Aviation, levies and tourism: a fact check

Lost tourism revenue can be mitigated by designing equitable and effective market-based measures | 18/09/2025

Executive summary

There are strong arguments in favour of adopting some form of additional global market-based measure on the international aviation sector (e.g., a global aviation fuel levy, or greenhouse gas (GHG) emissions pricing mechanism; this report uses the terms interchangeably). In light of the sector's substantial share of global emissions, the strong correlation between aviation use and income, and the comparative under-taxation of the sector, such a measure may drive emissions reductions while raising finance for global climate action. However, the potential negative impact on tourism-dependent economies - including for instance Small Island Developing States (SIDS) and Least Developed Countries (LDCs) - has been used to argue against the introduction of such a measure.

Previous research has explored various options for pricing aviation emissions, including jet fuel and ticket levies, and provided regional assessments of the potential impacts on tourism. Here, we investigate the tourism impact of a global levy on aviation fuel use – which also serves as a proxy for an equivalently priced GHG emissions pricing mechanism – on three countries: Belize (SIDS), Madagascar (LDC) and Vanuatu (SIDS). Our study illustrates the potential implications for these three climate-vulnerable countries with economies heavily dependent on tourism.

Loss of tourism revenue is, undoubtedly, an important consideration in the design of a global aviation levy, or GHG emissions pricing mechanism. However, this paper demonstrates that impacts can be mitigated by designing an effective mechanism –

including distribution of costs to those consumers most able to pay and steady increases in the levy rate, or GHG emissions price, through time – as well as equitable distribution of revenues. The potential loss of tourism revenue for SIDS and LDCs should not, therefore, deter against the adoption of a global measure such as a fuel levy or GHG emissions pricing mechanism.

Introduction

Aviation, climate change and the case for action

Aviation is responsible for 2.5% of global, energy-related, CO_2 emissions every year, as well as non-CO_2 impacts which contribute significant additional warming.[1;2] These climate impacts disproportionately burden the world's poorest,[3] while at the same time just 1% of the world's population produce more than 50% of the sector's CO_2 emissions,[4] revealing a fundamental injustice.

Despite widespread recognition of the scale of aviation's climate damages and the global inequalities these expose, the industry has largely avoided contributing to global climate finance, and at the same time has made little progress toward reducing its climate impact.

It is estimated that Emerging Markets and Developing Countries (EMDCs) other than China will require annual investment for climate action of $2.3-2.5tn by 2030.[5] Solidarity Levies represent one possible means of generating climate finance, as is being explored by the Global Solidarity Levies Taskforce (GSLTF).[6] Similarly, climate finance could also be generated while driving decarbonisation within the aviation sector by introducing a global greenhouse gas (GHG) emissions pricing mechanism, similar to the inclusion of aviation within the European Union Emissions Trading Scheme (EU ETS).

For example, recent research commissioned by the GSLTF explored various options for aviation levy design, including jet fuel and ticket levies.[7] This work estimates that an aviation fuel levy applied to all international flights, at a central rate of €0.368/L ($0.40/L),[8] could generate substantial annual revenues of €84bn ($92bn), while contributing to 4-10% reductions in CO_2 emissions by driving improvements in fuel efficiency and reducing demand.[9]

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[1] International Energy Agency (IEA), nd. Aviation. Retrieved 1 September, 2025 from https://www.iea.org/energy-system/transport/aviation
[2] Lee, D.S., Fahey, D.W., Skowron, A., Allen, M.R., Burkhardt, U., Chen, Q., Doherty, S.J., Freeman, S., Forster, P.M., Fuglestvedt, J., Gettelman, A., De León, R.R., Lim, L.L., Lund, M.T., Millar, R.J., Owen, B., Penner, J.E., Pitari, G., Prather, M.J., Sausen, R., Wilcox, L.J., 2021. The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. Atmospheric Environment 244, 117834. https://doi.org/10.1016/j.atmosenv.2020.117834
[3] King, A.D., Harrington, L.J., 2018. The Inequality of Climate Change From 1.5 to 2ºC of Global Warming. Geophysical Research Letters 45, 5030–5033. https://doi.org/10.1029/2018GL078430
[4] Gössling, S., Humpe, A., 2020. The global scale, distribution and growth of aviation: Implications for climate change. Global Environmental Change 65, 102194. https://doi.org/10.1016/j.gloenvcha.2020.102194
[5] Bhattacharya, A., Songwe, V., Soubeyran, E., Stern, N., 2024. Raising Ambition and Accelerating Delivery of Climate Finance. London: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science. Retrieved 1 September, 2025 from https://www.lse.ac.uk/granthaminstitute/publication/raising-ambition-and-accelerating-delivery-of-climate-finance/
[6] Global Solidarity Levies Taskforce, nd. About. Retrieved 1 September, 2025 from https://solidaritylevies.org/about/
[7] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/
[8] European Central Bank (ECB), 2025. US dollar (USD). Retrieved 1 September, 2025 from https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/eurofxref-graph-usd.en.html. Use average rate from past year.
[9] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/

Tourism impacts and price elasticity of demand

It is reasonable to assume that most or all additional costs resulting from any form of levy or GHG emissions pricing mechanism will be passed on to passengers via ticket price increases. As such, demand for international aviation could be anticipated to fall, with knock-on impacts for tourism in destination countries.

