Article title: Navigating the Climate Conferences: Comparing the Carbon Footprint of Private Jet Travel and Other Modes of Transport to COP28
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Navigating the Climate Conferences: Comparing the Carbon Footprint of Private Jet Travel and Other Modes of Transport to COP28

Abstract

The annual Conference of the Parties (COP) meetings are pivotal events for collective action to combat climate change. This year, as world leaders, government officials and observers convene in Dubai, UAE, for COP28, climate justice will be a central theme. In light of these negotiations, we present an updated version of UCL's carbon footprint calculator to compare different modes of transport from the UK to COP28 in Dubai. Analysing private jet data from the 2022 COP27 in Sharm El-Sheikh, Egypt, we then investigate the carbon footprint of private jet travel to COP28. The carbon footprint calculator demonstrates the carbon inefficiency of air travel compared to alternative modes of transport to COP28. As the most polluting form of transport, the carbon footprint of private jets is disproportionately high. We find that for a journey from London to Dubai, private jet travel is 9 times more polluting than a commercial flight, 35 times more than train transport and 52 times more than coach travel. Given the primary objective of COP conferences to discuss and negotiate climate change policies and actions, the use of private jets by prominent individuals undermines the core mission of these discussions. The research calls for transparency, accountability and informed choices in travel decisions to align with climate change commitments. Additionally, we explore the significance of the chosen COP venue in promoting equity, the associated carbon footprint and the influence of the hosting nation on negotiations.

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Keywords
Carbon footprint, climate change, COP, private jet, transport

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Introduction

Climate change is unequivocally recognised as one of the most pressing global challenges of our time (1). As the international community strives to implement ambitious strategies to reduce greenhouse gas emissions and avoid catastrophic climate warming, the annual Conference of the Parties (COP) meetings serve as pivotal events for collective action and negotiation (2). The COP27 meeting in Sharm El-Sheikh, Egypt saw almost 50,000 participants, including 12,000 delegates representing 195 states, convene from the 6th–18th November 2022 (3). This year, the number of participants is expected to exceed 70,000 as world leaders, government officials, and observers from industry, academia and non-profit organisations gather in Dubai, UAE for COP28 (4). The conference will take place against a backdrop of extreme weather events worldwide, multiple global temperature records and scientific data reiterating that the world is off track to limit warming to well below 2°C (1,5,6).

After last year's breakthrough agreement on establishing a new 'loss and damage' fund, aimed at offering financial assistance to vulnerable countries affected by climate disasters, climate justice will be a central theme in the COP28 discussions – in particular, for the Global South who have been focusing on climate justice through the concept of Common But Differentiated Responsibilities and Respective Capabilities since the inception of the global climate regime in 1992. Amidst these crucial decisions, the use of private aircraft by high-level delegates, symbols of exclusivity, excess and disregard for the environment, appears paradoxical. Private jets are the least fuel-efficient and most carbon-intensive modes of transport owing to the low passenger occupancy (7). Despite only accounting for 4% of global total aviation fuel use, the energy intensity of private aviation makes its environmental impact disproportionately high. As a transport option reserved for the highly affluent and global leaders, private aviation produces emissions of up to 7500 tonnes of CO_2 per year and is 5 to 14 times more polluting per passenger than the commercial equivalent (7,8). The contribution of these highest emitters to global warming is estimated to be 50,000 times greater than that of the lowest-income communities living on less than US$1.90 per day (9). Furthermore, when compared against the average annual carbon footprint per person of 4.7 tonnes in 2019, some private jets release two tonnes of CO_2 per hour shared amongst typically very few passengers (7,10). Private jets therefore embody a striking example of carbon inequality in which the most privileged contribute significantly to climate change whilst the impacts are often experienced by those least privileged (11,12).

Despite the unparalleled environmental impacts, the carbon footprint of private aviation remains largely underreported and under-regulated (7,13). In light of the upcoming COP28 meeting, this study explores the carbon footprint associated with different modes of transport to Dubai. By utilising private flight data, we first aim to quantify and evaluate the number, distance travelled and greenhouse emissions attributable to private jet travel during last year's COP27 in Sharm El-Sheikh. We then employ a carbon footprint calculator to assess the environmental impact of different transport modes to COP28, evaluating the carbon footprint of private jet travel. The study utilises the UCL carbon footprint calculator created in 2022 to calculate the carbon footprint for travel from the United Kingdom to COP27 in Sharm El-Sheikh (14). The calculator was developed to make users better informed about transport choices when travelling internationally, provide open-source data and calculations to promote transparency in carbon-footprint calculators, encourage virtual attendance, and offer best practices in carbon offsetting.

This research has critical implications for sustainable travel policies and climate-conscious decision-making surrounding high-level international conferences. The provision of empirical evidence of the carbon footprints for different transport modes to COP meetings empowers attendees to make informed choices that align with their commitment to climate action and promote transparency and accountability in global climate governance.

Methodology

COP27 private jet data

Private jet arrival and departure data for Cairo International Airport and Sharm El-Sheikh International Airport were retrieved from the global flight tracking database, Flightradar24, which provides open-source automatic dependent surveillance-broadcast (ADS-B), MLAT and radar data (15). The primary data source, ADS-B, is the world's largest network and encompasses information on the position, altitude and speed of aircraft equipped with ADS-B transponders. The ADS-B signal is detected by receivers with a coverage of 250-450 km and data from a network of receptors at different locations are compiled to cover a complete flight trajectory. While there is a requirement for all aircraft to continuously transmit these data to support air traffic management and safety, platforms such as Flightradar24 offer aircraft owners privacy options to restrict information (10). Although other networks including OpenSky Network and ADS-B Exchange provide unfiltered data, coverage is unavailable over North Africa (16,17). Where possible, the data retrieved from Flightradar24 in this research include the departure and arrival airports and aircraft model. Data gaps are, however, present due to reduced coverage over the region.

