

The EU's scheme for limiting CO₂ emissions will include aviation from 2013. Not all stakeholders are happy about the way it is monitored, how it will effect their European operations, and the cost of complying. The scheme is also likely to limit the growth and development of most airlines.

Will the EU's ETS limit airline development?

The European Union's (EU) emissions trading scheme (ETS) will mean that most aircraft operators flying into, out of or inside Europe will need to record their carbon dioxide (CO₂) emissions. For the past few years operators have been planning for this scheme, and have been preparing to use specialised software.

CO₂ emissions are calculated from the fuel burned on a relevant flight and therefore an operator's total fuel burn on applicable flights for the year. This figure for 2011, combined with an operator's cargo- or passengers-carried figure, formulates the amount of free CO₂ allowances it will be granted in 2013. These free allowances may be increased in a few cases, from 2014, if an operator can show it needs more for route network growth, but an operator will never gain free credits equivalent to 100% of its needs.

Credits are due to be set at 80% of an operator's needs in the previous year. To meet its needs in full, an operator will need to purchase credits, which can currently be bought from other industries or from the aviation allowance auction in 2013 (*See Complying with the EU's ETS, Aircraft Commerce, June / July 2010, page 36*).

There has been a lot of controversy about the EU's ETS. On the one side there has always been a big push to include aviation in the ETS from those that want strict regulation in emissions released from all industries. On the other there has been a call to exclude aviation, since many feel this industry is already making huge efforts to reduce emissions, as well as producing only 2% of all transport-related CO₂ emissions. There is no doubt that an aircraft, per person, is more cost-effective in terms of emissions than all other forms of transport, including cars. Many argue, however, that the altitude at which an aircraft emits the pollutants is far more of a problem than the equivalent on the ground.

Legal opposition

The arrival of the EU's ETS has not been plain sailing. Many airlines, both in Europe and based elsewhere, feel the system will penalise those flying in and out of Europe, as opposed to flying in other areas of the world. This in turn will potentially affect the growth of European aviation.

The ETS will affect the way that European airlines operate, and airlines

and aviation bodies from outside Europe are not happy. They feel that they are being forced into a system that Europe should not be implementing, at great cost to themselves. China and Russia have lodged lawsuits against the scheme but, in particular, American Airlines, the American Transport Association of America (ATA) and United Airlines have lodged a joint case, arguing that the ETS is unlawful, in the High Court in the United Kingdom (UK).

The group feels it already has a strong record of fuel efficiency and emissions savings, and that additional forced legislation is both expensive and flawed. The written observations sent to the High Court say that the EU's ETS is against both the Chicago Convention and the Open Skies Agreement. They say also that the piecemeal set-up could bring chaos to international aviation because flights will be monitored for the entire flight length, not just when the aircraft is over the EU. This, says the ATA, could cost the US airline industry more than \$3 billion over the next 19 years, and is basically an illegal, exorbitant and counter-productive tax on US citizens that violates US sovereignty.

American carriers, in turn prefer that

THE COUNTRIES AFFECTED BY THE EU'S ETS

27 EU Member States

Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, United Kingdom

3 EFTA Countries

Iceland
Liechtenstein
Norway

Other Countries that may potentially join the EU's ETS

-Areas that already have a form of emissions scheme

Switzerland
New Zealand
North Eastern US states

-Areas that are planning emissions schemes

Japan
Australia
California

Countries that have lodged, or are considering lodging, legal action against the EU's ETS

United States of America
China
Russia

Countries outside the EU that could see airport development due to the ETS

Switzerland
Turkey
Egypt
Morocco



Airlines will be looking at ways to reduce both their fuel consumption and CO₂ emissions. Airlines and other bodies are researching and testing alternative fuels, particularly biofuels, and the ETS will only serve to accelerate their development.

certificates. This could be expensive if the price keeps rising, or if the industry simply runs out of credits, says Harling. But equally, due to the economic situations in some member states, such as Greece, the carbon credit value could fall as the value of the Euro drops. Then again supply and demand could go up and down over the next three years.

Those carriers that are already buying up credits, could find themselves with an excess that they can sell and perhaps make a profit, or profit from others' routes. "Lufthansa, for example, could pick up the routes of airlines that do not have enough credits for their network and need to drop frequencies, routes or even bases," says Harling.