Change in demand for a product in response to a change in its price can be described by the quantity Price Elasticity of Demand (PED). PED is defined as the ratio between the percentage change in a demand for a product and the percentage change in its price. Price elasticities are nearly always negative, since for nearly all goods and services under nearly all circumstances, when the price goes *up* the demand goes *down*, and when the price goes *down* the demand goes *up*. In other words, demand changes in the *opposite* direction to price.

The absolute PED value (i.e., the size of the number, ignoring whether it is positive or negative) determines whether PED is described as elastic or inelastic. When the absolute value of PED is greater than one, it is called *elastic*, meaning that demand changes by proportionately *more* than the price. For example, a PED of −1.5 means that when price goes up by 1%, demand will fall by 1.5%. Conversely, if the absolute value of PED is between zero and one, demand is *inelastic*, and will change by proportionately less than the change in price. For instance, if PED for a good is −0.5, for a price rise of 1%, demand for that good will decrease only by 0.5%.

A wide range of PED estimates for aviation exist, varying according to a number of factors. For instance, PED can be influenced by geography, ticket class, travel purpose, individual income, and whether a measure is applied regionally or globally.[10;11;12;13] As such, there is no single PED value which can be applied to aviation. Most estimates for aviation range from ~ 0 to –3, and research carried out for the International Air Transport Association (IATA) suggests that pan-national measures (such as a global aviation fuel levy) would be characterised on average by a negative and inelastic PED of around –0.6.[14] In other words, when the price of a ticket rises by 1%, demand would fall by only 0.6%.

This has significant implications for economic measures such as levies or GHG emissions pricing mechanisms, since inelastic demand for a good or service implies that when such a measure is imposed on it (increasing the price), demand will change by less and so the market will not be much affected by the measure. This further implies

[10] Inter*VISTAS* Consulting Inc., 2007. Estimating Air Travel Demand Elasticities. Retrieved 18 August, 2025 from https://www.iata.org/en/iata-repository/publications/economic-reports/estimating-air-travel-demand-elasticities---by-intervistas/
[11] Morlotti, C., Cattaneo, M., Malighetti, P., Redondi, R., 2017. Multi-dimensional price elasticity for leisure and business destinations in the low-cost air transport market: Evidence from easyJet. Tourism Management 61, 23–34. https://doi.org/10.1016/j.tourman.2017.01.009
[12] Mumbower, S., Garrow, L.A., Higgins, M.J., 2014. Estimating flight-level price elasticities using online airline data: A first step toward integrating pricing, demand, and revenue optimization. Transportation Research Part A: Policy and Practice 66, 196–212. https://doi.org/10.1016/j.tra.2014.05.003
[13] Brons, M., Pels, E., Nijkamp, P., Rietveld, P., 2002. Price elasticities of demand for passenger air travel: a meta-analysis. Journal of Air Transport Management 8, 165–175. https://doi.org/10.1016/S0969-6997(01)00050-3
[14] Inter*VISTAS* Consulting Inc., 2007. Estimating Air Travel Demand Elasticities. Retrieved 18 August, 2025 from https://www.iata.org/en/iata-repository/publications/economic-reports/estimating-air-travel-demand-elasticities---by-intervistas/

revenues raised could be significant, since many people will carry on consuming the good even with the levy imposed.

This briefing

The potential negative impacts on tourism-dependent economies - including for instance Small Island Developing States (SIDS) and Least Developed Countries (LDCs)[15] – has been used to argue against the introduction of a global levy or GHG emissions pricing mechanism for the aviation sector.[16] However, there are strong arguments in favour of adopting such measures, given the sector's substantial share of global emissions,[17] the strong correlation between aviation use and income,[18] and the comparative under-taxation of the sector.[19]

This paper highlights recent evidence on this topic, as well as providing illustrative estimates of the potential tourism and economic impacts of a global aviation fuel levy on the economies of three countries: Belize, Madagascar and Vanuatu. This fuel levy also serves as an illustration of the impacts of an equivalently priced GHG emissions pricing mechanism, which would be expected to have similar initial impacts. The three countries chosen were selected due to their status as either SIDS (Belize and Vanuatu) or LDCs (Madagascar), their vulnerability to climate change and the fact that tourism and air travel contributes markedly to the economies of each of these countries (Table 1).

Our quantitative analysis illustrates that while loss of tourism revenue is, undoubtedly, an important consideration in the design of a global aviation levy or GHG emissions pricing mechanism, it is not an argument against the adoption of such measures.

Table 1. Summary of case study countries analysed in this study. Statistics relate to overnight visitors, excluding same-day visitors (which make a substantial proportion of total visitors to Vanuatu and Belize).