Carbon footprint calculator

The carbon footprint of different transport modes from the UK to COP28 was determined using the UCL carbon footprint calculator. The initial tool produced in 2022 for COP27 and the latest version for COP28 are available at the UCL Climate Hub (18,19). This research uses the latest version of the tool that incorporates various updates. The calculator consists of four different modes of transport: aircraft, rail, car, and coach. Journeys using these distinct modes of transport have been updated for routes to Dubai. Routes are based on a network of 33 cities with transport links between the UK and Dubai. The user is presented in the 'Results' section of the calculator with four selected routes based on carbon efficiency and convenience. Routes travelling through regions in which the UK foreign office 'Advise against all travel', including Syria and Iraq, have been excluded. Ferry transport has also not been incorporated into the tool owing to the continued suspension of services. The carbon footprint of a direct flight is compared against three routes that use rail or road transport to a waypoint (Paris, Milan or Istanbul) followed by a subsequent flight. The choice of these waypoints is based on rail accessibility and the availability of a direct flight to Dubai. The travel time and carbon footprint are presented in the results for each route (14).

International flight routes were identified using FlightConnections and car, coach and rail data sourced through the Google Maps API to generate distances (14). Flight emissions include a multiplier of 1.9 to account for the indirect effects of air travel. This is a central estimate based on the best available estimate (20–22).

Greenhouse gas (GHG) emissions have been converted to carbon dioxide equivalents (CO_2e) to account for the different warming effects of various GHG using the Global Warming Potential (GWP) factors provided in the IPCC's Sixth Assessment Report (23,24). Barnsley *et al.* (2022) provide an overview of the carbon footprint tool and further details on the calculation of flight, car, coach and train GHG emissions.

COP27 private jet carbon footprint

The UCL carbon footprint tool was used to calculate GHG emissions released from private jet travel associated with COP27. Private jet passenger load factors are based on research that determined the average occupancy of private flights in Europe as 4.7 passengers per flight and that 41% of private flights are empty lags (25). These values are divided by the average capacity (7.4 passengers) of the most popular aircraft in Europe (7):

$$Private\ jet\ passenger\ load\ factor = \frac{\%\ of\ occupied\ flights\ \times\ average\ occupancy}{average\ capacity}$$

Results

COP27 private jet travel

In the following analysis, the time period of COP27 is inclusive of the day prior to and following the meeting (5th–19th November) in which journeys are attributed to conference attendance. Figure 1 demonstrates the increase in private aircraft traffic during this period, which exceeds the baseline daily average in the weeks before and after COP27 (average = 12 private flights). During COP27, 416 private flights arrived at or departed from Cairo International and Sharm El-Sheikh Airports. The greatest number of private journeys occurred from the 6th November 2022 to the 10th November 2022 (244 flights), peaking at 62 private jet journeys on the 9th November 2022.

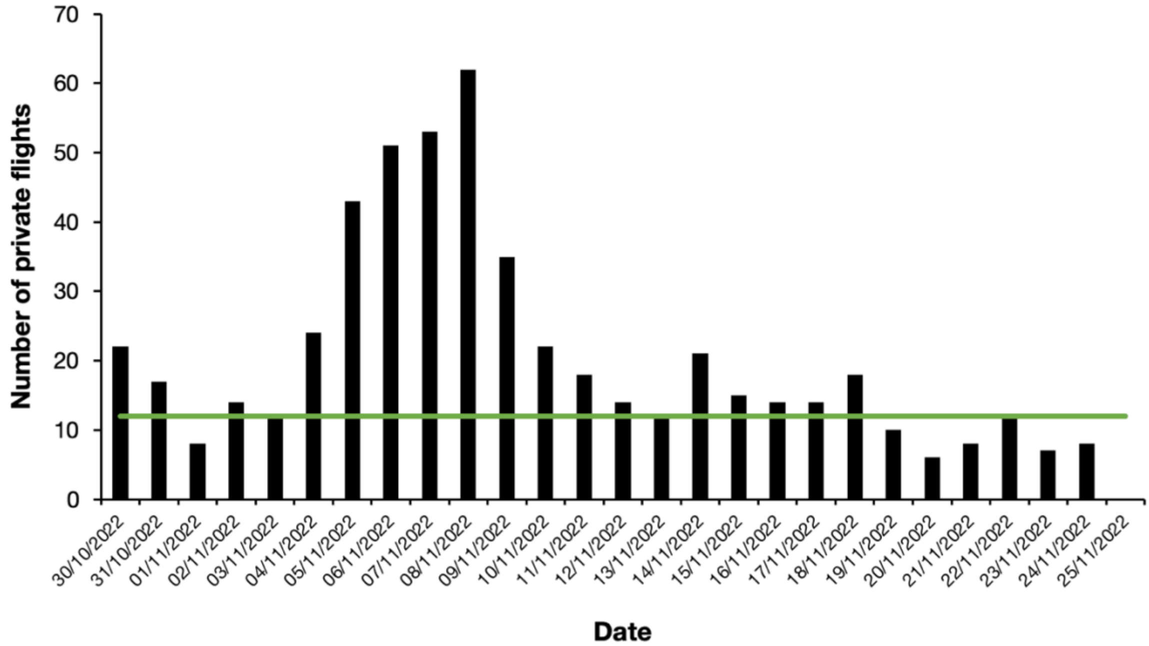

Figure 1: *Number of private jet flights arriving to and departing from the Cairo International and Sharm El-Sheikh airports before, during and after COP27 (6th-18th November 2022). The average number of private jets in the weeks before and after COP27 is displayed as a solid green line.*

Of a total of 315 private flights during COP27 with arrival and departure information disclosed, the most flown journey was between Cairo and Sharm El-Sheikh. This domestic journey accounted for 17% of all flights during the time period. The second most frequent flight path was between Cairo or Sharm El-Sheikh and London (5%) followed by Tel Aviv (4%) and Dubai (4%) (Figure 2). Europe was the top origin and destination for private flights during COP27 (45%) followed by the Middle East (24%) and North Africa (21%). This disparate global picture of private flights to COP27 is also reflected in the distance distribution of private jet journeys during the conference. The majority of flights were short-haul distances of 0–249 km (25%) and 250-499 km (19%) or long-haul journeys >3000 km (21%) (Figure 3).

