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# Energy Saved with Online Conferences

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01

Motivation

03

Method

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02

Data

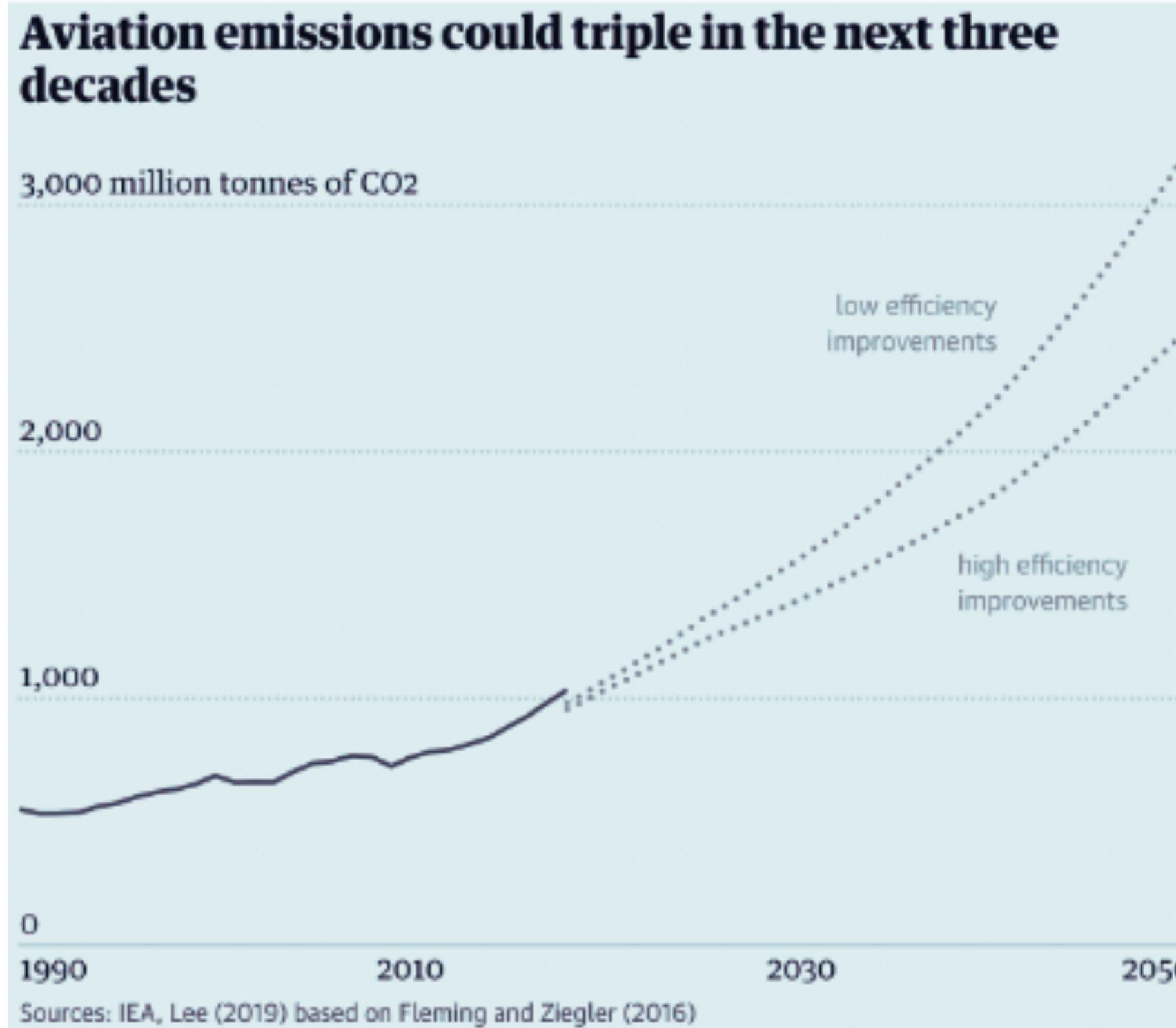
04

Results

# 01

## Motivation and Objective

# An Increasing Trend in Aviation Emissions



# Our Objective

- Provide an estimate for the total energy that could be saved by moving academic conferences online.
- Consider energy consumed by plane and train.



# 02

## the Data We Used

# AMERICAN MATHEMATICAL SOCIETY & CANADIAN MATHEMATICAL SOCIETY

- 2019 AMS Conference in Seattle, WA, USA
- 2020 CMS Conference in Montreal, ON, Canada
- we web scraped attendees data of the two conferences



03

Methods

# Random Sampling

- Simple random sample with size of 200 attendees from each conference.
- We found the nearest airport from their affiliation and then calculated the distance to the destination airport from there
- Trains were used in CMS data for people from areas around Montreal