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[15] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/

[16] Air Transport Action Group (ATAG), 2025. Whitepaper: International aviation levies. Retrieved 1 September, 2025 from https://www.atag.org/newsletter-articles/20250624-atag-newsletter/unfccc-cop30-and-the-global-solidarity-levies-task-force/

[17] International Energy Agency (IEA), nd. Aviation. Retrieved 1 September, 2025 from https://www.iea.org/energy-system/transport/aviation

[18] Gössling, S., Humpe, A., 2020. The global scale, distribution and growth of aviation: Implications for climate change. Global Environmental Change 65, 102194. https://doi.org/10.1016/j.gloenvcha.2020.102194

[19] Egal, J., Mauroschat, R., Dardenne, J., 2023. Aviation Tax Gap. Retrieved 1 September, 2025 from https://www.transportenvironment.org/articles/every-hour-european-governments-lose-out-on-e4-million-in-aviation-taxes

Country	Receipts from international tourism (US$, 2019)[20;21]	Number of overnight international visitors (2019)[22]	Proportion of overnight international visitors arriving by air (%, 2019)[23]
Belize	427,900,000	503,000	76
Madagascar	951,000,000	384,000	100
Vanuatu	295,000,000	121,000	100

Country case studies

The possible regional impacts of a global aviation fuel levy on tourism demand have recently been studied.[24] This research showed that applying a fuel levy on all international flights at $0.40/L would cause regional average GDP reductions for the countries analysed varying from less than 0.1% (North America, South America and Europe) to 0.3% (Australia and Oceania) and 0.6% (Central America and the Caribbean). This illustrates how regional reliance on tourism and air travel influences the magnitude of the economic impacts of an aviation fuel levy on a given region, with SIDS noted as a particularly vulnerable country classification.

Here, we highlight this work, and supplement it by providing route-level examples of the impacts of a global aviation fuel levy on three countries whose tourism industries and economies are likely to be sensitive to a global aviation fuel levy. We use the impacts of a fuel levy to also illustrate the impacts of an equivalently priced GHG emissions pricing mechanism, which would be expected to have similar initial impacts. Second, we illustrate how equitable redistribution of revenues, coupled with equitable design of the measure, could effectively mitigate economic impacts.

Methods

In the below scenarios, we provide illustrative constraints on the impacts of a global aviation fuel levy on demand along air routes into Belize, Madagascar and Vanuatu. We assume that the levy is applied globally, to all commercial (both domestic and international) flights, and based on fuel use with all costs passed through to travellers by

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[20] World Bank, nd. International tourism, receipts (current US$) - Madagascar, Vanuatu, Retrieved 1 September, 2025 from https://data.worldbank.org/indicator/ST.INT.RCPT.CD?locations=BZ-MG-VU. Receipts are assumed to be from overnight visitors, and not to include contributions from same-day visitors.

[21] For Belize, no World Bank data were available, so used: Statistical Institute of Belize, 2024. Tourism Satellite Account 2019. Retrieved 1 September, 2025 from https://sib.org.bz/statistics/economic-statistics/tourism-satellite-account/. Used inbound, overnight tourism expenditure and assumed exchange rate = 2.00 Belize $/US $.

[22] United Nations Tourism, 2023. Tourism Statistics - Inbound Tourism. Total Arrivals. Retrieved 1 September, 2025 from https://www.untourism.int/tourism-statistics/tourism-data-inbound-tourism

[23] For Belize, other overnight arrivals are by boat and land-based transport. For Vanuatu and Madagascar, tourists on cruises are classified as same-day, not overnight, visitors. United Nations Tourism, 2023. Tourism Statistics - Inbound Tourism. Total Arrivals by Mode of Transport. Retrieved 1 September, 2025 from https://www.untourism.int/tourism-statistics/tourism-data-inbound-tourism

[24] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/

increases in ticket prices. We assume no change in fuel efficiency as a result of the levy, although note that imposition of a fuel levy would likely drive improvements in fuel efficiency.[25]

In all studies of this type, results will be highly dependent on the chosen levy rate. The central rate suggested by work commissioned by the GSLTF ($0.40/L) is roughly equivalent to the social cost of carbon.[26] However, this work recognises that any levy would be imposed via a time-linked mechanism, increasing in price over time. Therefore, we estimate the initial impacts for a levy which starts at a rate of $0.05/L - equivalent to the current US domestic tax on gasoline[27] - as well as the impacts of a levy at the higher rate of $0.40/L.

As noted above, we use the impacts of a global aviation fuel levy to also illustrate the impacts of an equivalently priced GHG pricing mechanism, which would be expected to have similar initial impacts (note that future impacts would likely vary, due to the two measures having differing interactions with, and incentives for, decarbonisation). For reference, our chosen fuel levy of $0.05/L is roughly equivalent to a price on aviation CO_2 emissions of $16/t$CO_2$,[28] far lower than, for instance, the current average carbon price in the EU ETS of $70/t$CO_2$.[29] A fuel levy of $0.40/L is roughly equivalent to a price on aviation CO_2 emissions of $130/t$CO_2$.

For each country two flight routes, representing common travel corridors, were chosen and analysed. The levy rate was applied to total fuel burn estimate for each given flight, taken from the ICAO Carbon Emissions Calculator,[30] converted from kilograms to litres using a fuel density of 0.8 kg/L.[31]

Average ticket price data for each flight route was not freely available. Therefore, we estimated representative prices for tickets along each route by searching for flights on each route on the Skyscanner website[32] and choosing the cheapest available direct flight between the two airports. We then searched for this flight (same carrier) on the 15th date of each month (or closest available date) for the next 6 months, and calculated the average (mean) of those 6 ticket prices. In this way, we aim to account as far as possible for seasonal variation in ticket prices, as well as variation in price depending on how far in advance tickets are booked. For each flight, we recorded the aircraft type indicated, and used public information to estimate the number of seats available on that flight of

