AVIATION TAX GAP

TRANSPORT & ENVIRONMENT

Aviation tax gap

How much revenues are governments losing out on due to poor aviation taxation?

July 2023

A study by TRANSPORT & ENVIRONMENT

Transport & Environment

Published: July 2023

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To cite this report
Transport & Environment (2023). Aviation's tax gap

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Acknowledgements

The findings and views put forward in this publication are the sole responsibility of the authors listed above.

Executive Summary

Flying is one of the most carbon-intensive modes of transport. Aviation is responsible for an increasing share of CO_2 and non-CO_2 emissions at European and global levels. One of the main reasons for this growth is related to aviation having been under-taxed and under-regulated for decades, giving the sector no incentive to invest in sustainable technologies and making flying artificially cheap to bump up demand. If this privileged tax status continues, traffic and emissions are expected to grow even further.

The aim of this report is to estimate how much European air passenger travel[1] benefits from tax and emission pricing exemptions, by calculating what the sector paid and what it *should* have paid if these exemptions were removed. This is what this study calls the "tax gap" - representing the lost revenues from poor taxation of the sector. The scope of the study includes EU27 countries, the UK, Norway, Switzerland and Iceland. Results have been calculated for 2022 and for 2025.

- Across Europe, the tax gap represents a huge shortfall in public revenues. The study finds that, **in 2022, European governments lost out on €34.2 billion**. If national & European governments fail to remove tax exemptions, the tax gap is set to increase to **€47.1 billion in 2025**.
- Over half (56%) of the total European tax gap in 2022 is attributable to the top 15 most polluting airlines' activities in Europe.
- On average, current pricing policies for aviation at EU level barely represent 16% of the total effective revenues that could be generated by properly taxing the sector.
- Ending the taxation exemptions in 2022 would have saved 34.8 million tonnes (Mt) of CO_2, equivalent to the combined emissions of the three biggest airline emitters in Europe (Ryanair, Air France and Lufthansa).
- When taking into account non-CO_2 effects of aviation, ending tax exemptions could have saved up to ~104.4Mt of CO_2 equivalent. **This would have had the same climate impact as taking all German cars off the road for a year.**

T&E's recommendations to European governments are the following:

1. Put an end to unjustified jet fuel tax exemptions, ensure carbon markets cover all airlines' carbon emissions (including from long-haul flights) and apply VAT on all plane tickets.
2. In the short term, national governments should implement their own ticket taxes to the level needed to close this tax gap, in the absence of these changes. On average, these range from €23 for a domestic journey, €51 for an intra-European journey and €259 for extra-European journeys.
3. Ensure that part of the revenues raised is reinvested in clean technologies like renewable energy and e-fuels production or promoting cleaner alternative modes of transport like rail.

[1] Air travel refers to passengers only. Cargo flights are excluded from this study.

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Glossary

Two letter country codes

AT	Austria	**GR**	Greece	**PT**	Portugal
BE	Belgium	**HR**	Croatia	**RO**	Romania
BG	Bulgaria	**HU**	Hungary	**SE**	Sweden
CY	Cyprus	**IE**	Ireland	**SI**	Slovenia
CZ	Czechia	**IT**	Italy	**SK**	Slovakia
DE	Germany	**LT**	Lithuania	**CH**	Switzerland
DK	Denmark	**LU**	Luxembourg	**IS**	Iceland
EE	Estonia	**LV**	Latvia	**UK**	United Kingdom
ES	Spain	**MT**	Malta	**NO**	Norway
FI	Finland	**NL**	Netherlands		
FR	France	**PL**	Poland		

Region definition

EU27	European Union
EEA	European Economic Area. It includes EU27 member states, Iceland, Liechtenstein and Norway.
EFTA	The European Free Trade Association is a regional trade organisation and free trade area consisting of four European states: Iceland, Liechtenstein, Norway and Switzerland.
Europe	Member states of the European Union as well as the United Kingdom, Norway, Iceland and Switzerland. The adjective “European” is used to refer to these countries.

Acronyms & definitions used in this report

VAT	Value Added Tax
ETS	Emission Trading System/Scheme
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation

BaU	Business-as-usual
journey	Refers to the movement of a passenger from its origin to its final destination. It entails an airport of origin, an airport of destination, and possibly stopovers in between.
segment	Refers to the movement of a flight, from take-off to landing. It entails an airport of departure and an airport of arrival. A passenger's journey can involve several segments for indirect flights.
domestic	Both departing and arriving airports are located in the same country in the case of segment-related metrics. Both origin and destination airports are located in the same country in the case of journey-related metrics. Flights/journeys between a mainland country and an airport situated in an outermost region (i.e. mainland Spain to the Canaries), are not labelled as domestic.
intra-European	Both departing and arriving airports are located in Europe in the case of segment-related metrics. Both origin and destination airports are located in Europe in the case of journey-related metrics. Domestic flights and journeys are excluded from the definition. Flights and journeys between Spanish and Portuguese outermost regions and Europe (including mainland Spain and mainland Portugal) are labelled as intra-European, given their location.
extra-European	Only the departing airport is located in Europe in the case of segment-related metrics. Only the origin airport is located in Europe in the case of journey-related metrics. Flights and journeys between French outermost regions and Europe (including mainland France) are labelled as extra-European, given their location.
intra-EEA	Refers to a flight between two airports located in the EEA.
extra-EEA	Refers to a flight between an airport located in the EEA and an airport located outside the EEA, or vice versa.

1. Introduction

Although accounting for around 2.5% of global CO_2 emissions [1], aviation was the fastest growing polluting mode of transport before the Covid-19 pandemic, with emissions rapidly increasing from 706 $MtCO_2$ in 2013 to 920 $MtCO_2$ in 2019 [2]. One of the main reasons for this growth in emissions is related to aviation being under-taxed and under-regulated for decades, giving the sector no incentive to invest in sustainable technologies and making flying artificially cheap to bump up demand. If this privileged tax status continues, traffic is likely to grow even further.

Flying is one of the most carbon-intensive modes of transport [3]. Aviation is responsible for an increasing share of CO_2 emissions at European [4] and global level [5] due to the combustion of fossil fuels. Not only does the sector contribute significantly to global warming through the release of CO_2 emissions, flying also causes non-CO_2 emissions, which represent two-thirds of aviation's climate impact. These are yet to be accounted for. Based on current tax policy and other regulations, flights departing and arriving from EU27 and EFTA states are likely to increase by 62% by 2050 compared to 2019 levels [6]. In the UK, projections point to a 74% increase in passengers by 2050 (compared to 2018) [7].

European countries have taken steps to address aviation emissions through the EU's Fit For 55 package, the UK's Jet Zero Strategy [8], Norway's Airspace Strategy [9], Iceland's climate action plan for 2018-2030 [10] and Switzerland's Airspace and Aviation Infrastructure Strategy [11]. But these do not go far enough to account for aviation's climate impact. In the UK, the impending SAF mandate will ensure minimum levels of sustainable aviation fuels (SAF) and the UK Emissions Trading Scheme (ETS) will phase out free allowances from 2026 [12]. In the EU, ReFuelEU Aviation will also enable the ramp up of SAF, whilst the reformed EU ETS and the taxation of fossil kerosene in the revision of the Energy Taxation Directive (ETD) will improve pricing of aviation CO_2 emissions. At national level, more and more member states are looking into establishing levies on aviation, in the form of ticket taxes (for instance in Germany [13]), but these efforts remain very weak and limited to date. The sector is still far from aligning with the Paris Agreement goal of reaching climate neutrality by 2050 [14].

Taxation in aviation is essential if the sector is to contribute to the EU's goal of reaching climate neutrality by 2050. Pricing of CO_2 emissions and the application of the polluter-pays principle is critical to send an effective signal to the sector that climate action is necessary. It can also enable the rapid deployment of technologies such as clean fuels or zero-emission aircraft. Taxation is not just a signal, but also a revenue-raising tool providing countries with leverage to invest in solutions to reduce emissions. Taxation can be undertaken in several ways with different policy instruments at different levels of governance. This study gives an insight into how aviation has been, and is, undertaxed and what mechanisms are needed to improve the sector's contribution to climate neutrality.

1.1. The need for aviation taxation

Mitigating aviation's impact on the climate and the environment involves introducing corrective measures, mostly linked to effectively pricing pollution and mandating the use of technologies meant to mitigate these impacts. The polluter pays principle (PPP), introduced by the Organisation for Economic Co-operation and Development (OECD) in 1972 and reaffirmed at the Rio Conference in 1992, holds polluters responsible for the environmental damage and pollution they cause [15]. The polluter must

cover the costs, not citizens. This principle is at the core of both EU [16]and UK[2] [17] environmental policy and drives the EU's approach to tackling aviation's climate impact. In aviation, applying the PPP would involve airlines paying in monetary terms for the full climate and environmental impacts of their operations, which is far from current practice. This means that airlines should pay for their share of the costs for, e.g. the rerouting of rail lines due to sea-level rise, or the additional need for air-conditioning in schools and hospitals due to hotter summers.

Whatever the combination of taxes used, taxing pollution from aviation has several technological, economic, and social benefits. Firstly, by making polluting fossil fuel more expensive it encourages airlines to invest in zero-emission aircraft and cleaner fuels. Secondly, it eliminates market distortions and reduces price gaps between polluting and cleaner modes of transportation. Thirdly, revenue generated from taxing emissions can also be invested in developing sustainable fuels and cleaner modes of transport. And fourthly, effective pricing of aviation pollution can address social and environmental injustices by ensuring that the industry pays for its environmental damage, rather than being subsidised by taxpayers [18].

However, in the aviation industry, the polluter pays principle is not being implemented due to the sector's prolonged under-taxation and over-subsidisation. This has resulted in artificially low prices for air travel [19]. For instance, an investigation found that on a round trip flight from Schiphol to Toulouse costing €81.65 per passenger, the total amount of subsidies amounted to €86.29 [19]. This hidden aid encourages greater demand for flying, thereby perpetuating the growth of emissions.

In addition to taxation, ending aviation subsidisation is paramount to set the sector on a sustainable path. The Covid-19 crisis has highlighted the favourable position airlines hold when it comes to accessing public funds. This emphasises that governments are artificially keeping a highly carbon-intensive sector afloat with substantial subsidies. During the Covid-19 pandemic, the UK government provided financial support to British Airways, easyJet, Wizz Air, and Ryanair, amounting to £1.8 billion (€2.0 billion) [20]. Switzerland provided 1.9 billion Swiss francs (€1.8 billion) to the aviation sector, including 1.275 billion francs (€1.2 billion) to Swiss and 600 million francs (€568 million) to Swissport International, Gategroup and SR Technics [21]. Norway provided its airlines with a 6 billion crones (€559 million) bailout [22]. These subsidies are not part of our analysis, but are important to mention when it comes to aviation's privileged access to public funds. In the EU, the European Commission allowed member states to assist companies affected by the pandemic through the "Temporary Framework" [23]. Several European airlines sought government assistance, accounting for over €37 billion in state bailouts provided mainly during spring 2020 [24]. Much of this aid was granted without requiring airlines to improve their sustainability practices.

Finally, taxes should be paid by (all) companies to fund public goods and services: the items that are paid for through general taxation. These include schools, hospitals, national defence, etc. For instance, the UK's Air Passenger Duty was specifically introduced as a revenue-raising tax to ensure UK aviation contributed to funding public goods and services.

[2] This has been explicitly reaffirmed by the UK government post-Brexit.

1.2. Scope and aim of this report

The aim of this report is to estimate how much the European air passenger travel[3] sector benefits from tax and emission pricing exemptions. The scope is therefore limited to taxes and carbon pricing mechanisms that are specific to the aviation sector, including

Taxes where aviation is fully or partially exempted	VAT	Fuel tax	ETS
Aviation pricing regimes or schemes	Ticket taxes	Corsia	

Only strictly revenue-raising ticket taxes and carbon schemes, where the output is used for general purpose, are considered in this study. Taxes and charges that are not specific to the aviation sector (corporate taxes, labour taxes etc.) are not included in this analysis. Taxes, fees, and charges applied to aviation but then reinjected in the sector are not considered as effective pricing as these revenue-raising taxes benefit the industry directly or indirectly, either by paying for the infrastructure, the administration of services, the safety or security of the industry. This does not compensate for existing pricing exemptions. We exclude various taxes and charges levied to defray the costs of the services (e.g. airport infrastructure maintenance, security, noise reduction measures) [25].

We hereon refer to those taxes, carbon pricing and carbon off-setting schemes as *air travel pricing*.

Throughout the report, *air travel pricing* is broken down into two categories:

- *Fuel and emission pricing* refers to fuel tax and carbon pricing via market-based measures. Both are costs that have to be paid by the airline directly. We assume that the fuel mix is only kerosene, as the use of sustainable aviation fuel will be negligible in 2025 [26].
- *Ticket pricing* refers to VAT and ticket taxes. Both VAT and ticket taxes are directly paid via the purchase of the ticket, either as a fixed amount in the case of a ticket tax, or proportional to the cost of the ticket in the case of VAT. Although airlines do not pay for these taxes directly, they are liable for their collection.

We define the aviation tax gap as the difference between the revenues from the current application of *air travel pricing* and what would have been raised in a *no-exemptions scenario*. In other words, it measures the deficit in revenues from aviation tax exemptions, while including revenues that arise from existing aviation taxes.

The tax gap is not only a deficit in revenues for tax authorities, it also artificially maintains low ticket prices. Tax exemptions have a direct impact on the demand for goods or services by influencing relative prices. By implementing tax exemptions, there is an increase in demand. Conversely, this report highlights the potential of reducing demand and consequently CO_2 emissions by closing the tax gap. Changes in tax revenues are also calculated in the second order, taking into account that in a scenario

[3] Air travel refers to passengers only. Cargo flights are excluded from this study.

without pricing exemptions, higher ticket prices would curb the demand for air travel, and therefore reduce the number of taxed units (passenger, emissions and fuel consumed) and the taxes arising.

We calculate the tax gap for two points in time:

- First, we estimate the tax gap in 2022, comparing the amount of money raised by air travel pricing with a no-exemptions scenario.
- Secondly, we look at 2025, where we assume that air travel has fully recovered to pre-pandemic (2019) levels. For that year, we estimate what the tax gap would be in a business-as-usual scenario, and assess how different policies could contribute to closing the tax gap.

The geographical scope includes member states of the European Union (EU27), the UK, Norway, Iceland and Switzerland. We refer to these 31 countries as *Europe* throughout the report. In order to improve readability, graphs may display only the most significant countries for the relevant metric. Full results for all countries are available in Annex III of the report.

A particular focus is given to 25 airlines. These include the top 15 2022 passenger travel emitters (Ryanair, Air France, Lufthansa, British Airways, easyJet, KLM, Emirates, Wizz Air, TUI, Iberia, United Airlines, Vueling, Delta Airlines, American Airlines, SAS Scandinavian airline) as well as ten airlines that are national carriers or major operators in some European countries (Iberia for Spain, ITA Airways for Italy, TAP for Portugal, Brussels Airlines for Belgium, LOT for Poland, Norwegian for Norway, Jet2.com for the UK, Aer Lingus for Ireland) and some other important third country carriers (Turkish Airlines and Qatar Airways).

The goal of this study is not to define an actual taxation regime that fully takes into account all the negative externalities of aviation, but rather to address the existing exemptions in current policies that have allowed the sector's emissions to grow. This tax gap study does not attempt to measure the taxation levels that would internalise all environmental and social externalities of aviation's activities.

2. Air travel pricing in 2022

2.1 State of aviation traffic and emissions in 2022

2022 was "the year European aviation bounced back", with traffic increasing by 48% compared to 2021 levels, reaching 83% of pre-pandemic (2019) levels[4] [27]. Low cost airlines outperformed the mainline and regional airlines, with Ryanair and Wizz Air polluting more than ever [14]. In 2022, 613 million passengers[5] travelled from a European country, representing 79% of the 2019 levels, with some variation on the destination region. Domestic and intra-European journeys reached respectively 83% and 80% of their 2019 levels, whereas extra-European recovered to 76% of its 2019 level. Passenger flights departing from Europe emitted 133 Mt of CO_2, or 76% of 2019 emissions levels (Figure 1).

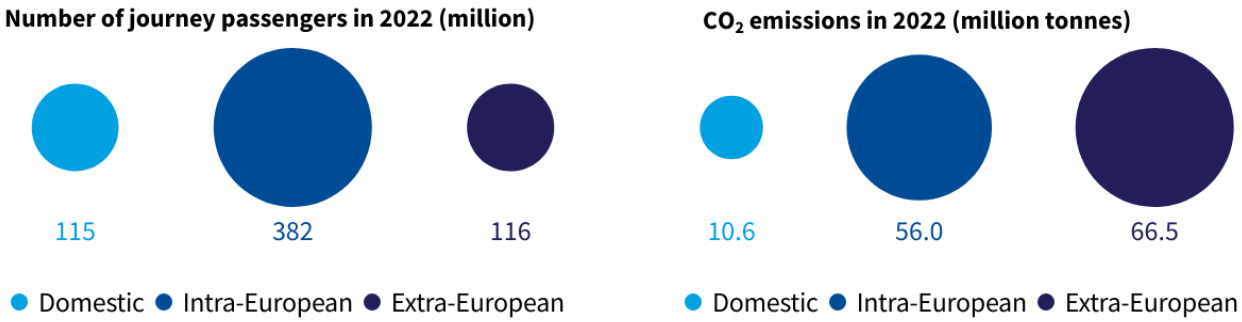

Figure 1: Estimate of the number of passengers journey and CO_2 emissions in 2022

Source: OAG

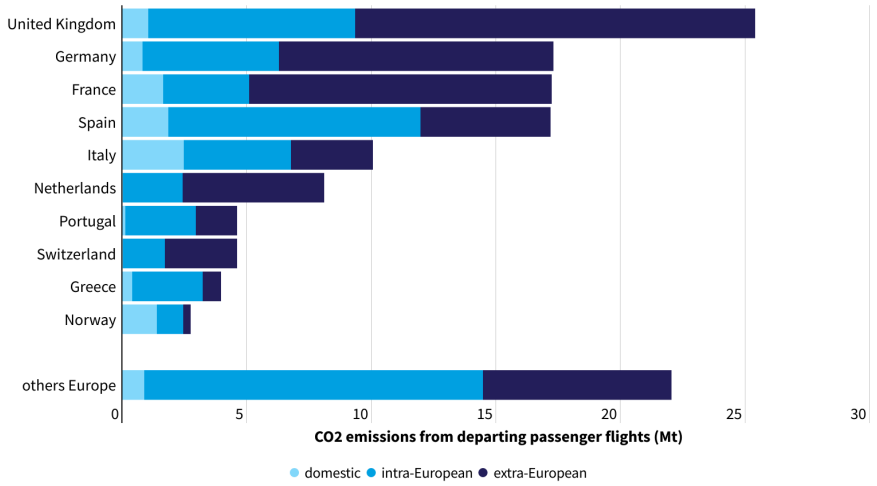

Figure 2: CO_2 emissions from departing passenger flights in 2022 (Mt)

Source: OAG. Emissions from flights departing from outermost regions are included in the emissions of the mainland country (e.g. the Canaries for Spain). See scope definitions in the glossary.

