

IMPACT OF EU-ETS ON EUROPEAN AIRCRAFT OPERATORS

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Summary: In 2009 EU Directive 2003/87/EC for inclusion of aviation into the EU Emissions Trading Scheme (EU-ETS) came into force. From January 2012, the EU-ETS will cover virtually all flights departing or arriving in the EU. As aircraft operators will be required to hold emission allowances for all flights that are subject to the EU-ETS, the economical impact of the system are currently being discussed. This paper aims at describing of current problems of EU-ETS, introducing methods of CO₂ monitoring and it describes economical and ecological impact of EU-ETS. This work was supported by the Grant Agency of the Czech Technical University in Prague, grant No. SGS10/221/OHK2/2T/16

Key words: EU-ETS, emission allowance, methods of emissions monitoring

INTRODUCTION

From 1 January 2012 will be most airline operators included in the emissions trading system (EU-ETS) within the European Community. The objective of the EU-ETS is to stop the rapid growth of emissions from air transportation and also to stabilize concentrations of greenhouse gases by 2020 and to reduce emissions by 20% compared to values achieved in 1990.

1. EMISSION TRADING SYSTEM

1.1 EU ETS overview

From 1 January 2012 will be included into the emission trading also most flights departing or arriving at airports within the European Community (EC). The main exceptions of EU-ETS are operators, which have less than 243 flights per year or to produce less emissions than 10.000 tons per year. Furthermore, in the system aren't include police, military, rescue, humanitarian flights and flights with a maximum take-off weight less than 5.700 kg or flights to ensure transport accessibility region of relevant state with offered capacity 30.000 seats or lower. For the period from 1 January 2012 to 31 December 2012 is the total quantity of allowances to be allocated to aircraft operators, equivalent to 97% of the average emissions achieved in the 2004, 2005 and 2006 within EC. For each annual period from 1 January 2013 is the total quantity of allowances to be allocated to aircraft operators, equivalent to 95% of the average emissions achieved in the 2004, 2005 and 2006 within EC.

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For the period from 1 January 2012 to 31 December 2012 will be auctioned by European Community Member States 15% of allocated allowances. The quantity of allowances is proportional to share of relevant state on the total attributed aviation emissions in all Member States EC. For the period of 2012 is the reference year 2010, for each subsequent year is the reference period the year ending 24 calendar months before the beginning of the relevant year to which the auction relates. (5), (6)

1.2 Emissions allowances

Retirement of allowances have to be done by 30th April for the previous calendar year, the number of surrendered allowances shall be equal to the total emissions from aviation activities, which were reported to the competent authorities in member states of the Community. If the operator does not exclude the above date, sufficient allowances to cover its emissions during the preceding year, shall pay a fine for excess emissions. Excess emissions penalty shall be EUR 100 per tonne of emitted carbon dioxide equivalent, for which the operator has not surrendered allowances. Payment of the excess emissions penalty does not relieve the operator from the removal of emission allowances in the next accounting period (ie 30th April in the next year). Missing necessary allowances have to the aviation operator buy on the allowances market or get involved in Community or international projects on the reduction of global emissions. The system is purely electronic, so allowances are not printed on paper but exist only in an online account register. Any company or operator with a commitment and any person interested in buying or selling allowances must have an account. The system consists of the national registry in each member state EC where the allowances are held, and a hub at European level CITL (Community Independent Transaction Log), which performs automated checks on each transfer of allowances to ensure that the rules of the relevant legislation. (1)

1.3 EU-ETS system

The current system of emissions trading EU-ETS for airline operators is based only on monitoring the fuel consumption of individual operators. On the basis of the proportion of flown tonne-kilometers from/to airport in the European Community, the operators are assigned the relevant quantity of free emission allowances. (1)