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[25] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/
[26] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/
[27] U.S. Energy Information Administration, 2024. How much tax do we pay on a gallon of gasoline and on a gallon of diesel fuel? Retrieved 1 September, 2025 from https://www.eia.gov/tools/faqs/faq.php?id=10&t=5
[28] Assuming burning 1kg of fuel produces 3.16kg CO_2, following footnote 34.
[29] World Bank, 2025. State and Trends of Carbon Pricing Dashboard. Retrieved 10th September, 2025 from https://carbonpricingdashboard.worldbank.org/compliance/price
[30] International Civil Aviation Organization (ICAO), 2024, ICAO Carbon Emissions Calculator (ICEC). Retrieved 1 September, 2025 from https://www.icao.int/environmental-protection/CarbonOffset
[31] E.g., Air Transport Action Group (ATAG), 2021. Fact sheet 13: Sustainable aviation fuel metrics. Retrieved 1 September, 2025 from https://aviationbenefits.org/downloads/fact-sheet-13-sustainable-aviation-fuel-metrics/
[32] https://www.skyscanner.net/ , searched between 18-28 August, 2025.

each seating class (economy, economy plus, business and first), assuming an 82.2% average occupancy.[33]

The total levy for a given flight, calculated by multiplying the levy rate by the total fuel use by the flight, was then split between the number of seats on the flight. The contribution to the total levy for a given flight was varied depending on seat class. Space and weight requirements increase through economy, economy plus, business and first-class seats, with associated increases in fuel use (and emissions). We apply IATA Cabin Class Factors[34] to our levy rates, meaning that the levy applied to economy plus, business and first class seats is 1.5, 4 and 5 times higher, respectively, than the levy applied to an economy ticket, broadly similar to other suggested multipliers of this type.[35] Our analysis accounts for the actual class of tickets available on each specific route and carrier chosen – for instance, if a given route and carrier only offers economy class seating, the total cost of the levy for that flight is split evenly amongst all tickets.

Percentage increases in ticket price were then used to calculate reduction in demand along each route using the PED value for a global economic measure (− 0.6) adjusted using published multipliers where available for the appropriate region and flight length.[36] We use the same PED for all ticket classes, although it is notable that wealthier tourists who are more likely to purchase business class tickets (for tourism purposes) are likely to exhibit greater price inelasticity.[37] More broadly, aviation PED values are a key source of uncertainty in any work of this type. The impacts of choosing different PED values are briefly explored in Appendix 1, showing that the main conclusions of our work are robust regardless of the PED values used.

Country-wide reduction in tourist visits by air was then estimated by assuming the largest reduction in demand along the two routes analysed for each country occurs across all routes. The reduction in number of visitors was calculated by applying this demand reduction to estimates of international visitor arrivals by air,[38] and the economic impact of this reduction estimated using available data on tourism receipts[39;40] and compared with country GDP.[41] We assume that all tourists travelling by air are overnight tourists (i.e., not same-day). Additionally, where data did not specify, we assumed that data on international tourism receipts was from overnight visitors only (i.e., excluding same-day

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[33] Air Transport Action Group (ATAG), 2024. Facts and figures. Retrieved 1 September, 2025 from https://atag.org/facts-figures

[34] International Air Transport Association (IATA), nd. IATA RECOMMENDED PRACTICE -RP 1726. Retrieved 3 September, 2025 from https://www.iata.org/en/programs/sustainability/ecohub/passenger-emissions-methodology/?_fs=16295728731-15014572231#tab-1

[35] Zheng, X. S., Shen, C., Kellogg, E., 2025. Designing an equitable aviation climate levy. Retrieved 2 September, 2025 from https://theicct.org/publication/designing-an-equitable-climate-levy-mar25/

[36] Inter*VISTAS* Consulting Inc., 2007. Estimating Air Travel Demand Elasticities. Retrieved 18 August, 2025 from https://www.iata.org/en/iata-repository/publications/economic-reports/estimating-air-travel-demand-elasticities---by-intervistas/

[37] Inter*VISTAS* Consulting Inc., 2007. Estimating Air Travel Demand Elasticities. Retrieved 18 August, 2025 from https://www.iata.org/en/iata-repository/publications/economic-reports/estimating-air-travel-demand-elasticities---by-intervistas/

[38] United Nations Tourism, 2023. Tourism Statistics - Inbound Tourism. Total Arrivals by Mode of Transport. Retrieved 1 September, 2025 from https://www.untourism.int/tourism-statistics/tourism-data-inbound-tourism

[39] World Bank, nd. International tourism, receipts (current US$) - Madagascar, Vanuatu, Retrieved 1 September, 2025 from https://data.worldbank.org/indicator/ST.INT.RCPT.CD?locations=BZ-MG-VU. Receipts are assumed to be from overnight visitors, and not to include contributions from same-day visitors.

[40] For Belize, no World Bank data were available, so used: Statistical Institute of Belize, 2024. Tourism Satellite Account 2019. Retrieved 1 September, 2025 from https://sib.org.bz/statistics/economic-statistics/tourism-satellite-account/. Used inbound, overnight tourism expenditure and assumed exchange rate = 2.00 Belize $/US $.

[41] World Bank, nd. GDP (current US$). Retrieved 1 September, 2025 from https://data.worldbank.org/indicator/NY.GDP.MKTP.CD

visitors). For this reason, our estimated economic impacts are conservative: if same-day visitors are included in tourism receipts, our analysis would overestimate the actual economic impact. For all metrics, values from the year 2019 were used to avoid the influence of Covid-19. The assumption that demand reduction along a given route applies to all flights is of course a simplification, as is our assumption that all tourists contribute equal amounts to total tourism receipts. We also do not consider additional factors such as substitution to other tourism modes (e.g., cruises).