[4] Includes all members of the European Civil Aviation Conference.

[5] This corresponds with 711 million segment passengers carried on a flight from Europe. For example a passenger doing an indirect journey from Nice airport to Charles de Gaulle airport and then to John F. Kennedy International airport counts as one passenger journey, but as two segment passengers.

In 2022, the UK, Germany, France and Spain were the top emitters, with 25.4 Mt, 17.3 Mt, 17.2 Mt and 17.2 Mt of CO_2 respectively emitted from passenger flights departing from airports in their territory (Figure 2).

2.2 Summary of European air travel pricing in 2022

This section is an overview of air travel pricing in 2022. Table 1 summarises, by country, scope and travel class when relevant, the weighted average of tax rates. The effective carbon price encompasses the actual amount that airlines pay for their CO_2 emissions, for each scope, considering the amount of free allowances they receive. Ticket taxes and VAT rates are based on a passenger journey, where the country in the first column corresponds to the country of origin, and the scope depends on the country of destination. More details can be found in Annex II. The fuel tax and carbon price rates refer to the rates paid on a litre of fuel/tonne of CO_2 for an aircraft taking off in the country in the first column, and where the applicable rate is determined by the destination country.

Table 1: Overview of aviation pricing, per country, in 2022 (weighted average)

Dom. = domestic, Intra. = Intra-European, Extra. = Extra-European.

Country of origin/departure	Avg. ETS - effective price (€/tCO$_2$)		Avg. fuel tax (€/L fuel)		Avg. ticket tax (€/origin eco passenger)			Avg. ticket tax (€/origin premium passenger)			VAT	
	Dom. + Intra[6]	Extra.	Dom.	Intra. + Extra.	Dom.	Intra.	Extra.	Dom.	Intra.	Extra.	Dom.	Intra. + Extra.
Austria	45				20	12	12	15[7]	12	12	13%	
Belgium	45				-	2	4	-	2	4	6%	
Bulgaria	45										20%	
Cyprus	45											
Czechia	45										15%	
Germany	45				13	13	32	13	13	41	19%	
Denmark	45											
Estonia	45										20%	
Spain	45										10%	
Finland	45										10%	
France	45				3	3	7	20	20	52	10%	
Greece	45										24%	
Croatia	45										25%	
Hungary	45										27%	
Ireland	45											
Italy	45				0.4	0.4	0.4	0.4	0.4	0.4	10%	
Lithuania	45										9%	
Luxemburg	45										3%	
Latvia	45										12%	
Malta	45											
Netherlands	45				8	8	8	8	8	8	21%	
Poland	45										8%	
Portugal	45				2	2	2	2	2	2	6%	
Romania	45										19%	
Sweden	45				6	6	21	6	6	25	6%	
Slovenia	45										10%	
Slovakia	45										20%	
Switzerland	33										8%	
Iceland	45										11%	
UK	£36[8] (€42)				£13 (€15)	£13 (€15)	£71 (€83)	£26 (€30)	£26 (€30)	£195 (€205)		
Norway	45		0.13		4	5	11	4	5	11	10%	

[6] Flights between Europe and outermost regions are excluded from the ETSs.

[7] Domestic business flyers seem to pay less than economy flyers for Austria, but it's just because the calculations are averaged out. It is not a reflection of the actual tax rates in Austria (refer to Annex II).

[8] For 2022 results, we use a conversion rate of 1€ = £0.853, average of 2022.

In 2022, as shown on Figure 3, we estimate that *air travel pricing* raised €8.8 billion across Europe, with a majority of revenues coming from ticket taxes (€5.0 billion), followed by revenues from carbon pricing in ETS (€2.6 billion) and domestic VAT, where applicable (€1.1 billion). A mere 1% of total revenues comes from the domestic fuel tax, since only Norway levies a tax on kerosene. Air passenger duty (APD), the UK's ticket tax, raised £2.5 billion[9], equivalent to €3.0 billion. Total revenues from air travel pricing for EU27 are estimated to amount to €5.0 billion.

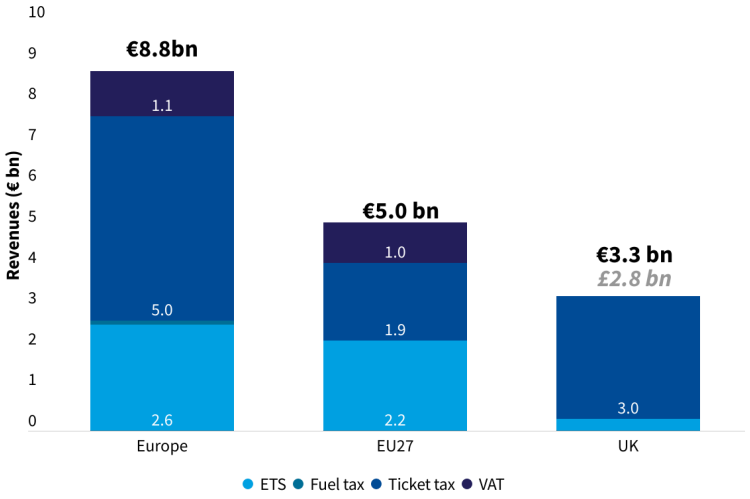

Figure 3: Total revenues from air travel pricing in 2022.
Europe includes EU27, the UK, Norway, Iceland and Switzerland

2.2.1 Emission trading systems (ETSs) in 2022

The primary objective of an ETS is to price and reduce GHG emissions of the aviation sector in a cost-effective way. Under the different emissions trading systems/schemes (EU ETS, UK ETS, Swiss ETS[10]), airlines are required to report their intra-European emissions only and to surrender allowances against those emissions. We estimate that the three emission trading systems raised a total of €2.6 billion from aviation in 2022, with the EU ETS, UK ETS, and Swiss ETS respectively raising €2.2 billion, €0.3 billion and €0.05 billion. The allocation of these revenues within Europe is explained in Annex II, Section 4.3.

In the EU ETS, only 15% of EU Aviation Allowances (EUAAs) are auctioned, the rest being given to airlines for free, whereas EU Allowances (EUAs) are fully auctioned. This is why revenues from EUAs make up for 84% of total EU ETS revenues from aviation. On average, we find that 47% of allowances surrendered by airlines in the EU ETS are given for free. In the Swiss ETS, we estimate that 62% of allowances were given for free. Similarly, the UK ETS, in its current form, fails to price emissions effectively because airlines are

[9] For 2022 results, we use a conversion rate of 1€ = £0.853, average of 2022.
[10] Flights within EU27, Norway and Iceland, as well as flights from EU27, Norway and Iceland to Switzerland and the UK, were covered by the EU ETS in 2022. Flights within Switzerland and from Switzerland to the EU27, Norway and Iceland were covered by the Swiss ETS. Flights from the UK to the European Economic Area, Gibraltar, Switzerland, and domestic UK flights were covered by the UK ETS.

granted excessive amounts of free allowances. In 2022, we estimate that 55% of allowances were given for free to UK airlines.

When taking into account free allowances, the average 2022 ETSs' price per tonne of CO_2 for the EU ETS (€85), the Swiss ETS (€85), and the UK ETS (£79,€93) respectively, are brought down to an average of €45, €33 and £36 (€42) per tonne of CO_2 for emissions covered (Table 1).

The effective ETS cost paid by airlines decreases when including the emissions of long-haul flights, for which airlines do not pay any allowances. Figure 4 shows, for 20 airlines, the small share of airlines' emissions that are actually priced compared to the entirety of their emissions from departing flights. For long-haul carriers, such as Air France, Lufthansa, British Airways, and KLM, the limited scope of the carbon markets results in those airlines not paying for most of their emissions.

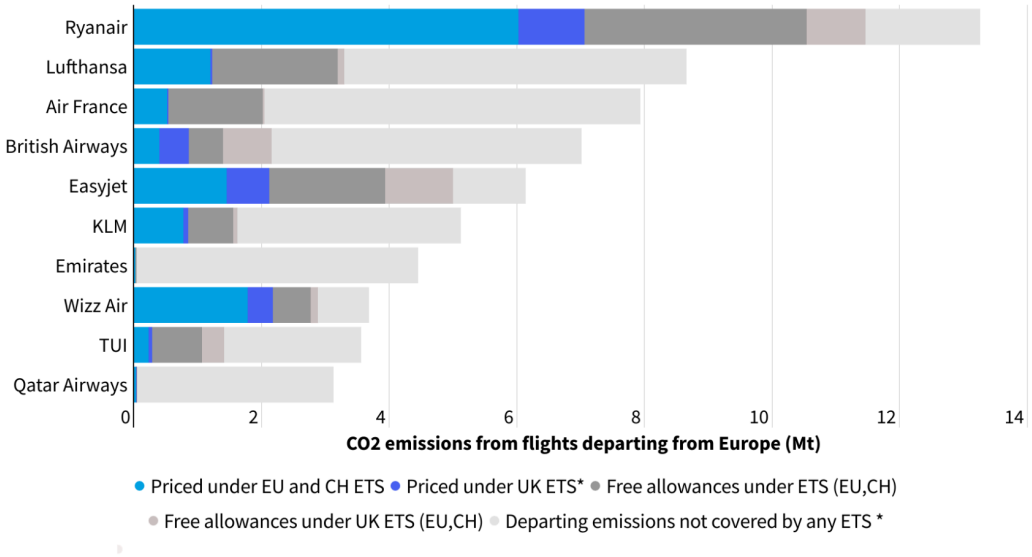

Figure 4: Only a share of airlines' emissions are priced under ETSs because of exemptions
Source: EU and Switzerland ETS verified emissions and OAG flight schedule data [14]. Emissions from cargo flights are included.

The combination of a reduced scope and free allowances results in airlines paying a much lower price for their departing emissions than the carbon price set in the ETSs. While the headline figure was around €85 and £79 (€93) per tonne of CO_2 respectively in the EU/Swiss ETS and the UK ETS in 2022, short-haul carriers like Ryanair and Wizz Air paid on average respectively €44 and €49 per tonne of CO_2, and long-haul carriers like Lufthansa, Air France and British Airways paid on average respectively €11, €6 and €11 per tonne of CO_2 [14]. In addition, the ETS does not address non-CO_2 emissions which are overlooked by climate instruments, despite their significant contribution to aviation's climate impact.

2.2.2 Carbon Offsetting and Reduction Scheme for International Aviation (Corsia) in 2022

Corsia is an international carbon offsetting scheme under which airlines need to offset credits to cover for the growth of their emissions (as opposed to all their emissions) above a certain level. The original emissions baseline above which airlines would have to buy credits was originally set at an average of 2019-2020, but due to Covid-19 and industry pressure, the baseline was set at 2019 emission levels for the

pilot phase (2021-2023) and then at 85% of 2019 levels for the rest of the phases up until 2035. For any year from 2021 onward, emissions from international aviation exceeding the baseline represent the sector's offsetting requirement for that year. The scheme currently ends in 2035.

Corsia has many structural flaws and is by far the worst solution to tackle aviation's climate impact [28]. The level of ambition of the scheme is much too weak and not aligned with either the Paris Agreement [29] or ICAO's aspirational goal of net zero by 2050 [30], nor the industry's own net zero target [31]. Indeed, only the growth in emissions is addressed, leaving the largest bulk of aviation emissions unaccounted for. T&E's calculations show that with the current baseline, a mere 22% of global international aviation emissions will be covered by the scheme in 2030. In addition, the prices of offsets are so low that they will not place any incentive in decarbonising the industry with an average cost of €1.70 per passenger flying between Europe and the US in 2030 [32].

Moreover, the quality of offsets is questionable, as highlighted by an assessment conducted by the European Commission [33]. The assessment underlines that none of the carbon reduction projects and offsetting programmes approved under Corsia meet all required sustainability criteria. In addition, it states that the approved offsetting programmes lack comprehensive provisions avoiding double-counting, whereby emissions savings are counted both by the airline and the country hosting the offsetting programme.

In 2022, airlines did not have to pay for Corsia-related emissions and we estimate that the revenues will be negligible in 2025.[11]

2.2.3 Fuel tax in 2022

The primary objective of fuel taxation is to encourage the shift to cleaner fuels. In Europe, only Norway and Switzerland impose a fuel tax on kerosene. Norway levies a rate of €0.17 per litre of mineral oil [35], but the tax is limited to domestic flights [36]. We estimate revenues from the Norwegian domestic fuel tax in 2022 to be €68 million. Meanwhile, Switzerland imposes a petroleum tax of €0.45 per litre on kerosene for domestic aviation [37][38]. However, this tax is applicable only to domestic aviation that does not connect to international flights [39]. Since the majority of domestic flights in Switzerland are connecting flights, we consider this tax to be negligible and exclude it from the analysis.

2.2.4 VAT in 2022

VAT is a general consumption tax assessed on the value added to goods and services [40]. EU member states implement common rules set in the VAT Directive [41]. They are free to exempt flight tickets from VAT, by applying reduced rates or a zero VAT rate. Article 98 of the Directive says that the "transport of passengers and the transport of goods accompanying them, such as luggage" can be applied at reduced rates (Annex III, point (5)). Furthermore, member states that have already exempted international passenger transport are permitted to continue to do so, in application of Article 371 in conjunction with Annex X, Part B (10) of the Directive. In the UK, both domestic and international flights are exempt from VAT, with a zero rating applicable to all scheduled flights [42]. In Norway, VAT is applied on passenger

[11] We calculate that Corsia revenues would represent €94 million in 2025, assuming an offset price of €8/tCO_2 [34], we did not include, as it is less than 1% of total tax revenues estimated to be paid by the sector in 2025.

transport at a reduced rate (VAT Act, section 5-3) and domestic flights transporting passengers apply a 12% VAT rate [43]. International flights as well as domestic segments of an international flight are exempt from VAT (VAT Act Section 6-28) [43]. Switzerland applies a standard VAT rate of 7.7% to domestic flights [44], whilst international flights and domestic segments of an international flight are exempt (article 41, VAT ordinance) [45].

Across Europe, all countries apply a zero VAT rate to international air transport, and five countries (Cyprus, Denmark, Ireland, Malta, and the UK) apply a zero rate for domestic journeys as well. The other countries apply either a reduced rate (e.g. France, Sweden) or the general VAT rate (e.g. Greece, Hungary). We estimate that VAT levied on air travel amounted to €1.1 billion in 2022, with Italy and Spain getting the most revenues (Table 2).

Table 2: Estimated revenues from domestic VAT in 2022

Country	Estimated revenues from domestic VAT
Italy	€221 mln
Spain	€182 mln
France	€182 mln
Germany	€167 mln
Greece	€151 mln
Norway	€143 mln
Sweden	€25 mln
Finland	€15 mln
Romania	€12 mln
Iceland	€4 mln
Croatia	€3 mln
Poland	€3 mln
Portugal	€2 mln
Bulgaria	€2 mln
Austria	€1 mln
Estonia	€1 mln
Switzerland	€1 mln
Other EU27	€0
United Kingdom	£0 (€0)

Some countries outside of Europe, such as Australia, Canada, India, Japan, and New Zealand, impose VAT on air travel. Typically VAT applies on domestic flights only. For instance, Australia applies a 10% rate [46], Canada applies a range of 5-15% [47][48], Japan has a rate of 10% [49][50], and New Zealand has a rate of 15% [51]. In certain countries like India, a Goods and Services Tax (GST) equivalent to VAT is applied to both domestic and international flights, with different rates for economy class (5%) and business class (12%) although it should be noted that GST is only applicable when the point of sale is in India [52].

2.2.5 Ticket taxes in 2022

In 2022, ten European countries applied a ticket tax, as defined in this study in section 1.2, on journeys originating from airports located on their territories (eight member states, the UK and Norway). Air Passenger Duty in the UK (APD), the German aviation tax, the French solidarity tax and the fiscal tax (Corsica), the Austrian Air Transport Levy, the City Council tax in Italy, the Swedish tax on air travel and the Norwegian air passenger tax were already in place in 2019. The Dutch aviation tax and the Portuguese Carbon tax were introduced in 2021. The Norway air passenger tax was paused in 2021 until the 1st of July 2022 [53], and the Belgian boarding tax was introduced in April 2022 [54], which means that only a share of passengers were subject to a ticket tax in 2022 in these two countries. This is reflected in the ticket tax revenues from 2022, in Table 3 below and in Table 1 above, since tax levels are given as a weighted average over the year 2022.