# Our Final Dataset

Unnamed: 0	attendee	affiliation	attendee need to arrive before dec.2 2020, WED	airport (a1, a2, a3,...)	international flight distance (km)	domestic flight distance (km)	short- haul distance (<=1,500 km)	medium-haul distance(1501- 4099km)	long-haul distance (>=4,100km)	commuting distance (km)	Train Distance (km)	Date: <b>December 3-8 2020</b>	time traveled
0	492	Lerna Pehlivan	University of Twente	NaN	(AMS,EWR,YUL)	6416.0	NaN	532.0	NaN	5884.0	NaN	NaN	8 h 32 min
1	412	Daniele Mastrostefano	University of Warwick	NaN	(BHX, FRA, YUL)	6638.0	NaN	767.0	NaN	5871.0	NaN	NaN	8 h 48 min
2	252	Adam Harper	University of Warwick, UK	NaN	(BHX, FRA, YUL)	6638.0	NaN	767.0	NaN	5871.0	NaN	NaN	8 h 48 min
3	614	Alan Thompson	Loughborough University	NaN	(BHX, ZRH, YUL)	6936.0	NaN	923.0	NaN	6013.0	NaN	NaN	9 h 9 min
4	686	Cole Zmurchok	Vanderbilt University	NaN	(BNA, LGA,YUL)	1752.0	NaN	1752.0	NaN	NaN	NaN	NaN	3 h 2 min

# Categorizing Flight Travel Distances

- short haul distance: less than or equal 1500km
- medium haul distance: between 1500km and 4099km
- long haul distance: more than 4099km
- fuel use for short haul flights: 0.034 L/km
- fuel use for medium haul flights: 0.028 L/km
- fuel use for long haul flights: 0.030 L/km



# Information on Energy Consumption of VIA Trains

- The average diesel fuel consumption per passenger per kilometer for VIA Rail in Canada can vary depending on a number of factors, such as the type of train, the route, and the occupancy rate.
- The average fuel consumption per passenger per kilometer for our long-distance trains was 0.066 litres



# Calculating Energy Usage

Flight fuel use per passenger (L) = short haul distance traveled (KM) \* 0.034(L/KM) + medium haul distance traveled (KM)\* 0.028(L/KM) + long haul distance traveled (KM)\* 0.030 (L/KM)

Train diesel usage per passenger (L)= distance traveled (KM)\* 0.066 (L/KM)