The total carbon footprint of private jet flights to and from Cairo International Airport and Sharm El-Sheikh International Airport during COP27 amounted to 1.1 kilotonnes of CO_2e (Figure 4). This is equivalent to 23,134 petrol cars and 72,872 train journeys travelling the most common COP27 private jet journey between Cairo and Sharm El-Sheikh.

Figure 2: *Number of private jet flights on flight paths arriving to and departing from the Cairo International and Sharm El-Sheikh airports during the time period of COP27 (5th-19th November 2022). Airports are displayed as purple dots and flight paths as pink lines.*

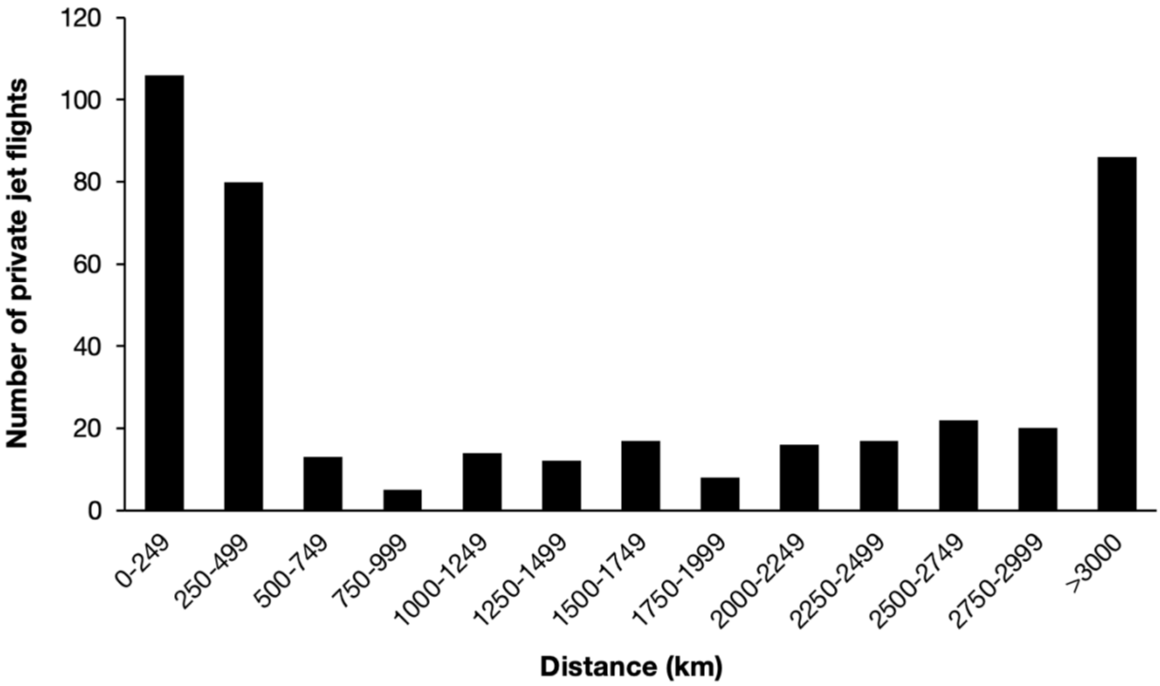

Figure 3: *Distance distribution of private jet flights arriving to and departing from the Cairo International and Sharm El-Sheikh airports during the time period of COP27 (5th-19th November 2022).*

Carbon footprint of travel to COP28

A comparison of journeys between London and Dubai using the UCL COP28 carbon footprint calculator reveals a range of carbon footprints (444–815 kgCO_2e) depending on the transportation mode and route (Figure 5). In general, routes combining train, coach or electric car transport in addition to air travel emit the lowest GHG emissions. The most carbon efficient transport route involves coach travel via Istanbul combined with a flight from Istanbul to Dubai (444 kgCO_2e) with a carbon footprint 229 kgCO_2e lower per passenger than a direct flight from London to Dubai (673 kgCO_2e). Electric car (463 kgCO_2e) and train (494 kgCO_2e) travel to Istanbul are additional low-carbon footprint alternatives, saving 31% and 27% GHG emissions compared to a direct flight, respectively. Routes combining diesel and petrol car travel with a flight are the least carbon efficient. Concurrently, a petrol-engined car journey to Istanbul alongside a flight from Istanbul to Dubai has the largest carbon footprint (815 kgCO_2e), emitting 142 kgCO_2e more per passenger than a direct flight from London to Istanbul.

