LLATVCC News-Sheet

Newsletter 66 – August 2021

It's getting busy again

As we've all noticed, Luton is back in as much business as the current round of foreign travel restrictions permits, so we're back to the before-06.00 departures, largely by those aircraft from easyJet and Wizzair that are based at Luton, followed by the incoming stream from eastern Europe. The usual sleep-destroyers from cargo flights have remained with us, these days without the justification that they carry urgent supplies of PPE.

Expansion Plans: the story so far

These new plans are now scheduled for a Statutory Public Consultation phase in the spring of next year, with a submission date for a single Development Consent Order in the summer of 2022. These consultations are likely to be primarily of an online digital nature, with a limited number of public events. The expansion proposals are said to be split into three phases:-

- Phase 1 – This would be achieved by alterations to the current facilities, to bring a throughput of 21.5 million passengers per annum (MPPA), which was forecast to be reached between 2029-2031.
- Phase 2 – This will see the modular development of a new Terminal 2 site, increasing throughput to 27 MPPA , forecast for 2033-2037.
- Phase 3 – Dependent on demand this would be more modular additions to T2, taking capacity to 32 MPPA, forecast for 2040-2045.

One wonders how the airport owners LLAL can be pursuing all these expensive plans, when they have had to borrow another £139 million from Luton Borough Council (though effectively from the Public Works Loan Board), at penal interest rates, just to stabilise the company this year. It was suggested that such increases in passenger numbers could be achieved without substantially increasing the number of aircraft movements, by means of the airlines upgrading their fleets to larger aircraft. Quite how this plays out in terms of noise remains to be seen but we're somewhat dubious; based on limited experience with the larger A321 aircraft, even the NEO (New Engine Option) version is noticeably noisier than the A320NEO and there have been questions raised about its landing noise, which is proving just as noisy as the earlier version of the A321. Definitely something to keep our collective eyes on.

Jet Zero Consultation

Government has opened a consultation, whimsically described as “Jet Zero”, in which several scenarios for aviation are envisaged so that aviation is able to carry on polluting even under the Government's aspirations for UK to be contributing net zero CO2 by 2050. It can be found at www.gov.uk/dft#consultations, and responses are sought by 8th . September 2021. Do take the time to study the document and if you find any of the following points from our study of use by all means incorporate them in any responses you make. Our reading of the consultation It appears

that the Government strategy is at heart something on the lines of a very dodgy project proposal which, at several points, contains statements on the lines “at this point a miracle occurs”. We also suggest that the basic premise that “aviation is good for the UK and must be permitted to thrive and expand” is fundamentally flawed. The industry's stresses and, unfortunately, those from DfT, are always on its alleged economic benefits, inevitably bracketing the value of civil aviation with military and space engineering and ignoring altogether the substantial losses through the net loss to the economy of tourist spending, almost all of which arises through low-cost short-haul flights, the reduction in property values as a result of aircraft noise, etc. etc. In 2017, the last “normal” year before the Covid crisis, the Office of National Statistics quoted that net toturist spending loss at around £32billion per year. Even at Heathrow, the UK's principal “business” airport, close to 80% of passengers are flying for social and domestic purposes. The Climate Change Commission position on containing the climate change effects of aviation is commendably simple and entirely comprehensible, based on reduction in the activity which generates the problem on both the demand and supply sides: significantly raising the cost of flights, much of the demand for which is very price-sensitive; and controlling the eventual supply, through halting the expansion of airports. Very much based on the premise that an ounce of prevention is far more effective than a pound of cure. The Climate Chane Commission recommends a moratorium on airport expansion schemes. It is also oxymoronic to use the term “Jet Zero, since all scenarios described, even the most optimistic, in the “Evidence” document see “residual emissions from aviation remaining in 2050, though these are lower in some scenarios than others. Therefore, for aviation to meet net zero, some abatement outside the sector will be required. “ Those residuals, euphemistically described as “abatement outside the aviation sector”, represent anything from 15% to 67% of the total abatement required to achieve true zero emission, and even that assumes the acceptance of so-called sustainable aviation fuel as somehow not involving emissions of greenhouse gas or otherwise adding to global warming. In fact, if (a very large IF) sustainable fuels create 80% less CO2 when burned, as some enthusiasts claim, the net effect of using 50% of sustainable fuel as a “drop-in” replacement would still cause a net 60% of the CO2 contribution to global warming together with 100% of the other adverse climate change effects.