Table 3: Ticket tax revenues in 2022

Country code	Number of origin passenger in 2022 (excludes transfer passenger), in million	Ticket tax name	Estimated revenues in 2022
United Kingdom	87	Air Passenger Duty	£2,546 mln (€2,986 mln)
Germany	56	German aviation tax	€1,048 mln
France	68	Solidarity tax	€276 mln
		Eco tax	€126 mln
		Fiscal tax (Corsica)	*€20 mln*[12]
		Taxe de l'Aviation Civile	Falls outside the definition of a tax in this report, because reinjected in the aviation sector (see Infobox 1)
Netherlands	19	Dutch air passenger tax	€149 mln
Sweden	13	Swedish tax on air travel	€107 mln
Norway	19	Norway air passenger tax	€94 mln
Portugal	23	Portuguese carbon tax	€37 mln
Italy	78	City Council tax	€30 mln Partially falls outside the definition of a tax in this report, because reinjected in the aviation sector (see Infobox 1)
		Embarkation tax	Falls outside the definition of a tax in

[12] Based on 2022 data, this tax generated €20 million. These revenues are included in the results for France, but were not modelled in the results for airlines. They are deemed negligible since they represent less than 5% of the total revenues from French taxes (Annex II, Table 11)

			this report, because reinjected in the aviation sector (see Infobox 1)
Belgium	11	Belgium boarding tax	€22 mln

Infobox 1: Earmarking of ticket tax revenues: France and Italy

In this analysis, we are specifically focusing on ticket taxes that are strictly revenue raising, used for general purpose, and not reinjected in the sector. Taxes, fees and charges reinjected in the aviation sector are not considered as compensating for the existing tax exemptions (VAT, fuel tax, ETSs) in our analysis. This definition excludes taxes which directly fund services, or bodies that are responsible for air passenger-related services. Revenues from the French TAC (Taxation de l'aviation civile) are allocated to the "Air Control and Operations" which funds the French aviation administration (Direction Générale de l'Aviation Civile). According to the French Court of Auditors, the TAC revenues have been largely allocated to the "Air Control and Operations" budget since its creation, and the latter was designated as the only beneficiary by the Finance Act from the TAC as from 2016, as a debt reduction measure (p.52) [55]. The TAC therefore falls out of the scope of this report as the revenues directly benefit the sector. In 2022, we estimate that the TAC raised €389 million for France.

Similarly for Italy, a portion of the Embarkation Tax revenues is reserved for payments to "institutions and companies that manage airport complexes or terminals for goods or passengers". However, there is no specific earmarking mentioned beyond this [25]. In a report commissioned by Airlines for Europe (A4E) about the economic impact of air taxes in Italy, PwC distinguishes air passenger taxes, that are purely revenue raising, and charges which are used to pay for a service, and considers the Embarkation tax, as being part of the second category [56]. Following this categorisation, we therefore consider that the Embarkation tax falls out of the scope of our analysis. Finally, the Italian City Council tax revenues are earmarked as follows: "The tax revenues are allocated to the state budget. For the subsequent reassignment for the part exceeding 30 million euros, a special fund is set up with the Ministry of the Interior and is reallocated into the aviation sector"[25]. We therefore only consider those 30 million as actual revenues from ticket taxes, as defined in our study. Any amount exceeding this is reinvested into the sector and thus excluded from our calculations. In Italy, the Embarkation tax and the part of the City Council tax revenues that is reallocated to the aviation sector raised €1.4 billion in 2022.

3. No-exemption scenario in 2022

3.1 Summary of pricing assumptions and resulting revenues from a no-exemption scenario

We define the tax gap in this study as the gap between the revenues from *air travel pricing* in 2022 and what would have been raised in a *no-exemption scenario* (if aviation was properly priced). In other words, it measures the deficit in revenues from exemptions, partially offset by revenues

coming from ticket taxes. Table 4 summarises the *no-exemption scenario*, and the rest of the section explains in detail what the removal of exemptions entails and how it could be made possible.

Table 4: Pricing assumptions for the no-exemption scenario in 2022.
*Includes flights from and to outermost regions.

Country of origin/departure	Avg. ETS - effective carbon price (€/tCO_2)		Avg. fuel (€/L fuel)		Avg. ticket tax (€/origin eco passenger)			Avg. ticket tax (€/origin business passenger)			VAT	
	Dom. + Intra European*	Extra European	Dom.	Int.	Dom.	Intra European	Extra European	Dom.	Intra European	Extra European	Dom.	Int.
EU27, Norway, Iceland, Switzerland	85	85	0.38	0.38							20%	20%
United Kingdom	£79 (€93)	£79 (€93)	£0.32 (€0.38)	£0.32 (€0.38)							20%	20%

The pricing assumptions for T&E's no-exemption scenario result from the following policies:

- All departing flights are included in all ETSs, with no free allowances;
- VAT is applied on all tickets at 20% (therefore no need for ticket taxes);
- Fuel taxation is applied to all departing flights with a rate of €0.38 per litre, corresponding to the full taxation rate initially proposed by the European Commission in the revision of the ETD.

We calculate that, if air travel had not been the subject of exemptions, *air travel pricing* would have raised **€43.0 billion**, **around half coming from fuel and emissions pricing, and the other half from ticket pricing**[13]. This is calculated after having accounted for the decrease in passenger demand and CO_2 emissions resulting from the increase in ticket prices due to additional taxes. **We estimate the decrease in total passenger demand to be 30% and the decrease in emissions to be 26%.**

[13] VAT is applied on the final price of the ticket (which includes the cost pass through of other taxes). If the ticket becomes more expensive due to fuel and emissions taxes, additional VAT will be generated.

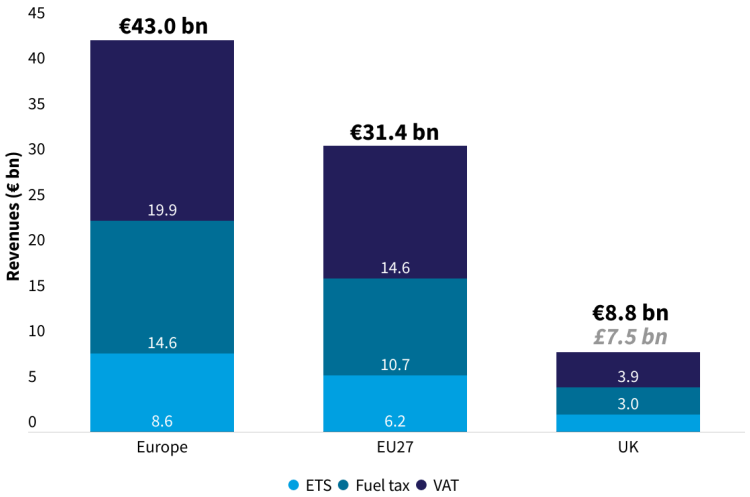

Figure 5: Potential revenues from aviation pricing (in a no-exemption scenario) in 2022

3.1.1 Emission trading systems (ETSs): all departing emissions fully priced

In 2008, as the EU (which then included the UK) prepared the inclusion of aviation into the ETS, the ETS' geographic scope encompassed all flights arriving at or departing from the EEA [57]. This scope was enshrined in law. The full inclusion was justified "in order to avoid distortions and improve environmental effectiveness" (recital 16) [57]. However, after facing strong international pressure from the United States and China, the EU introduced the "stop the clock" derogation temporarily excluding extra-EEA flights from the carbon market. The time-bound derogation was aimed at providing time for ICAO to develop a market-based mechanism to address aviation emissions at a global level. However, as described in section 2.2.2, the resulting scheme - Corsia - cannot deliver any meaningful reductions in emissions. Airlines only have to offset emissions exceeding 85% of 2019 levels, the historical peak of aviation emissions. Traffic has not returned to these levels since the global pandemic, and thus no airline has paid anything so far. In addition, the system only becomes "mandatory" in 2027 when all ICAO states "are expected" to join. Big emitters such as China, Russia, India or Brazil have not indicated they would join the scheme yet.

It is becoming increasingly difficult to say that Corsia can deliver emissions reductions in line with the Paris Agreement and ICAO's long-term aspirational goal. The EU (now excluding the UK) included a provision in the revised ETS stating that if Corsia is found as not aligned with the Paris Agreement or if participating states to Corsia together account for less than 70% of global emissions from international aviation, the scope of the ETS should be extended to all departing flights as of 2027. The stop the clock derogation was extended one last time to the end of 2026, and the ETS specifies this should be the last time-bound derogation of the scope. It would be a first step towards addressing the missing 60% of aviation emissions which are currently not priced.

Additionally, since aviation was included in the ETS, airlines have benefited from free allowances that have covered up to half of their emissions. Indeed since 2013, airlines have received a total of 300 million allowances for free, equivalent to €5.9 billion that could have been used to finance the development of clean technologies and green fuels. This additional exemption is finally coming to an end by 31 December

2025, as airlines will have to pay for all their intra-EEA[14] CO_2 emissions covered by the EU ETS as of 2026. Until then, the number of allowances granted for free to airlines will decrease gradually over two years, with a reduction of 25% in 2024 and 50% in 2025.

This is being partly replicated in the UK ETS: free allowances will be removed from 2026, but the UK's government has not given any indication that it would extend the UK ETS to flights to all destinations [12].

Our scenario without an ETS exemption entails that:

- Airlines are required to surrender allowances against emissions from all their flights departing from Europe, and not only intra-European flights.
- Airlines are not given free allowances and pay the full market carbon price for their emissions.
- ➔ *Based on the above, our scenario without ETS exemptions means that airlines in 2022 pay €85 per tonne of CO_2 emitted for flights departing from EU27, Norway, Iceland and Switzerland, and £79 (€93) per tonne of CO_2 emitted from flights departing from the UK.*

3.1.2 Fuel tax levied on kerosene for all departing flights

Currently, Norway and Switzerland are the only European countries applying a tax on kerosene, albeit limited to domestic flights [36]. It comes in stark contrast to taxation of other sectors such as the road sector which pays on average 54 cents per litre of fuel in the EU and the UK [58]. A fuel tax is an effective tool to make fossil fuel more expensive, and therefore encourage behaviour shifts towards more efficiency, cleaner transport or cleaner fuel. Kerosene taxation on intra-European flights is not mentioned in the aviation and climate strategies of the UK, Iceland, Norway and Switzerland. It is only debated within the EU but it has shown to be a contentious issue leading to divisions among transport diplomats [59].

The ability of EU member states to apply a taxation rate on kerosene is regulated by the Energy Taxation Directive (ETD). When the ETD was agreed upon in 2003, its objective was to harmonise the level of energy taxation at EU level to improve the functioning of the internal market [60]. However, the Directive specifically excludes the taxation of kerosene supplied for air navigation other than for private pleasure flying. Nevertheless, member states have the option to apply a kerosene tax on domestic flights or enter into a bilateral agreement with other member states. While the Directive sets a minimum tax rate of 33 cents per litre for kerosene, member states may apply a reduced rate. At present, none of the member states apply a tax on kerosene on either intra-EEA or domestic flights.

A proposal to revise the ETD was published on 14 July 2021 as part of the Fit for 55 package. It aims to align the text with climate imperatives by increasing taxation rates and getting rid of numerous outdated exemptions [61]. Regarding the aviation aspects, the proposal contains the following elements:

- Jet fuel for intra-EU flights will gradually be taxed to reach a minimum rate of 10.75€/GJ (approx. 0.38€ per litre) as of 2033, except for cargo-only flights. A 38 cents per litre tax would still be much lower than what the car sector is paying [58].

[14] Also includes flights from the EEA to the UK.

- Jet fuel used for private jets (business or leisure) will be taxed at the minimum rate (0.38€ per litre) as of 2023.
- Member states, on a voluntary basis, can tax jet fuel for extra-EU flights bilaterally with countries that have allowed it in their Air Service Agreements (ASA) with the EU.
- Advanced biofuels and e-fuels will benefit from a zero tax rate for ten years.

Nevertheless, the adoption of the revision is facing numerous legislative hurdles, which is why no agreement has been reached until now. Legislative files pertaining to taxation require unanimity, and some member states, notably southern member states, are expressing reluctance to tax aviation fuel. If agreed upon, the taxation would only apply to intra-EEA and domestic flights.

In the UK, no indications have been made by the UK government that it will apply a kerosene tax. However, there are no legal restrictions restricting the application of fuel taxes to all domestic flights and flights to the EU: it is entirely in the powers of the Chancellor to do so, and therefore it is a political decision not to tax jet fuel. Taxing fuel is the norm for other UK transport modes: road fuel is taxed at a rate of 52.95p (€0.62) per litre,[15] and diesel for trains are taxed at 10.18p (€0.12) per litre.

European countries could also implement a kerosene tax on international flights. Contrary to common belief, the Chicago Convention does not prevent applying a tax on kerosene uplifted to planes for international flights, it only prohibits states from taxing fuel already on board a plane as it lands on its territory [62]. Setting a kerosene taxation at international level would require renegotiating some air agreements, a task the European Commission and the other European states are well placed to do.

> ➔ *Based on the above, our scenario without fuel tax exemptions entails that airlines should have paid €0.38 per litre of fuel for all flights departing from airports in Europe in 2022.*

3.1.3 20% VAT applied on all tickets

Airlines do not have to pay VAT on international flights (intra-European and extra-European flights), those causing the most emissions. But, the continued VAT exemption in air travel is unjustified for several reasons [63]:

- It is unfair that luxury products like air and cruise/ferry tickets are exempt from VAT, whilst some essentials are not. In the UK, food, medicines and goods bought from charity shops are exempt from VAT, but electricity and gas for home heating are not. Bus, coach and rail travel is exempt from VAT, but taxi services, as luxury goods, are not. In most EU member states, basic foods, children's clothing, and other essentials are charged VAT, at varying rates. VAT is also applied to most transport of passengers [64].
- Indirect taxes such as VAT are more growth-friendly than direct taxes and broadening tax bases is preferable to increasing tax rates.
- The exemption creates a less attractive regulatory and market environment for lower-carbon transport alternatives like rail and bus, discouraging investments in these sectors.

[15] This is due to rise to 57.95ppl in April 2024.

- Aviation is by far the most carbon intensive mode of transport, applying a VAT exemption to the sector creates an artificial increase in the demand for air tickets and thus increases emissions.

> ➔ *Based on the above, our scenario without VAT exemptions entails that VAT is levied on all air tickets, for journeys originating from Europe, at a standard rate of 20%.*[16] *As explained above, VAT is levied by the country where the passenger journey starts. Similarly to ticket tax practices, for indirect journeys, the airline operating the first leg of the journey is liable for collecting VAT.*

3.1.4 Corsia and ticket taxes

In a hypothetical scenario where airlines pay a tax on their fuel, full price for all their emissions, and standard Value Added Tax (VAT) is applied to all tickets, it can be argued that the need for additional ticket taxes and Corsia becomes unnecessary on departing flights. This is because, with these measures in place, aviation emissions would be priced and addressed through comprehensive policy measures, and the aviation industry would be contributing its share to state budgets through VAT.

[16] Similar to the EU's average rate of 21% [65]

4. Results: the tax gap in 2022

4.1 Overall tax gap

The tax gap is the difference between what would have been raised in a *no-exemption scenario* and the amount of money raised by *air travel pricing*. We find that the total European tax gap amounted to €34.2 billion in 2022 (Figure 7). The fuel tax and ETS exemptions amounted to €20.5 billion and VAT exemption to €18.8 billion, partially offset by €5.0 billion in revenues from aviation ticket taxes (Figure 8).

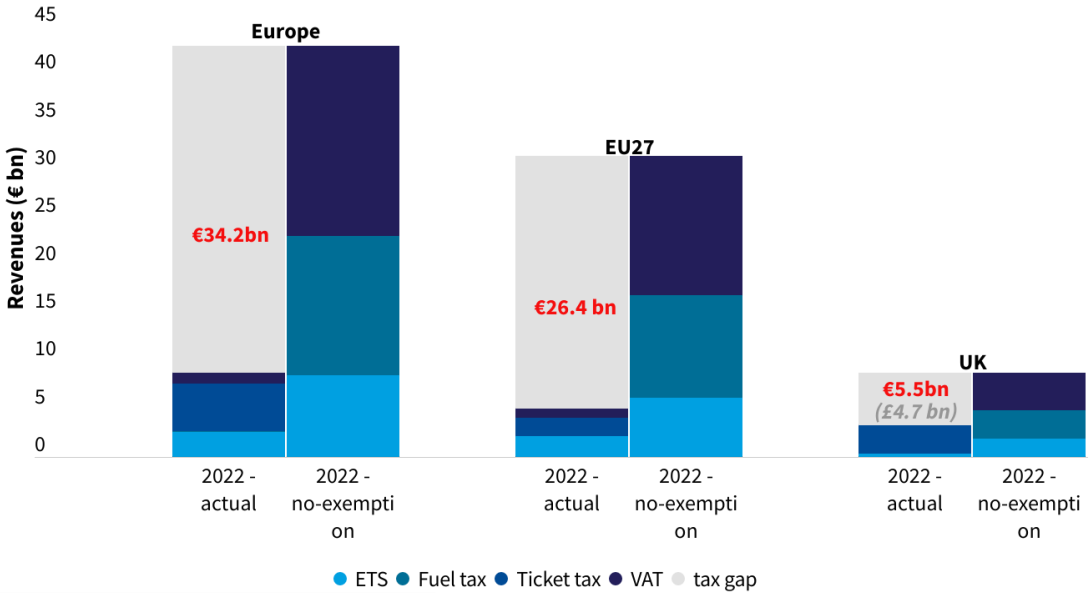

Figure 6: Aviation tax gaps for Europe, EU27 and the UK in 2022

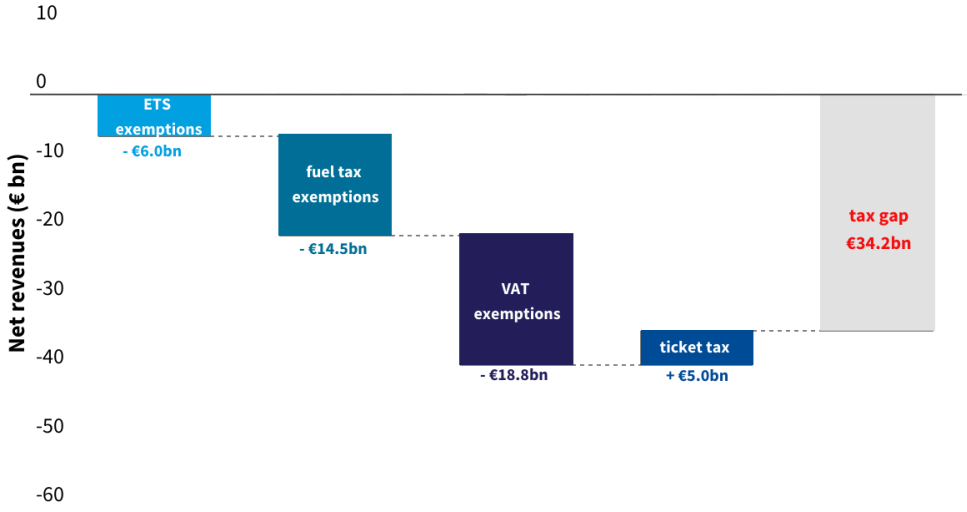

Figure 7: Composition of the European 2022 aviation tax gap

For the UK, the tax gap amounted to £4.7 billion (€5.5 billion) in 2022. The UK's ticket tax partially addresses some of aviation's lack of pricing, as it generated £2.5 billion (€3.0 billion).

