Project Team 17:
Visualizations of the Use of Fuel in the MBTA (2016-2019)

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Problem Statement:

- Began Very Broad:
  - Original goal was to cover the full environmental impact of non-renewable fuel sources emitted by the MBTA
  - E.g. Carbon Footprint

- Example of Original Tasks:
  - “Compare carbon emission levels of different lines and fuel type”
  - “Analyze efficiency of trains: passengers transported per mile per emissions generated”

Data Set:

- Limited by Availability of Data:
  - Found that recent and published data on the subject was very limited
  - None that focused on carbon emissions from the MBTA specifically

- Main Dataset:
  - “MTBA Fuel and Energy”
  - Part of the National Transit Database's Annual Database Energy Consumption table
  - Year, Fuel Source, Miles Traveled, and Mode of Travel
  - Filtered to Exclude Empty Cells

Interviews:

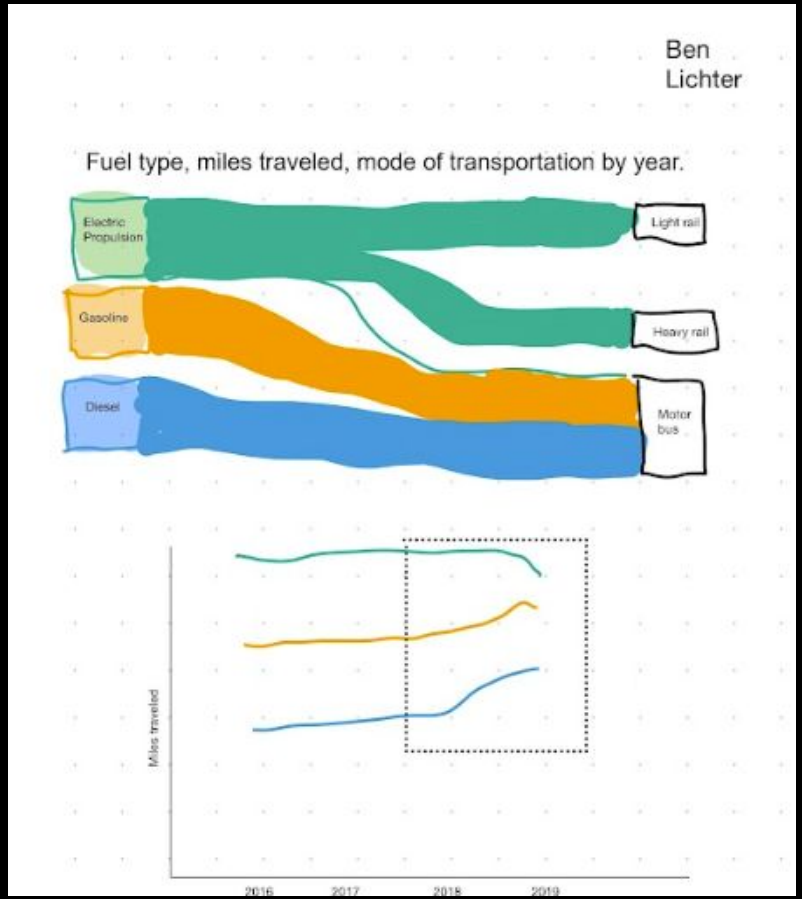
- Discouraged:
  - Any sort of chart junk
  - Only compare values if there is a notable difference to be found
  - Trying to find a solution
  - Trying to cater to general public

- Encouraged:
  - Accuracy over engagement; engaging enough to be digestible
  - Immediate and valuable outliers and trends
  - Making problems clear and identifiable
  - Prefered Visual: Line graph (for trends)

Design Process:

- Values:
  - Showcases trends and efficiently
  - Color Categorical
  - Line Chart + another visualization