The prospects for Zero Emissions aircraft and hydrogen as a fuel

In practical terms, i.e. airframes capable of carrying around 200 passengers distances of around 1500miles, none exists beyond some pretty pictures. In terms of electric-only aircraft the basics of physics and chemistry are stacked against such designs: the task of accelerating around 70tonnes of aircraft from zero to 140mph in around 30 seconds (and over a distance of not more than around 2000 metres) and then climbing to height is outside the capability of even the best battery designs and the weight of sufficiently powerful electric motors is prodigious. Jet fuel is hugely energy-rich and the engines that turn it into useful thrust are relatively lightweight in terms of pounds per horsepower. Further, unlike an electric battery whose weight remains constant throughout a flight and thus needs the same amount of energy to keep the aircraft in the air, jet fuel burns off during flight, reducing the energy required to keep the aircraft flying – in a typical short-haul flight from UK to Spain around 6 tonnes of weight are lost. Some demonstrations have been made of light aircraft powered by battery but the accent is on the word “light”. The commercial prospects for the types of electric aircraft currently postulated, seating perhaps 20 passengers and with a range of less than 100 miles, are not apparent. There is also the issue of the electrical equivalent of refuelling to be addressed – hydrocarbon fuel can be loaded into aircraft quickly (and, for military purposes, transferred air-to-air).

It has been suggested that perhaps hybrid aircraft, using the power of jet engines for the takeoff and landing cycle (the latter stages of which are also power-intensive) and reverting to battery power during the cruise stage of flight. Around 40% of fuel burn on a short-haul flight is consumed in the takeoff and landing phases, so electrical power along with a somewhat lesser, and thus lighter, electric motor could be employed in ducted-fan mode for the 60% of the flight that was in the cruise phase – no such aircraft yet exists even in prototype form but in effect two types of engine: a jet and an electric motor; would exist in one airframe thus reducing what would otherwise be payload. The possibilities for hydrogen-powered aircraft are just that: possibilities. There appear to be two possible directions here: using the hydrogen in a fuel cell to generate electrical power to turn an electric motor (and thus propellors), or to burn the hydrogen in an adapted jet engine. The fuelcell/electric motor route seems far outside existing and predicted capabilities of fuel-cell technology, but the "hydrogen as a liquid equivalent of hydrocarbon fuel" route may be possible, though early Russian work on an equivalent to the Boeing 727 suggested that airframes would have to be radically redesigned since the fuel, unlike hydrocarbon fuel which can be accommodated in flexible "bag" tanks in the wings, would require to be accommodated in metal tanks within the body-form of the aircraft. There would be significant weight penalties, and the specific output of hydrogen is lower than that of hydrocarbon fuel, further reducing payload. There is, also, a significant issue of infrastructure, at and between airports and refineries as there is at present a substantial underground pipeline network for jet fuel distribution which obviates most of what would otherwise be transfers by road tanker. In any event such aircraft are not zero-emission: they may not emit CO2 but they still contribute to global warming through creation of con-trails, and there will also be emissions from burned lubricants just as with conventional jet engines.

Efficiency improvements

Those cited are possibilities, some of which are beyond optimistic. The 2% year-on-year improvement in fuel efficiency mentioned would represent a 20% improvement over a 10-year period, far in excess of anything achieved in the last 10 years despite airlines' strong focus on saving fuel costs (usually the largest component of the cost of a flight). ICAO (essentially the aviation industry at prayer) likes to talk in terms of the average improvement achieved since 1962, long before the current generation of high bypass-ratio engines such as are now being fitted to Airbus A3xxNEO or Boeing 737MAX aircraft. Looking forward from today's engines the improvement achievable year-on-year is less than the year before and steadily approaching zero. Airlines' fleets in UK are only now using these newer aircraft – and in doing so some of them are trading-up: A321NEO replacing A320, which adds seating capacity but also burns more fuel than the smaller A320 being replaced. Some improvements could undoubtedly be achieved through managing the arrival of flights at greater distances from the arrival airport so as to avoid need for "stacking", as well as better allocation (or even some form of central management) of the numbers of flights to individual airports to reduce or eliminate congestion, to reduce the effects of the current free-for-all. Continuous descent approaches help a little, as does/would single-engine taxying and electric tugs, but these are very much at the margins of what's measurable. It had been suggested that open-rotor engine technology could reduce CO2 emissions substantially as a results of lower fuel burn, though aircraft fitted with such engines would have performance equivalent to that of a turboprop due to aerodynamic interference between the airflow around the aircraft and that around the rotors. Flights would be slower and lower, reducing cost effectiveness, and there are significant noise disadvantages both within and outside such aircraft. Some of the relatively fanciful sketches of fuel-efficient airframes, employing the "blended wing" design, are likely to be more than problematic – while it may be possible to reconcile passengers to lack of real

windows by presenting them with a flat-panel display simulating an outside view, there would be substantial difficulties in achieving emergency evacuation of such an aircraft within the timescale mandated by ICAO.