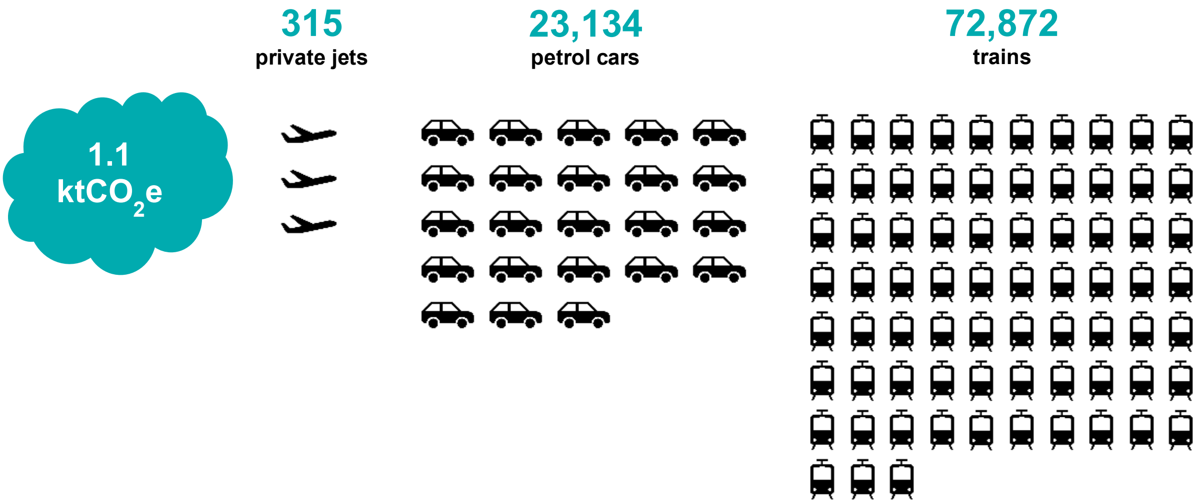

Figure 4: *Comparison of carbon footprint per passenger (1.1 ktCO_2e) for all private jet flights during the time period of COP27 (5th-19th November 2022) against petrol car and train journeys. Car and train journeys are based on distance (382 km) of the most common flight path between Cairo and Sharm El-Sheikh. Car journeys are calculated for a Vauxhall Corsa and train journeys are based on the European rail network.*

Based on the most frequently flown private aircraft types to COP27, a private jet journey to COP28 would release between 7735 to 11,154 kgCO_2e per passenger (Figure 6). The most commonly used commercial aircraft travelling from London to Dubai emit 673 to 1174 kgCO_2e per passenger. Therefore, the average private jet (9022 kgCO_2e) emits 10 times more kgCO_2e per passenger than the average commercial aircraft (923 kgCO_2e) travelling from London to Dubai.

The carbon intensity of a private jet journey (1413 gCO_2e per passenger) from London to Dubai is 9 times greater than a commercial aircraft (152 gCO_2e per passenger) (Figure 7). Coach travel is the least carbon intensive mode of transport (27 gCO_2e per passenger) followed by the electric car (32 gCO_2e per passenger) and train transport (40 gCO_2e per passenger).

The carbon footprint of one person travelling from London to Dubai for COP28 by private jet would be equivalent to 11 people travelling by direct commercial flight (Figure 8). In comparison, 16 people could travel by train and 17 people by electric car or coach to Istanbul followed by a direct flight to Dubai.

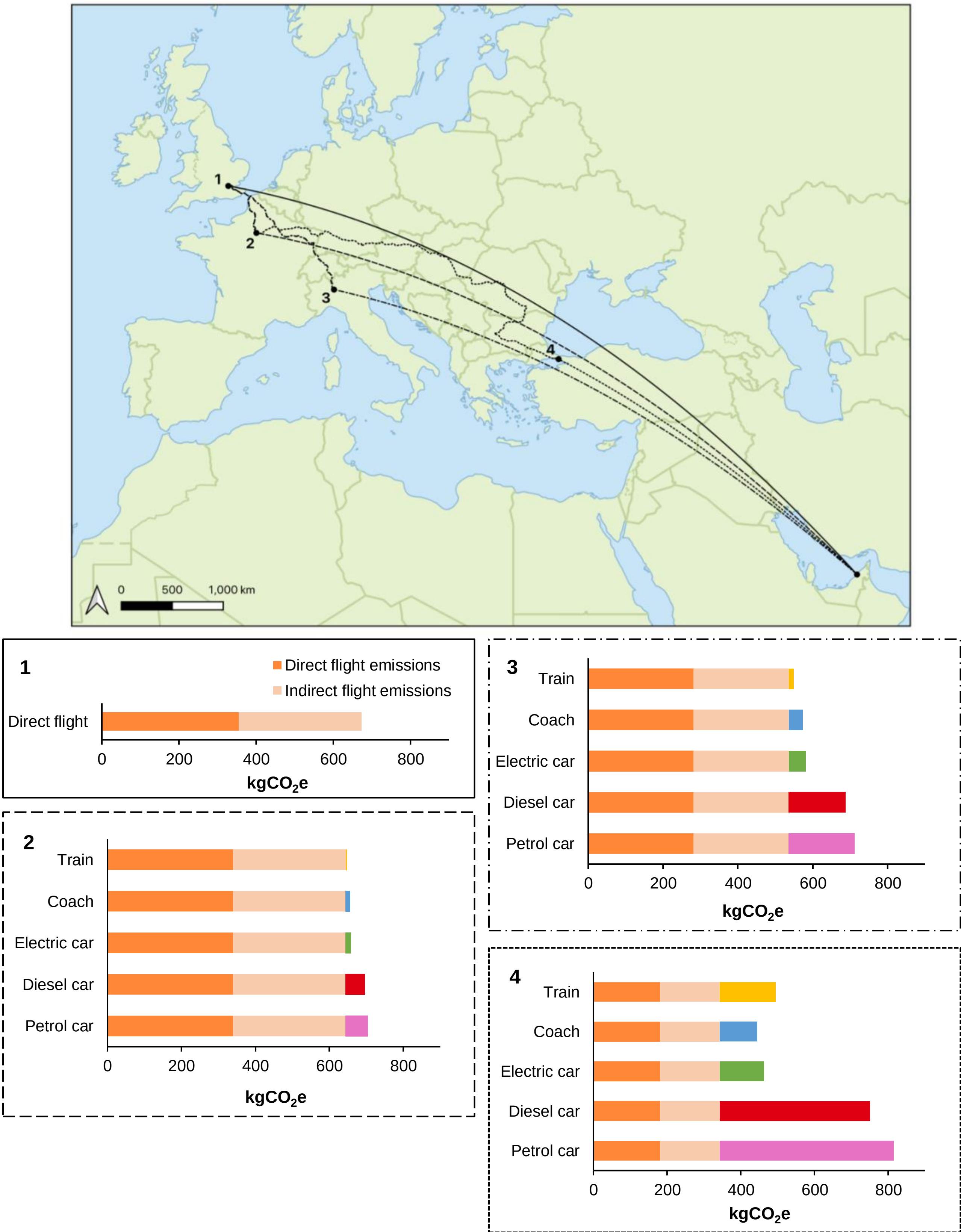

Figure 5: *Carbon footprint per passenger (kgCO₂e) of different routes from London to Dubai for COP28 involving different modes of transport. Direct and indirect emissions from flights are displayed separately. Flights are based on an Airbus 380-800 and car journeys are calculated for a Vauxhall Corsa.*

