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Air Transport Pricing and Taxation

Alexia Litschgy

- Air transport makes a major contribution to France's economic activity providing 89,000 jobs and forging strong ties with the tourism sector. It allows for interconnections at regional, national and international levels due to its network effect. However, the airline industry also causes negative externalities, especially climate-related ones.

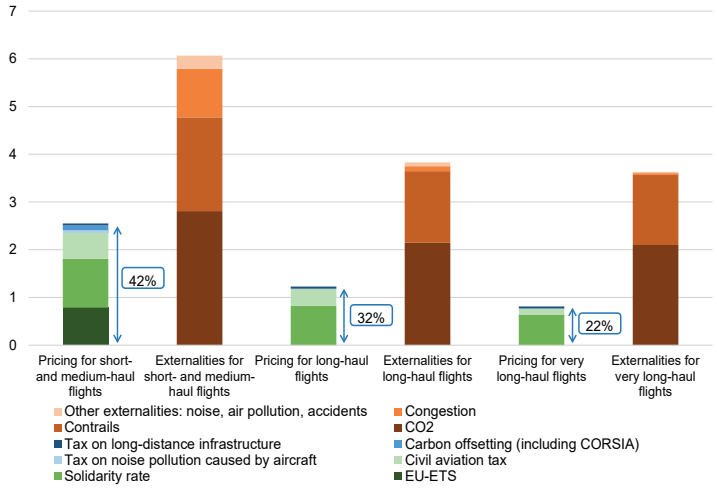
- According to economic theory, optimum transport pricing involves having users pay for the social cost of their travel, i.e. the additional monetary and non-monetary costs that a journey generates for society as a whole. This covers both the costs of the service provided to the user (fuel and aircraft maintenance in the case of air transport) and those imposed on non-users, meaning the negative externalities associated with a journey, such as noise pollution and greenhouse gases. Whilst the former are theoretically included in the price of the airline ticket, the latter are not taken into account in the absence of government intervention.

- The airline industry has a multi-tiered pricing system that is globally correlated with these negative externalities. Internationally, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) imposes emission offsetting requirements over and above a baseline. At European level, the carbon market covers emissions from intra-EU flights. In France, several taxes are levied on the sector, in particular the solidarity rate which was increased by the 2025 Initial Budget Act.

- In 2025, French air transport pricing covers an average of around 34% of all its negative externalities. This means that when a flight causes disturbances costing society €1, the user only pays 34 cents.

- In the medium term, with regard to carbon emissions, the most economically-effective solution is still to roll out pricing instruments at international level. These instruments would provide coverage of the carbon externalities for the entire industry whilst ensuring fair conditions for competition, thus mitigating carbon leakage.

Comparison between marginal pricing and the marginal costs of externalities (c€/passenger-kilometre) for the different categories of flights in 2025



Source: DG Trésor calculations, based on the Sustainable Development Agency (CGDD) report: Mobilités : Coûts externes et tarification du déplacement, 2020 (in French only).

How to read this chart: 42% of air transport externalities are covered by pricing for short- and medium-haul flights (domestic and intra-European) compared with 32% for long-haul flights (< 5,500 km) and 22% for very long-haul flights (>5,500 km).

1. Greenhouse gas emissions are the main negative externalities of air transport

1.1 The airline industry plays a major role in the French economy

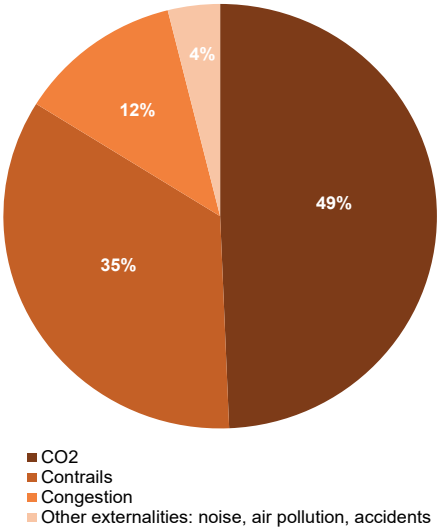
The air transport industry is thriving; it provided 89,000 jobs in France in 2023[1] and has strong ties with the tourism sector. The Air France-KLM Group alone employs 46,000 people.[2] The number of air passengers jumped 42% between 2010 and 2024.[3] In 2023, the industry accounted for 1% of kilometres travelled by households and 8% of their transport budget.[4]

