by solar-generated electricity from panels on the hangar roof.

These airfields receive no government subsidies yet directly contribute to their local communities both as a civic and visual amenity and through the generation of employment and payment of business rates. **Most GA airfields are in semi-rural locations where they are a focal point for community activities with bikers, cyclists, ramblers, ornithologists, photographers and many others.**

5. ANYTHING ELSE WE CAN DO?

Reverting back to aircraft - a good, efficiently running, engine and clean airframe can have a big impact on fuel efficiency and oil use. Promoting good maintenance disciplines, not accepting oil leaks, keeping props and leading edges clean can have significant effects.

Individual operating practices can aid environmental and cost-efficient performance. Adherence to optimal climb and descent profiles, minimising full throttle operations and using engine mixture controls to minimise over-rich running can both reduce emissions and overall fuel-burn.

We should also look at the environmental impacts relating to waste - particularly during maintenance activities, where we generate waste oil. There are waste oil recovery companies across the country who can collect, recover and reuse. It's important to get linked up with licenced waste disposal so that users know the waste is treated correctly and not polluting the environment.

Vintage Aircraft Club
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