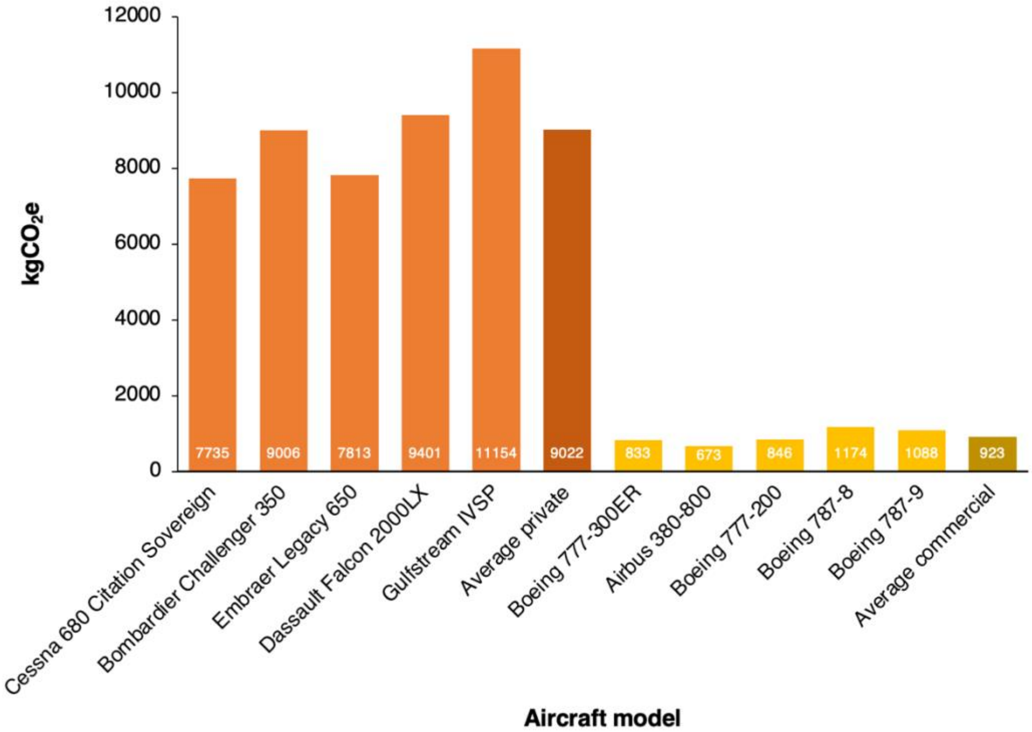

Figure 6: *Comparison of the carbon footprint per person (kgCO_2e) of private jet (five most common models based on COP27 data) and commercial aircraft for journeys from London to Dubai for COP28.*

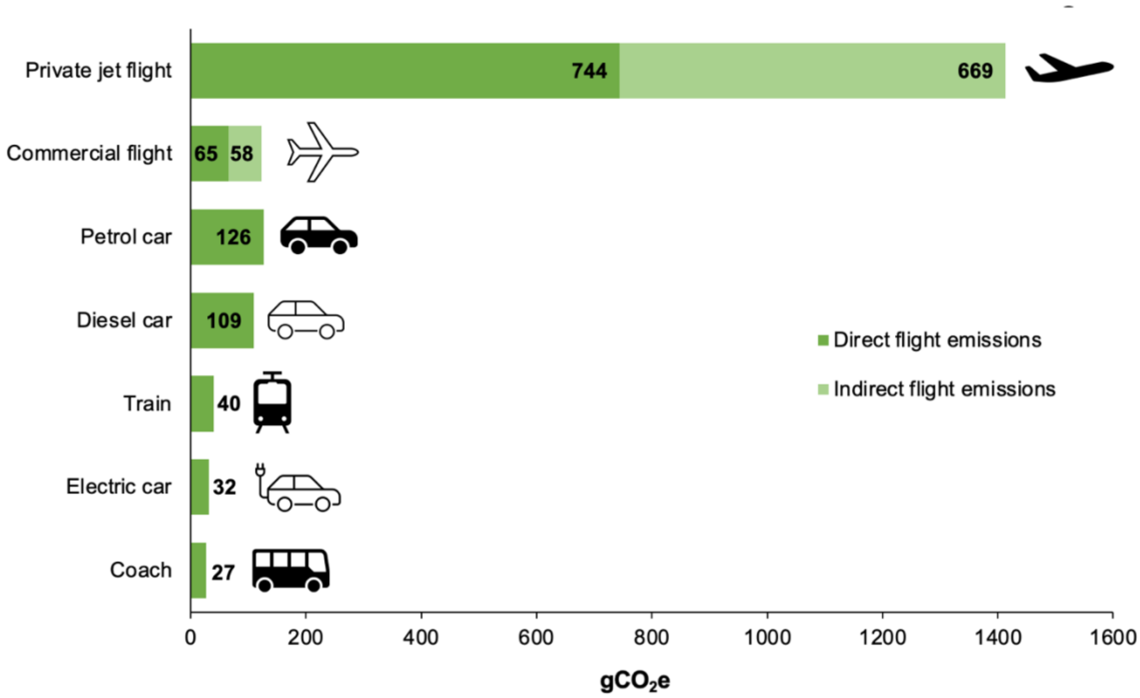

Figure 7: *Carbon intensity (gCO_2e) of different modes of transport to COP28. Flight emissions are based on journeys from London to Dubai. Car, train and coach emissions are based on journeys from London to Istanbul. Private jet emissions are based on a Cessna 680 Citation Sovereign (most common in COP27 data), commercial flight emissions are based on an Airbus A380-300 and car journeys are calculated for a Vauxhall Corsa.*