Similarly, for the EU27 the total aviation tax gap amounted to €26.4 billion, which is derived from the limited application of VAT (€13.6 billion) and lack of fuel pricing (€10.7 billion). On average, current pricing policies for aviation among EU27 countries represent **barely 16% of the total effective revenues that could be generated by properly taxing the sector.**

4.2 Tax gap per country in 2022

Figure 9 shows a ranking of the ten countries which lost the most revenues from exemptions. This mainly reflects the importance of the aviation sector in the given country (Figure 4). The amount of the tax gap for all countries can be found in Table 18, in Annex III.

- The top ten biggest tax gaps represent €28.5 billion, which is 83% of the total European tax gap. Only six of these top ten countries (UK, France, Germany, Italy, Portugal and the Netherlands) impose some form of ticket taxation that reduces their tax gap, but this is minimal compared to the amount of exemptions, between 3% in Portugal and 35% in the UK. No country is close to closing the tax gap via ticket taxes.
- The UK has the largest tax gap in absolute terms of £4.7 billion (€5.5 billion).

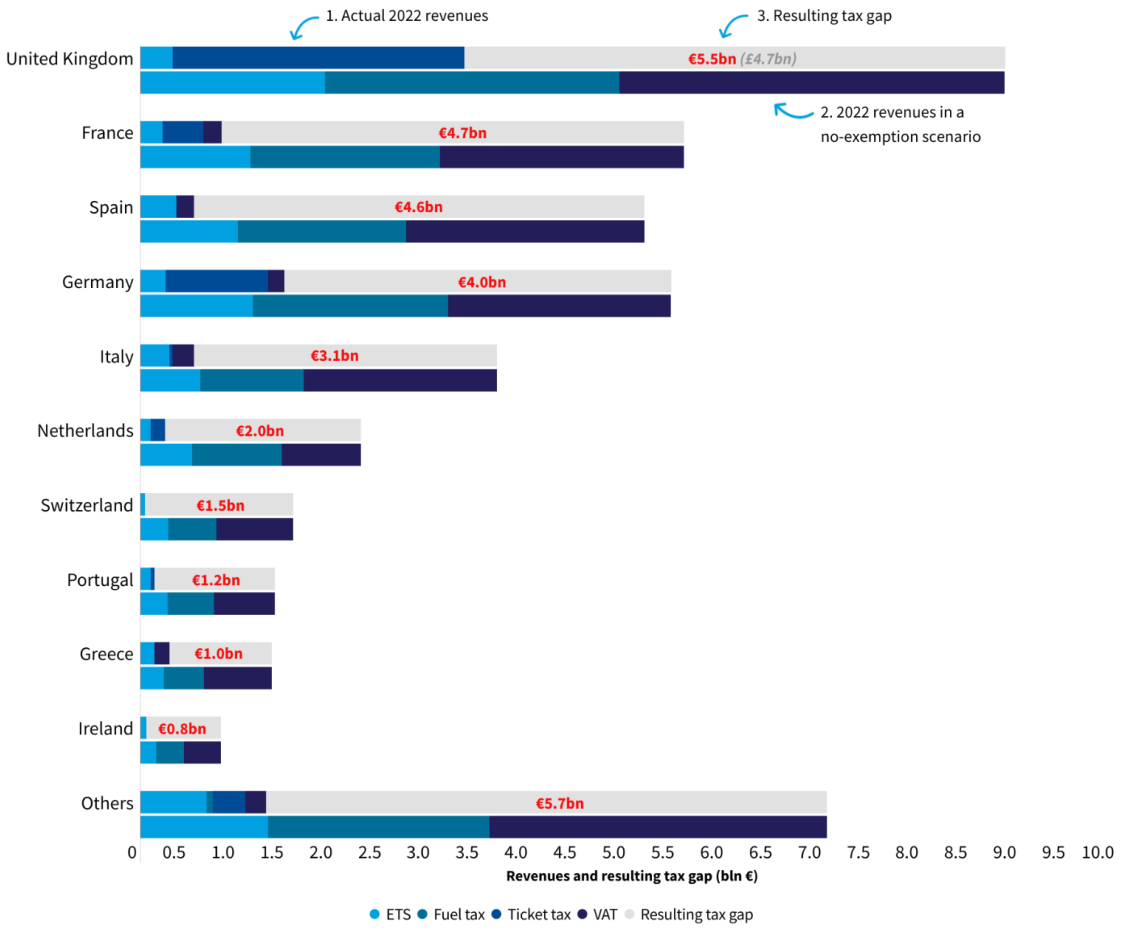

Figure 8: The ten biggest aviation tax gaps per country in 2022

Figure 9 below shows the share of actual revenues European countries have benefited from aviation taxation in 2022 compared to the potential no-exemption scenario. It shows that the average EU27 country policies in 2022 only **covered 16% of the total potential revenues from properly pricing aviation.**

Because Norway is the only country that applies a kerosene tax (domestically) in combination with ticket taxes, and because of the size of its domestic market, it is the country that is closest to covering half of the actual revenue gap in taxing the sector. The UK's policies cover 37% of the potential revenue they could get if the government properly taxed aviation. At the other end of the table, Switzerland is the country furthest away from effectively taxing its aviation sector, mainly because of the important share of emissions from long-haul flights departing from its territory that aren't priced and passengers not taxed.

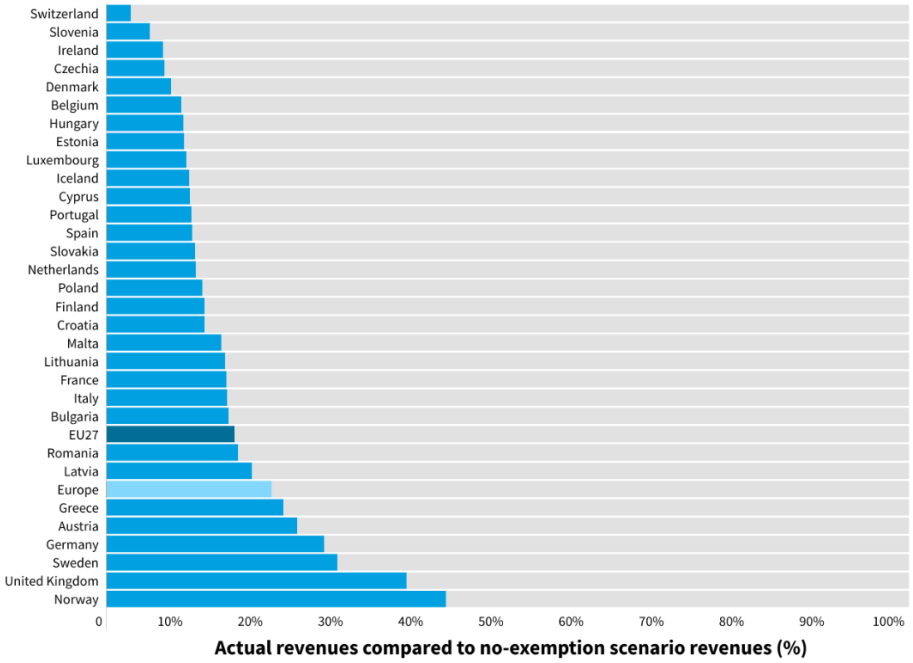

Figure 9: 2022 share of actual pricing revenues from aviation compared to a no-exemption scenario, per country (%)

4.3 Tax gap per airlines in 2022

Airlines do not pay tax on the kerosene they burn (except in Norway and Switzerland on fuel for domestic flights) and only pay a fraction of the full carbon price on their emissions under ETSs. These exemptions **amounted to a €20.5 billion subsidy to the sector in 2022**. Airline lobby groups have been actively lobbying to keep these exemptions for decades [66].

Figure 10 shows how much airlines should have paid in 2022 if full fuel pricing was applied and if passengers flying on their planes had paid a full VAT rate (see assumptions in Table 4). This represents the

"induced" tax gap for airlines, given ticket taxes and VAT are not paid by airlines directly, but by passengers.

The fuel tax and ETS exemptions in 2022 still resulted **in the top 15 polluting airlines saving €11.8 billion in fuel and emissions pricing**. This is calculated in the second order, meaning this takes into account the demand reduction induced by a full carbon pricing, but also by the full ticket pricing with VAT.

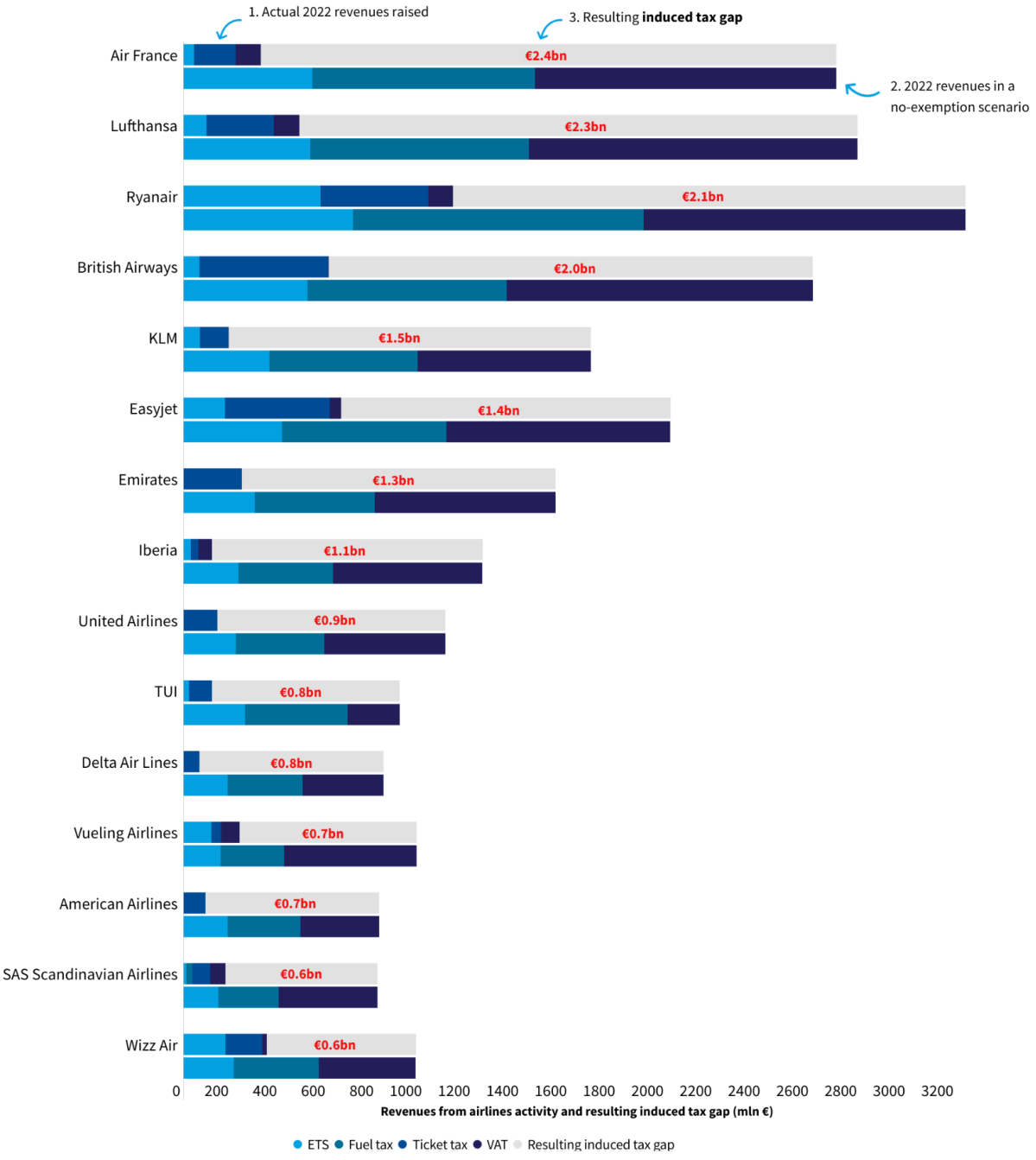

Figure 10: Induced tax gaps for the top 15 emitting passenger airlines in 2022

The lack of pricing for these top 15 airlines caused 56% of the total European tax gap in 2022, which showcases the importance of addressing tax exemptions on these airlines' activities. Despite raising €2.9 billion in ticket taxes, €0.6 billion in VAT and €1.4 billion in carbon/fuel pricing, **these 15 airlines' induced tax gap still amounted to €19.3 billion of lost revenues.**

The lack of pricing of national carriers is also causing a lot of lost revenues for their respective member states. Table 5 below shows that Air France's lack of pricing contributed to €1.9 billion, or 41% of France's tax gap in 2022. Failing to price Lufthansa's flights and emissions caused the German government to lose out on €1.4 billion in revenue (35% of their tax gap).

Table 5: Airlines induced tax gaps in specific countries in 2022. See Annex IV, Table 21 for more results.

Beneficiary	Airline	Fuel and emission pricing tax gap (€bln)	Ticket pricing induced tax gap (€bln)	Resulting induced tax gap (€bln)
United Kingdom	British Airways	1.1	0.4	1.5
	Emirates	0.3	0.1	0.3
France	Air France	1.3	0.7	1.9
	easyJet	0.1	0.1	0.2
Spain	Iberia	0.5	0.4	0.9
	Ryanair	0.2	0.2	0.5
Germany	Lufthansa	1.1	0.3	1.4
	United Airlines	0.2	0.0	0.2
Italy	Ryanair	0.3	0.2	0.5
	ITA Airways	0.1	0.1	0.3

Another interesting angle is the importance of third country carriers' tax gaps alongside European airlines. Lack of effective pricing of third country airlines' activities considered in this analysis (Turkish Airlines, Qatar Airways, Emirates, Delta Airlines, American Airlines, United Airlines), **generated €4.3 billion of Europe's total tax gap**. The tax gap induced by Emirates' activity (€1.3 billion) for example is similar to the tax gap induced by easyjet (€1.4 billion). United Airlines (€0.9 billion) and Delta Airlines' (€0.8 billion) induced tax gaps are also similar to TUI's (€0.8 billion) or SAS's (€0.6 billion). Turkish Airlines' (€0.7 billion) and Qatar's (€0.6 billion) induced tax gaps are even slightly more than TAP Air Portugal's (€0.6 million) and Finnair's (€0.5 million) respectively (Figure 11 below).

This represents potential revenues governments could have obtained if airlines were fairly priced. The UK and Germany are the countries most affected by the loss of revenue from third-country airlines. They should see effective pricing not only as a way of generating revenue, but also as restoring competition between their national carriers and third country competitors. The fact that some of these third country airlines have a bigger tax gap than some European airlines should be an additional justification for governments to better price flights departing from their territories.

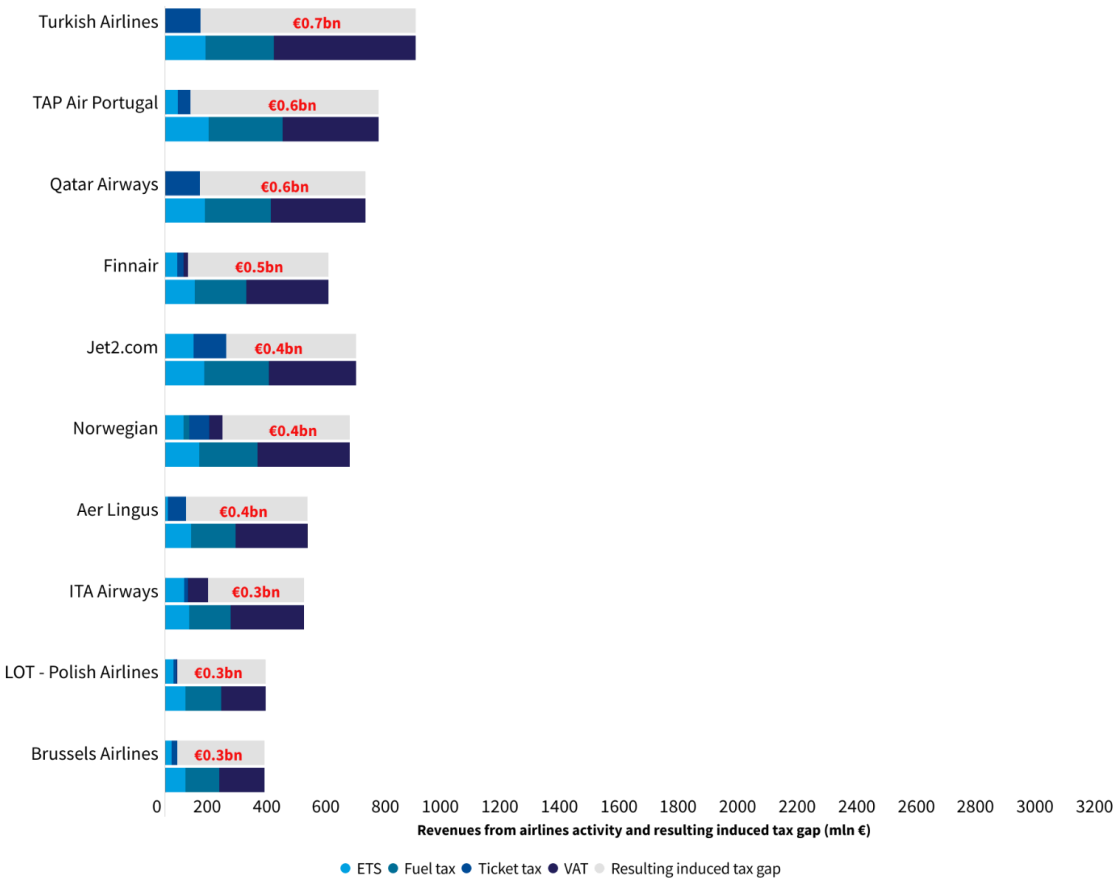

Figure 11: Other examples of airline induced tax gaps in 2022

(Selection based on national relevance)

4.4 Repercussions on ticket prices

Additional costs incurred in a no-exemption scenario by airlines would be eventually passed on to the consumer, given their limited ability to internalise costs. If VAT was levied on all tickets, their prices would increase accordingly. Table 6 shows how ticket prices are kept artificially low because of exemptions. In a scenario without those exemptions, return trip ticket prices would be 25%, 43% and 24% higher, for domestic, intra-European and extra-European return tickets respectively.