The industry contributes to France's economic expansion by allowing for interconnections at regional, national and international levels. By making it easier for people to travel long distances, it enhances the mobility required for social interaction and trade, as well as helping maintain links with overseas France.

1.2 Air transport causes major negative externalities

Flights are the cause of a certain number of negative externalities. The most prominent are those connected with greenhouse gas (GHG) emissions. In 2024, air transport accounted for 15% of the transport sector's GHG emissions and 8% of France's total emissions (21 $MtCO_2eq$ in 2024, 17 $MtCO_2eq$ of which was due to international flights).[5] These emissions constitute 49% of the cost of air transport's negative externalities (see Box 1).

Chart 1: Breakdown of air transport's externalities (in % of c€/passenger-kilometre) for all flights in 2025



Source: DG Trésor calculations, based on the Sustainable Development Agency (CGDD) report: Mobilités : Coûts externes et tarification du déplacement, 2020 (in French only).

How to read this chart: CO_2 emissions (49%) and contrails (35%) represent the main externalities relating to air passenger transport. The effects tied in with congestion (12%) and noise, air pollution and accidents (4%) also generate non-negligible socio-economic costs.

The formation of contrails causes substantial warming and, as such, is also a major externality accounting for an average of 35% of air transport externalities. Contrails are artificial clouds formed by water vapour and the soot from kerosene combustion in well-defined areas of the atmosphere (ice supersaturated regions). The formation of these trails leads to warming that is on a par with greenhouse gas emissions, and researchers are still attempting to fully understand and predict them.[6] As the phenomenon is tied in with specific weather conditions, it is highly localised: 80%

(1) On the basis of Insee (2024), The national accounts in 2024, Domestic employment in 2024. These figures include airport staff and aircraft repair work and maintenance but exclude the aerospace industry.
(2) Air-France-KLM Group (2024), "La contribution socio-économique du groupe Air-France KLM en région Île-de-France" (in French only).
(3) Directorate General of Civil Aviation (DGAC), Statistiques du trafic aérien (in French only).
(4) Ministry for Spatial Planning, Chiffres clés des transports – 2025 edition (in French only).
(5) Citepa monthly emissions barometer – Q4 2024, including international bunker fuel emissions.
(6) The benchmark estimate of the warming caused by contrails was put forward by Lee et al. (2021).

of contrails are thought to be attributable to roughly 3% of flights.[7] In this case, the average pricing of this externality on all flights is not the most effective public policy mechanism. It is more pertinent to focus measures on the relevant flights by using, for instance, specific standardised or incentivising instruments that would help bring down the externality. Reducing a significant proportion (around 60%)[8] of contrails on the most affected flights by, for example, altering flightpaths to avoid ice supersaturated regions seems to be a feasible solution. Rollout of such approaches would reduce the social cost connected with contrails without the need to raise the pricing of this externality for the vast majority of flights.

Congestion caused by the presence of an additional aircraft against a backdrop of limited ground and air capacities, causing delays that have a cost for both users and airlines, is another negative externality which accounts for 12% of all externalities. The remaining 4% are made up of noise pollution, which may be intense but, as it is highly localised, only affects a limited number of people, local air pollution by nitrogen oxides and intrinsic insecurity due to the risks of accidents.

Box 1: Methodology for calculating the monetisation of externalities

In economic theory, the monetary value of externalities can be calculated by estimating their cost for society. This method allows them to be compared both amongst themselves and to pricing, and allows for the determination of the most suitable public policies to take account of them.

