Quantifying Scope 3 CO_2 Emissions Associated with Employee Air Travel at Boston University

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Campus Climate Lab
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Background

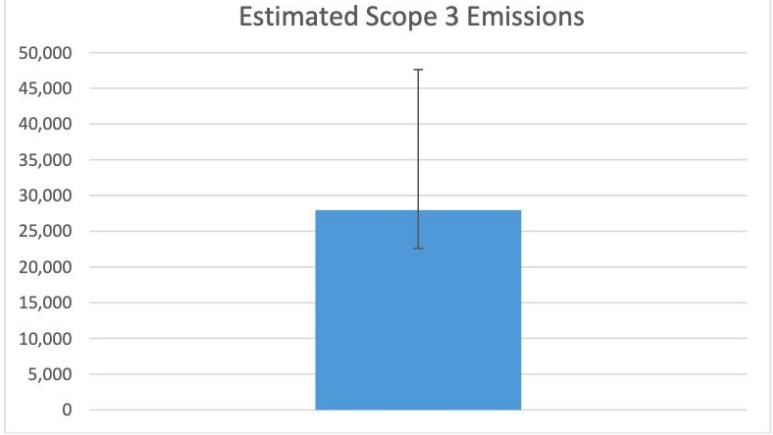
What are we investigating?

- Scope 3 CO_2 emissions associated with BU employees' business travel
- Previous work by Transportation Working Group of the Climate Action Plan (2015)

What are Scope 3 Emissions?

- Induced emissions, eg.:
  - commuting, travel, waste disposal, purchasing supplies, dining services
- On the order of 200,000 MT CO_2e, greater than Scopes 1 and 2 combined (129,400 MT CO_2e)

Chart 1. Estimated Scope 3 emissions with uncertainty bounds.



Methodology Summary

Collected over 46,000 employee flight records from Concur in the period from 2017 through early 2020.

Emissions were calculated using the ICAO carbon emissions calculator (ICEC).

Flight records and emissions were analyzed using R software.

Distributed a survey to explore the flight behavior of a sample of 118 staff and faculty at BU.

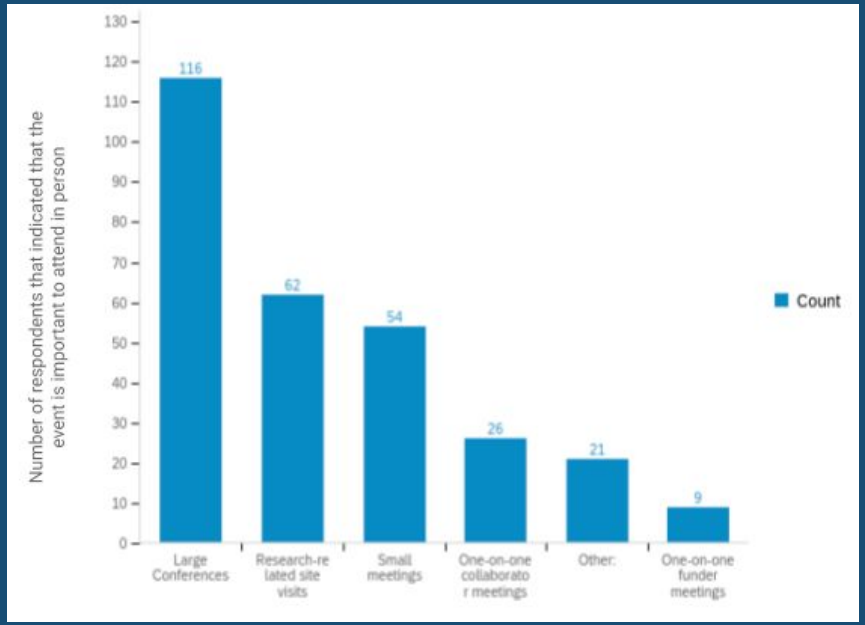
Survey results were analyzed using Qualtrics.

Survey and flight data results were examined in order to make estimates about total emissions.