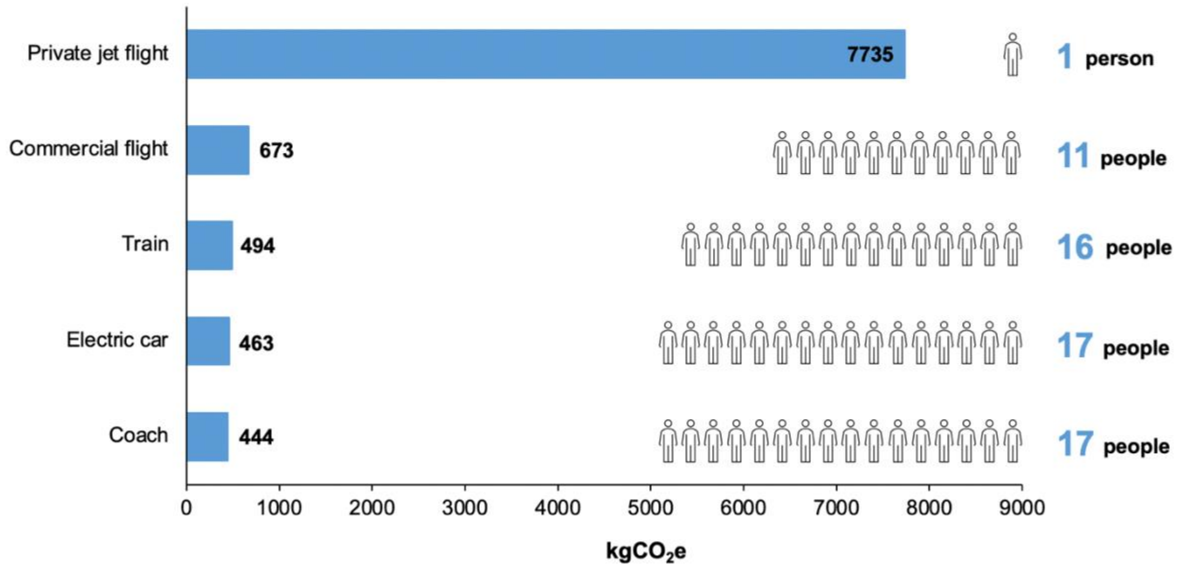

Figure 8: *Carbon footprint per person (kgCO_2e) of different modes of transport from London to Dubai for COP28. Private jet emissions are based on a Cessna 680 Citation Sovereign (most common in COP27 data), commercial flight emissions are based on an Airbus A380-300 and car journeys are calculated for a Vauxhall Corsa. Train, electric car and coach journeys are from London to Istanbul followed by a direct flight to Dubai. The number of people on different modes of transport that would have the same carbon footprint as a single person travelling by private jet is displayed.*

In comparison to the previous two COP meetings, the carbon footprint per passenger for attendees travelling from London is highest for COP28 (Figure 9). For example, directly flying to COP28 incurs a carbon footprint per passenger of 673 kgCO_2e compared to 481 kgCO_2e for COP27 and 92 kgCO_2e for COP26. Train (17 kgCO_2e), electric car (18 kgCO_2e) and coach (18 kgCO_2e) travel is lowest to COP26 as no direct flight is involved. While the carbon footprint for train, electric car and coach travel to Istanbul for COP27 and COP28 is the same, the subsequent direct flight to Dubai (343 kgCO_2e) releases more emissions than flying to Sharm El-Sheikh (224 kgCO_2e).