GHG emissions are valued using a shadow carbon price equivalent to the value of climate action,[a] set in the Quinet report (2025) at a target rate of €300_{2023}/tCO_2 by 2030. Contrails are estimated commensurate to their impact on the climate, using the relative global warming potential over 100 years, which is the metric used as part of the Paris Agreement. There is debate in the scientific community about the choice of metric, and the impact of these effects may be greater than estimated in this paper.

Other valuations of externalities have been estimated using a publication by the Sustainable Development Agency (CGDD).[b] The economic valuation of congestion is based on the economic and financial repercussions of delays on airlines, on the one hand (compensation for passengers, downtime of aircraft and personnel) and on passengers on the other hand (cost in terms of time). The cost of air pollution factors in nitrogen oxides and its economic valuation relies on the costs of the effect on health and mortality, the impact on buildings and harm to plant life, including loss of crop yields. The cost of noise pollution draws on the depreciation in the value of housing due to the sound levels to which it is exposed. The cost of accidents is based on those recorded in the past and the economic valuation of the cost of mortality and bodily injury. These various estimates make use of the shadow carbon prices that are often present in socio-economic assessments.[c]

a. This assumption ignores the implicit additional costs relating to standards in favour of decarbonisation.
b. Ministry for the Ecological Transition (2020), "Mobilités Coûts externes et tarification du déplacement", *Théma Analyse*, Sustainable Development Agency (in French only).
c. High Commission for Strategy and Planning (2013), "Cost benefit assessments of public investments".

(7) Teoh et al. (2024), "Global aviation contrail climate effects from 2019 to 2021", *European Geosciences Union*.
(8) Avoiding altitudes that are likely to create contrails enables them to be reduced by around 60%. Due to the uncertainty surrounding changes to weather conditions, the total elimination of contrails is not considered realistic for the time being. Source: C. Elkin and D. Sanekummu. (2023), "How AI is helping airlines mitigate the climate impact of contrails", *American Airlines and Google*.

2. The airline industry has a pricing system that is globally correlated with the negative externalities

According to economic theory, international carbon pricing instruments should be prioritised as they maintain the relative competitiveness of businesses between countries and mitigate carbon leakage. In addition, it is more effective to roll out a pricing instrument that is directly correlated with the externality generated as is the case with kerosene consumption connected with GHG emissions, so as to encourage its reduction. In this respect, from an economic standpoint, the most effective pricing instrument would be kerosene pricing at international level (tax or market). Nevertheless, at this point in time, there is no international agreement to implement such an instrument and European law governs its use (see Box 3). The current pricing instruments are described below.

2.1 The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

CORSIA is a global carbon offsetting scheme for aviation that covers all international flights (extra-European) between the participating States. It was adopted by the International Civil Aviation Organization (ICAO) in 2016, has been effective since 2021 and will become mandatory for all Member States in 2027. CORSIA requires airlines to purchase ICAO-approved carbon credits to offset the proportion of their emissions that exceeds a threshold that was set at 85% of 2019 emissions. In other words, airlines must offset the increase in emissions over and above this threshold.

Incidentally, in France, airlines are also subject to a carbon offsetting requirement on domestic flights under the Climate and Resilience Act. At least 50% of airlines' emissions must be offset by projects based in the European Union.

2.2 The EU-ETS carbon market

Since 2012, the EU Emissions Trading System (EU-ETS) has been covering emissions for intra-European flights, in addition to industrial sectors, electricity generation and maritime transport. Use of a carbon market allows low-carbon initiatives to be spread out in a cost-effective manner within its scope so as to reach target emission levels. However, the EU-ETS does not currently extend to extra-European flights from the European Economic Area to non-EU countries which account for half the sector's CO_2 emissions in France.[9] This situation is not set to change until 2027 at the earliest.[10]

2.3 The solidarity rate of the air passenger transport tax

The solidarity rate of the air passenger transport tax was introduced in 2006, first as the solidarity tax on airline tickets (TSBA), or the Chirac tax. It was increased in the 2025 Initial Budget Act. The solidarity rate varies depending on the passenger's ultimate destination and travel conditions (see Table 1). Airlines pay the solidarity rate for all aircraft taking off from France but passengers in transit are exempted (see Box 2).