If one year an airline found itself with an excess of credits, having bought too much while hedging, they must remember to transfer the unused credits to the following year. This surrender date will always be at the end of April each year. This could have one of two effects on growth: airlines will either collect their credits over a few years and then open a lot of new routes; or network growth will be slow and measured over the next few years. Airlines traditionally announce new routes in groups, but this could change to one route at a time.

Alternative fuels

One way of reducing carbon emissions is to utilise the biofuels that are currently in development and will be commercially available in the near future (see *The development of alternative fuels, Aircraft Commerce, April/May 2011, page 21*). The use of alternative fuels will reduce the amount of emissions and therefore the number of allowances used. If 100% biofuels are used, then it is potentially possible that an airline might not have to relinquish any carbon allowances. This however, depends on the availability of biofuels at the right price and at 100% strength, not mixed with traditional aviation fuel. This could affect the airports to which an operator might choose to fly, especially in the planning stage of route network additions.

"The ETS may not have an effect on the size of an aircraft if the most cost-effective type is already operating a route. It will, however, have a big effect on fuel use," says Simon McNamara, deputy director general, European Regions Airline Association (ERA).

emissions are cut through multilateral agreement and initiatives to develop fuel-saving aircraft, engines, fuels and operational procedures, not by penalising those who are already making environmental efforts.

The number of countries objecting means that there is a small chance that these countries could be excluded. The directive goes all the way back to Kyoto, says Guido Harling, executive director & head verifier, ETSverification. China could be let off, but this would very much depend on it proving that it is taking appropriate measures to reduce CO₂ emissions. As this is unlikely, the EU is likely to go ahead.

The results of the lawsuits could have a large impact on the scheme. 2012 is due to be the trial run for aviation, with full trading actually starting in 2014. With the lawsuits on-going, the EU may have little choice but to postpone the financial start, in 2013, of the ETS, otherwise there will be some airlines paying and some not. In reality, the EU is very unlikely to let this happen, and will ensure that some semblance of its scheme continues.

Carbon certificates

Those carriers that are affected by the ETS will have been collecting all their operational data over the past year. The transported payload and fuel used on any particular flight or route during 2011 is then formulated and passed to the EU.

These figures will be used by the EU to calculate an operator's EU aviation allowance (EUAA), based on the 2011 payload and fuel-burn data, which is issued as a currency. In November 2011, the EU will publish an allowance benchmark that will give airlines a better

idea of what allowances to expect. A carrier will only be issued with 80% of its needs in carbon certificates. The additional 20% will need to be gained by buying credits, as well as including any additional route or frequency growth that it may have calculated for.

"Having a well planned fixed-route network means a carrier will have a pretty good idea of its fuel requirements. This results in the carrier knowing how many additional credits 20% will involve, plus any growth plans," says Harling. "This results in an operator being able to start trading early and take advantage of the lower prices currently being charged for carbon credits. Carbon credits are already available from other industries, but not yet from aviation. These credits are only available for one year, so they must be converted before the start of the second aviation trading term in order to be valid when they are needed."

Harling roughly estimates that an airline can expect its ETS costs to be a 1.5-2% surcharge on current fuel burn, starting from April 2013.

The large airlines, such as British Airways, Air France and Lufthansa, in particular, are starting to buy credits well ahead of the start of the scheme. Lufthansa is buying a number of credits every week, and has even set up a department to oversee the buying and hedging of credits. This approach is only possible for airlines that have access to immediate cash, and are happy to hedge their credits in much the same way as is often done with aviation fuel, bearing in mind the risk that external factors could lead to a fall in the price of credits.

Other airlines, especially the smaller ones, will have to buy much later in 2013 once they have an idea of their free



While all affected airlines are likely to see operational and financial effects from the ETS, it is hard to forecast exactly how airlines will react. Air Berlin, for example, has recently announced a 10% fleet cut, while Deutsche Bahn will operate a new train service from Germany to London in 2013.

it is that a specialist department has been set up with the sole responsibility of dealing with the EU's ETS, and ensuring total conformity to reduce the chance of any fines for late or incorrect data. Also, a large airline is more likely to be able to afford specialist software to simplify the collection and verification of data. These additional costs, both one-off and on-going, will need to be picked up from somewhere. The one-off costs could mean that operators reduce any growth for a few years to lower the cost of additional credits, and then start growing again once the ETS has been in operation for a number of years.