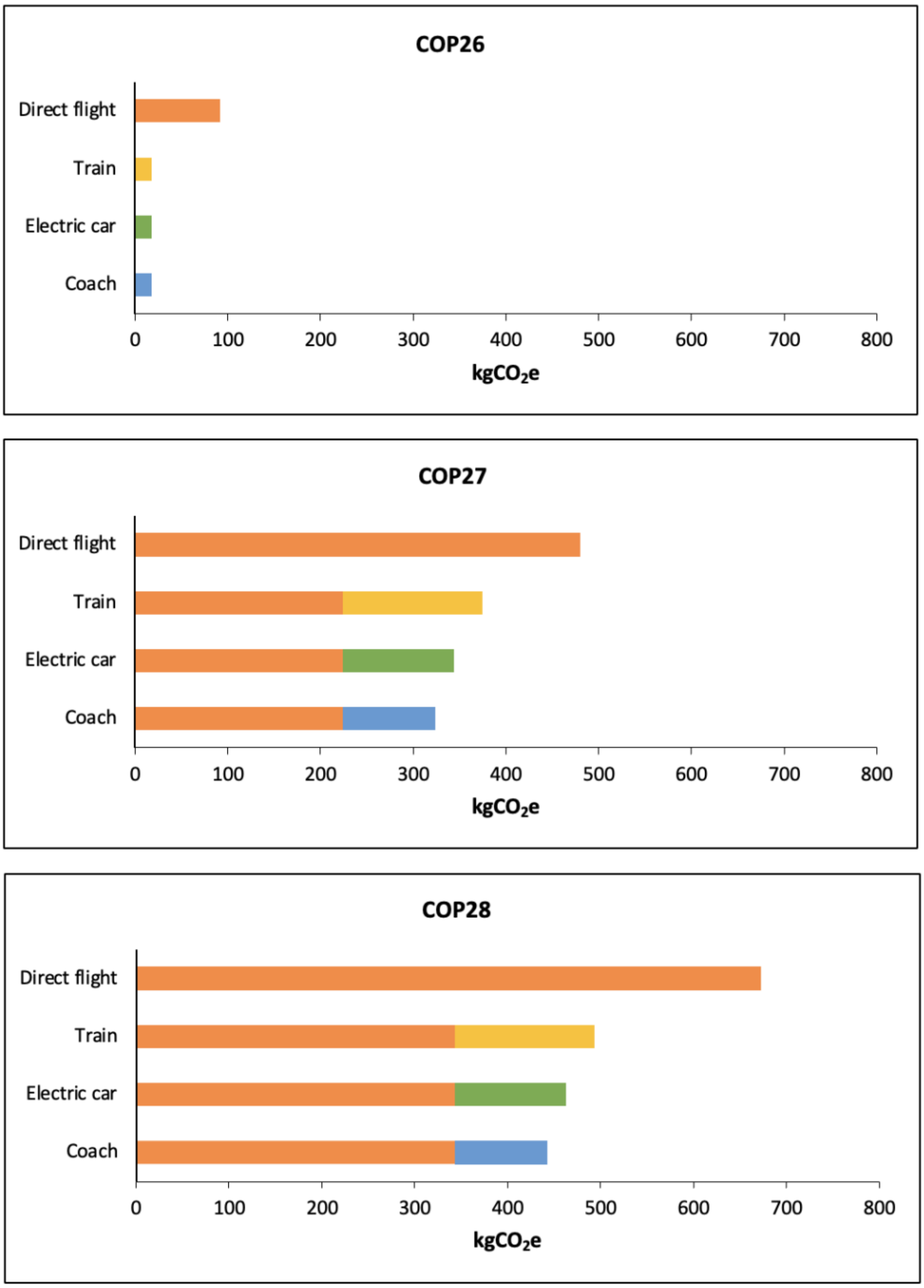

Figure 9: *Comparison of the carbon footprint per passenger (kgCO_2e) from London to COP26 (Glasgow), COP27 (Sharm El-Sheikh) and COP28 (Dubai) involving different modes of transport. Train, electric car and coach journeys are based on travel to Istanbul followed by a direct flight to Sharm El-Sheikh (COP27) or Dubai (COP28). Direct flight emissions are coloured orange. Car journeys are calculated for a Vauxhall Corsa.*

Discussion

Environmental Impact of aviation

Transportation is a significant contributor to global GHG emissions accounting for around 15% of total GHG emissions and almost one-quarter of carbon emissions from the energy sector (26). However, different modes of transport vary widely in their environmental impact. Aviation is one of the most carbon-intensive forms of travel and widely acknowledged as a ‘hard-to-decarbonise’ sector (27). This is due to its heavy reliance on energy-dense liquid fossil fuels (fossil kerosene-based Jet A/A-1) and slow fleet turnover (26,28,29). Globally, aviation fuel use and emissions have sustained a multi-decadal growth with CO_2 emissions estimated to reach up to 1.9 $GtCO_2$ by 2050, around 2.6 times greater than 2021 values (30). Our analysis of the carbon intensity of different transport modes to COP28 reveals commercial air travel (152 gCO_2e per passenger) to be four times more polluting than train transport (40 gCO_2e per passenger) and six times more than coach travel (27 gCO_2e per passenger) for a journey from London to Dubai.

Another challenge for decarbonising air travel is its impact beyond merely CO_2 emissions. Aviation contributes to climate warming through the release of CO_2 and non-CO_2 emissions (31–33). The non-CO_2 pollutants or ‘indirect effects’ include nitrogen oxides (NOx), sulphur dioxide, soot particles and water vapour. Through changes in the chemical composition of the atmosphere and cloud cover, these emissions impact the Earth-Atmosphere radiation budget. Although there are both warming and cooling effects resulting from non-CO_2 emissions, the net impact is a positive radiative forcing (34). The largest positive climate forcings are from NOx emissions and the production of contrails and cirrus clouds (22). Although indirect effects result from the release of emissions for all types of transport, the impact on radiative forcing is most significant high in the atmosphere. This makes aviation a particularly polluting mode of transport.

There remains significant uncertainty in quantifying the size of aviation’s non-CO_2 effects on climate as they are both extremely complex and non-linear, especially regarding short-lived climate forcers such as contrails (35). In addition, a large proportion of research does not focus on the full array of non-CO_2 effects with only a few studies determining the net radiative forcing of global aviation (22,33,36). As a result, indirect-effect estimations have 8 times more uncertainty compared to CO_2 emissions. Formulating a metric to account for the short-lived indirect effects and long-lived CO_2 emissions of aviation thus invokes a series of scientific and policy challenges. The simplest approach involves applying a CO_2 equivalent emissions 'multiplier' averaged across aircraft models and atmospheric conditions (34). However, the size of the 'multiplier' could vary between 1 and 4 times the direct emissions depending on the time horizon and emission metric (21,33).

While the indirect effects of aviation have become a discussion point in science and policy, it is excluded from global climate policy. Notably, radiative forcing from aviation is absent from both the Kyoto Protocol and Paris Agreement (37). However, as the IPCC states *"reaching and sustaining net-zero global anthropogenic CO_2 emissions and declining net non-CO_2 radiative forcing would halt anthropogenic global warming on multi-decadal time scales."* (38). In order to achieve net zero in the aviation sector, both direct carbon emissions and non-CO_2 forcings need to be tackled. Moreover, there is further oversight in the monitoring and regulation of the aviation sector nationally and internationally. For example, domestic commercial and private aviation activity is placed under the responsibility of nation states in the 2016 Paris climate agreement and international aviation is not included (8,33). The omission of a large share of aviation emissions in global mitigation plans highlights that aviation's contribution to climate change is not fully considered. At COP28, there will be a global stocktake, which will assess how on-track (or off-track) the world is in tackling the climate crisis. The International Civil Aviation Organisation is to submit their updates to this global stocktake. They have a long-term aspirational goal of achieving net-Zero emissions by 2050, that are supposed to include new technologies, operational tools, as well as fuels and cleaner energies that could move the sector towards this target (39). The international community (including states and civil society) need to pay attention to the strategies coming out of ICAO and what they submit before COP28, especially as the 3rd Conference on Aviation Alternative Fuels (CAAF/3) will take place the week prior.

Private jet travel to climate meetings

Private jet travel is currently our most polluting mode of transport, consuming large amounts of fuel and carrying relatively few passengers. For example, on a journey from London to Dubai, the carbon footprint of private jet travel is 10 times higher per passenger than the average commercial flight. In terms of carbon intensity (the amount of CO_2e emissions released to travel one kilometre per passenger) private jet travel is 9 times more polluting than a commercial aircraft, 35 times more than train transport and 52 times more than coach travel. These results closely align with other research that shows private jets to be 5 to 20 times more polluting per passenger than commercial alternatives and 50 times more than trains (7,40).