The solidarity rate works on a slightly progressive scale.[11] This is due, inter alia, to the fact that people on higher incomes travel by plane more often. In France, air travel-related emissions of the wealthiest 10% of households are 15 times higher than those of the poorest 10%.[12]

(9) According to 2019 estimates from the Directorate General of Civil Aviation ("Calculateur d'émissions de gaz à effet de serre de l'aviation – Chiffres clés" (in French only)). Emissions from all domestic flights are accounted for but only half of those from international flights to avoid double counting

(10) The Commission may make a legislative proposal following the assessment of CORSIA's delivery on the goals of the Paris Agreement that it will carry out in 2026.

(11) M. Büchs and G. Mattioli (2022), "How socially just are taxes on air travel and 'frequent flyer levies'?", *Journal of Sustainable Tourism*, 32(1), 62-84.

(12) Pottier et al. (2020), on the basis of the National Transport and Travel Survey (2008) (in French only)..

Table 1: Solidarity rate amounts in 2025 based on the passenger's destination and travel conditions

Amount per passenger	Economy class	Business class	Business aviation (private jets)	
			Turboprop	Turbojet
EEA + MSs < 1,000 km	€7.4	€30	€210	€420
Other destinations < 5,500 km	€15	€80	€675	€1,015
Other destinations > 5,500 km	€40	€120	€1,025	€2,100

Source: Aviation taxes – Ministry for Spatial Planning and Decentralisation.

Box 2: Carbon leakage risks connected with taxes on airline tickets

Taxes on airline tickets help improve overall externality coverage. Although these taxes do not directly target the source of externalities, they do enable, on average, an immediate closing of the gap between pricing and marginal externalities. There is a connection between the amount and the emissions as the former varies depending on the passenger's destination and travel conditions.

Furthermore, taxes on airline tickets, as they currently stand in France, were introduced to mitigate carbon leakage risks:

- For passengers landing in France or in transit, there are no taxes on airline tickets as they are only levied on passengers taking off from France; this safeguards the appeal of French airports as transit hubs.
- For passengers taking off from France, landing fees (*coûts de touchée*)[a] allow for an assessment of the risk of carbon leakage in the event of taxes on airline tickets being raised. Here, carbon leakage is defined as a passenger travelling abroad from France by going to a foreign airport using a different means of transport. This means that there is a carbon leakage risk when the fees of the foreign airport, plus the cost of travel to get there, are lower than the fees of the French airport. Nevertheless, at the present time, landing fees are similar in France and in neighbouring countries: in 2022, landing fees were €32 on average per cycle (landing followed by take-off) and per aircraft in France and €36 on average in the rest of Europe.

Consequently, a moderate increase in taxes on airline tickets does not generate a significant risk of carbon leakage, but this risk may be greater in the event of larger tax hikes.

a. Landing fees are all costs relating to an aircraft landing at an airport. More specifically, the landing fee for the turnaround of an aircraft is defined as "all the services invoiced as taxes or fees (including taxes on airline tickets) to an airline for an aircraft's landing, taxiing, parking and take-off, passenger disembarkation and boarding". Landing fee monitoring carried out by the Directorate General of Civil Aviation allows for an assessment of the competitive position of French airports in relation to their European counterparts.

2.4 Other taxes deemed as contributing to the airline industry's pricing

The airline industry is also liable for the civil aviation rate, which is the second component of the air passenger transport tax, and which funds the public services provided by the Directorate General of Civil Aviation (safety, air traffic control and operating airport infrastructure).[13] The civil aviation rate is indexed to inflation and, in 2025, stands at €5 per passenger for intra-European flights and €9 for extra-European ones.

