Problem

Factors like how long these vehicles wait at stop lights, temperature outside, and road conditions have an affect on the CO2 emissions from a car

Air pollution was worse around traffic lights in comparison to free flow traffic

- Researchers estimate that idling from heavy-duty and light duty vehicles combined wastes about 6 billion gallons of fuel annually. About half of that is attributable to personal vehicles, which generate around 30 million tons of CO2 every year just by idling.
- For saving fuel and reducing emissions, eliminating the unnecessary idling of personal vehicles would be the same as taking 5 million vehicles off the roads.

Solution Pillars

This solution is easier to **enforce** than electric cars since it is a part of the underlying system - as opposed to motivating individuals to make greener choices

Cheap - integrable into current hardware/structure

Easily **scalable** to multiple regions

Sustainability is **not** at the expense of user comfort (like multiple solutions)

- It benefits the drivers by lowering travel time, improving mileage, making driving cheap

How it works

API provides the access to data needed to integrate traffic lights, which then minimizes idling and abrupt accelerations thus reducing carbon emissions.

- If one light just turned green, and the next closest light going red would cause an abrupt stop
- Speed limit before the light (static value) - used to compute light changing time
- Is the light a gateway to a pollution hotspot (y/n)
- Condition of the road
- Temperature readings at the different lights - colder temp > emissions
- If more cars at a light, then turn that green so less stalling

Architecture Diagrams

Screenshots needed for demo/explanations:

- Map data type
- Get, put, post, delete
- JSON file with inputs
- Conditionals code snippet
- Final output screenshot DynamoDB Table

Uses for Data Collected/API

- Time first stalled - helps keep in mind/be sensitive to larger public
- Road conditions - helps take appropriate actions according to road conditions (ex: not paved, more friction, more emission… don't want that… collecting that data and

reflecting it back + smoothness rating as shown - likely would take into consideration more factors - would help make decisions on what actions to take… like paving the road)
- Temperature - similar to previous one - reflecting temperature data back is helpful because it specifically can help gauge how long the yellow light needs to stay on
- Specific light location - needed to identify location of stoplight

Future

- Sensor input for traffic information
- Weather API from local weather sources
- Use API with machine learning to link multiple intersections
- Data collection + analysis on a more fine scale

Resource:

https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle
https://www.edf.org/attention-drivers-turn-your-idling-engines
https://europeanlung.org/en/news-and-blog/waiting-at-traffic-lights-exposes-drivers-to-high-levels-of-air-pollution/
https://afdc.energy.gov/files/u/publication/idling_personal_vehicles.pdf
https://www.nrdc.org/onearth/speed-sweet-spot

https://github.com/Aron-Chu/CloudHackathon