Table 6: Absolute and relative ticket price increase in the no-exemption scenario

Scope origin/destination	Average one way ticket price		Increase of a one way ticket (average between the two legs of a return trip)	
	2022 - actual	2022 - no-exemption scenario	Absolute terms	Relative terms no-exemption compared to actual
Domestic	€106	€132	+ €26	+25%
Intra-European	€126	€180	+ €54	+43%
Extra-European	€447	€664	+ €217*	+24%[17]

[17] In the case where extra-European countries would align their pricing policies, the roundtrip ticket price would increase by 49%.

The prices of tickets for flights with a higher fuel consumption and climate impact naturally increase more. However, as previously reported, this increase in price would mostly affect those passengers who fly most frequently and on the most polluting routes. 1% of flyers cause 50% of aviation's global emissions [67], therefore increasing the price of travelling would affect those most responsible for the sector's growth and climate impact.

4.5 Foregone CO_2 savings

A direct consequence of having ticket prices increase to a more effective price is a decrease in demand in passengers, and eventually in flights and CO_2 emissions (see infobox 2). Not only is this an important part of T&E's vision to reduce aviation's climate impact down to zero by 2050, it is also a core component of the UK government's Jet Zero Strategy, accounting for 27% of 2050's envisaged emissions reduction. Additionally, without curbing demand for aviation, the sector has no chance of meeting the EU's climate-neutrality goal by 2050. If demand for air travel continues to increase exponentially as it did before the Covid-19 pandemic, the energy needs and technological costs to deploy decarbonised aviation by 2050 will be too high. The lower the demand, the lower the energy requirements to produce clean fuels and the lower the costs incurred manufacturing clean technology.

Ending the exemptions in 2022 would have saved 34.8 Mt of CO_2, equivalent to the combined emissions of the three most polluting airlines in Europe (Ryanair, Air France and Lufthansa).

Infobox 2: aviation's non-CO_2 climate impact

Aviation's climate impact goes beyond CO_2 emissions. On top of CO_2, aircraft engines emit other gases – nitrous oxides (NOx), sulphur dioxide (SO2) and water (H2O) – and particulate matter (soot). When emitted at high altitudes, these emissions affect atmospheric physical and chemical properties. This results in an increase in greenhouse gases, and the potential formation of persistent contrail cirrus, high, linear clouds which trap the Earth's heat. The combined effects of contrail cirrus and the other gases are estimated to cause up to three times more warming than aviation's CO_2 emissions alone. There are different options for translating these non-CO_2 effects into CO_2 equivalent, including the use of the Global Warming Potential (GWP) metric. By using this metric, we aim to show that the climate benefit of taxing aviation goes beyond only reducing CO_2. For the purpose of this analysis, we used Table 5 of D. Lee's recent study to calculate the potential CO_2 equivalent with GWP*100 metric, which translates into a factor of 3 [68].

Therefore, by saving 34.8Mt of CO_2, taxation measures analysed above could save up to ~104.4Mt CO_2 equivalent when taking into account non-CO_2 effects. **This would have the same climate impact as if all the Germans drivers would leave their car in the garage for a year**[18].

[18] source: UNFCCC. The most recent available data from UNFCCC are from 2020. Cars emissions in Germany (sector 1.A.3.b.i) in 2020 were 89.6 $MtCO_{2eq}$. Pre-Covid emissions (2019) were 99.0 $MtCO_{2eq}$.

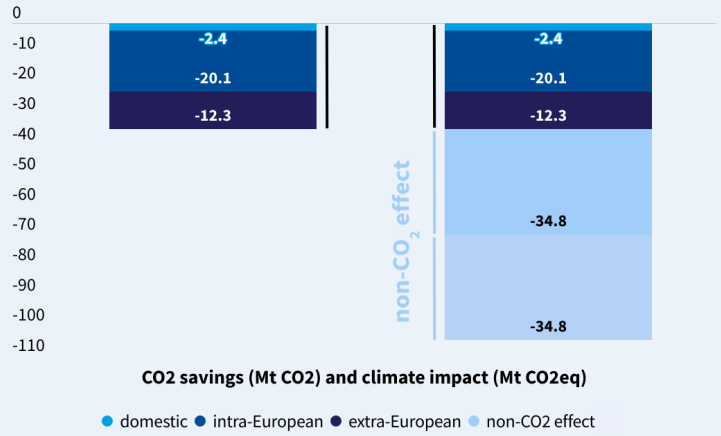

Figure 12: CO_2 emissions savings and climate impact of a no-exemption scenario in 2022

5. The 2025 tax gap and how to close it

5.1 The 2025 pricing assumptions

In this section, we calculate the extent of the future tax gap if no change in pricing policies is enacted compared to those known to us today (July 2023). Eurocontrol estimates that total traffic in 2023 will reach 92% of 2019 levels and that full recovery will happen in 2025 [27]. Therefore, we calculate the tax gap at full recovery by using CO_2 emissions and passenger traffic from 2019. In this scenario, European aviation will transport 772 million passengers and will emit 174.2 Mt of CO_2 in 2025 (Figure 13).

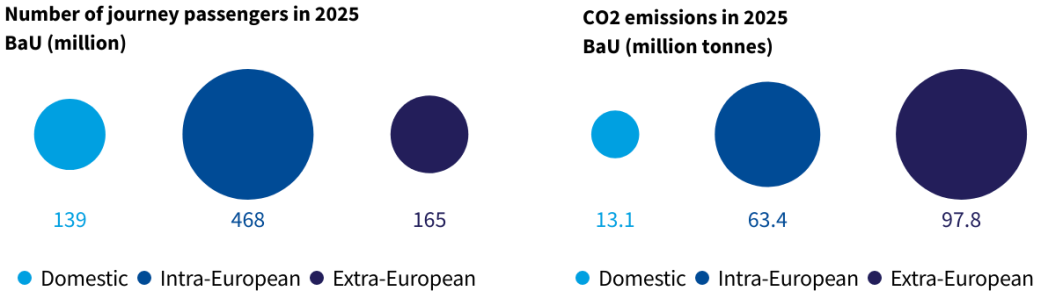

Figure 13: Passenger numbers and CO_2 emissions in 2025 in a business-as-usual scenario

We define the business-as-usual (BaU) scenario in 2025 as a scenario with the existing policy measures in place:

- EU ETS as agreed in December 2022 and which entered into force on 6 June, i.e free allowances ending in 2026, only intra-EEA scope[19] [69]. For the UK ETS we assume that there will be no changes in the scope. For the UK we use the same allocation of free allowances as announced for 2025 [70][12]. For the Swiss ETS we have calculated the allocation of free allowances by applying a 2.2% Linear Reduction Factor until 2025 to obtain the total aviation cap, of which 85% are free

[19] As well as flights from the EEA to the UK and Switzerland.

allowances [71]. We assume an allowance price of €100 (£88.3[20]) for all ETSs in 2025, which is slightly less than forecasted [72].

- Ticket tax with the most recent rates (2023 rates). In practice, the only significant changes are for the Netherlands (flat ticket tax increased from €7.9 to €26.4), the UK APD (decrease of the domestic rate), and Norway (increase of the long-haul rate).
- The current 2022 VAT rates for aviation remain the same in amount and scope.
- Intra-EEA fuel is taxed as if the ETD proposal is adopted and implemented, which means a tax of 7ct/L in 2025 (progressively increasing to the full 0.38cts in 2030).
- Given the lack of concrete proposals, no fuel tax is assumed for Switzerland and the United Kingdom in the business-as-usual scenario.

We compare the business-as-usual scenario with T&E's no-exemption scenario, which is identical to the one defined in 2022 (see Table 4 in Section 3.1), except that the ETS price is at 100€. This entails:

- All departing aviation is included in all ETSs at a price of 100€ per allowance, with no free allowances.
- VAT is applied on all flights at 20% (therefore no need for ticket taxes).
- Fuel taxation is applied to all kerosene uplifted at a rate of €0.38 (£0.35[21]) per litre.

5.2 The 2025 tax gap

Figure 14 shows that if no further pricing policies are put in place, **the tax gap will amount to €47.1 billion in 2025, an increase of 38% compared to 2022**. If countries fail to implement effective pricing in 2025, they will lose out on an extra €12.9 billion compared to 2022. This is due to air traffic and emissions continuing to increase while not being effectively priced, which therefore increases the amounts of lost revenues from aviation taxation. The less you tax an increasingly polluting activity, the more tax revenue you will lose out on.

[20] For 2025 results, we use a conversion rate of 1€ = £0.883, as retrieved in May 2023.
[21] For 2025 results, we use a conversion rate of 1€ = £0.883, as retrieved in May 2023.

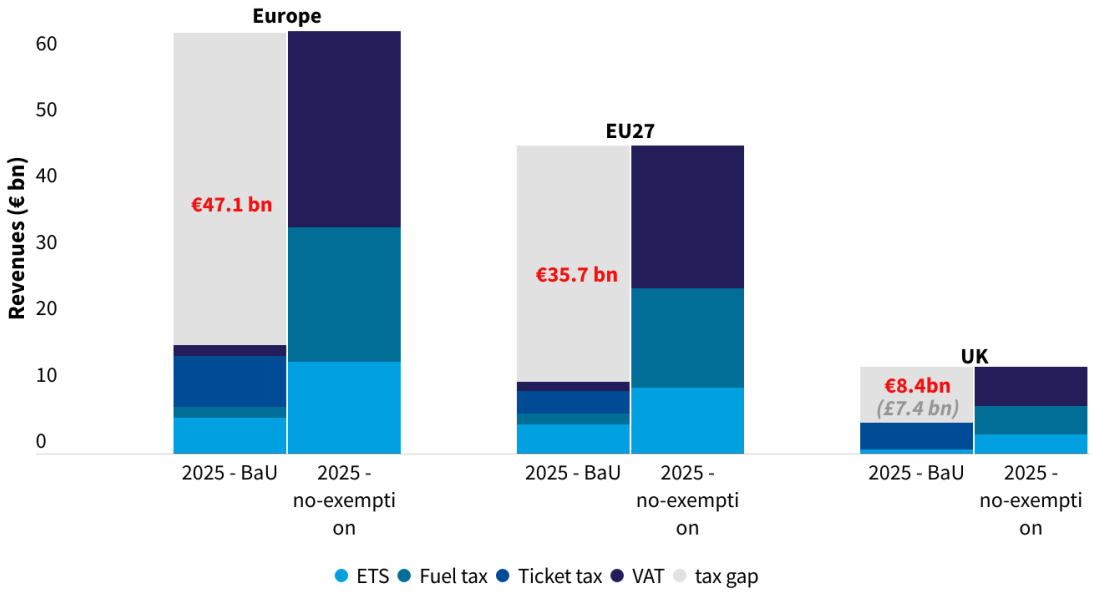

Figure 14: Future aviation tax gap in 2025 if no action is taken

For the UK, the tax gap could increase to £7.4 billion (€8.4 billion) in 2025 if no additional pricing policy measure is adopted (up from £4.7- €5.5 billion in 2022). Whilst APD would still address some of the shortfall (as it would generate £3.6 billion (€4.1 billion), the overall gap would remain and grow. This is mainly due to the lack of VAT (£5.2 - €5.9 billion) and fuel pricing (£3.8 - €4.3 billion).

Similarly, for the EU27, the total aviation tax gap would grow to €35.7 billion (up from €26.4 billion in 2022), which is mainly due to the limited application of VAT (€20.2 billion) and lack of fuel pricing (€13.3 billion). On average, if no additional policies are taken among EU27 countries, the regulatory framework would generate **barely 23% of the total effective revenues that could be generated by properly taxing the sector.**

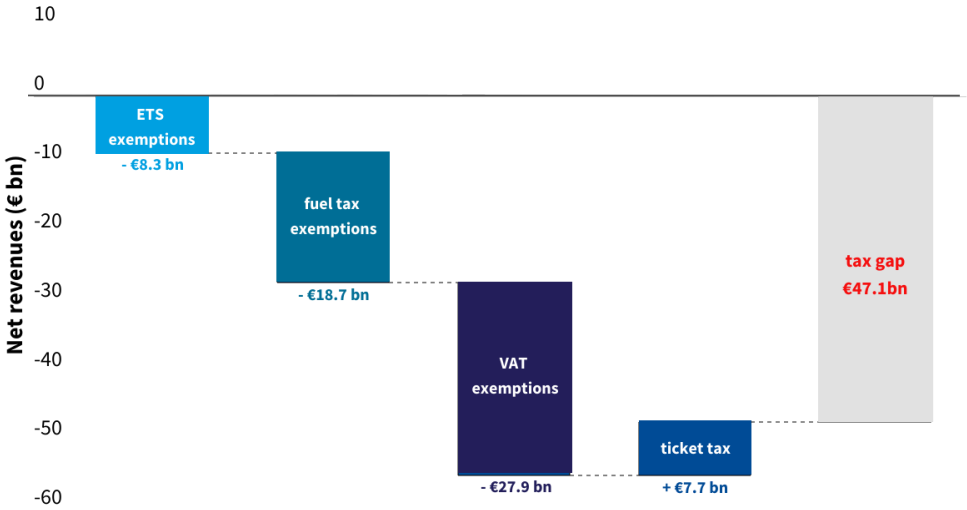

Figure 15: What will the European tax gap be made of in 2025?

In Europe, the amount of ticket tax revenues is expected to increase slightly compared to 2022 (rising from €5 billion to €7.7 billion). This increase can be attributed primarily to the growth in traffic resulting in a larger tax base, but also because of an increase in some countries' tax rates (Portugal, Norway, Germany and Netherlands). However, it is important to note that even with this increase, the revenue generated from ticket taxes will still not be enough to compensate for the lack of VAT taxing (€27.9 billion) and definitely not enough to close the gap left by under-taxing fuel (€18.7 billion) and under-pricing emissions (€8.3 billion) (Figure 15).

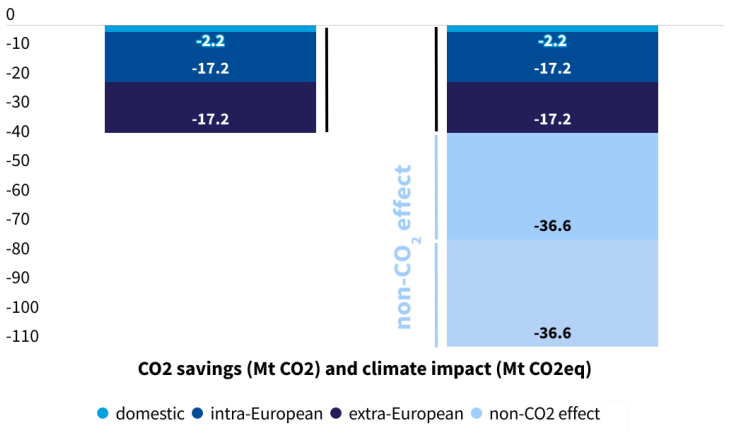

Figure 16: Potential cut in emissions with full pricing scenario in 2025
(including estimated non-CO_2 effects, see Infobox 2)

On top of potential lost revenues, not changing policies to effectively price aviation would also lead to **foregone emissions savings amounting to 36.6 Mt of CO_2 (Figure 16)**. For the UK specifically, the CO_2 savings represent 6.2 Mt of CO_2. For the EU27, the CO_2 savings represent 28.3 Mt of CO_2.

5.2 How to close the tax gap

In this section, we explore the potential solutions decision-makers could activate to close the tax gap and the tax exemption of the aviation sector. To do so, we have estimated the impact of improving the different pricing mechanisms or creating new pricing mechanisms, looking at extra revenues, CO_2 savings and impact on the market.

5.2.1 Current air pricing framework

In this section we analyse three scenarios with different sets of climate policies varying in ambition and see how they help Europe close the tax gap. For each of these scenarios we analyse the revenues generated, the extent to which the tax gap is bridged, the impact on travel demand and emissions savings. When making the calculations, we assumed that non-EU countries namely the UK, Switzerland, Iceland and Norway, apply similar climate measures to those in place in the EU. It should be noted that calculating the combined effect of these policy measures is not done by summing up the effect of each individual measure. The outcomes differ across various scenarios due to their varying influences on demand and prices.

Scenario 1: unchanged ETSs and implementation of fuel tax on intra-European flights

This scenario assumes that we stay ina business-as-usual scenario defined in Section 5.1 (with the current rates of VAT, ticket taxes and current scope of ETSs). But on top, we assume that a kerosene tax is applied on the fuel used on all intra-European flights, ie. a tax of €38 cents per litre on all flights within Europe, which is the rate proposed in the European Commission's proposal to revise the ETD which would apply in 2033. We assume it applies as of 2025. This rate is still lower than the average fuel taxes paid by road users (54 cents per litre). As a reminder, jet fuel is currently not taxed anywhere in Europe apart from Norway and Switzerland. This scenario is meant to show what the current pricing regulatory framework could achieve if the EU's ETD jet fuel tax rates were implemented as of 2025.

Figure 17 below illustrates the outcome of this scenario.

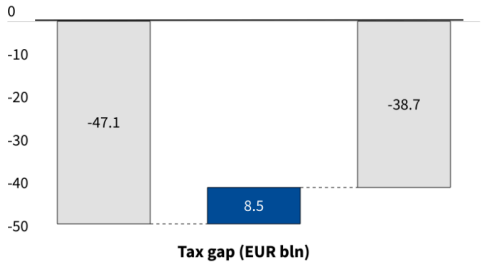

Figure 17: Share of scenario 1's contribution to the European tax gap in 2025

It shows that this scenario would close the tax gap by €8.5 billion in 2025. It is therefore still largely insufficient and has a limited revenue raising impact. It would still cut CO_2 emissions by 9.1Mt.

Scenario 2: ETSs with a departing scope and no free allowances.