Survey Results - Key Findings

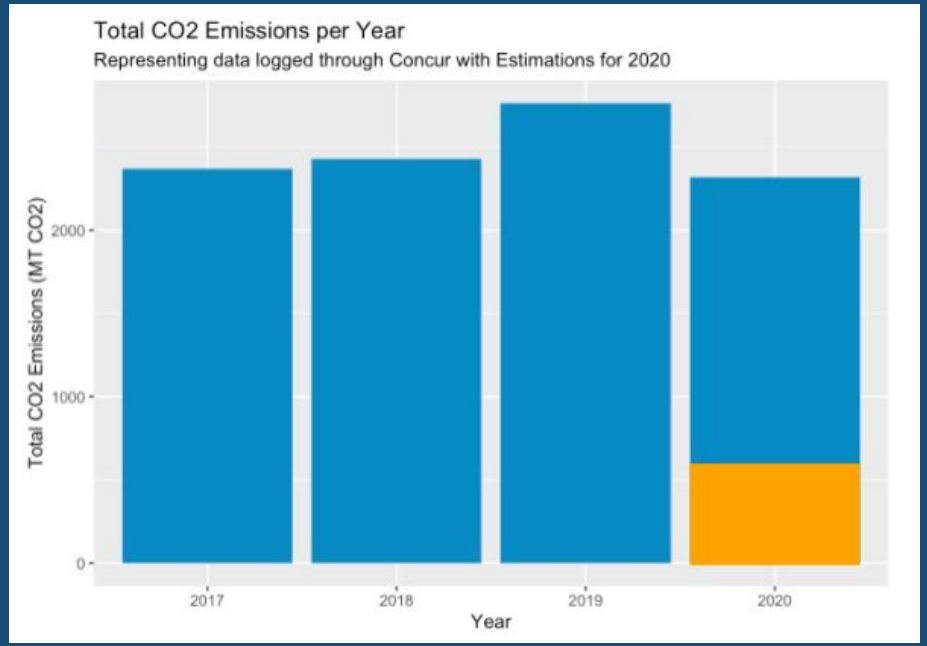
On average, the employees in our sample self-reported that only 33% of their flights are booked through the Concur platform.

Despite the changes that have been made since early 2020 and the start of the COVID-19 pandemic, the majority of our respondents said that they expect to fly as much as before COVID-19 once travel is deemed safe again.



Concur Data Results - Key Findings

We were able to determine total CO2 emissions for our flight data from Concur, as well as information about the location and quantity of flights from 2017 through early 2020.



Estimates

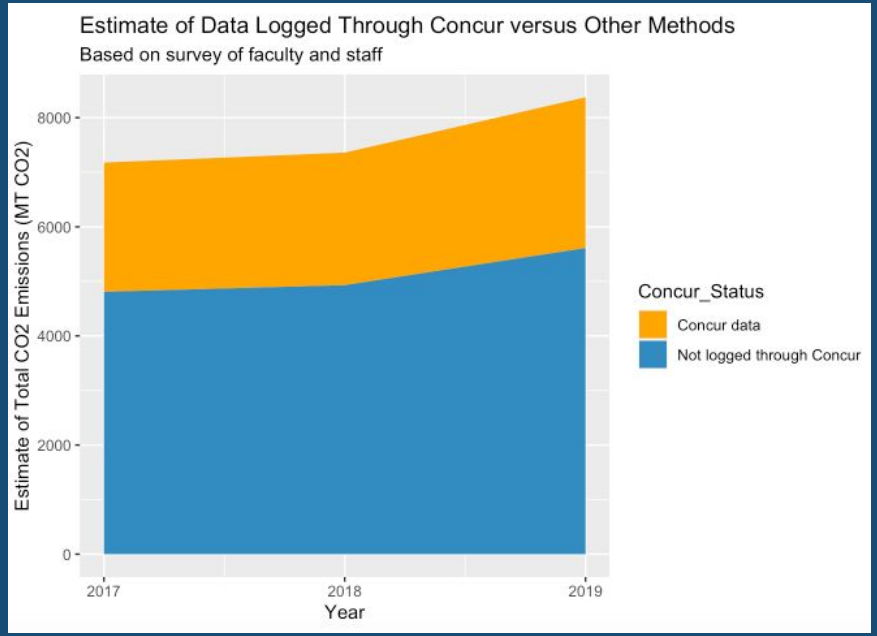
We estimated total yearly emissions based on two models: Best Case and Worst Case.

Best Case: the flights reported through Concur account for all employee travel in 2017 through 2020.

Worst Case: Concur records account for only 33% of all employee flights, as reported in our survey.

Emissions Estimations (MT CO2)

Year	Best-Case Estimate	Worst-Case Estimate
2017	2369	7177
2018	2429	7360
2019	2764	8376
2020	2319	7027
Total 2017-2020	9880	29940



Recommendations

1. **Mandate the usage of Concur for travel booking**

2. **Increase promotion of alternate forms of travel (eg., bus, train, car) for shorter-distance business trips**

   NYC was the most common domestic destination, easily accessible by Amtrak - fewer emissions (and less $$)

