EXPERT PANEL SUMMARY

What is the Future of Air Transport?

Wednesday 26 May 2010

Background

As air transport recovers from the global economic crisis it faces major challenges. It needs to reduce emissions substantially and it needs to make much more efficient use of scarce resources; these include not only oil but also air space and airport capacity. Financial sustainability is as challenging as environmental sustainability in an industry that is highly exposed to external shocks as the financial crisis and the volcanic ash emergency underline. This session examined the major innovations in preparation for air traffic management, asked what airlines and airports can do to ensure financial stability and assessed the potential for reducing the sectors environmental footprint.

The Panel

- Moderator: Eric Kroese, Special Advisor on International Aviation Policy to the Minister of Transport of the Netherlands
- Christian Dumas, Vice President Environmental Affairs, Airbus
- Angela Gittens, Director General, Airports Council International
- Dave Knorr, US Federal Aviation Administration
- Matthias von Randow, Director at Air Berlin
- Bo Redeborn, Director Cooperative Network Design, EUROCONTROL
- Johannes Reichmuth, Director of the Institute of Air Transport and Airport Research at the German Aerospace Center

Market and Industry Changes

Innovative business models have driven a major expansion of the industry and the session began by looking forward to what may lie ahead for the market following two decades that have seen "flags dropping off the tails of national carriers" and strong growth but no profits.

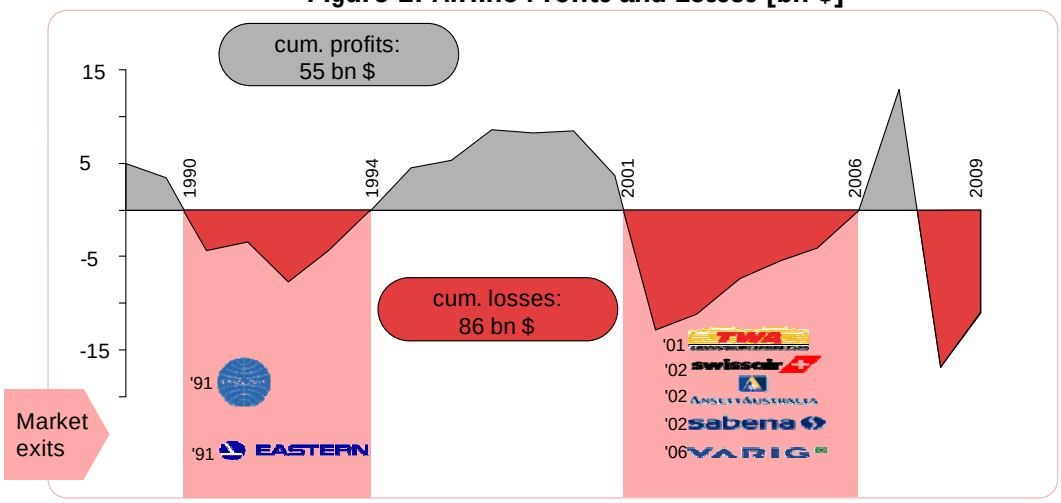
Tremendous growth has accompanied economic expansion, accelerated by competition, with 300 million passengers in 1970 growing to 2 500 million today. Projections see global passenger traffic doubling or even quadrupling to 2050. Much will depend on what happens in China and India. Even if per capita travel stays at levels only a third of Europe today these markets will double world traffic volume. Growth at the higher end of the spectrum is conditional on

liberalising these markets and on making Open Skies agreements for inter-Asian traffic and services between Asia and the rest of the world.