Under this scenario, it is assumed that the ETSs have partially been fixed, with emissions of all flights departing from a European airport included in the scope of the carbon pricing instruments. In addition, there are no free allowances handed over to airlines. This scenario assumes no change in current VAT regimes and ticket taxes as defined in Section 5.1. It assumes a small fuel tax from the ETD is applied, which means that a mere 7 cts per litre fuel tax is applied on domestic and intra-European flights, as per business-as-usual scenario described in Section 5.1. This scenario is meant to show what a reform of carbon pricing mechanisms could bring.

Figure 18 below illustrates the outcome of this scenario.

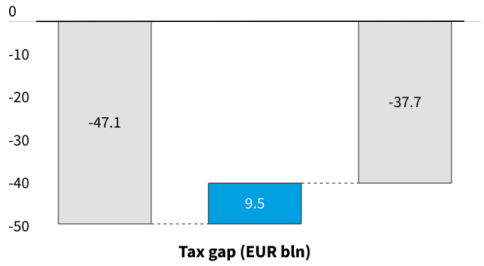

Figure 18: Share of scenario 2's contribution to the European tax gap in 2025

It shows that although a well-functioning carbon market would bridge some of the tax gap (€9.5 billion), it still also remains largely insufficient to cover the total. It would however save 6.3 Mt of CO_2 that year.

Scenario 3: ETSs with a departing scope and no free allowances, and fuel taxation on all departing flights.

This scenario takes scenario 2 and adds a kerosene tax at a rate of €38 cents per litre with a more ambitious scope, applying on all flights departing from a European airport. The ticket taxes and VAT assumptions are the same ones as defined in Section 5.1. This scenario is meant to show what could be effective pricing for aviation emissions and fuel use, taking into account that no country has yet proposed to tax fuel on all departing flights.

Figure 19 below illustrates the effect in terms of revenues, emissions cuts and impact on demand of these measures.

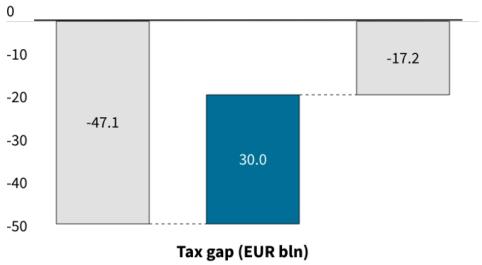

Figure 19: Share of scenario 3's contribution to the European tax gap in 2025

Despite being closer to filling in the tax gap with this scenario (€30.0 billion), there is still over 30% of the gap still to be filled. However, this scenario does mean that CO_2 emissions could be reduced by 21.1Mt. This is the most ambitious scenario out of the three analysed in this section, but also the most politically challenging: it implies that all European countries agree to apply a fuel tax within Europe, and also to renegotiate the few Air Service Agreements that prohibit fuel taxation on flights to some third countries.

5.2.2 Alternative measures at national level in case of failure to act

Given the difficulty in establishing jet fuel taxes at the European level as well as reforming the various carbon pricing systems in the EU, UK and Switzerland, this analysis also shows the possibility of adopting national taxation rates that would cover the remaining tax gap. T&E has calculated the ticket tax rates each European country should put in place to bridge the entirety of its tax gap, including VAT, fuel tax and ETS. This means that we took the pricing policies that are currently foreseen for 2025 and modelled the amount of ticket tax needed to cover the remaining gap. The tax is divided into three distance bands categories (approximated by domestic, intra-Europe, and extra-Europe). All rates by country can be found in Table 7.

On average in Europe, in order to effectively cover for the current lack of effective pricing, passengers should be subject to a tax of:

- **€23** for a domestic journey
- **€51** for an intra-European journey
- **€259** for an extra-European journey

For each country, the rates differ slightly, based on national taxation policies that already exist (VAT, ETSs, fuel tax) as well as the share of each country's aviation emissions and air traffic. The ticket tax rates are always higher for extra-European journeys because this segment causes the most emissions (the longer you fly, the more emissions you create) but also because these are largely ignored in current taxation policies.

Implementing a ticket tax has several advantages. First, differentiating the tax by distance flown for short, medium or long-haul routes allows states to adapt the tax based on the assumed environmental impact of the flight. Second, the scope of a ticket tax can more easily be applied to extra-European flights than a fuel tax, as it does not require renegotiating some ASAs.

The more countries apply these taxes at their national level, the more effective aviation pricing would be at European level. These policies are also fair, as they would apply to all carriers operating from European countries. As we saw in Section 4.3, third country carriers are also responsible for some big aviation countries' tax gaps, such as in Germany (United Airlines) and the UK (Emirates), which is why applying pricing policies to all carriers irrespective of their nationality is essential.

Table 7: Ticket tax required to reach the no-exemption level of taxation, depending on the passenger's destination[22]

For countries with few domestic passengers (<10,000 per year), OAG flight data make it impossible to calculate a precise ticket tax. The revenues of these domestic taxes would be negligible in any case.

Country	Domestic[23] journeys		Intra-European journeys	Extra-European journeys
	Domestic ticket tax	Domestic VAT (assumed to be applied on top of a potential domestic ticket tax)		
Austria	22	13%	53	228
Belgium	-	6%	46	215
Bulgaria	10	20%	52	133
Croatia	7	25%	54	239
Cyprus	-	0%	72	78
Czechia	-	15%	46	223
Denmark	23	0%	49	263
Estonia	-	20%	61	204
Finland	32	10%	71	279
France	26	10%	44	247
Germany	11	19%	48	230
Greece	6	24%	64	197
Hungary	-	27%	38	188
Iceland	26	11%	72	238
Ireland	20	0%	42	308
Italy	20	10%	46	254
Latvia	16	12%	52	135
Lithuania	-	9%	46	126
Luxembourg	-	3%	50	265
Malta	-	0%	48	202
Netherlands	-	21%	49	307
Norway	26	10%	54	289
Poland	17	8%	40	186
Portugal	20	6%	48	281
Romania	10	19%	48	157
Slovakia	-	20%	38	94
Slovenia	-	10%	60	132
Spain	19	10%	49	275
Sweden	29	6%	51	247
Switzerland	31	8%	50	289
United Kingdom	£33 (€38)	0%	£46 (€52)	£298 (€338)
EU27 (average)	21		50	239
Europe (average)	23		51	259

[22] The ticket tax modelled is based on a list of countries and not distance bands. It assumes no country has a ticket tax and these rates would cover the tax gap left by exemptions. This doesn't distinguish passenger classes.

[23]To better reflect the flights' length, journeys from France to its outermost regions are considered as extra-European. Journeys from Spain or Portugal to their outermost regions are considered intra-European.

6. Conclusions and policy recommendations

This report aims at improving understanding of how poorly taxation regimes address aviation's climate impact and activity. This report did not attempt to measure the total tax gap that would consider all environmental and social externalities of aviation but rather quantify the tax gap that is generated from specific tax exemptions granted to the sector. Several key takeaways can be drawn from our study:

- **In all of Europe, the tax gap represents a huge shortfall of public revenues.** We calculated that in 2022, European governments lost out on €34.2 billion, equivalent to building a high-speed rail (HSR) track from Hamburg to Rome every year[24].
- **If policy makers do not improve air travel pricing in a more environmentally and socially equitable way the tax gap is set to increase to €47.1 billion in 2025.** For the UK, the tax gap increases by 51%, to reach €8.4 billion (£7.4 billion) in 2025. For the EU27, this represents an increase of 35%, reaching €35.7 billion in 2025.
- **The analysis of current taxation shows the polluter pays principle is poorly implemented in the aviation sector.** In 2022 in Europe, fuel and emission pricing exemptions resulted in the loss of €20.5 billion in revenues (€14.7 billion for EU27 and £3.9 (€4.6) billion for the UK).
- **The lack of VAT is also an important source of foregone revenues.** Applying VAT only on certain domestic flights and at a reduced rate resulted in a loss of €18.8 billion in Europe in 2022, only slightly compensated for by a few ticket taxes that raised €5.0 billion in 2022.
- **The top 15 European polluting airlines benefitted from €11.8 billion in fuel and emission pricing exemptions in 2022**. From this, Air France's share represented €1.4 billion, Lufthansa €1.3 billion, Ryanair €1.3 billion, KLM €0.9 billion, easyJet €0.9 billion and Iberia €0.6 billion. Because the top 15 emitting airlines' emissions and fuel were not properly taxed, and passengers not paying effective VAT, the activity of these top 15 airlines caused more than half (56%) of the total European tax gap in 2022.
- **We find that ending tax exemptions in 2022 would have saved 34.8 Mt of CO_2** - equivalent to the combined emissions of the three dirtiest airlines in Europe (Ryanair, Air France and Lufthansa).

The overall shortfall of revenues represents a very significant amount that EU countries, Iceland, Norway, Switzerland and the UK should tap into, to partially re-invest these in the green transition and for the benefit of society at large. There are a number of policy levers that T&E recommends EU, the UK and wider European countries to adopt in order to maximise the benefits of ending aviation's taxation exemptions.

T&E believes that the following policy measures combined are best fit to address these tax gaps.

- **All countries with ETSs should extend the scope to all departing flights** and get rid of free allowances as soon as possible. The EU should follow through on the programmed extension of the scope enshrined in the revised ETS Directive which should take place as of 2027. The UK should follow suit and extend the scope of its ETS to cover all departing flights, as soon as

[24] According to the European Court of Auditors 2018 report [73], building a HSR line in the EU cost on average 25 million per km. Based on this assumption, we calculated that 1368 km of tracks could be built with a total amount of €34.2 billion. It would cover the distance between Hamburg - Rome (1309 km).

practicable possible. Realistically, these changes will have to be consulted on during the next Parliament, to start towards the end of the decade.

- **Taxation on kerosene** should be applied on all flights departing from an airport in Europe. After undertaking a legal analysis of the individual air service agreements in place, governments should apply the tax where they are legally allowed to do so and renegotiate those ASAs that prohibit taxation. The European Commission should be given the mandate to renegotiate the horizontal agreements which do not allow fuel taxation. Similarly, in the UK the Department for Transport should be tasked with renegotiating those Air Service Agreements that do not allow taxation.
    - For the EU, starting at a full rate of 38 cents per litre, which was the rate proposed by the European Commission's initial draft revision of the ETD.
    - For the UK, the next budget should include a kerosene tax on all fuel uplifted to planes flying domestic and EEA routes, at the same rate as avgas (the fuel used primarily for small pleasure flying) is currently charged: 38.2 pence per litre. However, it is important to recognise that this measure would only be a starting point with the ultimate goal of expanding its application to cover all departing flights.
- **The zero-rated VAT should come to an end** and VAT should be applied on all flights departing from a European airport at a full rate of 20%, the EU average. No ticket taxes would be required if the three measures were applied.

The policies mentioned above are ambitious but necessary to close the tax gap, they portray what governments should aspire to when defining policies to address aviation's unfair tax treatment. T&E understands the political complexities of adopting some of these measures, for example at the EU level, taxation matters require unanimity which often hinders any political and legislative progress. This is why countries play an essential role in the meantime and can implement changes to rapidly address these exemptions.

T&E recommends implementing or increasing ticket taxes that mirror the effect of adopting these measures. If all countries included in this analysis would apply a ticket tax to the levels shown in the table in Section 5.2.2, we would finally be closer to putting an effective price on aviation.

- **Ticket taxes should be implemented at national level to compensate for aviation's taxation exemptions**. This study provides governments with the rates member states should implement to put an end to the tax gap.
- On average across Europe, this translates into a ticket tax of:
    - **€23** for a domestic journey
    - **€51** for an intra-European journey
    - **€259** for an extra-European journey
- For the UK, T&E believes that Air Passenger Duty rates should be raised to bring in broadly the equivalent amount as VAT would have done. The recently introduced cut to domestic APD rates should be reversed.

In a time of climate urgency coupled with an energy and cost of living crisis, it is socially and environmentally unsustainable for a polluting sector to continue benefiting from what are essentially fossil fuel subsidies. Given the growing need for governments to fund the industrial & social transition as well as the cost of climate change's impact on vulnerable communities, it is time to put an end to aviation's taxation privileges.

Annex I: Detailed methodology

1. CO_2 emissions and passenger volumes

Aircraft movements are compiled from the OAG schedules analyser (2019 and 2022) [74]. Emissions are calculated by applying the kerosene CO_2 emission factor to the fuel burn, computed for each aircraft's type and journey length using the Eurocontrol methodology [75]. Passenger volumes per journey are extracted from the OAG traffic analyser (2019 and 2022). It includes information on the airport of origin, the airport of destination, as well as possible stopover airports for non-direct journeys, and the operating airline for each of the journey legs. Travelling class and corresponding base fares are also provided.

Whereas CO_2 emissions between airports are calculated on a segment basis, i.e on a basis of a flight departing from airport A and landing in airport B, passenger movements are given on a journey basis, i.e with an airport of origin, an airport of destination, and possibly stopovers in between. In order to estimate the impact of carbon pricing (applied at segment level) on ticket fares (given on a journey basis) and the impact of any change in ticket fares (at journey level) on the reduction of CO_2 emissions (at segment level), CO_2 emission from segments is mapped to passenger journeys, proportionally to passengers volumes. For example: on a segment from A to B, we calculate that flights emitted 1 Mt of CO_2, and that 1 million passengers flew from A to B. Thanks to the journey passenger data, we know that among all passengers flying on the segment from airport A to airport B, 30% are originating from airport A, with airport B as final destination, and another 70% of passengers originate from airport A, stopover in airport B, to eventually reach airport C as final destination. 300 thousand tonnes of CO_2 is allocated to passengers flying directly from airport A to airport B, and 700 thousand tonnes are allocated to passengers flying from airport A, stopping in airport B, with airport C as final destination. The same reasoning is applied on segment B to C to allocate the CO_2 inherent to the second leg of passengers flying from A to C via B. This mapping disregards any difference in aircraft and load factors of different airlines flying on the same route.
For modelling performance purposes, emissions as well as passenger movement were then aggregated at country levels.

2. Airfares to ticket prices

Consumer ticket prices are an important component of the analysis for two reasons. First, it has a major influence on the calculation of VAT revenues as they are calculated as a percentage of the consumer ticket price. Secondly, the impact of taxes on demand is calculated from the relative change in ticket prices, compared to a reference scenario (2022 tax regime or 2025 business-as-usual scenario in the case of this report). The higher the ticket price, the lower the relative increase incurred by a certain tax rate. Ticket prices are both very volatile and complex data to collect. In order to reflect a picture close to reality, while keeping a rather simple approach, we followed the following steps, similar to the ones undertaken by CE DELFT [25].

2.1 Airfares

OAG provides airfares for each journey. Airfares do not include aviation taxes levied in the MS of departure, VAT, airport charges levied by the airport of departure, EU ETS cost, nor extras (seat selection, extra luggage etc.). OAG air fares data are collected through two channels.

- Information about tickets booked via holiday agencies are centralised in Global Distribution Systems (OAG airfares are sourced from TravelPort). Airfares collected through this channel have a detailed breakdown by travelling class (first, business, premium economy, discount economy). Because taxes mainly distinguish between two travelling classes only, first and business air fares were averaged in one category, called "business" in this report, whereas premium economy, full and discount economy are aggregated in one "economy" class.
- Fares from online booking are sourced from RDC [76]. Contrary to fares collected via Travel Port, they are not broken down in travel classes.

As most of online bookings are economy class, we considered that business class airfares from GDS were representative for business class airfares, whereas the simple average between economy class airfares from GDS and online fares were representative of economy class airfares. In the OAG database, the airfares are provided with the highest journey granularity possible (e.g. Airports of origin, destination, stopover airports, and airlines name operating on each segment). This granularity level leads to a very big amount of data. In order to allow transparency, airfares per travelling class were averaged (weighted by passenger numbers) based on country of origin, country of destination for Europe and region of destination for other destinations (Table 8), as well as airlines (selection of 25 airlines, the rest is aggregated as other airlines).

Table 8: airfares destination country grouping

AT	HR	SE	Asia : South East Asia
BE	HU	SI	Asia : North East Asia
BG	IE	SK	Europe : Western Europe
CY	IT	CH	Europe : Eastern/Central Europe
CZ	LT	IS	Middle East
DE	LU	UK	Latin America : Caribbean
DK	LV	NO	Latin America : Central America
EE	MT	Africa : North Africa	Latin America : Upper South America
ES	NL	Africa : Southern Africa	Latin America : Lower South America
FI	PL	Antarctica	North America
FR	PT	Asia : South Asia	Southwest Pacific
GR	RO	Asia : Central Asia	

2.2 Airport charges

In order to estimate the consumer price, airport charges were added to base airfares. Airport charges are the fees paid by an airline in exchange for the use of the airport infrastructure. The value of the fee levied

is dependent on the airport and the exact fee calculation is generally based either on the weight and the aircraft type or on the number of passengers carried. Given the complexity of the calculations, we chose a simplistic approach. Aviation Economics carried out a study for Airlines for Europe in 2016, analysing the 21 biggest European airports, in 13 countries [77]. Based on this sample of airports, the average airport charges per passenger for those 13 countries were calculated. The charges are calculated for three different aircraft types, meant to be representative of three different scopes:

- Dash 8 Q400 for regional and domestic operations (associated to domestic operations in this analysis
- Airbus A320 for short-haul operations (associated to intra-EU 31 operations in this analysis)
- Boeing 777 for long-haul operations (associated with extra-European in the analysis).

For these 13 represented countries, the average airport charges calculated with this airport sample was applied to all other airports of this country. This approximation is deemed reasonable as the biggest airport in a country usually makes up for most traffic (For example French airports). The results show that the bottom ten airports of the sample have smaller airport charges than the top ten. Therefore, for the countries which don't have any airport making it to the top 21, and that are therefore unrepresented by this study, we considered that the average airport charges of the bottom ten would apply to them. For non-European airports, the simple average airport charges, regardless of the aircraft type was applied.

The study has been conducted in 2016 and use 2015[25] fees. The Airports Council International (ACI) reported a decrease in charges on a per-passenger basis of 4.3% per annum, over the five-year period between 2014 and 2019, after accounting for inflation. To reflect the change that occurred between the time when the study was conducted and 2019, this global decrease on a per annum was applied to the 2015 fees. For low cost airlines, we assume lower airport charges, at €10 per passenger, in line with Ryanair's annual report (p.112) [78]. Table 9 summarises the airport's charges assumption, depending on the country where the airport is located, and the scope of the flight.