The tax on noise pollution caused by aircraft is earmarked to fund assistance to residents and to reduce noise. Its amount, that is contingent on the airport of departure, ranges from €0 to €75 per aircraft, i.e. less than €1 per passenger for a standard airliner.

Lastly, the most profitable airports[14] pay a tax on long-distance transport infrastructure operators.

(13) In this case the civil aviation rate is considered as contributing to air transport pricing although the revenue is used primarily to finance aviation services.
(14) As long-distance transport infrastructure has gross income of more than €120m and average profitability in excess of 10%.

Box 3: Kerosene pricing

The tax on kerosene is an effective carbon pricing measure as it ties in directly with CO_2 emissions and the cost for users.

Kerosene taxation is governed by the Chicago Convention on International Civil Aviation. It provides that the fuel already present onboard an aircraft may not be taxed by the country in which the aircraft lands but the fuel taken onboard in the relevant country may be. This means that it could be possible to introduce a system for pricing the kerosene payload. However, within the EU, the Energy Taxation Directive (ETD) bans kerosene taxation for all international flights[a] (including intra-Community ones).[b]

However, the ETD does allow for kerosene taxation for domestic flights. Nevertheless, taxes on aircraft fuel could lead to risks of carbon leakage (risk of other hubs being used instead of Paris, risk of fuel uplift in another country).[c]

In France, kerosene used for domestic flights is exempt from excise duty, except for that used for non-commercial aviation.

a. As a comparison, the ETD imposes a minimum levy of €0.33/L on kerosene for non-aircraft use.
b. With the exception of bilateral agreements between EU Member States; none have executed such an agreement.
c. This risk only relates however to 10% of consumed kerosene at most. The risk that airlines will partly uplift fuel in a country where the pricing is lower is severely mitigated by the ReFuelEU Aviation Regulation. It provides that 90% of the kerosene consumed by an airline for all flights leaving an airport shall be purchased in that airport. This limits the risk that French airlines will be disadvantaged in relation to foreign ones that can more easily fill up their aircraft abroad than in France.

3. Pricing the social costs of air transport is making inroads but still fails to provide full coverage, especially for long-haul flights

DG Trésor has updated the data from a study by the Sustainable Development Agency[15] on coverage of the externalities of the air passenger transport sector. This involves comparing the negative externalities generated by air transport (see section 1.1) with the taxes levied on it (see section 2).

On average, French air transport is bearing roughly 34% of its external costs in 2025. Marginal external costs are estimated at 4.6 c€$_{2025}$ per passenger-kilometre (c€/pkt), driven mainly by CO_2 emissions as well as by contrails. Marginal pricing is estimated at an average of 1.5 c€$_{2025}$/pkt.

Changes to the solidarity rate that were introduced by the 2025 Initial Budget Act have enabled coverage of externalities to be improved, increasing it from 23% to 34% on average for all flights. In addition, the distinction between the two categories of extra-European flights (flights of less and more than 5,500 km) that was introduced by the same budget act brings marginal pricing closer to marginal externalities.