Belize

Direct flights to Belize City depart from locations across northern and central America. We consider ticket price increases and demand reduction along two routes, the first departing Miami and the second Panama City. Full results are shown in Table 2.

On both routes, economy and business class seats were available to buy. Along these routes, a global fuel levy at $0.05/L is estimated to increase economy ticket prices by $2.16 and $2.72, respectively, while business passengers experience larger ticket price increase of $8.63 and $10.90, respectively.

Using best available PED estimates, the small ticket price increases associated with the $0.05/L levy result in demand reductions of 0.4 - 1.1% along both routes and across both ticket classes. Extrapolating this demand reduction to apply to all inbound visitors by air would suggest an overall reduction in demand of 1600 - 2100 visitors per year. Assuming all overnight international visitors contribute equally to tourism receipts, the higher of these estimates suggests lost revenues of $1.4m - $1.8m per year, equivalent to around 0.06% - 0.07% of Belize's GDP.

At the higher levy rate of $0.40/L, economy tickets increase in price by $17.27 (Miami) and $21.80 (Panama), while business tickets increase in price by $69.07 (Miami) and $87.18 (Panama). If the resulting reductions in demand apply across all routes, this would translate to economic impacts equivalent to 0.46 - 0.60% of Belize's GDP. This is in close agreement with the regional average economic impacts of an equivalent levy estimated for Central American and Caribbean countries by recent work (~ 0.6% of GDP).[42]

[42] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/

Table 2. Summary of results for Belize. Ticket type abbreviations used are: E = economy, E+ = economy plus, B = business, F = first class.

Route	Fuel burn (L)	Representative ticket price by seating class	Passengers per flight	Ticket price increase (levy = $0.05/L)	Ticket price increase (levy = $0.40/L)	Demand reduction (levy = $0.05/L)	Demand reduction (levy = $0.40/L)
USA to Belize (MIA-BZE)	7381	E: $286 E+: N/A B: $590 F: N/A	E: 118 E+: 0 B: 13 F: 0	E: $2.16 B: $8.63	E: $17.27 B: $69.07	E: 0.50% B: 0.97%	E: 3.98% B: 7.72%
Panama to Belize (PTY-BZE)	7166	E: $520 E+: N/A B: $640 F: N/A	E: 92 E+: 0 B: 10 F: 0	E: $2.72 B: $10.90	E: $21.80 B: $87.18	E: 0.35% B: 1.12%	E: 2.77% B: 8.98%

Madagascar

Direct flights to Madagascar arrive from destinations in Africa and Europe. We therefore consider two routes, one from Charles de Gaulle airport in France, the other from Addis Ababa Bole Airport in Ethiopia. Full results are shown in Table 3.

On the longer route from Europe, economy, economy plus and business class tickets were available to purchase. Projected increases in ticket prices were $13, $20 and $53, resulting in demand reduction for passengers in each class of 0.82%, 0.79% and 0.58%, respectively. If these demand reductions occur across all inbound visitors by air, roughly 3100 fewer visitors would fly to Madagascar each year.

On the shorter route from Ethiopia, only economy and business class tickets were available. We project ticket price increases of $8 and $31, translating to demand reductions of 0.74% and 0.76% for each class, respectively. If these demand reductions occur across all inbound visitors by air, this suggests around 2800 fewer visitors would fly to Madagascar each year.

Table 3. Summary of results for Madagascar. Ticket type abbreviations used are: E = economy, E+ = economy plus, B = business, F = first class.

Route	Fuel burn (L)	Representative ticket price by seating class	Passengers per flight	Ticket price increase (levy = $0.05/L)	Ticket price increase (levy = $0.40/L)	Demand reduction (levy = $0.05/L)	Demand reduction (levy = $0.40/L)
France to Madagascar (CDG-TNR)	92464	E: $956	E: 220	E: $13.14	E: $105.13	E: 0.82%	E: 6.60%
		E+: $1502	E+: 26	E+: $19.71	E+: $157.69	E+: 0.79%	E+: 6.30%
		B: $5425	B: 23	B: $52.56	B: $420.51	B: 0.58%	B: 4.65%
		F: N/A	F: 0				
Ethiopia to Madagascar (ADD-TNR)	25838	E: $379	E: 113	E: $7.78	E: $62.24	E: 0.74%	E: 5.92%
		E+: N/A	E+: 0				
		B: $1466	B: 13	B: $31.12	B: $248.97	B: 0.76%	B: 6.11%
		F: N/A	F: 0				

Assuming all overnight international visitors contribute equally to tourism receipts, this suggests lost revenues of between $7.1m and $7.6m per year, equivalent to 0.05% of Madagascar's GDP.

At the higher levy rate of $0.40/L, ticket price increases are far higher, increasing by $105 for an economy ticket between France and Madagascar. If the associated levels of demand reduction found for each route apply to all inbound visitors by air, economic losses would be equivalent to 0.40% (Ethiopia route) to 0.43% (France route) of Madagascar's GDP. We note that this is larger than the regional average economic impacts estimated for African countries by recent work (just over 0.1% of GDP).[43] This difference may be explained in part by the particular importance of tourism to Madagascar's economy,[44] as well as by Madagascar's reliance on passengers arriving by air (Table 1). The larger economic impacts associated with the higher levy rates underscore the need for an effective levy design which incorporates a time-linked increase in levy rate.