Table 9: Airport charges assumptions

Country	Airport charges per departing passenger, in € (domestic)	Airport charges per departing passenger, in € (intra-European)	Airport charges per departing passenger, in € (extra-European)
UK	38.7	34.2	36.2
FR	14.4	13.6	32.3
IT	23.7	23.3	31.4
ES	23.2	21.7	28.0
IE	18.8	19.3	26.9
DE	22.8	19.6	23.6
BE	25.6	25.9	26.3

[25] Or 2014 values if 2015 data were not available.

SE	7.6	11.8	14.5
NO	13.0	13.2	13.1
NL	25.3	25.7	30.2
AT	27.3	25.2	28.2
DK	4.6	21.8	24.5
CH	29.8	32.0	36.0
Other European airport (average of bottom ten)	19.95	20.42	23.22
Airports outside of Europe (simple average of the 13 countries' airport charges)	24.6		
Low cost airlines	10		

According to Aviation Economics, the top 21 airports made up for 50% of passenger traffic in 2015. Given the lack of aggregated database on airport charges, we deem this proxy based on the top 21 airports to be close to reality while keeping a simple and transparent approach. For a journey involving one or several stopovers, airport charges are applied as many times as the passenger is taking off from an airport.

2.3 Ticket prices

OAG provides fares per booking class, that are collected through a Global Distribution System, or through another provider that gathers online fares. Fares are basic fares, i.e. exclusive of any charges and tax (e.g. Air passenger Duty), or extra (e.g. seat selection, luggage allowances). Given the lack of data concerning the average amount of extras or charges per passenger, only the taxes listed in Annex II are added to the basic fares. Given the difficulties of projecting ticket prices, we use the same airfares and airport charges for both 2022 and 2025.

3. Elasticities and demand reduction

The price elasticity reflects the impact of the cost of flying in demand. In general terms, an increase in ticket price as the one analysed in this study would result in a lowered demand for air travel. However, the reduction is not universal across the market, as it depends on factors such as the choice and utility of other modes of transport to undertake the journey (such as train, bus, or car), and how wealthy the passenger is.

In this report, we use the same methodology as in our roadmaps, which can be found in Appendix B [18]. This results in the following elasticity coefficients, broken down into three journey scopes (Table 10).

Table 10: elasticities used in this analysis, per journey scope

Journey scope	domestic	intra-European	extra-European
Ticket price elasticity	-0.92	-0.84	-0.63

On top of a reduction in demand, higher fuel costs may also result in an increase in energy efficiency, as airlines would seek more ambitious solutions to reduce fuel consumption and emissions. Nonetheless, the long lead times of aircraft development, fleet renewal and operational improvements mean that this effect would only be felt in long timeframes.

Due to the temporal scope of this report, and the relatively lower value for energy efficiency elasticity coefficient (~ -0.1 as per some sources), we consider that the impact on energy efficiency of an increase in fuel prices by 2025 would be minimal. As a consequence, we have decided not to include this energy efficiency elasticity correction, focusing instead on the dominant factor of demand reduction.

Annex II: Overview of taxes

1. Ticket taxes

Table 11 is an overview of the ticket taxes that are taken into account in the calculation of the ticket tax revenues in 2022, and in 2025 in the business-as-usual scenario. When they are not taken into account, it is explicitly mentioned. 2019 rates are given for information.

Taxes are levied by the country of departure and the rate depends on the country of the final destination. Transfer passengers are exempted from ticket taxes, provided that the stopover is less than a certain duration, 24 hours in most cases. For example, a passenger that starts their journey in Charles de Gaulle airport, stopover at Schiphol airport to eventually fly to an airport in John F. Kennedy airport will pay the French solidarity tax, at the rate of €7.51, but not the Dutch tax. The airline operating the first leg of the journey is liable for collecting the tax[26].

Table 11: Overview of the ticket taxes analysed as of July 2023

Country	Name of the tax	Tax rate in April 2019 (per passenger, except VAT, unless specified)	Tax rate in April 2022 (per passenger, except VAT, unless specified)	Tax rate considered for 2025 (or latest rate available)	Sources	Notes
AT	Flugabgabe / Austria Air passenger levy	Short-haul: €7 (In the case of domestic flights subject to VAT, the VAT applies to the price of the ticket without the ticket tax of €7) Medium-haul: €15 Long-haul: €35€	<350 km (GCD[27]): €30 ≥ 350 km (GCD): 12€ (In the case of domestic flights, the ticket taxes are inclusive of VAT, or €26.55, and €10.62, excluding VAT)	2023 rates: <350 km (GCD): €30 ≥ 350 km (GCD): 12€ (In the case of domestic flights, the ticket taxes are inclusive of VAT, or €26.55 and €10.62, excluding VAT)	Tax rates: [80][81] [82]	In the case of domestic flights, the ticket taxes are inclusive of VAT. This is ignored in this model, where we consider that the VAT is applied on top of the ticket tax rate. Austrian domestic passengers are less than 1% of passengers departing from Austria, which is not significant and in any case presents results that are more conservative (i.e. we estimate more revenues from current taxation schemes).
BE	Belgium plane tax	-	<500 km (from Brussels airport):	<500 km (from Brussels airport):	[83][54]	Belgium introduced a tax as of 1 April 2022. Since

[26] German law text gives an example with two airlines [79].
[27] GCD: Great Circle Distance is a typical measurement to calculate distances between two points along the surface of the sphere.

			€10 ≥ 500km ((from Brussels airport), to EEA, UK, CH: €2 Outside EEA, UK or CH: €4	€10 ≥ 500km ((from Brussels airport), to EEA, UK, CH: €2 Outside EEA, UK or CH: €4	[84]	passenger data are on a yearly basis, we consider that each passenger subject to the tax paid 75% of the rate on average for 2022.
DE	German aviation tax (Luftverkehrsteuergesetz)	Short-haul: €7.38 Medium-haul: €23.05 Long-haul: €41.49	Short-haul: €12.77 Medium-haul:€ 32.35 Long-haul: €58.23	Short-haul: €13.03 Medium-haul: €33.01 Long-haul: €59.43	[85][86]	Short-haul are countries in Annex 1 to the LuftVG [87]. Medium-haul are countries in Annex 2, and long-haul are the rest of countries. No mention of any VAT reduction. The ticket tax can be reduced by a certain % depending on the revenues generated by German EUAAS under the EU ETS. We decided not to include this specifically in the analysis and apply the full rates to have a conservative assessment.
ES	-	-	-	-		Discussion about introducing a ticket tax is ongoing, but not in force yet. So it is not part of the analysis. [88]
FR[28]	French Civil Aviation Tax - Taxe de l'aviation civile	Domestic[29], EEA, CH, countries situated less than 1000 km from France[30]: €4.58 Others: €8.14	Domestic, EEA, CH, countries situated less than 1000 km from France: 4.73€/pax [31] Others: 8.50€/pax	Domestic, EEA, CH, countries situated less than 1000 km from France: 4.73€/pax[32] Others: 8.50€/pax	[89][90] [91]	Included in the price of a ticket price but not considered as a tax or as raising revenues. See info box 1.

[28] Includes metropolitan territories as well as 'départements d'outre mer' (Guadeloupe, Guyane, Martinique, Mayotte, La Réunion) and 'collectivités d'outremer (Saint-Barthélemy, Saint Martin)
[29] Includes metropolitan territories as well as 'départements d'outremer' (Guadeloupe, Guyane, Martinique, Mayotte, La Réunion).
[30] Includes the UK, Andorra, Monaco and Saint-Marin.
[31] Tariffs in 2021 (April 2021 - 31 mars 2022)
[32] Tariffs in 2021 (April 2021 - 31 mars 2022)

FR[33]	Solidarity tax	Domestic[34], EEA, CH, countries situated less than 1000 km from France[35]: €1.13 eco - €11.27 business Others: €4.51€ eco - €45.07 business	Domestic[36], EEA, CH, countries situated less than 1000 km from France[37]: 1.13€/eco - 11.27€/business Others: 4.51€/eco - 45.07€/business	Domestic[38], EEA, CH, countries situated less than 1000 km from France[39]: 1.13€/eco - 11.27€/business Others: 4.51€/eco - 45.07€/business	[89] [90]	
FR	Eco taxe	-	Domestic[40], EEA, CH, countries situated less than 1000 km from France[41]: 1.5€/eco - 9€/business Others: 3€/eco - 18€/business	Domestic[42], EEA, CH, countries situated less than 1000 km from France[43]: 1.5€/eco - 9€/business Others: 3€/eco - 18€/business	[92]	The eco tax came into effect on 1 January 2020
FR	Fiscal tax (Corsica)	4.57 /pax disembarking in Corsica	4.57 /pax disembarking in Corsica	4.57 /pax disembarking in Corsica	[93][94] [25]	Based on OAG passenger data, this tax generated €20 mln in 2022 and will generate €16 mln in 2025 (2019 traffic). We include these figures ad-hoc in the French revenues in 2022 and 2025, but those taxes were not modelled on an airline basis so not included in the airline

[33] Only passengers departing from 'départements d'outremer' (DOM) are subject to the solidarity tax. Passengers departing from 'collectivités d'outremer' (Saint-Barthélemy, Saint Martin) are not subject to solidarity tax.
[34] Includes metropolitan territories as well as 'départements d'outremer' and 'collectivités d'outremer (Saint-Barthélemy, Saint Martin)
[35] Includes the UK, Andorra, Monaco and Saint-Marin
[36] Includes metropolitan territories as well as 'départements d'outremer' and 'collectivités d'outremer (Saint-Barthélemy, Saint Martin)
[37] Includes the UK, Andorra, Monaco and Saint-Marin
[38] Includes metropolitan territories as well as 'départements d'outremer' and 'collectivités d'outremer (Saint-Barthélemy, Saint Martin)
[39] Includes the UK, Andorra, Monaco and Saint-Marin
[40] Includes metropolitan territories as well as 'départements d'outremer' and 'collectivités d'outremer (Saint-Barthélemy, Saint Martin)
[41] Includes the UK, Andorra, Monaco and Saint-Marin
[42] Includes metropolitan territories as well as 'départements d'outremer' and 'collectivités d'outremer (Saint-Barthélemy, Saint Martin)
[43] Includes the UK, Andorra, Monaco and Saint-Marin

						induced tax gap. This is deemed negligible as revenues represent less than 5% of the total amount of the revenues from all other French ticket taxes.
IT	Embarkation tax	Domestic: €6.57 (weighted average) EEA + UK: €12.69 (weighted average) Other destinations: €18.14 (weighted average)	Domestic: €6.57 (weighted average) EEA + UK: €12.69 (weighted average) Other destinations: €18.14 (weighted average)	Domestic: €6.57 (weighted average) EEA + UK: €12.69 (weighted average) Other destinations: €18.14 (weighted average)	[25], weighted average rate for 2018, as we could not find the information.	Considered as a charge, included in the price of a ticket price but not considered as a tax or as raising revenues. See info box 1. The Italy Embarkation tax depends on the departing airport, and distinguishes between three destination bands. We use a weighted average for the analysis
IT	City Council Tax	€7.07 (weighted average)	€7.07 (weighted average)	€7.07 (weighted average)	[25], rates from 2018.	Tax rates calculated as a weighted average between Rome airports and the others [25]. Only €30 million are considered to be revenues from a tax, as the rest is reinjected in the aviation sector. See Info box 1. €30 mln of revenues corresponds to a tax of around €0.40 per passenger.
NL	Vliegbelasting Dutch tax	-	€7.947	€ 26.43	[95][96]	
PT	Portuguese Carbon Tax	-	€2 (Flights between mainland and Azores/Madeira are exempted)	€2 (Flights between mainland and Azores/Madeira are exempted)	[97]	Introduced on the 1st of July 2021. Non Commercial flights were exempted. From 1st July 2023 Non commercial jets with a capacity of up to 19 passengers will be included but this is not part of our analysis, as no data available on non-commercial flights.

SE	Swedish aviation tax	Short-haul: SEK61,€5.76 Medium-haul: SEK255, €24.09 Long-haul: SEK408, €38.54	Short-haul: SEK64, €6.02 Medium-haul: SEK265, €24.92 Long-haul: SEK424, €39.87	2023: Short-haul: SEK69 Medium-haul: SEK288 Long-haul: SEK461	[98]	Avg. exchange rate 2019 [99] Avg. exchange rate 2022 [100] Avg. exchange rate 2023 [101]
UK	Air passenger duty	Band A: £13 eco, £26 business (€14.83 eco, €29.65 business) Band B: £78 eco, £172 business (€88.96 eco, €196.17)	Band A: £13 eco, £26 business (€15.25 eco, €30.50 business) Band B:£84 eco, £185 business (€98.53 eco, €217.01 business)	Domestic: £7 eco, £14 business (€7.93, €15.85) Band A: £13 eco, £26 business (€14.72, €29.44) Band B: £87 eco, £191 (€98.52 eco, €216.29 business) Band C: £91 eco, £200 business (€103.05 eco, €226.48 business)	[102]	Children under 16 yo, travelling in the lowest class of travel are exempted. Because of the lack of information, this is not taken into account in the model. No APD is paid for direct long-haul flights (other than to the UK and band A) from airports in Northern Ireland. We disregard this exemption in our model. Avg. exchange rate 2019 [103] Avg. exchange rate 2022 [104] Avg. exchange rate 2023 [105] For 2025, we used the latest rate available which goes until April 2024.
NO	Norway Passenger fees	To EEA: NOK75, €7.6 Others: NOK200, €20.3	As of July 2022 To EEA: NOK80, €7.4 Others: NOK214, €19.8	2023 To EEA: NOK82, €7.5 Others: NOK320, €29.2	[106]	The tax was temporarily abolished until 1 July 2022 [106]. Avg. exchange rate 2019, [107]. avg. exchange rate 2022, [108]. avg. exchange rate 2023, [109].
CH	Swiss ticket tax	-	-	-		A flight ticket tax part of the CO_2 law was rejected by voters in June 2021. Almost three-quarters

						(72%) of respondents to a Swiss survey are in favour of increasing the price of airline tickets for climate reasons [110]. But this was not included in our analysis.

2. VAT

In both 2020 and in the business-as-usual scenario, VAT is only levied on domestic journeys i.e. the airport of departure and the final destination are situated in the given country. Journeys between metropolitan France and the French outermost regions are exempted from VAT [111]. Similarly for flights between Spain and the Canary Islands, Ceuta and Melilla [25], and Portugal, Azores and Madeira or between the islands [25]. VAT is not raised on a domestic flight if it is part of an indirect journey that is not domestic.

Table 12: Overview of VAT rates as of July 2023

Country	VAT rates for domestic journey
AT	13%
BE	6%
BG	20%
HR	25%
CY	0%
CZ	15%
DK	0%
EE	20%
FI	10%
FR	10%
DE	19%
GR	24%
HU	27%
IE	0%
IT	10%
LV	12%
LT	9%
LU	3%
MT	0%
NL	21%
PL	8%
PT	6%
RO	19%
SK	20%
SI	10%

ES	10%
SE	6%
NO	10%
IS	11%
CH	8%
UK	0%

3. Fuel tax

Table 13: Overview of aviation fuel tax analysed as of July 2023

Country	Name of the tax	Rate in April 2019	Rate in April 2022	Rate in April 2025	Sources	Notes
CH	Tax on fuel	-	-	-		Fuel tax is applied but the bulk of fuel is exempt: international flights are exempted from any fuel tax. Feeder flights are exempted from fuel tax, if they are followed by an international flight [112][113]. As most flights are exempted, we do not include this tax in our analysis. According to the OECD, fuels used in off-road transport are taxed under the mineral oil tax and the surtax, but domestic aviation fuels are exempt [114]. Another reason why we did not include this for our analysis.
NO	CO_2 Tax on Mineral Products	Domestic (per tonne of CO_2) NOK500, €50	Domestic (per tonne of CO_2) NOK500, €50	Domestic (per tonne of CO_2) NOK500, €50	[115]	avg. 2019, [116]. avg. 2022, [117].

4. Emissions trading systems

4.1. General ETSs' assumptions, 2022

Table 14 - Assumptions on ETS allowances and allowance prices in 2022

ETS	Number of free allowances	Number of EUAAs (for EU ETS)	Average allowance price (€ or £/tCO_2)
EU ETS	23.6mln [118]	27.8 mln[44] (assuming that free allowances are 85% of the EUAA cap [119])	€85.45 [120]

[44] This is not used in the current calculations because ETS revenues are allocated according to emissions. See Annex II, 4.4 for more details.

CH ETS	0.9mln [121]	N/A	€85.45 [120]
UK ETS	4.3mln **(1)**	N/A	£79.22[45] (€92.89) [122]

(1) Note on the UK ETS 2022

Emissions covered by the UK ETS from OAG data (8.3Mt) were found to be slightly higher than the total emissions covered by the UK ETS official data (7.8Mt). According to official data, the share of free allowances among emissions covered by the UK ETS was 55%, resulting in an effective carbon price of 36£ per tonne of CO_2. In order to match this effective carbon price, we modelled a slightly higher number of free allowances (4.5 million).

Table 15 - Assumptions on ETS allowances and allowance prices in a no-exemption scenario in 2022

ETS	Number of free allowances	Number of EUAAs (for EU ETS)	Average allowance price (€ or £/tCO_2)
EU ETS	0	27.8mln[46]	€100
CH ETS	0	N/A	€100
UK ETS	0	N/A	£85.3[47] (€100)

4.2. General ETSs' assumptions, 2025

Table 16: Assumptions on ETS allowances and allowance prices for BaU in 2025

ETS	Number of free allowances	Number of EUAAs (for EU ETS)	Average allowance price (€/tCO_2)
EU ETS	11.0mln [118]	24.8mln[48]	100
CH ETS	0.4mln	N/A	100
UK ETS	3.0mln	N/A	£88.3[49] (€100)

In 2025, the business-as-usual scenario assumes 24.8 million EUAAs for the EU ETS, based on a linear reduction factor of 2.2% per year starting in 2021, and 4.3% starting 2024. In 2025, the number of free allowances is 50 % of the quantity of allowances in respect of which free allocation would have taken place in that year, or 44% [123]. For the Swiss ETS, we apply the same linear reduction factor of 2.2%

[45] For 2022 results, we use a conversion rate of 1€ = £0.853, average of 2022.
[46] This is not used in the current calculations because ETS revenues are allocated according to emissions. See Annex II, section 4.4 for more details.
[47] For 2022 results, we use a conversion rate of 1€ = £0.853, average of 2022.
[48] This is not used in the current calculations because ETS revenues are allocated according to emissions. See Annex II, section 4.4 for more details.
[49] For 2025 results, we use a conversion rate of 1€ = £0.883, as retrieved in May 2023.

to the number of aviation allowances. Given the lack of information about a potential change in the number of free allowances, we assume the same share as 2021, 2022 and 2023, or 85% of free allowances among the aviation allowances. For the UK, the number of free allowances is 3.0 million in 2025 [12].