Despite continuous growth, airlines make losses overall. Figure 1 summarises the last two decades, though it masks differences between airlines. For the size of losses, exit from the market has been relatively limited. This reflects government intervention to rescue national carriers, which in turn reflects the economics of providing universal service. In passenger railways, with a similar network economic structure, governments provide support for services to thin markets (stops in small towns, services to remote locations), up-front, under public service contracts. In aviation such support does not exist. Instead legacy carriers aim to attract larger numbers of passengers by providing feeder connections to the profitable parts of their networks, internally cross-subsidising the feeder routes and supporting the heavy costs of hubs. Though the hub and spoke system proved a profitable way of providing a network of services for a time, the rise of low cost carriers running direct point-to-point services on key routes has undermined the profitability of the model. The response of legacy carriers has been a wave of massive consolidation with, for example, 19 companies in Europe merging into two alliances, Lufthansa and Airfrance-KLM.

The alliances "stand for competition and quality", as Matthias von Randow noted, but their expansion underscores the importance of antitrust authorities in the future if competition is to continue to be the motor of innovation, to provide the range of different types of traveller with the quality of service they need, making air travel accessible to all.

Figure 1. Airline Profits and Losses [bn $]



Source: Air Berlin http://www.internationaltransportforum.org/2010/AirTransp_outline.html

Before liberalisation the market was heavily regulated and divided between scheduled and charter companies. Opening of the markets resulted in competition from low-cost, one class, low-service operators. The future may see something different - hybrid companies that operate services for all parts of the market; business, private and tour operator clients. This is already the model emerging for companies like Air Berlin which operates a single class on short haul flights but business and economy on long haul, with full service offered on long and short haul. Asia is seeing a similar pattern emerge. Low cost airlines have arisen even without complete liberalisation and have quickly transformed into hybrids with the addition of long haul operations.

Such changes have a profound effect on airports; "hub shifts wreak havoc" as hubs require very different facilities from other airports. Changing airline business models will dictate future airport development, although Angela Gittens remarked that "passengers saving money on low-cost air tickets do not necessarily want a low cost environment at the airport". The effects are not so large

on the operational side of air traffic management but traffic forecasts become much more uncertain.

Sustainability of Energy Demand and Environmental Compatibility

Aviation is the only mode of transport where "we have been betting the whole future on a single fuel". This has, however, had the advantage of driving fuel economy harder than in other sectors. Aircraft today are 70% more efficient than 40 years ago. There is a strong incentive for efficiency because fuel has to be carried on-board, trading-off payload and range for fuel. This is unique to aviation.

The industry set out its goals for reducing its carbon footprint at COP15 with the Air Transport Action Group aiming at carbon neutral growth by 2020 and 50% emissions reductions by 2050. The largest gains will come from technological and operational improvements. Full electric aircraft – derived from the pioneering efforts of Solar Impulse – were not expected to play a significant role in civil aviation in next 30-40 years but lightweight materials and better aerodynamics (critical also for Solar Impulse) will be important and, for example, the EU ACARE research program aims to make major improvements.

Christian Dumas noted that "if it was possible to replace all 20 000 aircraft flying today with today's most fuel efficient aircraft, CO2 emissions would be cut 25% but it will take 20 years to for the fleet to turn-over at normal replacement rates, a much longer horizon than for cars".

Economic instruments are viewed by the Air Transport Action Group as driving a relatively marginal part of the improvement in the medium term. Industry's key concern is to see revenues from emissions trading used to fund research and development to accelerate the pace of improvement rather than taken out of the sector as a pure tax. This is because the main effect of trading will be to push up the price of carbon and drive improvements in other sectors, and aviation may be robbed of the resources needed to ensure long-term technological improvements. The other key industry requirement is for regional trading systems to be made compatible, although there was pessimism among researchers joining the debate that this could be achieved with multiple trading systems and only a single global trading system would avoid serious distortions of the market. Multiple trading systems would result in some long haul flights paying twice and others diverted on longer routes with higher emissions to avoid paying charges on part of the route.

