Rail or Road?

Comparing the carbon footprint of passenger train versus car travel

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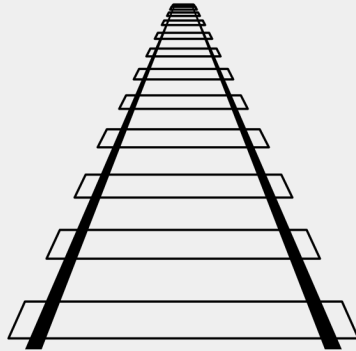
Why this topic?

'Go Big'

- Travel's theme for 2022

80%

Percentage of respondents willing to change their lifestyles to help reduce the effects of global climate change

Pew Research Center

Flight Impact web app by Metis alum Nina Sweeney

Origin Country

Select or type location ▾

Origin City

Select or type location ▾

Destination Country

Select or type location ▾

Destination City

Select or type location ▾

Per Passenger Emissions Limit (kg)

1995

0   1995

Welcome to Flight Impact!

Flying is one of the most carbon-intensive ways that we can spend our time as individuals, and its use is dominated by a small group: in 2018, only **11% of the global population** took a flight, and just **1% of the population was responsible for 50% of aviation emissions** ([Time](), 2021). If flying is a part of your life, there are ways to reduce your air travel emissions, and you can start here! Explore route options, understand your flight's carbon impact, and inform your decisions with EPA data.

How to get started:

- Compare the carbon emissions of multiple routes by choosing locations from the left-side dropdowns or filtering your search to an emissions limit
  (*For reference, the EPA estimates that a [typical passenger vehicle]() emits about 4.6 metric tons (4600 kg) of CO2 per year*)
- Hover over the routes on the map, zoom in, and drag left and right to explore the route map
- Check out the table at the bottom of the page for alternative routes, emissions comparisons, and additional ways to travel consciously

Arctic Ocean   *Arctic Ocean*

Data Engineering Pipeline

Data Ingestion
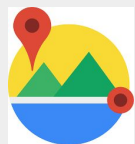
Processing and Storage

Deployment

Websites

Processing

APIs

Storage

Interactive Web App

Home Screen

Origin city

Select or type location ▾

Destination city

▾

Amtrak Route

▾

About the data:

Distances are calculated using Google's Distance Matrix API, which allows one to specify the transit mode (in this case, driving or train).

Emissions data come from the Climatiq.io API and the primary source is the EPA. Both train and vehicle emissions reflect per passenger amounts.

Rail or Road?

The purpose of this web app is to allow users to compare the carbon footprint of train versus car travel between cities serviced by the same Amtrak route.

Note: The destination city options reflect a simplified version of the true Amtrak network, since the web app design does not account for the ability to transfer between routes.

User instructions:

1. Select an origin city
2. Select a destination city
3. Select an Amtrak route
4. View the distance, emissions and emissions per mile **per passenger** by train versus car
5. View and/or zoom in on a map that plots the cities on the Amtrak route between the origin and destination cities

Train results...   ## Car results...

Iceland   Sweden

Norway   Russia
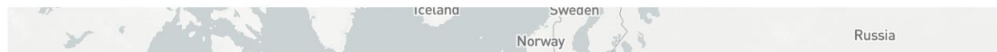
Search Results - Boston to NYC via Acela

Origin city

Boston, Massachusetts ▼

Destination city

New York, New York ▼

Amtrak Route

Acela - Boston - DC ▼

About the data:

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Train results...

Distance: 233 miles

Carbon emissions: 41 kg

Carbon emissions per mile: 0.18 kg
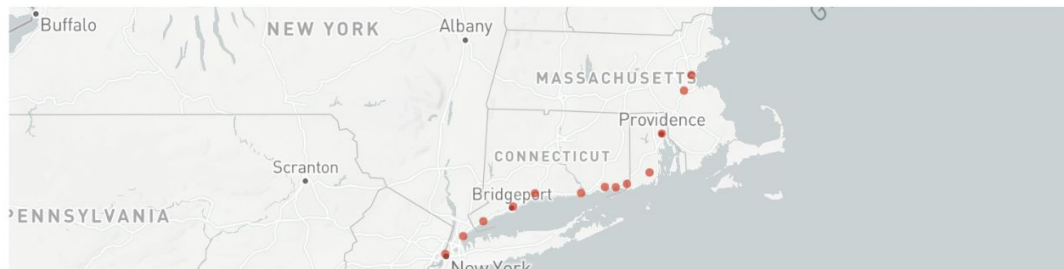
Cities in route:

1. Boston, Massachusetts
2. Westwood, Massachusetts
3. Providence, Rhode Island

Car results...

Distance: 212 miles

Carbon emissions: 65 kg

Carbon emissions per mile: 0.31 kg

Search Results - Boston to NYC via Northeast Regional

Origin city

Boston, Massachusetts ▼

Destination city

New York, New York ▼

Amtrak Route

Northeast Regional - Boston to Ne… ▼

About the data:

Distances are calculated using Google's Distance Matrix API, which allows one to specify the transit mode (in this case, driving or train).

Emissions data come from the Climatiq.io API and the primary source is the EPA. Both train and vehicle emissions reflect per passenger amounts.

Train results...

Distance: 251 miles

Carbon emissions: 41 kg

Carbon emissions per mile: 0.16 kg

Cities in route:

1. Boston, Massachusetts
2. Westwood, Massachusetts
3. Providence, Rhode Island
4. West Kingston, Rhode Island

Car results...

Distance: 212 miles

Carbon emissions: 65 kg

Carbon emissions per mile: 0.31 kg

Key Takeaways

- Compared to car travel, train travel has a smaller carbon footprint in terms of total emissions and emissions per mile

- Different train routes between the same two cities can have different carbon footprints in terms of total emissions and/or emissions per mile

Future Work

- Incorporate driving directions data from Google's Directions API, so users can view the driving route as well

- Incorporate connections between Amtrak routes, so users are not limited to selecting cities within the same route

Thank you!

https://share.streamlit.io/chloebs4590/metis-engineering/main/emissions_app.py

https://github.com/chloebs4590/Metis-Engineering