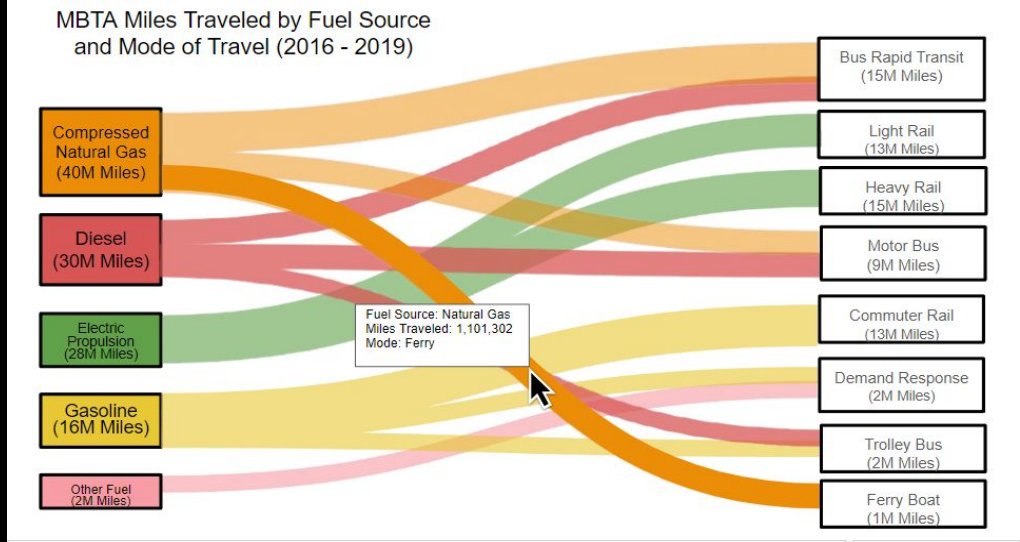
- Paper Sketch:
  - Marks: Lines, Area
  - Channels: Position, Area, Color
  - Bright and Accurate
  - Clear changes over time

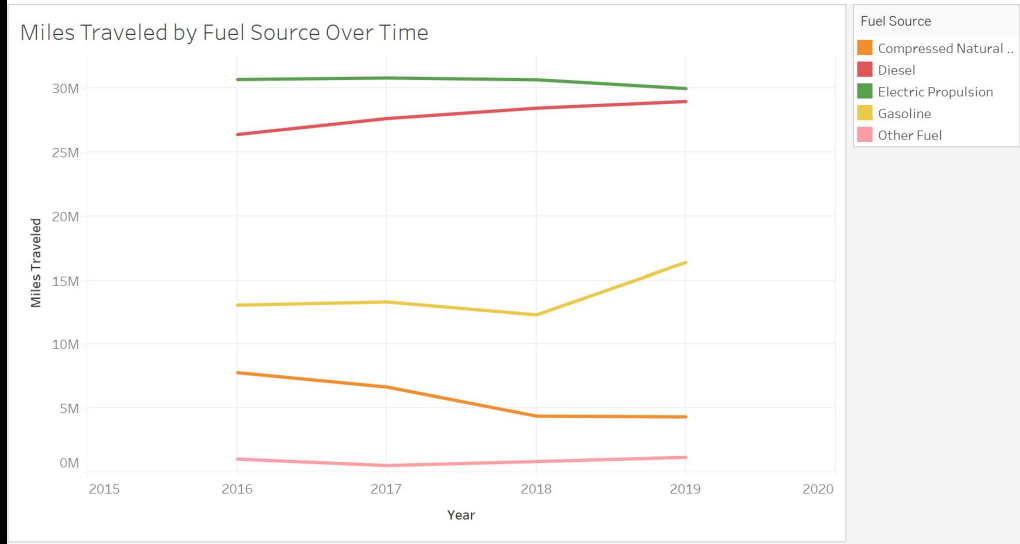


Design Process:

- Digital Rendering:
  - Sankey Graph:
    - Made on Powerpoint
    - Conceptual
  - Line Graph:
    - Made on Tableau
    - Generated by
    - cleaned dataset

- Identify issues:
  - E.g. Overlap, Colors





Final Visualization:

- Final Problem Statement:
  - Help viewers find out what fuel types contribute the most to fuel consumption of the MBTA and which modes of transportation run on them
  - Targeted towards officials of the MBTA

- Implements Details on Demand, Brushing and Linking
  - View Exact Miles Traveled, Fuel Source and Mode of Transportation

Final Visualization:

- Fulfills Tasks:
  - Analyzing annual trends in energy consumption and emissions
    - Expanding on that by what energy was consumed, where it went, and how many miles were derived from it
  - Comparing each mode of transportation's miles traveled over instances of time
    - Based on the Miles Traveled category of our dataset.
    - “Best” or most “efficient” fuel source to find sources of inquiry