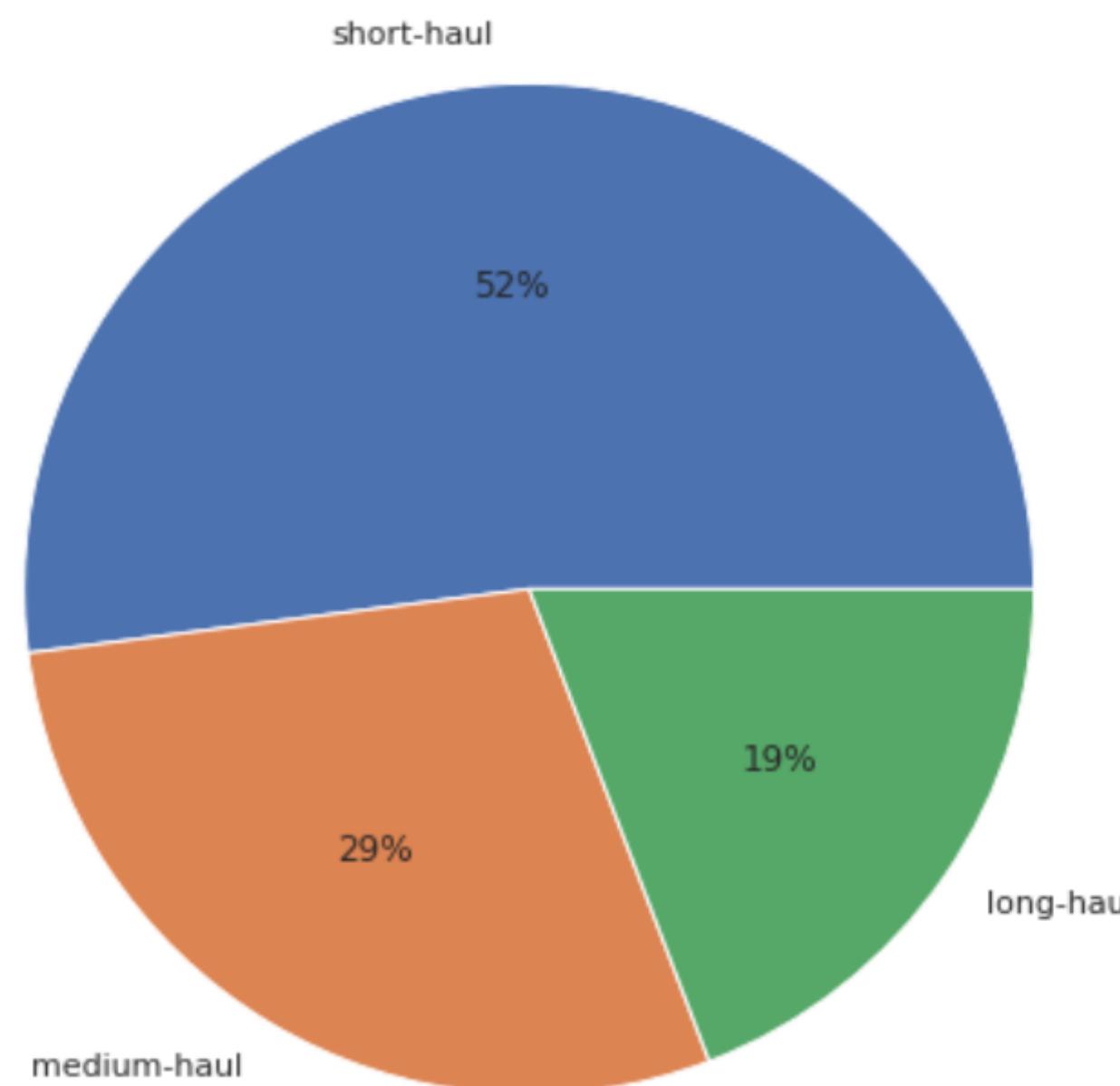


# 04

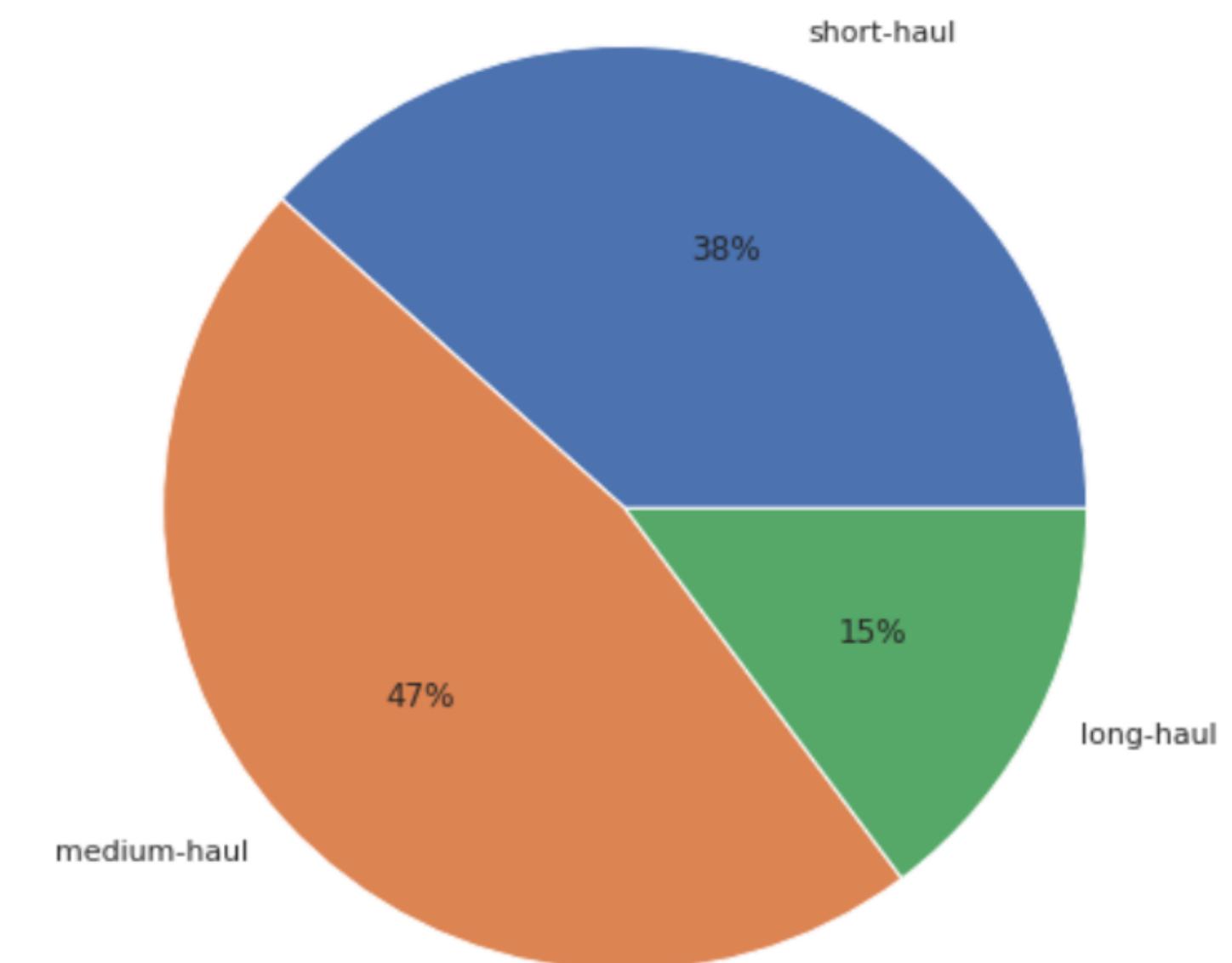