The use of more, and more modern, next-generation, regional jets could decrease an operator's emissions, enabling an operator to grow some routes, but this again will be an additional financial cost.

Regional airlines

There is no doubt that those operators that only fly within Europe are going to suffer. All their flights will be subject to the ETS, so they will have an additional cost of 2% on top of their current fuel bill. That amount of extra financial outlay cannot be absorbed just from profits. Customers will pay the price with fare increases, and potentially reduced routes and frequencies.

"Airlines also have to factor in the administration costs of the scheme," says McNamara. "Overheads and the cost of compliance, and the purchasing of additional carbon credits must all be taken into consideration. One of the big burdens of this system is the complexity with monitoring, reporting, verifying and signing off of various data. For smaller airlines, the overheads will be large, with the added cost of needing to introduce specialist IT. These costs will be proportionally larger than for a large flag carrier, which may already have the relevant staff and IT in place."

To save money and reduce the carbon credit bill, regional airlines may choose not to develop new routes within Europe, or expand current ones. Those small airlines that are currently not part of the ETS, because they fall under the limit of payload and fuel burn, will be unlikely to expand because it will not be economical to grow routes. As soon as they go over the threshold, they will start paying a lot more per passenger, which will seriously erode profits. The result could be a mass of very small European airlines that offer very specialised services, or many of the intra-European routes being snapped up by the large flag carriers.

As mentioned, the larger airlines are

already starting to hedge their credits, due to larger capital reserves, in a way that many smaller airlines are just unable to do. If large airlines have an excess of carbon credits they could offer to take a route from a smaller operator, which may not have enough credits. The larger airlines will also be able to offset some of the additional European costs against their continental long-haul routes. This could also make large hub-and-spoke networks much more favourable than a random network of regional carriers.

A large hub-and-spoke network is likely to eliminate smaller airports in favour of increasing the use of larger regional airports. This has the added benefit of economies of scale. An airline may be able to offer a larger aircraft on a route due to increased passenger loads, thereby reducing the cost per passenger, although the distance a passenger has to travel to their nearest airport may increase, causing carbon leakage.

The very large regional operators, such as the low-cost carriers (LCCs), are likely to pass every additional ETS cost on to the passenger. Due to already low fares, large networks and firm contract negotiation it is unlikely that they will need to change their operating style, however. If every operator increased prices by 2%, then nothing much would change, the differential would still be the same, and only the passenger would lose, by having to pay higher fares.

It is not just the 1.5-2% additional charge in credits that an airline has to pay. All operators must also have an approved method of collecting and registering their carried payloads (these data will only be collected in 2011) and fuel consumed.

The larger the airline the more likely

Long-haul operations

By the very nature of long-haul, these flights will either originate from, or stop outside, the EU. Despite the fact that an entire flight's path will not be over European airspace, the entire flight has to be included in an operator's allowance. A 10 hour flight to the West Coast of America, for example, may only include two hours of flight in EU airspace. Many argue that this is an unfair way to regulate the system, but it does ensure that long-haul and regional airlines should, in theory, be affected in similar ways. The added costs and how to deal with them are essentially the same. Long-haul carriers have the option of younger, more fuel-efficient aircraft, and are more likely to be large flag-carriers with the financial advantages already mentioned.

Fuel burn

There is no doubt that airlines are keen to find as many ways as possible to assist in reducing their fuel bill. Aircraft operators already do this to keep their own costs down and argue that adding an ETS is pointless, confusing and costly.

Many airlines already have operational procedures and ask their pilots and operations staff to plan and fly routes in a certain way that is the most cost-effective (see *Proven techniques to reduce fuel burn, Aircraft Commerce, April / May 2010, page 21*). This is becoming such an important issue that most operators have departments to deal

The ETS could have the effect of reducing the number of lower-density point-to-point routes and size of operations at regional airports, and make airlines return to the use of trunk routes from major airports and using the largest aircraft types.

with it. One ETS software and data collection provider, ETS Aviation, has also started to offer this service, using industry experts, alongside its ETS product. Additionally, airlines are increasingly using computers and software to analyse route and network performance (see *Forecasting & analysing route & network performance, Aircraft Commerce, February / March 2010, page 15*). These will become more important as comparisons need to be made, and routes may need to be cut.

