

# WPI

# MAGLEV

# TRANSPORTATION



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## Abstract

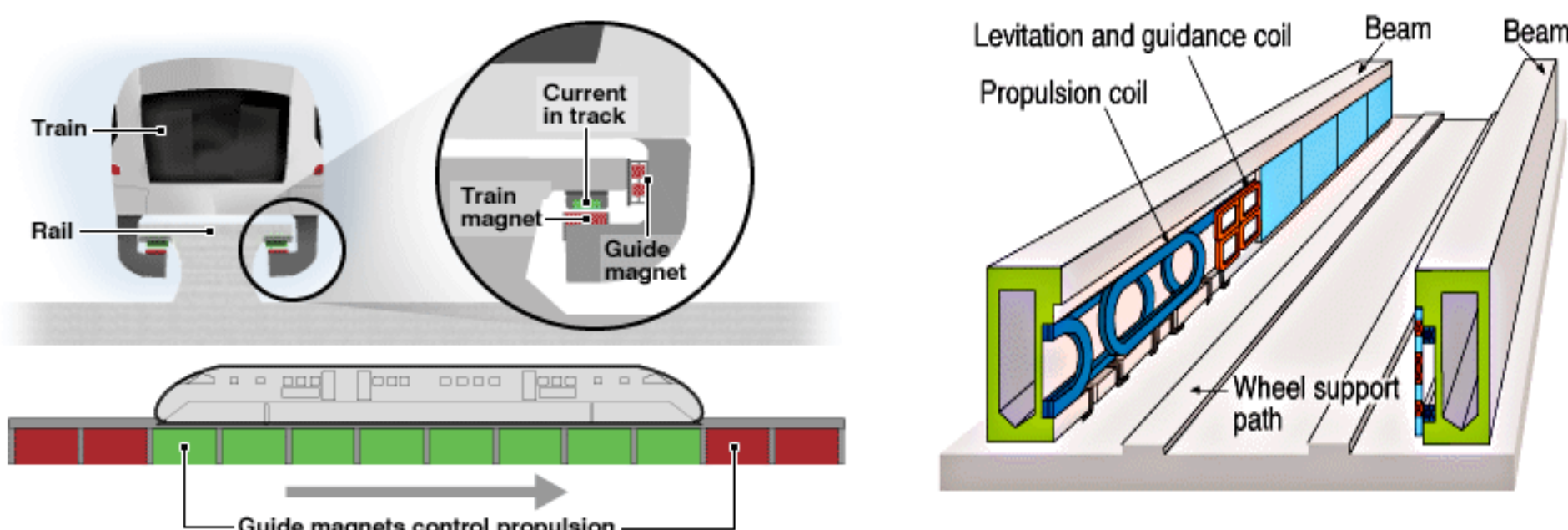
The maglev train provides fast and efficient transportation that could potentially save energy and reduce carbon emission over short distances. The purpose of our project is to determine what the economic and environmental benefits magnetic levitation technology can bring to current transportation methods. Studies on energy efficiency and carbon emissions of common planes were compared to maglev trains. The calculations show that the maglev train used less energy and produce fewer emissions than the commercial plane. Based on these results, the maglev train provides a fast alternative to commercial plane travel, but the high initial cost and lack of route availability would hinder the development of maglev trains.

## Background

The electromagnetic levitation transportation train use a series of linearly placed magnets to lift and propel the vehicle. The train uses propulsion coils to alternate the magnetism of the north and south poles on the track and train to repel the train away from the track.

The trains frictionless surface allows maglev trains to achieve speeds of over 500 km/hr.

