

Electric Vehicle Analysis

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Group 9

Objective

Develop an economic model to help people decide which car to buy

Questions to answer:

- Which car to buy based on 10-year cost estimate of owning the car?
- Will you really save money by owning an Electric Car?
- What is the projection of Electric Car adoption based on current trends?
- Which is the best state to own an electric car?

Motivation

- Hundreds of options, hard to pick the best
- Comprehensive Cost Model to assist the decision-maker
- Location, Environmental concern and Car-use based process



Data Sources

Data Type	Website Scraped
Car Price, Type and MPG	cars.com
Maintenance Cost	yourmechanic.com
Insurance Cost	insure.com
Gas Prices	gasbuddy.com
Electric Prices and Environmental costs	eia.gov
Car Sales	bts.gov
Electric Vehicle Charging Stations	afdc.energy.gov

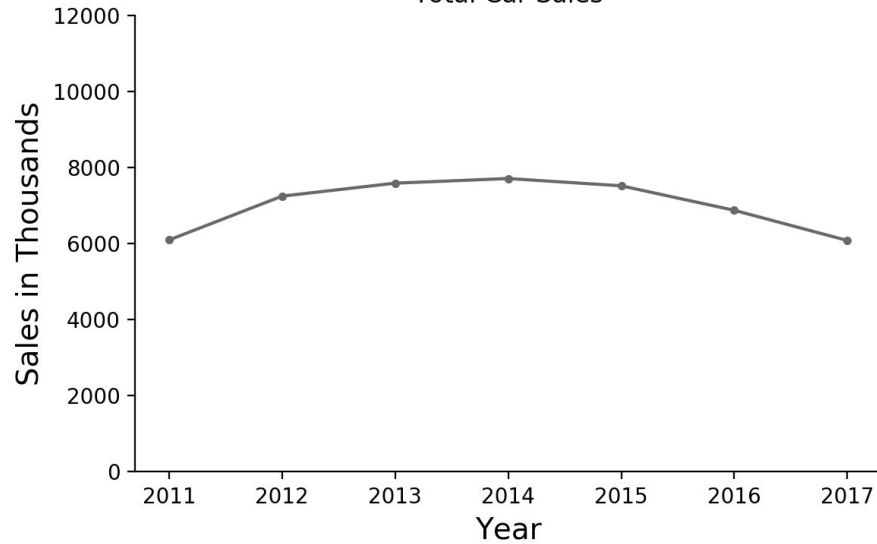
Libraries used: lxml, requests, pandas



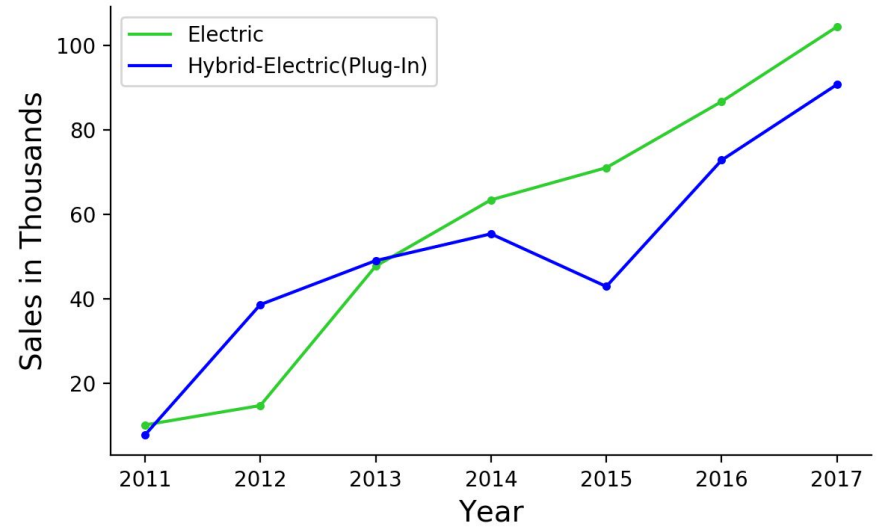
Automobile Market Analysis

Car Sales

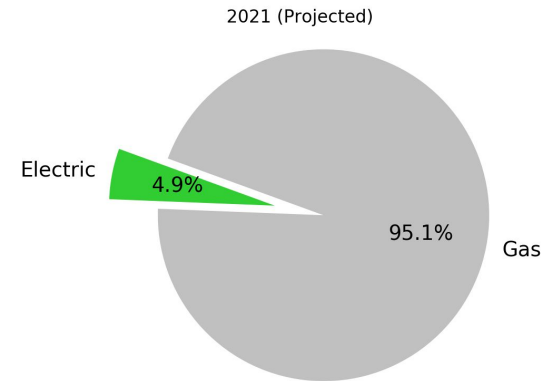
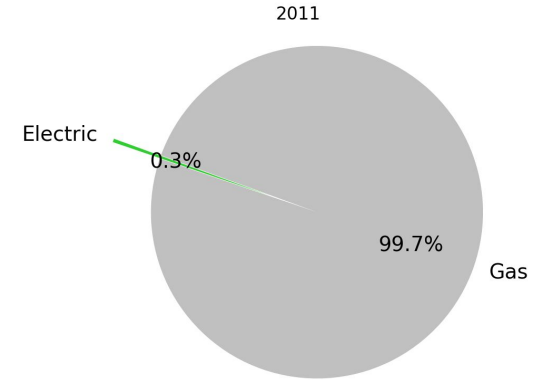
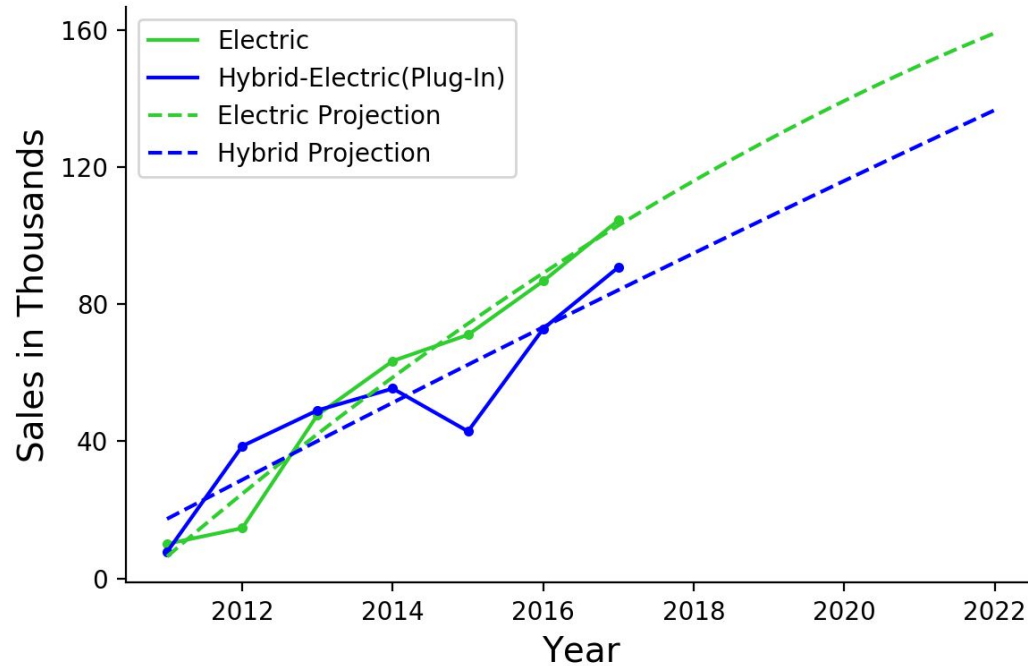
Total Car Sales