## Results

# A Breakdown of Distance Travelled by the Attendees

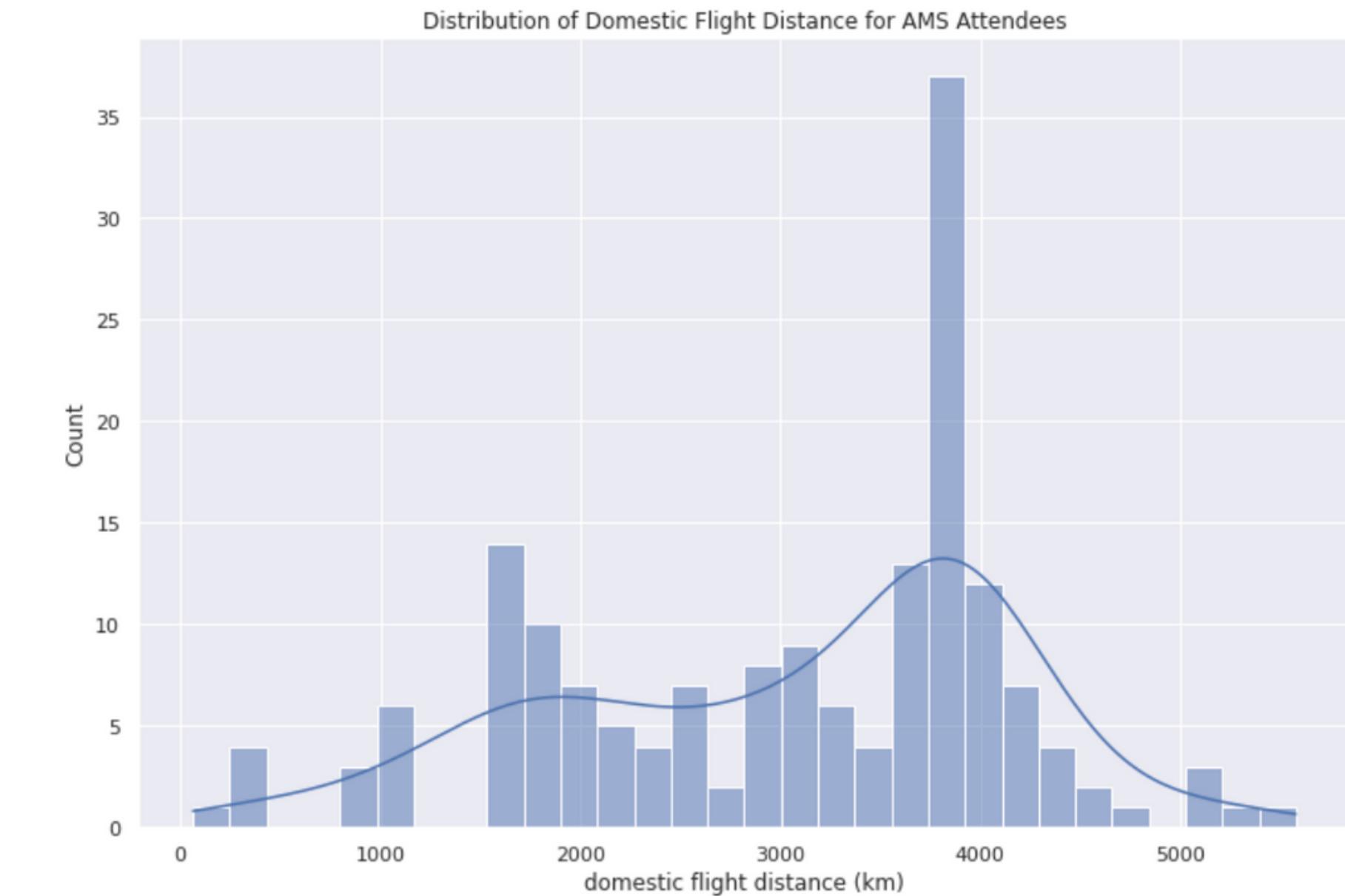