[43] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/
[44] World Bank, 2025. Madagascar Economic Update: Bridging the Productivity Divide. Washington, D.C.: The World Bank. Retrieved 1 September, 2025 from https://www.worldbank.org/en/country/madagascar/publication/madagascar-economic-update-bridging-the-productivity-divide

Vanuatu

Table 4. Summary of results for Vanuatu. Ticket type abbreviations used are: E = economy, E+ = economy plus, B = business, F = first class.

Route	Fuel burn (L)	Representative ticket price by seating class	Passengers per flight	Ticket price increase (levy = $0.05/L)	Ticket price increase (levy = $0.40/L)	Demand reduction (levy = $0.05/L)	Demand reduction (levy = $0.40/L)
Australia (Brisbane) to Vanuatu (BNE-VLI)	9240	E: $201	E: 143	E: $2.73	E: $21.83	E: 0.81%	E: 6.50%
		E+: N/A					
		B: $493	B: 7	B: $10.91	B: $87.31	B: 1.33%	B: 10.62%
		F: N/A					
Australia (Sydney) to Vanuatu (SYD-VLI)	11340	E: $177	E: 181	E: $3.14	E: $25.08	E: 1.07%	E: 8.52%
		E+: N/A					
		B: N/A					
		F: N/A					

More than 50% of inbound tourist arrivals to Vanuatu are from Australia.[45] We therefore consider the impacts of a levy on two routes – the first from Brisbane, Australia to Port Vila, Vanuatu, and the second from Sydney, Australia, to Port Vila. Along the first route and with the selected carrier, both economy and business class tickets were available, while along the second, only economy class tickets were available. Full results are shown in Table 4.

On the route between Brisbane and Port Vila, economy ticket prices increase by around $3, while business class tickets increase in price by $11. This translates to a reduction in demand for each ticket class of 0.81% (economy) and 1.33% (business). If applied to all inbound visitors by air, demand reduction on this scale would result in around 1000 fewer visitors to Vanuatu every year.

On the slightly longer route between Sydney and Port Vila, only economy class tickets were available from the cheapest carrier. Ticket prices increased again by around $3, resulting in a 1.1% reduction in demand which, if translated to all inbound visitors by air, would result in around 1300 fewer visitors each year.

[45] World Travel and Tourism Council (WTTC), 2020. TRAVEL & TOURISM ECONOMIC IMPACT 2020 VANUATU. Retrieved 1 September, 2025 from https://destinationcenter.org/wp-content/uploads/2021/10/WTTC-Economic-Impact-Report-2020_vanuatu_A4-24pp-1.pdf

Assuming all international visitors contribute equally to tourism receipts, this suggests lost revenues of between $2.5m and $3.1m per year, equivalent to around 0.3% of Vanuatu's GDP.

At the higher levy rate of $0.40/L, economy ticket prices increase by $22 (Brisbane) and $25 (Sydney), while business class tickets increase by $87. If the associated levels of demand reduction found for each route apply to all inbound visitors by air, economic losses would be equivalent to 2.1% (Brisbane route) to 2.7% (Sydney route) of Vanuatu's GDP. Again, this is far larger than the regional average economic impacts estimated for countries in the Australia and Oceania region by recent work (just over 0.3% of GDP).[46] However, tourism makes an extremely large contribution to Vanuatu's GDP: in 2019, tourism directly contributed 15.3% to Vanuatu's GDP and made a total contribution (also considering indirect effects) of 34.7%. This compares with direct and indirect contributions of 3.5% and 11.7%, respectively, for the whole Oceania region, explaining at least in part Vanuatu's heightened economic sensitivity to changes in tourism demand.[47] Again, the larger economic impacts associated with the higher levy rates underscore the need for an effective levy design which incorporates a time-linked increase in levy rate.

Mitigating tourism impacts

Equitable distribution of costs

Focusing firstly on costs to individual consumers, a levy, or GHG emissions pricing mechanism, through which costs are passed onto consumers based on the space/weight requirements of their seat facilitates a more equitable approach to emissions pricing. It means that the absolute increase in the price of a business class ticket is more than, for instance, that of an economy class ticket, reflecting the fact that business class passengers are responsible for more fuel burn (and, consequently, emissions) on a per passenger basis. This also ensures that costs are more equitably distributed amongst consumers, passing higher costs onto those more able to pay.

Equitable distribution of revenue

Turning now to the impacts on countries, introducing a global aviation levy, or GHG emissions pricing mechanism, as discussed above, would result in economic impacts on tourism-dependent states. It is therefore necessary to consider how these impacts can be accounted for in the design of any measure. The difference between the economic

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[46] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/

[47] World Travel and Tourism Council (WTTC), 2020. TRAVEL & TOURISM ECONOMIC IMPACT 2020 VANUATU. Retrieved 1 September, 2025 from https://destinationcenter.org/wp-content/uploads/2021/10/WTTC-Economic-Impact-Report-2020_vanuatu_A4-24pp-1.pdf

losses incurred by a fuel levy at $0.05/L and $0.40/L suggests that a form of price ‘ratchet’ mechanism, whereby the levy rate, or equivalent GHG emissions price, gradually increases over time, may help to mitigate potential initial economic impacts on tourism-dependent states (see below for more detail).