Table 17 - Assumptions on ETS allowances and allowance prices for no-exemption scenario in 2025

ETS	Number of free allowances	Number of EUAAs (for EU ETS)	Average allowance price (€/tCO$_2$)
EU ETS	0	24.8mln[50]	100
CH ETS	0	N/A	100
UK ETS	0	N/A	£88.3[51] (€100)

4.3. Allocation of ETS aviation revenues to countries

In the EU ETS, the amount of European Union aviation allowances issued by participating states (EUAAs) is not sufficient to cover the EU ETS aviation emissions. In 2022, we estimate that the EUAAs cap covered 56% of EU ETS aviation emissions. Therefore, airlines have to purchase general EU allowances (EUAs) on top of EUAAs to be able to comply with the ETS. The number of EUAAs issued by each participating country is defined in a Commission decision [124]. However, we cannot know with certainty which country issued the EUAs purchased by airlines - and therefore know with certainty which country is getting revenues from them. In the absence of detailed auctioning information, two methodologies have been considered to allocate EU ETS revenues to participating countries.

1. **Revenues from EUAs purchased by airlines are distributed proportionally to the number of EUAs issued by participating countries**, as defined in the same Commission decision [124]. Because the distribution of EUAs is based on historical stationary emissions[52], countries with polluting coal plants, like Poland and Czechia for example, get relatively high revenues compared to their aviation activity, because they issue more EUAs proportionally than other countries.
2. **Revenues are distributed proportionally to their emissions covered by the EU ETS**. In other words, a country receives as much revenues from the EU ETS as CO_2 emitted from flights departing in their territory and covered by the EU ETS scope.

We chose option 2 in this analysis, as the approach is deemed simpler, more transparent and correlates better with the importance of the aviation sector in each country. Revenues raised in the UK ETS and

[50] This is not used in the current calculations because ETS revenues are allocated according to emissions. See Annex II, 4.4 for more details.
[51] For 2025 results, we use a conversion rate of 1€ = £0.883, as retrieved in May 2023.
[52] General allowances to be auctioned are distributed among member states in shares that are identical to the share of the verified emissions under the EU ETS for 2005 or the average of the period from 2005 to 2007, whichever one is the highest.

Swiss ETS accrue to the UK and Switzerland respectively. Figure 20 shows the difference in revenues from the ETS depending on the allocation method.

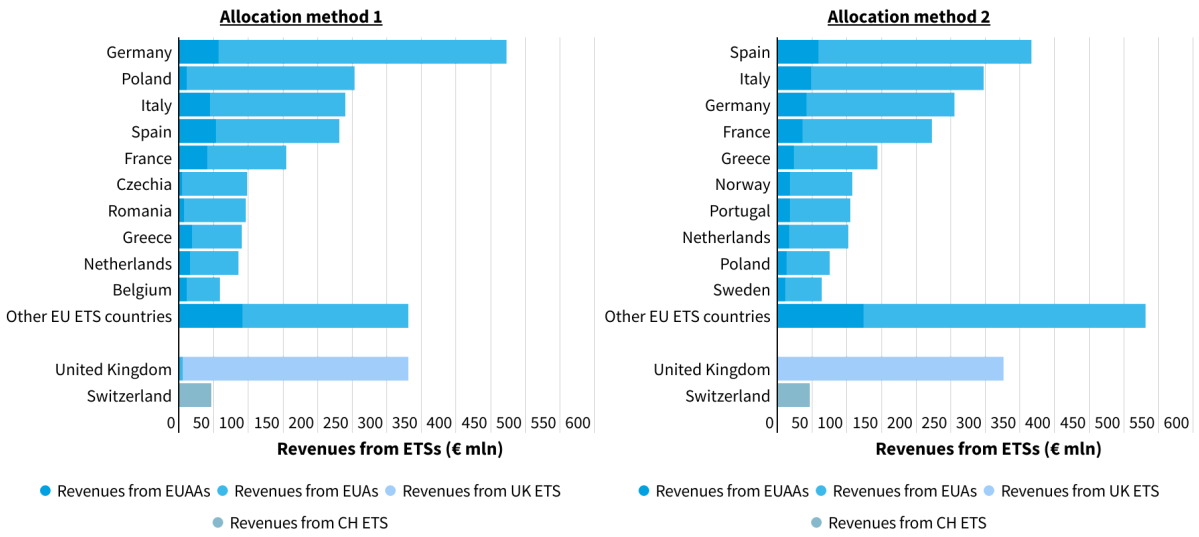

Figure 20: Recap of options to allocate revenues from EU ETS

4.4. ETSs' revenues from airlines

For the selection of 25 airlines, emissions covered by the ETSs as well as the number of free allowances allocated in 2022 were taken from the official ETSs registries (EU/Swiss registry, UK registry) [125][126]. ETSs revenues from airlines were calculated by multiplying the amount of paid allowances (verified emissions minus free allowances) by the average ETS price of each ETS (See section 4.1). This analysis does not take any ETS hedging practices into account, despite it being common for some airlines.

4.5. Calculation of airlines' induced ETS revenues gap to a country

Because of the lack of transparency on the trading of allowances, we cannot know exactly how much a country (e.g France) is receiving from a certain airline (e.g. Air France). Two methodologies are envisioned:
Methodology 1: Revenues from Air France to France are calculated by multiplying the emissions from Air France departing from France by the average ETS price paid by Air France. The latter is calculated with the share of free allowances that Air France is getting compared to the emissions covered by the ETS. This would align with the methodology used to calculate Air France ETS revenues at the global level.
Methodology 2: Revenues from Air France to France are calculated by multiplying the emissions from Air France by the average ETS price paid by all airlines (45€/tCO_2). This would align with the methodology used to calculate France's ETS revenues from all airlines.
The difference between those two methodologies is found to be very minimal. Table 21 gives the more conservative of the two tax gaps, i.e the smaller induced tax gap of the two.
For the UK ETS, the methodology is different, since all revenues from an airline in the UK ETS are going to the United Kingdom. Therefore, revenues paid by British Airway and Emirates to the UK are directly drawn from the official UK registry.

Annex III: Detailed results per country

1. Revenues from tax in 2022 and resulting tax gap

Table 18: Comparison of revenues in 2022 and what would have been raised in a no-exemption scenario, and the resulting tax gap (€bln)

Revenues of the no exemption scenario are calculated second order, i.e taking into account the decrease in demand due to the increase in ticket price

Revenues (€bln)	2022				2022 - no exemption scenario				Resulting tax gap (€bln)
	ETS	Fuel tax	Ticket tax	VAT	ETS	Fuel tax	Ticket tax	VAT	
United Kingdom	0.33	0.00	2.99	0.00	1.89	3.01	0.00	3.94	5.53
France	0.22	0.00	0.44	0.18	1.12	1.94	0.00	2.49	4.71
Spain	0.37	0.00	0.00	0.18	0.99	1.72	0.00	2.44	4.61
Germany	0.25	0.00	1.05	0.17	1.15	1.99	0.00	2.28	3.96
Italy	0.30	0.00	0.03	0.22	0.61	1.06	0.00	1.97	3.10
Netherlands	0.10	0.00	0.15	0.00	0.53	0.91	0.00	0.81	2.00
Switzerland	0.05	0.00	0.00	0.00	0.28	0.49	0.00	0.78	1.51
Portugal	0.10	0.00	0.04	0.00	0.27	0.47	0.00	0.63	1.23
Greece	0.14	0.00	0.00	0.15	0.24	0.41	0.00	0.69	1.05
Ireland	0.06	0.00	0.00	0.00	0.16	0.28	0.00	0.38	0.76
Belgium	0.05	0.00	0.02	0.00	0.16	0.28	0.00	0.33	0.70
Denmark	0.05	0.00	0.00	0.00	0.12	0.20	0.00	0.33	0.59
Poland	0.07	0.00	0.00	0.00	0.13	0.23	0.00	0.29	0.58
Norway	0.11	0.07	0.09	0.14	0.17	0.30	0.00	0.51	0.56
Austria	0.05	0.00	0.11	0.00	0.13	0.22	0.00	0.31	0.51
Sweden	0.06	0.00	0.11	0.02	0.13	0.22	0.00	0.33	0.48
Finland	0.04	0.00	0.00	0.02	0.09	0.15	0.00	0.20	0.39
Romania	0.05	0.00	0.00	0.01	0.07	0.11	0.00	0.19	0.31
Cyprus	0.03	0.00	0.00	0.00	0.05	0.08	0.00	0.14	0.24
Czechia	0.02	0.00	0.00	0.00	0.04	0.06	0.00	0.14	0.22
Hungary	0.02	0.00	0.00	0.00	0.04	0.07	0.00	0.13	0.22
Iceland	0.02	0.00	0.00	0.00	0.05	0.09	0.00	0.10	0.21
Croatia	0.02	0.00	0.00	0.00	0.03	0.06	0.00	0.12	0.18
Bulgaria	0.02	0.00	0.00	0.00	0.03	0.05	0.00	0.07	0.12
Malta	0.01	0.00	0.00	0.00	0.02	0.03	0.00	0.05	0.09
Luxembourg	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.05	0.08
Latvia	0.02	0.00	0.00	0.00	0.02	0.03	0.00	0.04	0.07
Lithuania	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.04	0.07
Estonia	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.05	0.07
Slovakia	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.03
Slovenia	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.02

EU27	2.09	0.00	1.92	0.97	6.16	10.67	0.00	14.55	26.40
Europe	2.59	0.07	5.00	1.12	8.55	14.56	0.00	19.88	34.22

2. Revenues from tax in 2025 and resulting tax gap

Table 19: Comparison of revenues in 2025 and what would have been raised in a no-exemption scenario, and the resulting tax gap (€bln)

Revenues of the no-exemption scenario are calculated second order, i.e taking into account the decrease in demand due to the increase in ticket price

Revenues (€bln)	2025				2025 - no-exemption scenario				Resulting tax gap (€bln)
	ETS	Fuel tax	Ticket tax	VAT	ETS	Fuel tax	Ticket tax	VAT	
United Kingdom	0.64	0.00	4.12	0.00	2.91	4.31	0.00	5.88	8.35
France	0.47	0.27	0.53	0.22	1.71	2.54	0.00	3.30	6.06
Germany	0.67	0.25	1.77	0.52	2.09	3.10	0.00	3.99	5.98
Spain	0.74	0.30	0.00	0.21	1.49	2.20	0.00	3.20	5.65
Italy	0.58	0.19	0.03	0.26	1.07	1.58	0.00	3.03	4.63
Netherlands	0.20	0.07	0.63	0.00	0.85	1.25	0.00	1.20	2.40
Switzerland	0.16	0.00	0.00	0.00	0.47	0.70	0.00	1.15	2.16
Portugal	0.20	0.07	0.04	0.00	0.38	0.56	0.00	0.78	1.39
Greece	0.24	0.06	0.00	0.13	0.29	0.43	0.00	0.76	1.05
Denmark	0.11	0.04	0.00	0.00	0.22	0.33	0.00	0.56	0.96
Belgium	0.11	0.04	0.04	0.00	0.25	0.37	0.00	0.53	0.95
Ireland	0.11	0.03	0.00	0.00	0.23	0.34	0.00	0.53	0.95
Austria	0.11	0.03	0.16	0.00	0.23	0.34	0.00	0.58	0.85
Sweden	0.17	0.06	0.19	0.05	0.25	0.37	0.00	0.64	0.79
Poland	0.15	0.04	0.00	0.00	0.21	0.31	0.00	0.45	0.78
Finland	0.10	0.03	0.00	0.03	0.20	0.29	0.00	0.39	0.71
Norway	0.21	0.08	0.26	0.17	0.26	0.39	0.00	0.75	0.67
Czechia	0.05	0.01	0.00	0.00	0.10	0.15	0.00	0.32	0.51
Hungary	0.05	0.01	0.00	0.00	0.07	0.11	0.00	0.23	0.35
Romania	0.09	0.03	0.00	0.01	0.09	0.14	0.00	0.22	0.32
Cyprus	0.05	0.01	0.00	0.00	0.08	0.11	0.00	0.19	0.32
Iceland	0.04	0.01	0.00	0.00	0.07	0.11	0.00	0.12	0.25
Croatia	0.04	0.01	0.00	0.00	0.05	0.07	0.00	0.18	0.24
Bulgaria	0.04	0.01	0.00	0.00	0.05	0.07	0.00	0.11	0.17
Malta	0.03	0.01	0.00	0.00	0.04	0.05	0.00	0.09	0.13
Latvia	0.03	0.01	0.00	0.00	0.04	0.06	0.00	0.07	0.13
Lithuania	0.02	0.01	0.00	0.00	0.02	0.03	0.00	0.07	0.10
Estonia	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.08	0.10
Luxembourg	0.02	0.01	0.00	0.00	0.02	0.03	0.00	0.07	0.10
Slovenia	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.03	0.04

Slovakia	0.01	0.00	0.00	0.00	0.01	0.02	0.00	0.02	0.04
EU27	4.40	1.62	3.37	1.44	10.05	14.88	0.00	21.61	35.71
Europe	5.45	1.71	7.74	1.62	13.77	20.39	0.00	29.51	47.15

Annex IV: Detailed results per airline

1. Revenues raised from tax in 2022 in Europe and resulting induced tax gap, per airline

Table 20: Airlines induced tax gap in 2022 (€ mln)

Airline	2022				2022 - no exemption scenario				Fuel and emission pricing tax gap (€mln)	Ticket pricing induced tax gap (€mln)	Induced tax gap (€ mln)
	ETS	Fuel tax	Ticket taxes	VAT	ETS	Fuel tax	Ticket taxes	VAT			
Air France	43	0	173	103	533	922	0	1,247	1,411	971	2,383
Lufthansa	94	0	278	107	524	906	0	1,359	1,336	975	2,311
Ryanair	567	0	447	101	702	1201	0	1,334	1,335	787	2,122
British Airways	66	0	533	0	513	826	0	1,268	1,273	734	2,007
KLM	66	0	120	0	355	614	0	717	902	597	1,500
easyJet	170	0	435	47	406	683	0	926	918	445	1,363
Emirates	1	0	241	0	295	496	0	748	790	508	1,298
Iberia	29	0	30	57	227	392	0	619	589	532	1,121
United Airlines	0	0	140	0	216	366	0	502	582	361	944
TUI	23	0	93	1	254	424	0	217	655	123	777
Delta Air Lines	0	0	66	0	181	310	0	335	491	269	761
Vueling Airlines	115	0	39	77	152	263	0	550	301	433	734
American Airlines	0	0	90	0	181	301	0	326	483	236	718
SAS Scandinavian Airlines	12	24	73	64	144	249	0	410	357	274	631
Wizz Air	173	0	153	18	207	354	0	400	388	229	617
Turkish Airlines	0	0	118	0	135	231	0	476	365	359	724
TAP Air Portugal	43	0	41	1	145	250	0	322	352	280	632
Qatar Airways	0	0	116	0	132	223	0	318	355	203	558
Finnair	41	0	21	13	100	172	0	277	231	243	474
Norwegian	61	20	66	45	114	196	0	311	229	199	428
Jet2.com	96	0	108	0	131	217	0	293	252	185	437
Aer Lingus	8	0	62	0	87	149	0	241	229	179	408
ITA Airways	63	0	13	68	81	140	0	245	158	164	322
LOT - Polish	27	0	11	2	68	118	0	150	160	137	297

Airlines											
Brussels Airlines	21	0	19	0	67	115	0	151	161	132	293

2. Revenues raised from tax in 2022 in Europe and resulting induced tax gap, per country and the airlines with the biggest tax gap

Table 21: Airlines induced tax gap in 2022 and main country beneficiary (€ mln). See Annex II, section 4.5 for a more detailed explanation of the two methodologies.

Airline (beneficiary country code)	2022					2022 - no exemption scenario				Fuel and emission pricing tax gap (€mln)	Ticket pricing induced tax gap (€mln)	Induced tax gap (€ mln)
	ETS (methodology 1)	ETS (methodology 2)	Fuel tax	Ticket tax	VAT	ETS	Fuel tax	Ticket tax	VAT			
British Airways[53] (UK)	35	N/A	0	501	0	450	717	0	897	1,133	396	1,528
Emirates (UK)	0	N/A	0	196	0	103	165	0	268	268	72	340
Air France (FR)	66	33	0	124	103	491	850	0	888	1,275	662	1,936
easyJet (FR)	35	30	0	30	26	50	88	0	118	103	62	165
Iberia (ES)	46	27	0	0	57	194	336	0	424	484	367	851
Ryanair (ES)	89	106	0	0	19	130	226	0	263	250	244	494
Vueling (ES)	53	70	0	0	76	97	169	0	348	196	271	467
Lufthansa (DE)	92	65	0	213	107	434	752	0	628	1,094	309	1,403
United Airlines (DE)	0	0	0	28	0	59	101	0	73	160	46	206
Ryanair (IT)	117	140	0	11	75	146	254	0	321	260	235	495
ITA Airways (IT)	33	62	0	3	68	71	124	0	210	134	139	273
KLM (NL)	44	43	0	36	0	295	512	0	282	763	246	1,009
Ryanair (IE)	33	39	0	0	0	42	72	0	84	75	84	159
Aer Lingus (IE)	15	5	0	0	0	56	98	0	121	139	121	260
TAP (PT)	28	26	0	8	1	112	195	0	180	280	170	450
Brussels Airlines (BE)	13	12	0	4	0	50	86	0	70	124	66	189

[53] Includes BA Cityflyer.

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