An aircraft can be flown over the straightest route, with the cheapest overflight charges and with minimal delays in order to reduce fuel burn. However, to do this effectively an airline needs an aircraft situation display (ASD) system, which is an additional expense, albeit one outweighed by the savings it can generate (see *Using ASDs to reduce fuel burn & flight times, Aircraft Commerce, June/July 2011, page 27*). Airlines also want air traffic control (ATC) procedures to be improved, since ATC can be a large cause of delays and additional fuel burn. "Our view has always been a market-based look at fuel use and to reduce fuel burn," says McNamara. "There are still many operational and infrastructure ways to reduce fuel burn, such as technology that reduces fuel use without passing the cost on to the consumer."

The final piece of the puzzle for many airlines is new technology: alternative fuels and new aircraft. Alternative fuels, such as biofuels, will result in zero emissions, certainly as far as the EU's ETS is concerned. When biofuels are comparable in price to traditional fossil aviation fuels, then their use will undoubtedly be favourable to airlines. This could well occur within the next five years, and make the ETS obsolete as long as biofuel can be produced in the quantities required. ETS will become a very expensive exercise in fuel burn data collection. This, and any exemptions that come from the legal cases, could open up the EU to a lot of legal cases from European airlines wishing to recover the costs of planning for the ETS.

The second aspect of new technology is aircraft: airframes and engines. It will be possible to reduce fuel burn by as much as 15% soon, if the 787 and A350 are compared with similar-sized current



aircraft, due to extensive engine research and the use of advanced materials in the airframe. These improvements, together with ecological methods of manufacture, and biofuels, will combine to make flying an environmentally friendly form of transport, hence the opposition to the ETS, particularly in the US.

Airports and hubs

Those airlines that are able to operate below the ETS threshold, are likely to continue using the smaller airports. This will be a benefit to passengers, since this can mean less of a commute and less queuing inside the airport. To remain under the threshold, however, involves limited, if any, growth by the operator.

If hubs become more popular and are developed, then the losers will be the smaller airports, many of which have only been developed into international airports in recent years. This will have an effect on local economies, as well as reduce the chance of any further regional airports being developed or expanded in coming years.

Already, there are a number of large long-haul hub airports within Europe with many routes feeding into them, bringing passengers in from regional areas. But, as the variety of regional flights is potentially reduced, these large hubs will become even more important, especially for connecting passengers. Although there is a chance that the ETS will increase the use of hub airports, it may also be the death of European international hubs. More and more airlines will be looking to reduce their ETS carbon credit bill, so flying as little as possible within Europe could be the answer.

A commercial operator can undertake fewer than 243 flights to and from Europe in a four-month period and have less than 10,000 tons of CO₂ emissions per annum to stay below the ETS compliance threshold. Any more flights, and the operator will be subject to monitoring and verification within the ETS. This equates to about 15 flights each week, or 7.5 return flights each week. This in turn means one flight a day to a European destination, or once a week to seven different European destinations. Most airlines flying into Europe undertake more than this. The Middle Eastern airlines are likely to be heavily hit, because the ETS may curtail many of their European expansion plans. The scheme is likely to cost some Middle Eastern airlines hundreds of millions of Euros over the next eight years, even though they have young fleets.

Non-EU Hubs

An operator only needs to register the fuel burn of a flight leaving or departing the EU. This could be a 12-hour flight or a few hours, with the latter being significantly cheaper. A method for reducing the ETS-relevant part of a flight is to stop just short of Europe, re-fuel and then continue onto the desired European airport. In reverse this would mean flying a few hours from Europe, re-fuelling and continuing to America or the Asia-Pacific.