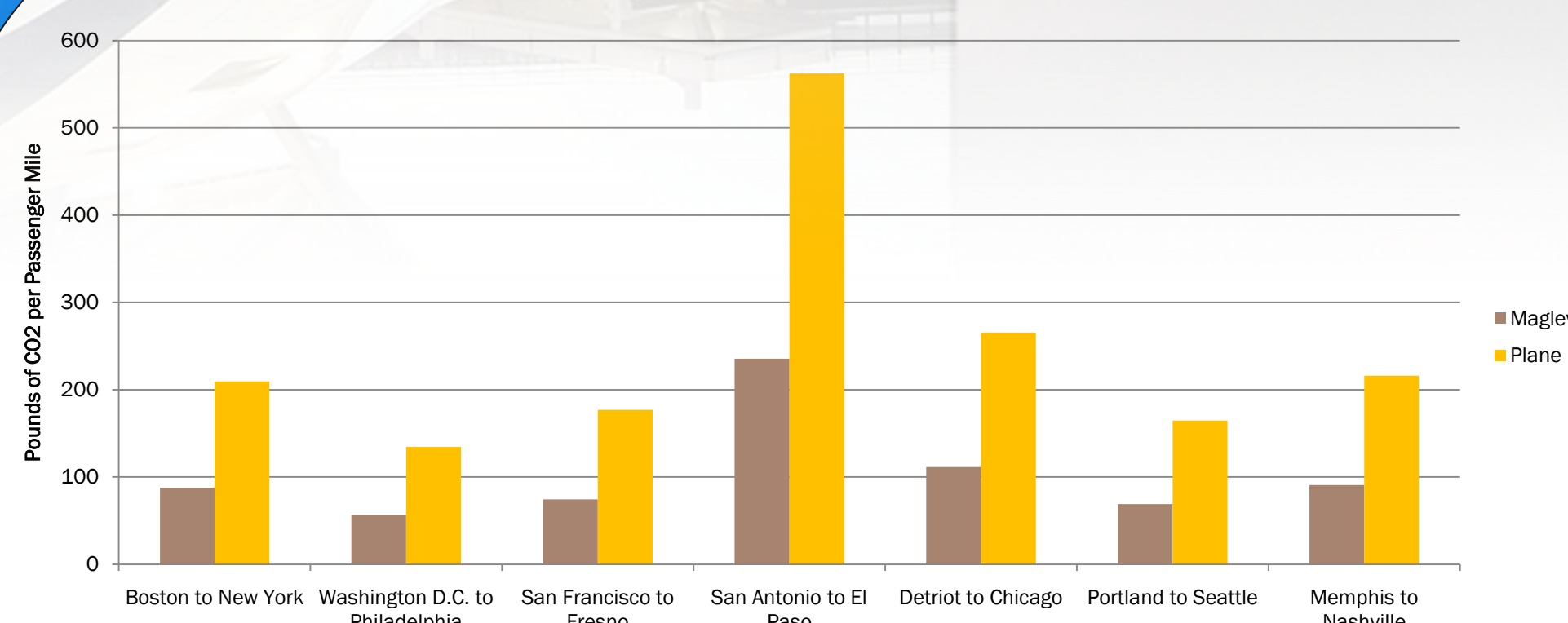
Magnetic levitation of the train is unstable due to the instability, at high speeds, of the magnetic fields of each magnet. The train requires highly advanced computer systems to monitor the fluctuations in the height of levitation. The electromagnets on the train adjust according to these calculations, which keep the train at a stable height (usually only a few millimeters).



## Project Goals

- Use data analysis to show that Maglev trains are environmentally and economically beneficial compared to other transportation

CO2 Emissions of Maglev Trains vs. Planes



## Results/Outcomes

### Maglev train/ Airplane

- CO2 per passenger/ per mile: 0.47 pound/1.06 pound
- Travel time: 2 hr 54 min/ 2 hr 20 min (1 hr check-in )
- Operating cost: 3 cents/ 15 cents
- Building cost: 1 billion US dollars/ 1 million US dollars

## Methodology

- Researched current working Maglev Trains to attain a variety of data.
- Researched pounds of CO<sub>2</sub> released by a plane comparative to that of a Maglev Train.
- Researched other aspects of incorporating a Maglev Train into current transportation system.
- Researched the total cost of building a Maglev Train comparative to a plane.
- Took into account operating cost of both a Maglev Train and a plane.
- Created a graph showing the differences between the pounds of CO<sub>2</sub> released by a plane and a Maglev Train.
- Created a graph showing the difference in cost over time, taking into account operating cost.
- Concluded that a Maglev Train is more environmentally friendly than a plane.
- Concluded that Planes cost less than Maglev Trains.

## Acknowledgments

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## References

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