Biofuels have been something of a chimera and two years ago and as Christian Dumas remarked "no one would have bet a cent on biofuels being used in aviation". Now, however, the industry sees them as the main plank of decarbonisation in the long term, accounting for over half of the gains from around 2050 onwards. Drop-in synthetic biofuels are now authorised for blending with aviation fuels for use across the fleet. However, it is clear that biofuels cannot be produced in very large volumes without an unacceptable environmental impact and their cost make biofuels uncompetitive. The small quantities that can be produced would probably be made better use of in aviation where there are no obvious substitutes, than for fueling cars, but the biggest CO2 mitigation potential is in power generation and heating. Nevertheless biofuels are viewed by the industry as the only "breakthrough technology" capable of rapidly decarbonising flight, as all other innovations are dependent on gradual turnover of the fleet.

Keeping shareholders on-side while investing massively in the innovation needed will require production of the best aircraft ever in terms of performance and profitability. The aircraft manufacturing industry works at the limits of innovation and there are bound to be failures that will have to be absorbed as well as the overall success the industry is committed to. Technological innovation was seen as a much more effective route to reducing CO2 emissions than attempting to limit demand, for example by cancelling airport development plans, as demand is real and truncating it will have a high economic cost. Pricing emissions, for example

through an emissions trading system, would provide incentives to manage emissions more effectively but the response needs to be left to the market to find the biggest improvements at lowest cost to society.

It was noted that air and high speed rail are competitors over short distances and more often complements. Innovative marketing of end-to-end services with long haul air trips completed by connecting rail legs on a single ticket has emerged, for example with Air France offering onward travel by TGV from Charles de Gaulle airport.

Air Traffic Management

There is a lot of old technology and old fashioned procedures behind air traffic management. Bertrand Picard's advice to "ditch old habits" to advance is highly apposite. Current systems are not sufficiently agile. The link between advanced systems in air space control and ground control in particular is weak, still reliant on analogue voice radio. Safety is a core concern for air traffic management (ATM) and cannot be put at risk by innovation in the sector but there comes a point when the old system is less safe than the new, despite the risks of change.

A revolution is in progress for ATM, driven in the US and Europe by the NextGen and SESAR programs. Priorities differ but both aim to improve service, improve safety and improve the efficiency the way air space and runways are used, relieving a critical bottleneck. They also aim to cut costs, and the charges levied on ATM users, with a greater focus on costs under SESAR as costs per flight in Europe are currently roughly double costs in the USA.

The suite of technologies needed is available now. These include transmitting detailed flight plan revisions to pilots in real time to avoid convective weather (storms) rather than limited radio instructions. They also include aircraft location technology so planes can interact and fly on very precise routes closely spaced and systems to replace radar by equipping aircraft to automatically "squawk" once a second giving their location speed and direction plan to other aircraft and ground controllers.

Managing the transition process is more complicated than developing the technologies. Some delay results from the time taken to ensure systems are forward and backward compatibility because of great range of plane generations in the skies. But some is attributable to attitudes that fail to embrace technology and resist change, for example the need to move away from a sector by sector air space control system. Intensified cooperation between ATM providers, airports and airlines will be needed to get things done. Major recruitment and retraining programs are underway to cope with the transition although in the long term many more planes will be handled per controller, accommodating growth.

Time has been poorly managed to date by ATM. In contrast with rail, where sophisticated timetabling has developed, ATM manages the three spatial dimensions well but has somewhat neglected the fourth dimension. Better projections of 4D trajectories will yield a major share of the gains with an emphasis on pre-flight planning and in-flight optimisation. The idea is to plan trajectories as part of company business plans and reduce the need to intervene in real time.

The more agile systems will also be much more effective in dealing with backlogs, and should be capable of dealing with the kind of disruption created by the recent volcanic ash problems much more rapidly.

While air traffic management improvements are critical, three quarters of the delays are on the ground or a result of delays to earlier legs of a plane's rotation. Gate to gate management will become increasingly important and getting ground side transport information integrated into system could make a big difference. Reliable transport is the key for passengers as well as business. It is clear that innovation in air traffic management will be able to successfully cope

with the massive increase in demand for air travel. Managing delays on ground, in airports, is a tougher challenge, and financial sustainability is the toughest challenge of all for the sector.