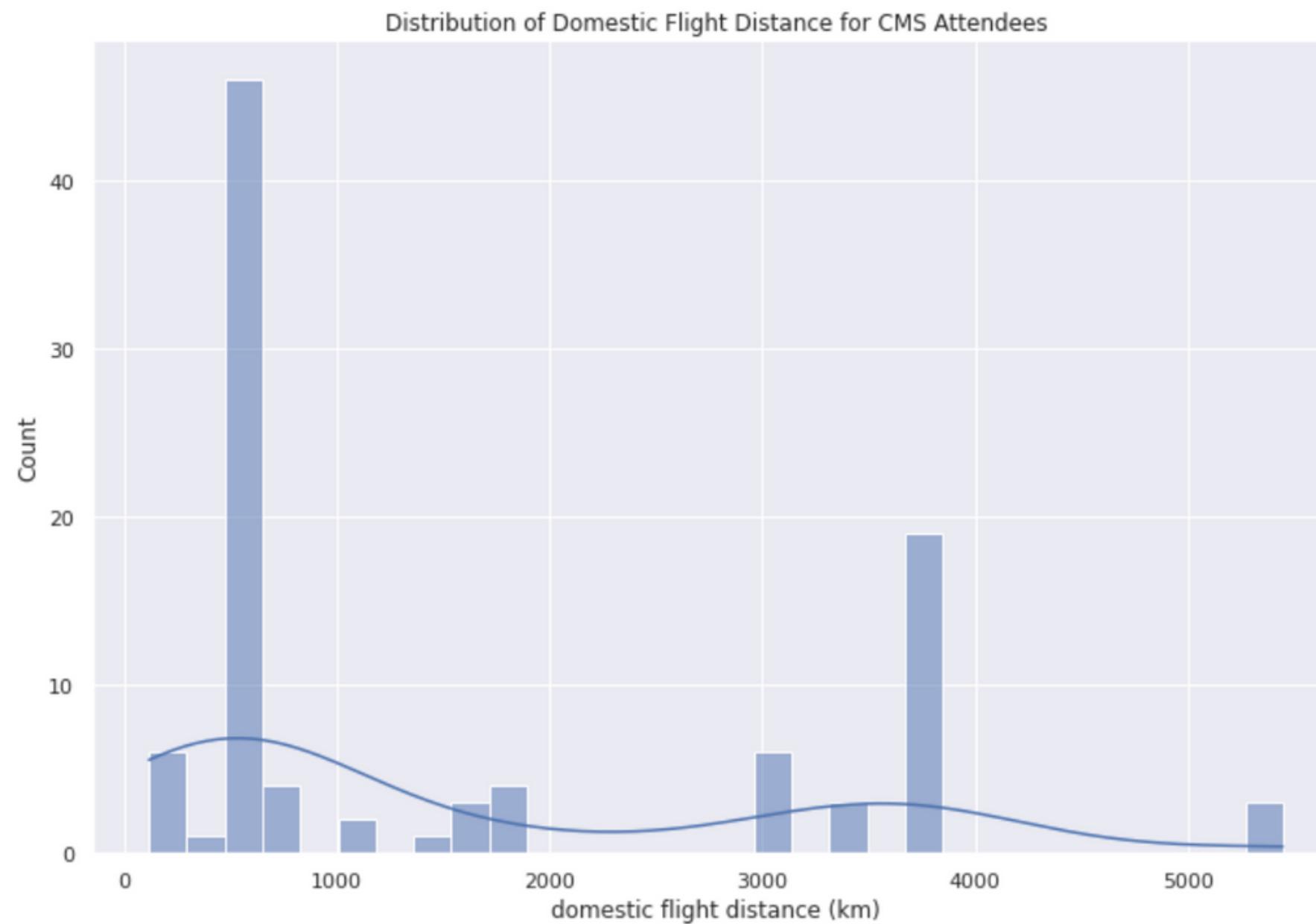
Percentage of Attendees Taking Flight of Different Distance for CMS