Sustainable Aviation Fuel

This is a classic example of greenwash – these so-called sustainable fuels are only "sustainable" in the sense that the feedstocks from which they are derived do not come from fossil fuels, being a variety of sources: household waste, waste cooking oils, waste animal fats, forestry waste etc. But they are still hydrocarbons in one form or another, however they may be synthesised, and still generate CO2 and oxides of nitrogen when burned. Some are said to generate slightly less per unit mass than conventional jet fuel, some may generate slightly less carbon particulate (soot) and most will generate slightly lower quantities of oxides of sulphur, but the differences are marginal. The production processes are energy-hungry, as are the transportation costs of the various feedstocks, some of which (waste cooking oils, the easiest to convert at present, are also in demand for supplementing animal feed), and forestry waste is a significant creator of humus and soil fertility if left in situ.

The cost of so-called sustainable fuels, ignoring issues such as transporting the feedstocks and the results of any competitive demands for some of them, are substantial: forward-looking estimates range from three to 11 times more costly per unit than conventional jet fuel though the optimists hint that the differences may reduce when large-scale production capacity becomes available – yet the climate change problem is now, not at some future date. The claimed benefits appear to be misleadingly described: though the claim is that they are responsible for 80% less CO2 production, that relates to the proportion of sustainable fuel that is blended with conventional fuel: at most, 50%. Carbon capture & storage, carbon trading etc. So far as carbon trading is concerned, it looks more relevant than it appears to be as a credible means of reducing global warming. The European Union's carbon credits traded from $7.78 to $25.19 averaging $16.21 per tonne in 2018, and thus the "cost" of appearing to mitigate polluting appears to fluctuate over a surprisingly wide range. The staunch advocates for CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation) talk in terms of "stabilising emissions" through market mechanisms such as carbon trading while setting their faces firmly against other more direct, auditable and comprehensible mechanisms such as increasing the price of airline tickets, something which would directly ensure that "the polluter pays". This principle also seems to be challenged by some of the enthusiasts for carbon capture, who suggest that it is so beneficial to all that its considerable costs should be shared between the aviation industry and, in effect, all taxpayers, though in any given year less than 50% of UK residents take a single flight. Global warming potential The consultation refers to the issue of global warming potential of the totality of jet exhaust but chooses to take the ICAO standard line that "there are uncertainties and further research is needed" when it comes to enumerating the scale of the under-counting. There is near-universal unanimity that the totality is substantially greater than that from CO2 alone and a conservative estimate is that the total global warming potential, largely as a result of water vapour, oxides of nitrogen, a little soot and oxides of sulphur, is at least 2.7 times that from CO2 alone. Thus the notion of Jet Zero as currently described is fundamentally flawed. Review Periodicity It is a nonsense for reviews of the progress towards zero climate change effects from aviation to be planned for 5-year intervals: the problem is with us now, and most of the elements in the scenarios envisaged in the consultation rely on regular and cumulative small-scale improvements. If these are not immediately manifest to

independent auditors, the foundation of the Jet Zero scheme fails. Annual independent verification of progess must be a legal requirement – the suggested 5-year interval is grossly inadequate.

AVGAS

A complete omission The scenarios ignore the existence of those aircraft which burn Avgas (a specialised version of petrol), together with their emissions. They may not be jets, but they are still contributors to global warming and most of them are used for leisure purposes only. It appears that aviation already enjoys an indulgence: unlike automotive petrol, from which lead (tetraethyl lead, used as an octane improver and incidentally as a lubricant for valve-seats and

guides) has long been banned, Avgas still contains lead additive, though AvgasLL has a lower lead content. The rest of the petrol-consuming universe has to contend with E5 or E10 petrol with 5 or 10% ethanol content, which is already rendering some devices such as motor-mowers unusable.