Sustainable Flight Line Operations

A special thanks to:
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Industry Experts: Janet B, Alaska Airlines; Chad Bednar, Delta Airlines

Goal Statement

The goal of this project was to reduce greenhouse gas (GHG) emissions from the ground support equipment (GSE) in the 737 Max Flight Line

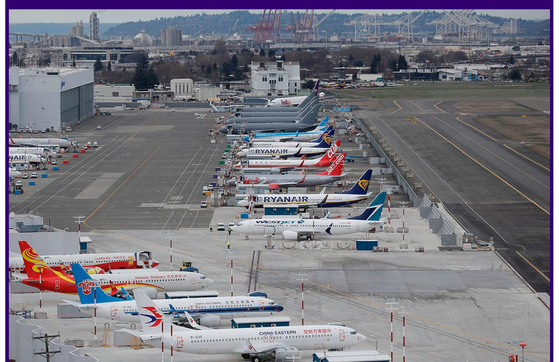


Fig. 1: 737 Max flight line at Boeing field

Motivation: Boeing Sustainability Report

Fig. 2: reach net-zero emissions by 2050

Fleet Considered:

21 TRUCK | 20 VANS | 10 FORKLIFTS | 5 TRACTORS

Assumptions

- Only accounting for operations within Boeing Field
- Not considering GHGs emitted during vehicle manufacturing
- No previous supporting infrastructure for fueling & maintenance

Infrastructure Mapping

Fig. 3: GSE parking at the 737 Max flight line

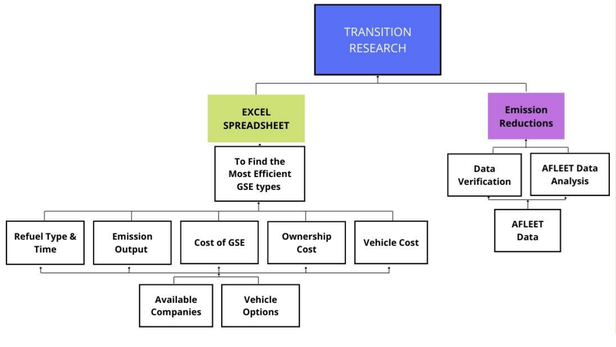
Methodology

Alternatives Researched

Gas | Electric | Hydrogen

Considerations

Safety | Technology maturity | Emission | Cost



Emissions Reduction

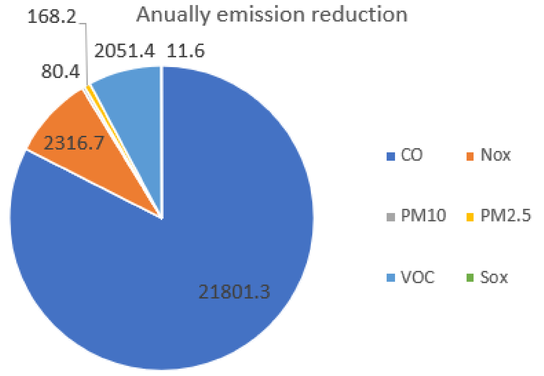


Fig. 4: Estimate of annual emission reduction (lbs)

Carbon sequestered by

164 tree seedlings grown for 10 years -or- 12.9 acres of U.S. forests in one year

Data Validation

Fig. 5: Measurements of GHG on UW Campus

Cost estimate

3 million USD

Prior to incentives from public agencies

Annual Payback
$ 383149

Payback Period
10.5 yrs

Simio Vehicle Charging Simulation

With the simulation, we tested parameters such as:

- Number of chargers needed
- Charger utilization
- Electricity cost

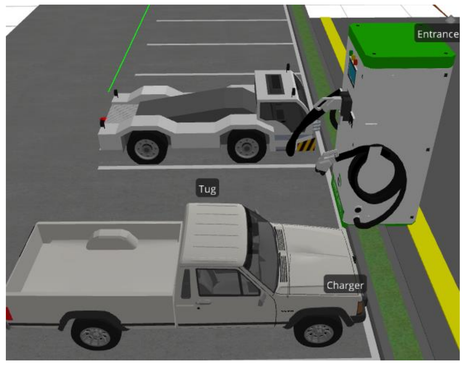


Fig. 6: Vehicles charging in simulation

Deliverables Summary

- Summary of greenhouse gas emissions savings
- Phase out plan
- Non comprehensive guide of safety regulations & standards
- Costs
  - Payback period
  - Maintenance and electricity cost
  - Cost of vehicles and infrastructure
  - Potential savings
- Quantity of chargers needed to install

Future Work

Due to time and resource constraints, there are items that we were unable to address but we consider key for future project success:

- Test the readiness of the flightline's electric infrastructure to support the chargers. If found lacking, upgrades need to be identified
- Collect emissions data from the 737 Max Flight Line for comparison.
- Further investigation regarding relevant regulations and standards applicable