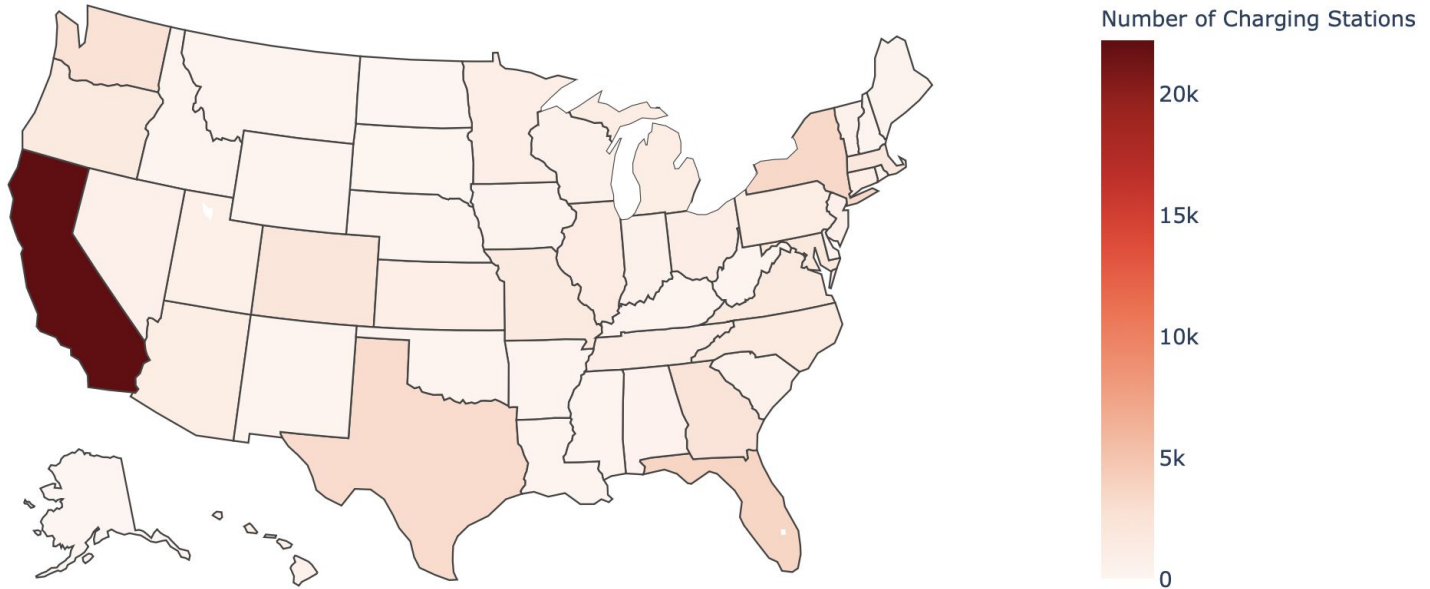
Electric Vehicle Sales



Projection and Market Share



EV Charging Station Distribution

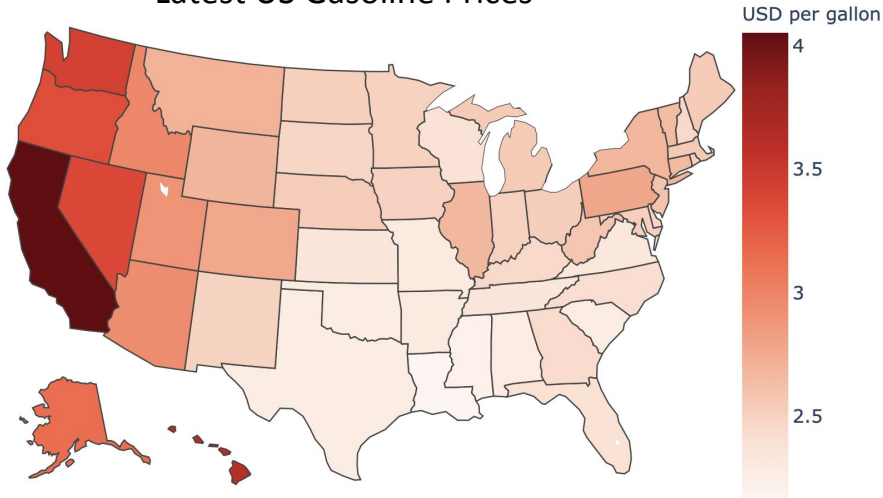




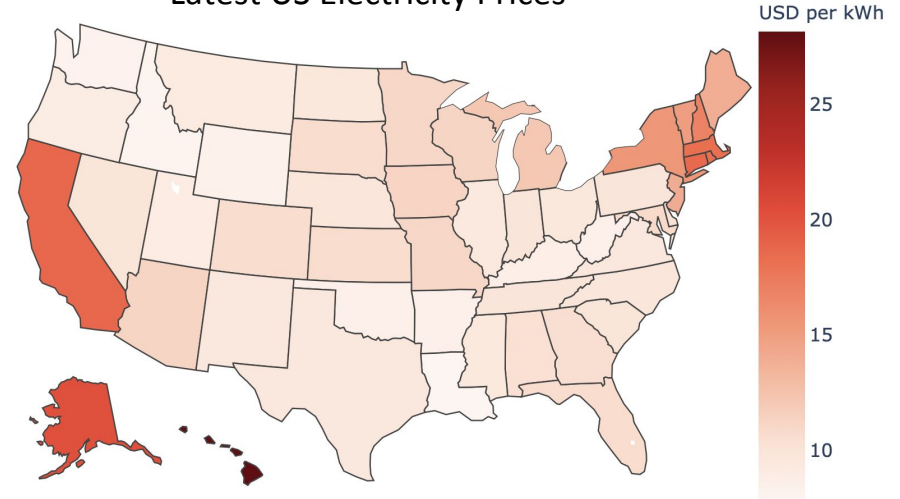