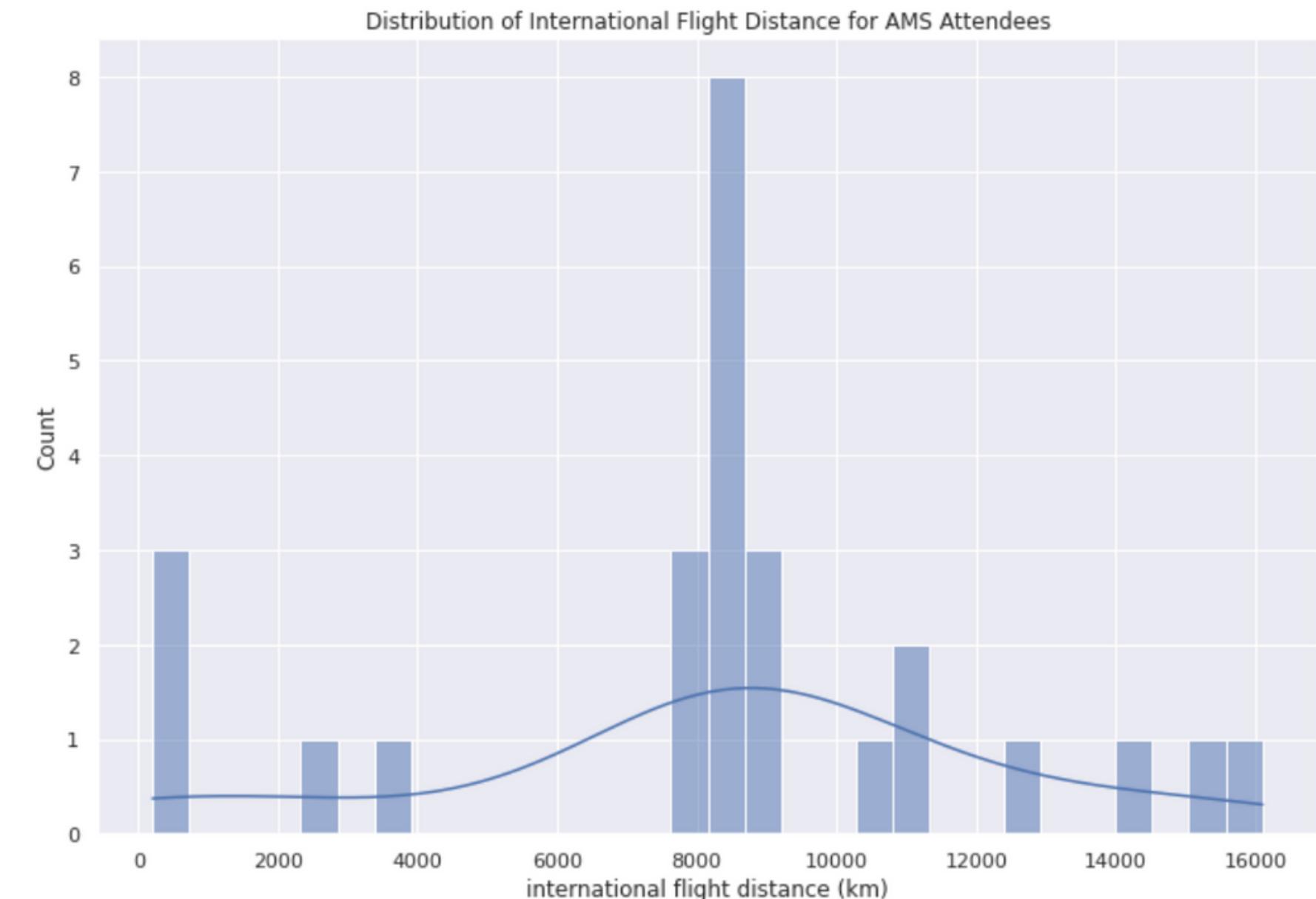
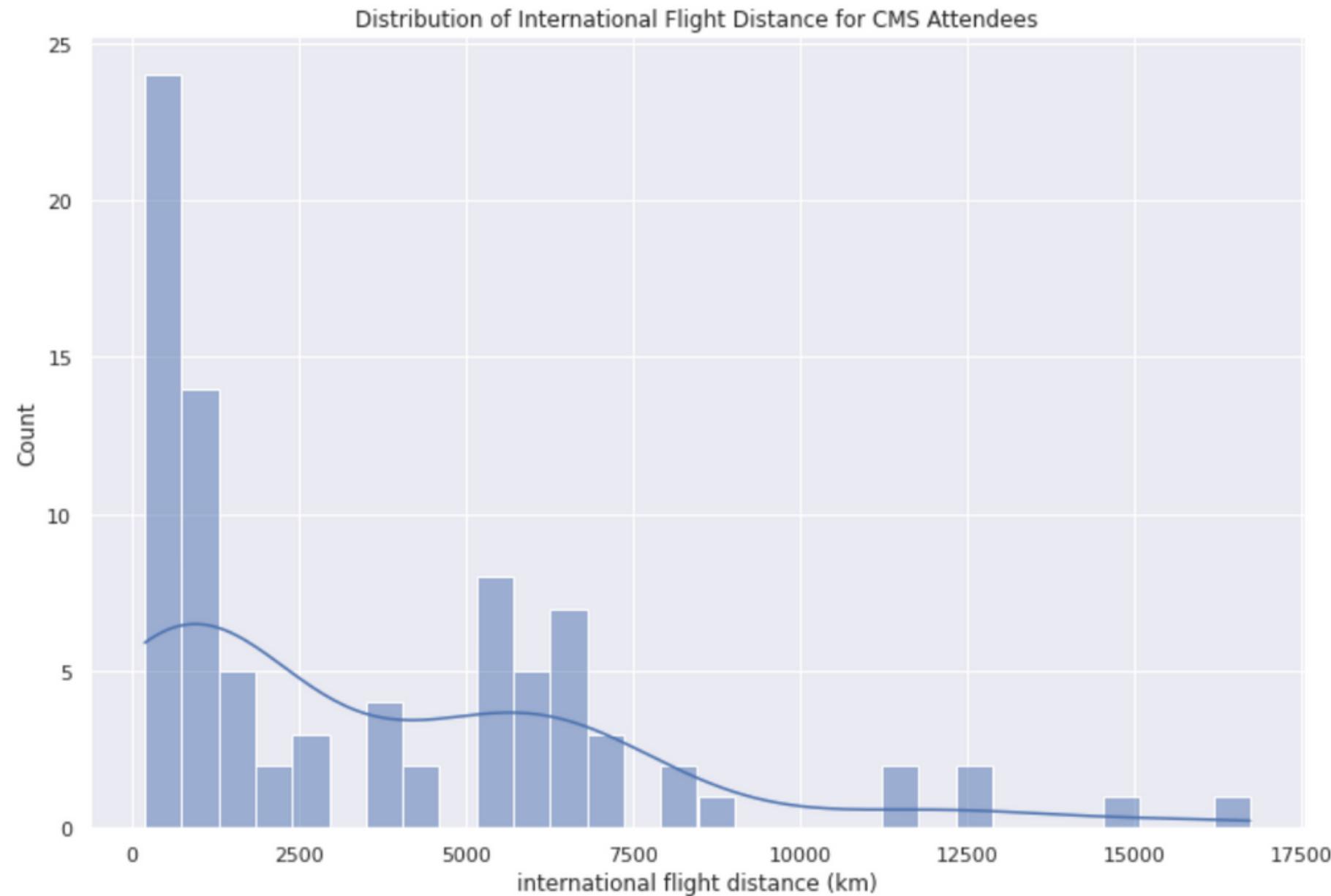
Percentage of Attendees Taking Flight of Different Distance for AMS