This method of 'cheating' the system could mean the rise of new international gateways. These countries and airports would essentially offer an aircraft arrival, parking, refuelling and departure service to and from EU-ETS countries. There may not even be any need for passengers



The EU's ETS is being contested in the British High Courts by a number of US major airlines. They claim the scheme is illegal and against their sovereign rights. While some airlines will just accept the scheme, some may choose to fly longer routes and bypass Europe. Others may use airports in the fringes of Europe.

stop, they may decide to choose their stop themselves, rather than have the airline dictate it. The Middle East could well, with its vast, new, retail-orientated airports, be the stopping choice for many passengers travelling to and from the East. For those airlines in the Asia Pacific which already fly to the Middle East, it may be preferable to offer a stop in the Middle East prior to continuing for an extra 6-7 hours into Europe, than fly to a less known airport and still have a 2-5 onward flight. Equally, it may be an opportunity to open up new routes or bases.

Conclusion

Whether an airline chooses to fly its current network, or to find ways around the ETS, there is no doubt that the cost of flying to Europe is going to rise. There will be no single answer, since different business plans and passengers will require different solutions. Even if many airlines chose to fly to an airport just outside the EU, they would not all fly to the same one. This could mean many new hubs popping up around the edge of Europe. However, those airlines based in Europe will have little choice but to continue as they are, and accept the ETS. "Now that we are closer to compliance, the questions over the legality of the EU's ETS have increased. A problem could arise if the scheme just becomes an intra-European regulation, meaning very little difference to emissions. The costs of implementing the ETS will make European air travel more expensive and less competitive, and Europe will have shot itself in the foot," says McNamara.

With new longer-reaching aircraft, it is possible that Europe will be bypassed all together. For example, Air New Zealand and Air India fly from the US to London, and onto their home bases. While it is accepted that they gain passengers by going through London, it may become more cost-effective to fly direct from the US to home. This all depends on the right aircraft, but that is just a matter of time for most airlines. With this style of route network, Europe's position as a major leader in aviation will be supported only by the movement of tourists and inter-European travel. **AC**

to leave the aircraft. If efficiently done, no more than 30-60 minutes might be added to the original flight time, taking into account downtime and an adapted routing. Operators would then only need to register a short-haul flight of a few hours as opposed to a long-haul flight of seven or more. However, an additional flight may involve extra in-flight service, catering and ground-handling charges.

To the east of Europe, there are few options, which adds to the negative feelings from the US. St. Petersburg and Moscow are well located to benefit as non-EU hubs, but this option is unlikely to be favourable for political reasons, and because many airlines have no experience of flying into Russia.

If Iceland had not agreed to join the ETS, despite not being an EU member state, then it would have been likely to prosper as a result. Smaller aircraft such as general aviation and private executive jets already use Reykjavik airport as a refuelling stop when flying between Europe and North America. Again there is just a 2-5 hour flight onward from Iceland, depending on the required airport in Europe.

Commercial flights are operated from an old US Air Force base at Keflavik, near the capital Reykjavik. This airport is already being developed, and has a vast space around it that could accommodate a large gateway airport. With this option now unavailable, this means that flights from North America must be completed in one go.

On the south-east of Europe a perfect candidate could be Istanbul. Already an up-and-coming location for aircraft and engine maintenance, airport expansion would be easily within Turkey's abilities.

From there it would be a short hop to many eastern and southern European airports. Flights from the Middle East would probably be just that little bit too close to Europe to benefit, since they are 6-7 hours from Western Europe, while Istanbul is 4-5 hours from there; a difference of just two hours. The Middle East could benefit, however, from flights that need to stop mid-route.

South of Europe, North African countries could benefit from short flights into Europe. Morocco and Egypt are preferred options currently; partly because their aviation industry is already progressing well and also because of their greater political stability. Tangier, in particular, would be a good airport geographically, due to its close proximity to Spain and Southern Europe.

There are still a few areas of Europe that are not a part of the ETS regulations, but not all will be suitable as a hub. While some European territories (the Canary Islands, Madeira and Gibraltar) are included in ETS, those that are not include Andorra, the Channel Islands, the Isle of Man and Monaco. However, Andorra has no airport, Monaco has only a heliport, and while the Channel Islands have good airports, they are small, and it would be difficult, if not impossible to operate multiple, large, long-haul aircraft there. A non-EU state such as Switzerland could be a good option for many carriers, since it is right in the middle of Europe, with an excellent inter-modal transport network. However, it is expected to join the ETS in the coming years, having already implemented its own emissions-reducing programme.

If passengers become aware of the situation, knowing that most long flights into and out of Europe will involve a

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