Any form of levy or GHG pricing mechanism will result in the generation of funds, referred to in this paper as ‘revenue’. The specificities of the measure’s design will implicate the stability and predictability of revenue. Nonetheless, it is important to consider revenue generation and distribution when assessing potential negative economic impacts on tourism-dependent economies.

Global revenues from a fuel levy applied to all commercial aviation fuel use at $0.05/L would have totalled $18.2bn in 2019.[48] Therefore, the proportion of revenues required by each of the three countries here to cover the costs incurred by the associated reduction in fuel demand are small, and at most 0.042%.

The purposes for which revenue can be used, and by whom, is a matter for careful consideration when designing an effective and equitable pricing mechanism. Our initial analysis illustrates that even in the case of flat-rate, equal revenue distribution across all Member States, the initial costs incurred by three tourism-dependent countries due to the projected loss of tourism are far outweighed by the revenues they would receive.

For example, in a scenario where revenues were distributed equally amongst the 193 UN Member States, based on 2019 figures each country would have received roughly 0.5% of total revenues, or $94m each. After covering the costs incurred by lost tourism, both Belize and Vanuatu would have had over 96% of those funds remaining to spend on climate action, while Madagascar would have 92% remaining (see Table 5). In reality, funds ought not to be distributed equally amongst the UN Member States, and those states most vulnerable to, and least responsible for, climate change must receive the majority of revenues raised.

As noted above, the tourism impacts we find are higher when the levy rate is higher. These impacts could be mitigated by equitable distribution of costs and revenues, as well as gradually increasing the levy rate to minimise the initial economic impact. Considering an equivalent measure based on a GHG emissions pricing mechanism illustrates how this gradually increasing emissions price would provide incentive for industry to decarbonise, and a means by which the economic impacts of higher emissions prices could be avoided.

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[48] Note, this is based on applying the levy to all aviation fuel use in 2019, while previous work has considered a levy on international flights only.[7] We provide a sensitivity analysis of our conclusions to applying the levy to international flights only in Appendix 2. Global industry fuel use taken from: Air Transport Action Group (ATAG), 2020. Aviation Benefits Beyond Borders (2020). Retrieved 1 September, 2025 from https://www.atag.org/resources/?p=2

Table 5. Revenue distribution can offset economic losses from tourism demand impacts.

Country	Lost tourism revenue (mn $) (rate = $0.05/L, using the maximum demand reduction estimate from the two routes analysed)	% of total, global revenue required to cover costs	% of distributed funds remaining for the country to use for climate action, after covering costs, if all 193 UN Member States receive same amount
Belize	1.78	0.010	98%
Madagascar	7.61	0.042	92%
Vanuatu	3.14	0.017	97%

Indeed, the fuel use levy considered in this piece is just one example of a potential mechanism which could raise revenue. If a measure was instead introduced which priced GHG emissions at an equivalent rate, the measure would initially generate revenue in a similar way to a fuel levy. Emissions pricing would also, however, provide market impetus for decarbonisation – for instance, it has been estimated that between 2010 and 2016, the EU ETS reduced aviation CO_2 emissions on applicable routes by around 5%.[49] By increasing the emissions price through time, countries and industry would be incentivised to accelerate decarbonisation, including as a means to minimise the economic impacts of the measure on tourism.

Conclusions and summary

This information paper provides case studies on the potential scale of economic losses experienced by Belize (SIDS), Madagascar (LDC) and Vanuatu (SIDS) due to a potential reduction in tourism demand with the introduction of a global aviation fuel levy. Our work follows the simplified methodology detailed in this paper, and the real-world impacts may be greater or lesser than those estimated here. However, our estimates provide an illustration of the potential economic impacts of a levy, or equivalently priced GHG emissions pricing mechanism, along existing tourist routes, in comparison to the potential revenues generated. The economic impacts of tourism reduction we find agree with, or are more conservative than, regional estimates found by more detailed modelling work.[50]

[49] Fageda, X., Teixidó, J.J., 2022. Pricing carbon in the aviation sector: Evidence from the European emissions trading system. Journal of Environmental Economics and Management 111, 102591. https://doi.org/10.1016/j.jeem.2021.102591

[50] Blom, M., Boerdijk, S., Meijer, C., van Seters, D., 2025. A fair share from aviation – Solidarity levies in aviation: Options for a coalition of the willing. Retrieved 1 September, 2025 from https://cedelft.eu/publications/a-fair-share-from-aviation-solidarity-levies-in-aviation-options-for-a-coalition-of-the-willing/

While there is undoubtedly an economic impact from a reduction in tourism demand, for the three countries studied the scale of these losses could be small enough that they can be compensated for by the equitable distribution of collected revenues, especially if the measure is effectively designed. For example, the losses incurred by these countries due to an initial fuel levy rate of $0.05/L (roughly equivalent to pricing aviation's CO_2 emissions at $16/t$CO_2$) are small enough that even after compensating for these, the vast majority of distributed revenues would remain available to be used for climate finance.