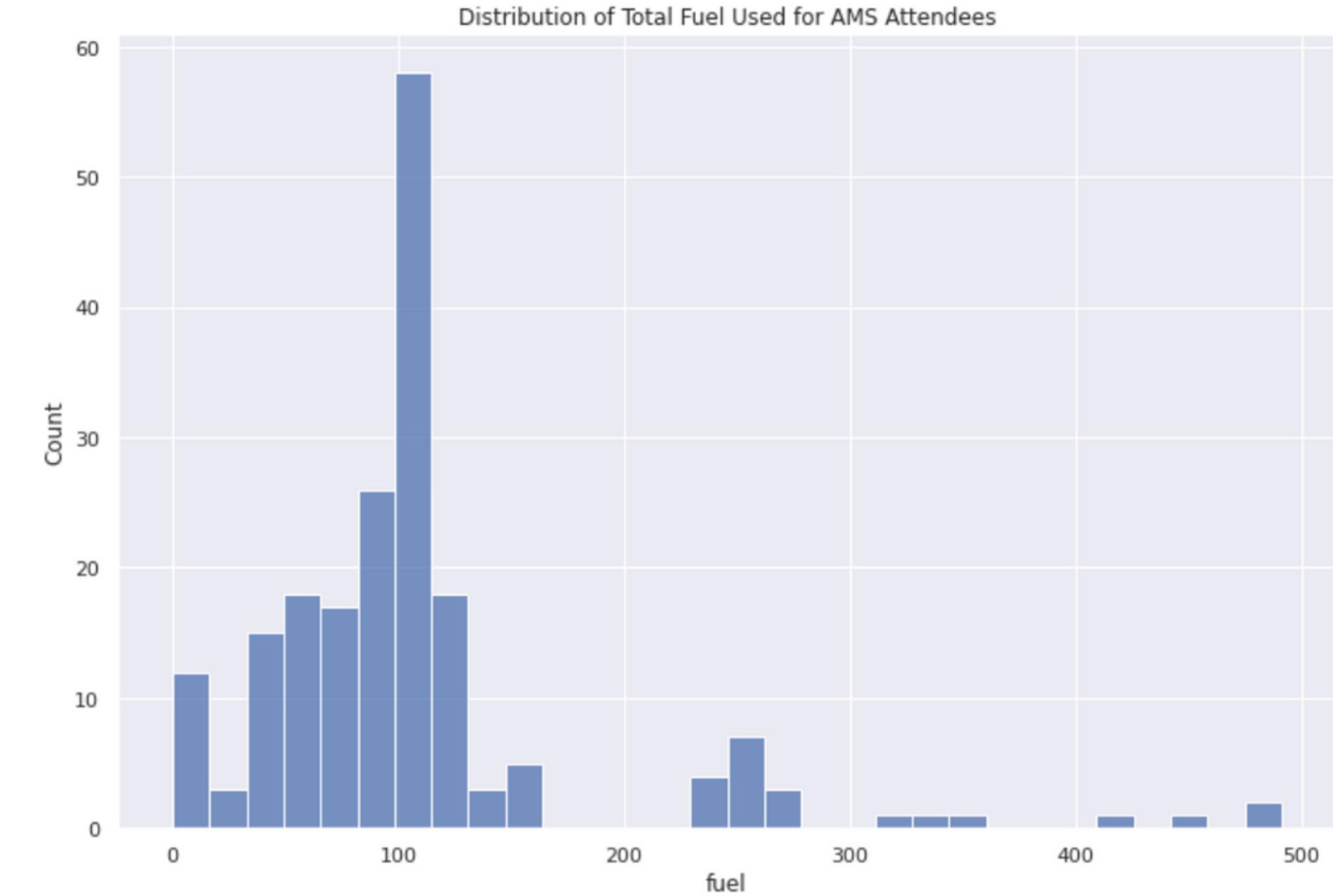
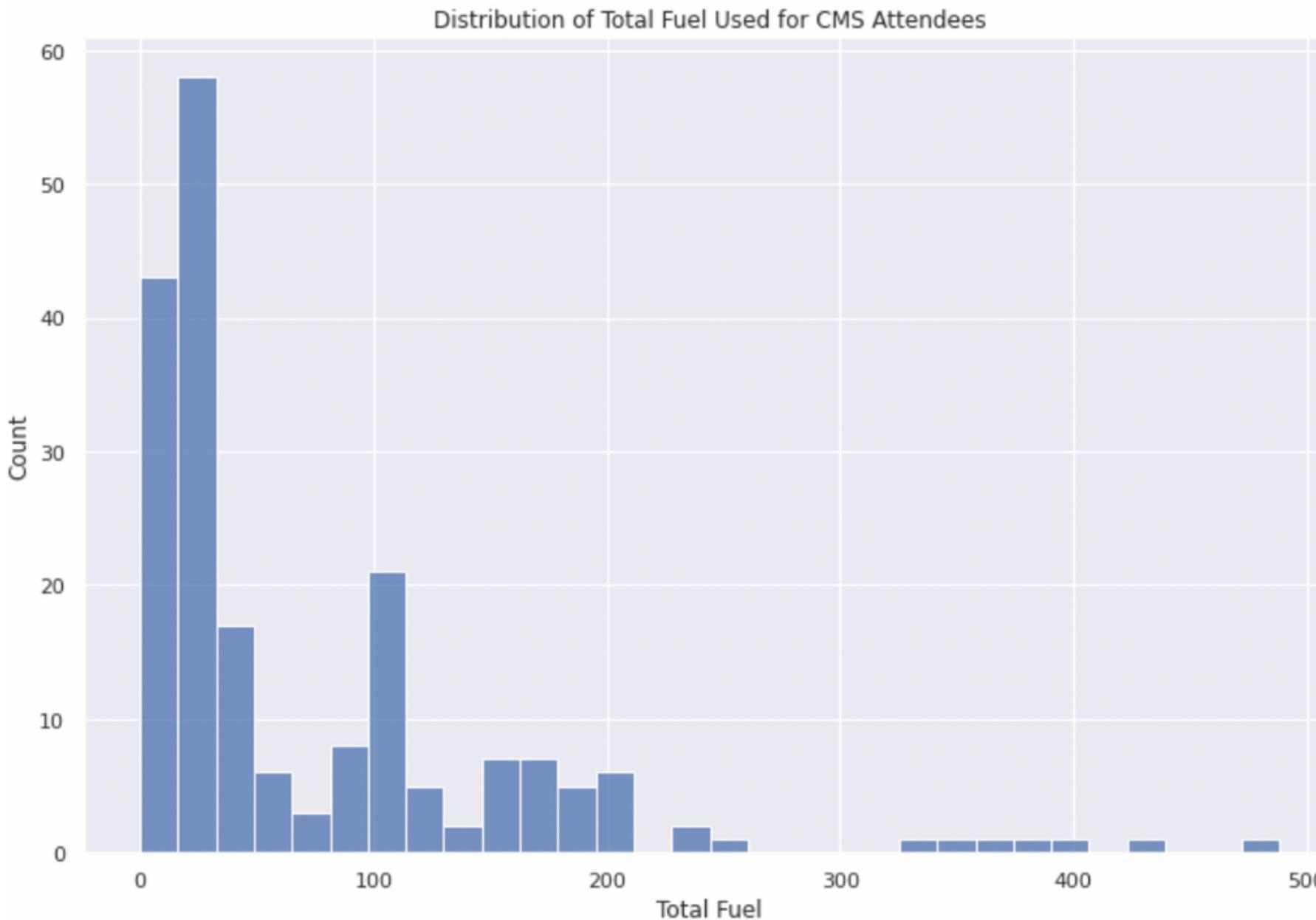
# Distribution of Domestic Flight Distance