2. AIRLINES OPINION

Air carriers inclusion in the EU-ETS agree that the current setting of the system is not fairly. According to the spokesman of European Airlines is the main reason for dissatisfaction the fact that the EU-ETS will be included only about 20% of all global flights. An example might be a direct flight with Lufthansa on the route Frankfurt - Bangkok, from which the whole fuel consumption and therefore CO₂ emissions are included in EU-ETS. Conversely flight with Emirates on the same route Frankfurt – Bangkok via Dubai will already be included only partially (Frankfurt – Dubai), emissions produced on route Dubai – Bangkok will not be included at all. Such adjusted system favors the non-European operators who can use their overseas airport interchanges to reduce the financial impact associated with emission allowances. Any reduction in flights of European operators has an impact on other economic

factors of these states (employment, development of territory and related services). Another undeniable fact is that the issue of greenhouse gases isn't local, but worldwide. Therefore, reduction of emissions in Europe, increasingly help to address rising global emissions. On the other hand, global greenhouse gas emissions generated by air transport in recent years, growing rapidly and to do any action can't improve the current situation. But the correct principle would be include all air operators in this system worldwide, of course, with the possibility of maintaining exemptions for operators with negligible annual number of flights or flights for special purposes. Already today there are reliable methods for the determination of emissions, depending on the type of aircraft flown distance and meteorological conditions. (4)

3. ENVIRONMENTAL TAX

An example of a fair solution can be to surface by environmental tax all flights performed worldwide. Environmental tax could be established in several zones according to distance flown and aircraft parameters (seat capacity, average fuel consumption / passenger). To ensure a neutral approach to all operators the patronage of the whole system should assume the ICAO (International Civil Aviation Organization). Similarly, the selection of environmental taxes should be fully within the competence of a neutral authority under ICAO. Selected financial resources should subsequently be invested in projects worldwide to reduce the impact of human activities on the environment.

3.1 Formula of the environmental tax

Environmental tax **a** for one flight is determined according to the following formula:

$$\mathbf{a = c.p + r.e.I}$$

p ticket price

e coefficient variation with regard to aircraft used

I length of the flight route

c coefficient variation with regard to approach

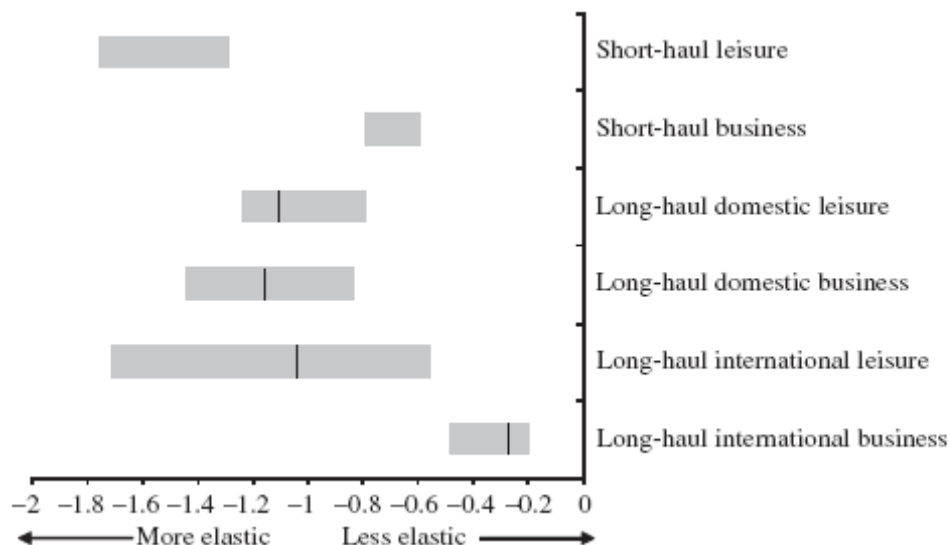
r coefficient variation with regard to approach

$c = 0$ is closer to the EU-ETS, it means to take account distance flown and used aircraft. It seeks to take account the financial externalities caused by the operation of an aircraft type.

