



# Fleet Vehicle Management

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# Problem Statement

Currently there are more than 100 fleet vehicles that are owned and operated by TCNJ. These vehicles not only cost a lot of money to purchase and maintain, they hurt the campus and our environment by emitting carbon monoxide. This issue is of the utmost importance and we plan on making big changes to the current fleet vehicle management that will not only benefit TCNJ, but the whole world.

## Objective of the Module

- Bring TCNJ closer to its goal of becoming a Net Zero campus
- Reduce the number of fleet vehicles
- Determine the most efficient way to implement these changes



# Desired End Product and Importance

- Less vehicles being used around campus
- Less carbon dioxide being released into the air
- Money being saved by not having to maintain old vehicles



# Research

# and


# Data

We will Research all of, but not limited to, the following:

- Vehicle Fleet CAB spreadsheet
  - What vehicles make up TCNJ's fleet
  - How old those vehicles are
- What methods are used to manage said fleet
- How other universities/colleges manage their on-campus fleet
- What vehicles are the most common
- What they are used for
- What vehicles are cheaper than others
- How big of a difference fuel makes
- What fleet vehicles may be unnecessary
- Any previously proposed, viable, solutions
- etc.

The Data we will take into consideration:

- The year / make / model
- How much it (fleet vehicle) costs to buy and maintain
  - Initial cost
  - Annual depreciation
  - Financial incentives
  - Fuel source and cost
  - Maintenance cost
  - Repairs
  - Tire replacement
  - Battery replacement
  - Insurance cost
- Emissions



## Similar Systems / Approaches

- Some colleges manage their fleets by using some sort of GPS fleet tracking system
- Colleges have on site maintenance facilities
- Features like Zubie Smart Maintenance are used to track, schedule, and pay for vehicle maintenance
- TCNJ already has golf carts on campus and future plans to switch to using more electric vehicles

## Possible Alternate Applications

- Ideally: less fleet vehicles on campus
- If need to purchase in the future, it's suggested to buy electric vehicles
  - Cars, trucks, & golf carts
  - More cost effective and more sustainable
    - Reduce carbon emissions and overall cost for maintenance

# Performance

- By retiring all fleet vehicles from 2006 and older, we are greatly reducing TCNJ's carbon footprint as well as annual vehicle costs.
- Newer vehicles are more technologically advanced and produce less emissions.
- The money saved by this reduction could help out other school projects, or go back into fleet management.



## Backup and Recovery

- Upload our codes and overall information to GitHub
- As a backup, also upload to alternative open source platforms
  - GitLab
  - Google Cloud Source Repositories
- Recover from these backup sources if needed

## Security

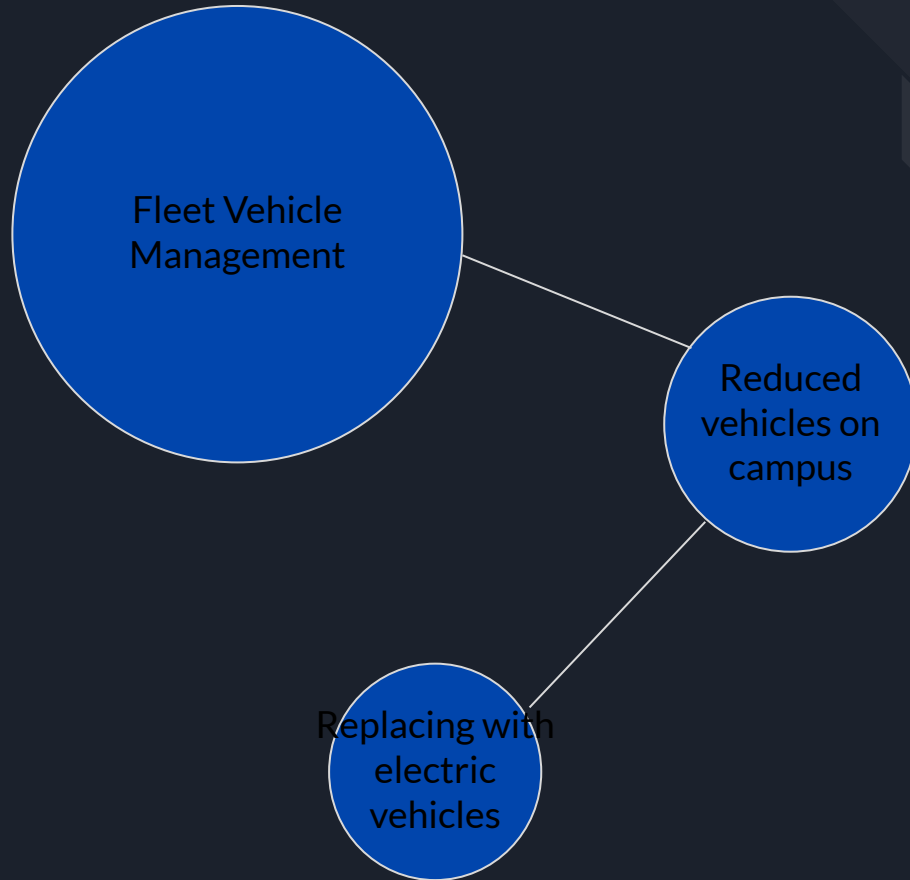
- Restrict access to a repository on GitHub
  - Maintain private repositories
  - Eliminate an open source project

# Technologies and Database Concepts

- An Entity-Relationship diagrams to specify relationships among several entities
  - Graphical representation of the relationships
  - ERD diagram tool- Lucidchart
- PostgreSQL database
  - Uses SQL queries to retrieve and manipulate data
- Use Python to integrate queries into UI



# Diagrammatic Representation



# Fleet Vehicle Management

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## Need

- Reduce TCNJ greenhouse gas emissions
- Reduce the cost of operating fleet vehicles

## Approach

- Reduce amount of fleet vehicle used
- Retire vehicles purchased prior to 2006
- Purchase electric vehicles as needed

## Benefit

- TCNJ will be saving money
- Environmentally friendly, less carbon dioxide in the air
- Reduced maintenance costs
- TCNJ won't have to store as many vehicles

## Competition

- College staff vs. themselves
- Short-term disadvantages distract from long-term benefits