# Distribution of International Flight Distance



# Distribution of Total Fuel Used



# Average Plane Fuel Saved for each Conference

DECEMBER, 2020



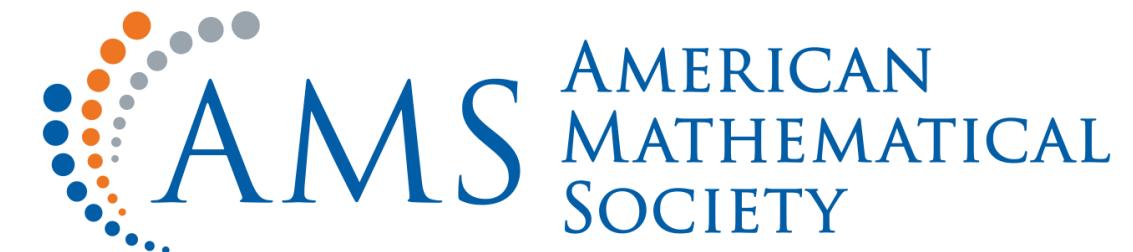
**70.89L/person**

690 TOTAL ATTENDEES

APRIL, 2022

**107.35L/person**

4018 TOTAL ATTENDEES



# Estimated Total Plane Fuel Saved for each Conference

NOVEMBER 2019



Canadian Mathematical Society  
Société mathématique du Canada

**48911 L**  
690 TOTAL ATTENDEE

APRIL 2022

**431351 L**

4018 TOTAL ATTENDEE



AMERICAN  
MATHEMATICAL  
SOCIETY

**4827 L**



**Canadian Mathematical Society  
Société mathématique du Canada**

*Estimated Total Diesel Saved in CMS*

According to the U.S. Environmental Protection Agency (EPA),  
the combustion of 1 gallon (3.78 liters) of jet fuel produces approximately 9.57 kilograms of CO<sub>2</sub>.

123,830 kg of CO<sub>2</sub> for CMS

1,092,071 kg of CO<sub>2</sub> for AMS

An average tree can absorb and store around 22 kilograms of carbon dioxide per year.

To offset the amount of carbon dioxide