Use of private jets by world leaders, corporations and the super-rich is receiving increasing attention (41). During the World Economic Forum 2022 in Davos, a study recorded 1040 private jets emitting 9700 tonnes of CO_2e (42). Overall, the total carbon footprint of private jet flights to and from Cairo International Airport and Sharm El-Sheikh International Airport during COP27 is estimated to have been 1.1 kilotonnes of CO_2e. This is equivalent to 23,134 petrol cars and 72,872 train journeys travelling the most common COP27 private jet journey between Cairo and Sharm El-Sheikh. Given the overarching goal of COP conferences to discuss and negotiate climate change policies and actions to reduce most effectively carbon emissions, use of private jets by high-profile individuals clearly undermines this goal. Such use is a symbol of excess and disregard for the environment, undermining the credibility of attendees and the conference itself. Showcasing a lack of commitment to sustainable practices shapes public opinion and influences the behaviour of others. Given the current absence of viable low-carbon alternatives and limited regulatory pressure, behavioural change plays a crucial role in reducing end-use emissions (43,44).

It is true that private jets can serve specific purposes for convenience and safety, particularly in the case of world leaders (45,46). Questions remain, however, over the necessity of many short-distance flights that amplify the disproportionate climate impact of private jets. Over shorter distances, planes are less efficient due to the higher fuel consumption of take-off and landing phases compared to cruising. Of a total of 315 private flights during COP27 with arrival and departure information disclosed, most flights were short-haul distances of 0-249 km (25%), compared to 250-499 km (19%) and long-haul journeys >3000 km (21%). The most common flight was a domestic short-haul journey between Cairo and Sharm El-Sheikh (382 km), accounting for 17% of all flights during the time period. Broader analyses of private flights across the EU demonstrate that private flights are commonly used for short distances. Almost 50% of domestic EU private flights are short-haul (<500 km) compared to less than 25% of commercial aircraft flying short distances (7).

Private jet travel is closely correlated with affluence and lifestyle, a means of transport accessible only to a small fraction of the population due to its high cost (44). The use of private jets by a select group of attendees worsens perceptions of inequality and exclusivity, especially in a forum like COP28 that aims to address global environmental challenges with broad participation. The carbon footprint of a single person flying by private jet to COP28 is equivalent to 11 passengers on a commercial direct flight. As the ‘loss and damage’ fund is a key agenda item of COP28, the environmental impact of private jets epitomises concerns around climate justice. The outsized carbon footprint of the few contributes disproportionately to climate change, whose impacts are often greatest for the most vulnerable and lowest carbon emitters (8).

The location and context of COP28

For attendees to COP28 travelling from Europe, the volatile situation in Syria and Iraq and suspension of trans-Mediterranean ferries requires the use of flight for part or the entirety of the journey. There are limited benefits in carbon efficiency between direct routes and travelling part-way by rail, coach or car. In general, travelling from the UK to Istanbul by coach, train or electric car followed by a direct flight to Dubai offers the lowest carbon footprint. Such a route may not be viable given the significant time and financial cost. The limited efficiency gains are largely a result of the higher carbon intensity of short-haul flights (14). In comparison to COP26 and COP27, the carbon footprint of travelling to COP28 from London is unsurprisingly higher, largely due to the additional emissions released from the longer flight. Promoting equity is an important aspect of hosting COP in different regions of the world. The location of Dubai with conflict zones blocking land routes from Europe, Asia and Africa makes flying at least part of the journey from most regions necessary and heightens its associated carbon footprint.

The hosting of COP28 in the major oil and gas-producing nation of the UAE will take place amid a backdrop of reinvigorated fossil fuel production and consumption. Based on current pledges, the UAE's climate action is rated as 'insufficient' by the Climate Action Tracker (47). Planned fossil fuel developments to reach 'gas self-sufficiency' and increase exports currently render its new Nationally Determined Contributions (NDC) targets unachievable. Furthermore, reports have focused on the hypocrisy of appointing an oil executive as the COP28 president and the active encouragement of participation of the fossil fuel industry (48). The involvement and influence of fossil-fuel companies threaten to undermine discussions, a concern that has escalated in recent years. During COP26, fossil fuel industry attendees outnumbered the number of delegates from any single country. At least 636 fossil fuel lobbyists registered to attend COP27, a 25% increase from COP26. The UAE has the largest number of fossil fuel lobbyists of any country, amounting to 70 attendees (48).

Conclusion

Climate conferences play a pivotal role in shaping the future of our planet. As the world grapples with the urgent need to address climate change, it is crucial to scrutinise the environmental impact of transport choices to the very negotiations that aim to find solutions. This study has demonstrated the substantial carbon intensity of private jet travel, emitting significantly more GHG emissions per passenger compared to any other mode of transport. This disproportionate environmental impact highlights a concerning paradox, where world leaders who have the greatest capacity to influence and implement climate policies, often engage in practices that exacerbate the problem. It underscores the need for greater awareness and accountability and raises questions about commitments to climate action, equity and climate justice. It also serves as a reminder of the importance of collective action, responsible decision-making and commitment to reducing emissions across all sectors of society.

Here, we consider the choice of location for COP, the associated carbon footprint of travel and the possible challenges arising from links to the fossil fuel industry. The research also highlights the importance of promoting sustainable travel and low-carbon alternatives for attendees to such conferences. By providing empirical evidence of the climate impact of different transport modes, the UCL carbon footprint calculator empowers conference participants to make informed choices that align with their commitment to address climate change.

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Authorship contribution

All authors contributed to the research design, analysis and writing of this article.

Data availability statement

The datasets generated and analysed during the current study are available in the repositories: https://www.ucl.ac.uk/climate-change/cop27-carbon-footprint-calculator
https://www.ucl.ac.uk/climate-change/cop28/cop28-carbon-footprint-calculator

Declarations and conflicts of interest

The authors declare no competing conflicts of interest. Ethics approval was not necessary.

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