(15) Ministry for the Ecological Transition (2020), *op. cit.*

Box 4: Optimum air transport pricing

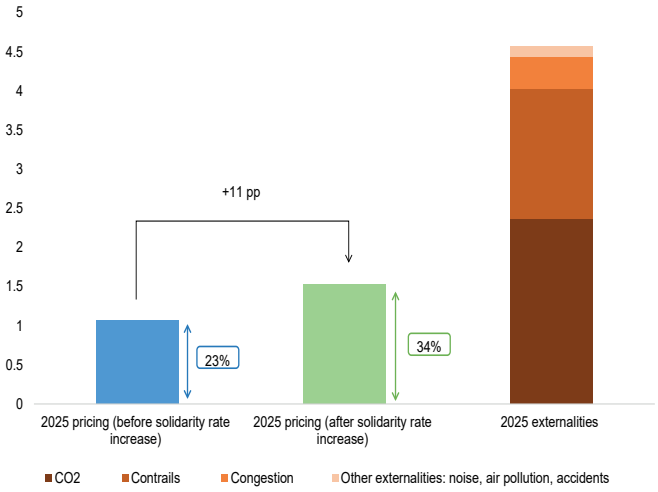
According to economic theory, optimum transport pricing involves having users pay for the social cost of their travel, i.e. the additional cost that a kilometre travelled generates for society as a whole. This covers both the costs of the service provided to the user, such as fuel and aircraft maintenance in the case of air transport, and those imposed on non-users, meaning the monetary valuation of negative externalities associated with a journey, such as the cost to society of noise pollution and greenhouse gases. Whilst the former are theoretically included in the price of the airline ticket, negative externalities are not taken into account in the absence of government intervention, which leads to demand for air transport services that exceeds the optimum social level.

Besides private costs, the social costs cover (i) those relating to services provided by the government and airports (airport services, aviation, safety and security) that the government passes on in the shape of taxes and fees and (ii) external costs (GHG emissions, contrails, local pollution, airport congestion, noise, accidents).

It is assumed that the costs relating to using infrastructure and to services provided by the government are fully covered by the taxes and fees paid by airlines, as determined by the Transport Regulatory Authority on the basis of an examination of the corresponding costs. Pricing assessment is therefore reduced to a comparison between the external costs and other taxes and fees levied on air traffic.

Furthermore, pricing assessment does not factor in either non-specific taxation applied to the air transport industry or the support arrangements in favour of that sector.

Chart 2: Comparison of the gap between marginal pricing and the marginal costs of externalities (c€/passenger-kilometre) for all flights in 2025 before and after the increase in the solidarity rate



Source: DG Trésor calculations, based on the Sustainable Development Agency (CGDD) report: Mobilités : Coûts externes et tarification du déplacement, 2020 (in French only).

How to read this chart: The solidarity rate hike introduced by the 2025 Budget Act enabled the average pricing of externalities to be increased for all flights from 23% (in a scenario without this increase) to 34% (with the increase) in 2025.

Coverage of externalities by the effective pricing arrangements is around 42% for short- and medium-haul flights. In 2025, passengers on long-haul and very long-haul flights are paying a lower proportion of external costs, 32% and 22% respectively (see chart on cover page). These flights are not included in the EU-ETS which only applies to intra-European flights. In addition, as the scales for the solidarity rate and the civil aviation rate apply per passenger, their relative weighting in the figures is higher for short-haul flights despite the rates making distinctions by categories of distance.

Coverage of only part of the negative externalities means that users are not paying the entire cost of their travel and this is inefficient from an economic standpoint.[16] If they were to bear the full cost, the price of airline tickets would increase; this would lead to some users deciding not to fly or choosing alternative means of transport, according to the price elasticity of demand and the cost of these alternatives.

(16) See the DG Trésor report (2025), "The Economic Challenges of the Net Zero Transition" (full report in French only, summary and presentation in English at the bottom of the linked page).

Nevertheless, 80% of contrails are caused by a small number of flights (see section 1) and some could be eliminated by altering flightpaths rather than by increasing taxes. Assuming that 60% of contrails could be avoided on the relevant flights,[17] coverage of externalities could reach an average of 43% for all flights.

In the medium term, the most effective solution would be to roll out carbon pricing instruments at international level. These would provide coverage of the carbon externalities for the entire air transport industry whilst ensuring fair conditions for competition, thus mitigating carbon leakage.

(17) Value estimated using tests on actual flights: C. Elkin and D. Sanekummu (2023), *op. cit.*

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Direction générale du Trésor
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Dorothée Rouzet
tresor-eco@dgtresor.gouv.fr

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