In summary, loss of tourism revenue in SIDS and LDCs is, undoubtedly, an important consideration in the design of any economic measure which is placed on the international aviation sector. However, the information provided in this document demonstrates that equitable distribution of costs and revenues, as well as effective measure design, can mitigate these impacts. Therefore, we recommend that **ICAO Member States agree to adopt a global GHG emissions pricing mechanism** that will drive ambitious emissions reductions and generate revenue to support climate action.

Appendix 1

Aviation PED values are a key source of uncertainty in work of this type. To assess whether our conclusions are robust when using different assumed PED values, we repeated our analysis using global average PED values from a recent publication by the International Council on Clean Transportation (ICCT).[51] This study provides global average PED values which vary by trip purpose (leisure vs business), seat class (economy vs premium), flight type (domestic vs international) and traveller income (low, mid and high).

To assess the magnitude of impacts of using different PED values, we repeated our calculations using international, leisure, mid-income PED values from the ICCT study, using economy elasticities for economy and economy plus tickets, and premium elasticities for business and first class tickets. We use global average values and do not differentiate between different geographic regions, and also assume that all travellers on the flights analysed are travelling for leisure purposes. The key differences between the two sets of PED values are that the ICCT values are overall more elastic, and differentiate between seat class with premium seats showing lower elasticity than economy seats.

The difference between economic impacts of a fuel levy at $0.05/L found using the two sets of PED values is shown in Table 6. As expected, given the overall higher elasticity assumptions, using PED values from the ICCT study results in economic impacts which are around 1.5 to 3 times larger than those we estimate.

Table 6. Comparison of the economic impacts of a global fuel levy ($0.05/L) using different PED values. The overall economic impacts are based on the maximum demand reduction obtained from the two routes analysed for each country.

Country	Lost tourism revenue from levy at $0.05/L as proportion of GDP (this study PED values, maximum estimate)	Lost tourism revenue from levy at $0.05/L as proportion of GDP (ICCT PED values,[52] maximum estimate)
Belize	0.07% of GDP	0.12% of GDP
Madagascar	0.05% of GDP	0.16% of GDP
Vanuatu	0.34% of GDP	0.68% of GDP

[51] Zheng, X. S., Shen, C., Kellogg, E., 2025. Designing an equitable aviation climate levy. Retrieved 2 September, 2025 from https://theicct.org/publication/designing-an-equitable-climate-levy-mar25/. Use values in their table 4.
[52] Zheng, X. S., Shen, C., Kellogg, E., 2025. Designing an equitable aviation climate levy. Retrieved 2 September, 2025 from https://theicct.org/publication/designing-an-equitable-climate-levy-mar25/

Despite this, the key conclusion of our work – that the economic costs of a fuel levy at $0.05/L can be compensated for by equitable revenue distribution – remains robust regardless of which set of PED values are used. This is shown in Table 7: even when using PED values from the ICCT study, both Belize and Vanuatu have more than 93% of funds remaining after compensating for lost tourism revenue in the case of flat-rate, equal revenue distribution across all Member States. For Madagascar, the proportion of funds remaining falls from 92% (this study PED values) to 76% (ICCT PED values). However, previous analysis of the intra Sub-Sahara Africa aviation market found it to be more inelastic than the global average,[53] meaning the global average PED values taken from the ICCT study likely result in an overestimation of economic impacts.

Overall, this additional analysis shows that our conclusions are robust to uncertainty in aviation PED values.

Table 7. Revenue distribution required to offset economic losses from tourism demand impacts, using different PED values.

Country	% of total, global revenue required to cover costs (this study PED values)	% of total, global revenue required to cover costs (ICCT PED values)	% of distributed funds remaining for the country to use for climate action, after covering costs, if all 193 UN Member States receive same amount (this study PED values)	% of distributed funds remaining for the country to use for climate action, after covering costs, if all 193 UN Member States receive same amount (ICCT PED values)
Belize	0.010	0.016	98%	97%
Madagascar	0.042	0.122	92%	76%
Vanuatu	0.017	0.035	97%	93%

[53] Inter*VISTAS* Consulting Inc., 2007. Estimating Air Travel Demand Elasticities. Retrieved 18 August, 2025 from https://www.iata.org/en/iata-repository/publications/economic-reports/estimating-air-travel-demand-elasticities---by-intervistas/

Appendix 2

We also investigate the sensitivity of our findings to whether the fuel levy, or equivalent GHG emissions price, is applied to all commercial flights (as in the analysis above) or international flights only. International aviation accounted for around 60% of total aviation emissions in 2023, and domestic aviation 40%.[54] Assuming these proportions also apply to fuel use, total revenues raised by a global aviation fuel levy on international flights only, at $0.05/L, would have raised roughly $11bn in 2019, compared with $18bn if the levy were applied to all commercial flights.

Assuming the economic losses from reduced tourism remain the same in either case, the proportion of revenues required to cover these costs is higher when the levy is applied to international flights only, because the total revenue collected is lower. However, even in this case, the economic losses experienced by the three countries studied here are at most 0.07% of the total, global revenues raised. After accounting for lost tourism revenue, Belize and Vanuatu would have more than 94% of funds available for climate action, while Madagascar would have 86% of funds remaining.

This illustrates that our main conclusions are robust, regardless of whether the levy is applied to all commercial aviation (i.e., domestic and international) or international aviation only.

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[54] International Energy Agency (IEA), nd. Aviation. Retrieved 1 September, 2025 from https://www.iea.org/energy-system/transport/aviation

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