3. **Maintain use of teleconferencing post-COVID-19**

   Survey results: 66% of travel is necessary for professional development

   Some in-person travel, and some flights, will always be necessary

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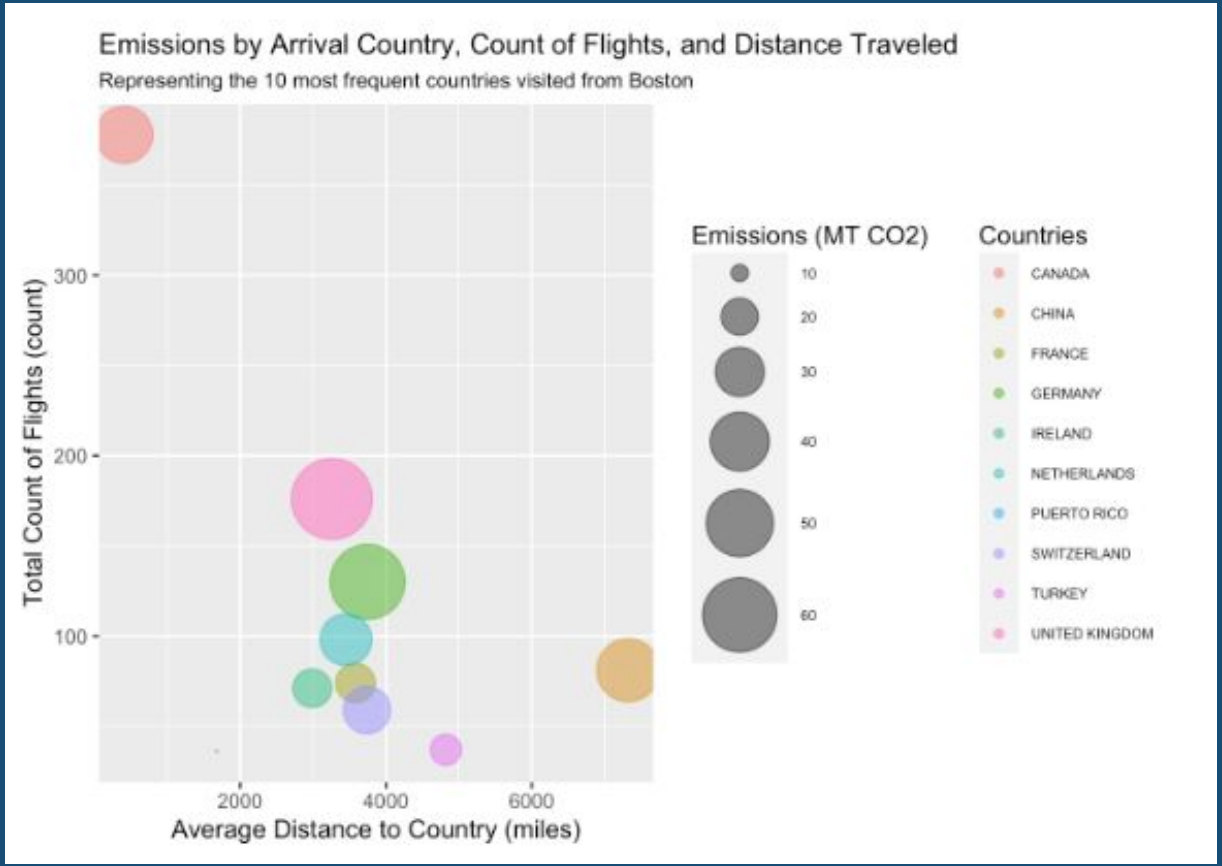
Questions?


Emissions by Arrival Country, Count of Flights, and Distance Traveled
Representing the 10 most frequent countries visited from Boston
Total Count of Flights (count)
300
200
100
2000
4000
6000
Average Distance to Country (miles)
Emissions (MT CO2)
10
20
30
40
50
60
Countries
CANADA
CHINA
FRANCE
GERMANY
IRELAND
NETHERLANDS
PUERTO RICO
SWITZERLAND
TURKEY
UNITED KINGDOM

Conclusions

Most common domestic destinations from Boston:

- New York
- Philadelphia
- Chicago
- Charlotte
- Washington, D.C.

-> all short-haul flights*

* 6 hours or less, as defined by the International Air Transport Association (IATA)

Challenges

1. Finding an accurate, verified platform for calculating emissions

   Documented and informed methodology; preferably open-source

2. Coding/Scraping

   Limitations of ICEC website and our own experience

3. Making sound estimations/assumptions

-> Learning experience at every step!

Conclusions

Total recorded emissions: 2,368.54 MT CO_2

Actual total could be up to 7,177 MT CO_2

Average distance flown: 1,245.44 miles.

About the distance from Boston to Miami, Florida (1,258 miles)

Many, short-distance flights were comparable in emissions to fewer, long-distance flights

ICAO Flight Emissions Calculator

One Way/Round Trip	Cabin Class	Number of Passengers
Round Trip	Economy	1

Leg	From City/Airport	To City/Airport
1		

Delete All Location(s) | Delete Leg | Add New Leg

Reset | Compute

Metric (KG / KM) | **Standard** (LBS / MI)