$r = 0$ is closer to the tax system regardless of the modernity of aircraft fleet and emission measures. This option is suitable for air transport of goods, which is less prone to change between price elasticity and demand. Likewise, the passengers travel in higher classes (business and first class). Contrary passengers traveling in the general class flexibly respond to change the elasticity of supply, thus the higher price caused by environmental taxes may be balanced by lower demand from the passenger side. (3)

3.2 Application of the environmental tax

When using the above formula to transfer payments emissions per passenger, it is possible to determine the average coefficient CO₂/km/available seat with regard to specific type and modification of aircraft. There are several options, which passengers will be charged and in what amount. The simplest option is a division of the tax according to the class of aircraft in which are passengers traveling (economy, business, first class). Another option is to take into account domestic flights and international flights. However, the most acceptable way in environmental taxes, it seems a combination of both options, ie. taking account the cost of the ticket and flight route parameters including aircraft distance flown. (3)



Source: (3)

Fig.1 – Price Elasticity of Demand for Different Air Travel Sectors

4. METHODS FOR MONITORING FUEL CONSUMPTION AND CO₂ EMISSIONS

4.1 RAMS Plus

RAMS Plus (Reorganized Air Traffic Control Mathematical Simulator) has been developed by ISA Software. RAMS Plus is able to simulate every flight emissions CO₂ through following 2 flight phases LTO a CCD. The Landing and Take Off cycle (LTO) includes all flight activities which take place below the altitude of 3000 ft. This cycle consists of taxi-out, take-off, climb out, landing approach and taxi-in. The Climb, Cruise and Descent cycle (CCD) includes flight activities above 3000 ft. (2)

4.2 AEM III

AEM III (Advanced Emission Model) has been developed in Eurocontrol Experimental Centre for estimating aircraft emissions and fuel burned. The model uses the flight profile (e.g. model RAMS Plus). Furthermore, AEM III using the ICAO emission data produced by individual motors, aircraft details according to Eurocontrol and the Boeing 2 database version, for the determination of emission estimate in the various phases of flight. AEM III allows to simulate the trajectory sections of individual flights. The above mentioned methods do not

include fuel consumption and emissions arising from ground activities related to handling of aircraft (handling activities, pre-flight procedures). Consumption is based on the aircraft database aircraft data (BADA), Eurocontrol Experimental Centre. Cruising flight speed and rate of climb / descent based on BADA tables containing the performance characteristics of each aircraft. This data set describes in detail the 91 types of aircraft and other types of aircraft 204 was assigned to one of 91 types of aircraft specified in detail with respect to such operating parameters (size, fuel consumption, optimum cruising speed and altitude). (2)

CONCLUSION

There is already clearly evident that the economic impact of the inclusion of aviation operators in the EU-ETS emissions allowances, will be insignificant. Despite the fact that in the coming years, aircraft operators will receive the greater part of the necessary emissions allowances free of charge from the EC, the financial cost of buying the necessary allowances in millions Euros for small operators, and tens of millions Euros for large operators. Due to the fact that the purchase of emission allowances is made on the open market, the current allowance price depends on the actual offer and demand. With the integration of aviation in the EU-ETS and therefore increased demands for allowances, can be expected the average price increase for the purchase of one permit. The advantage over the competition and reduced costs for the purchase of emissions allowances will be operators who are recognized in the reporting year, the EU-ETS reduced fuel than the fuel consumption in detecting the proportion of service on the EC market. Nothing to do can improve definitely the global emissions. But the right principle would be to include all air operators in any system worldwide, of course, with the possibility of maintaining exemptions for operators with insignificant annual number of flights or flights for special purposes. The system basis would become a reliable method for the determination of emissions, depending on the type of aircraft flown distance and meteorological conditions (e.g. AEM III) in combination with the environmental tax. This means to take account the different amount of environmental tax according to the class of aircraft in which passengers travel (economy, business, first class) and to take account domestic flights and international flights.

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