Cost Factors

Fuel and Electric Prices across states

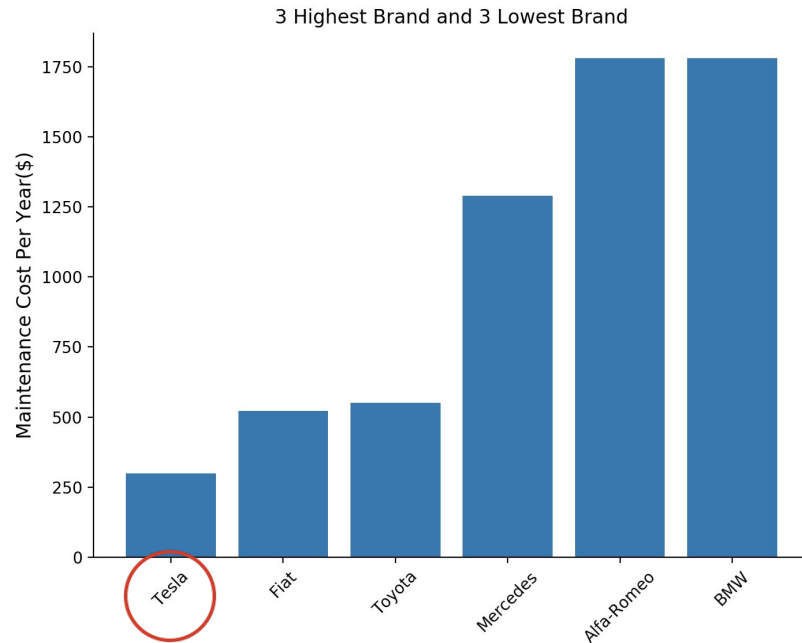
Latest US Gasoline Prices



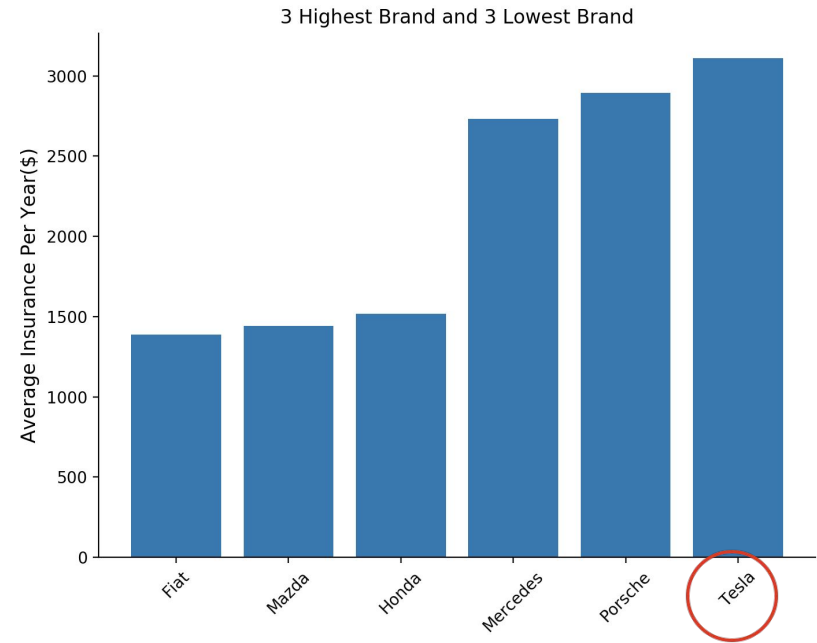
Latest US Electricity Prices



Maintenance Cost

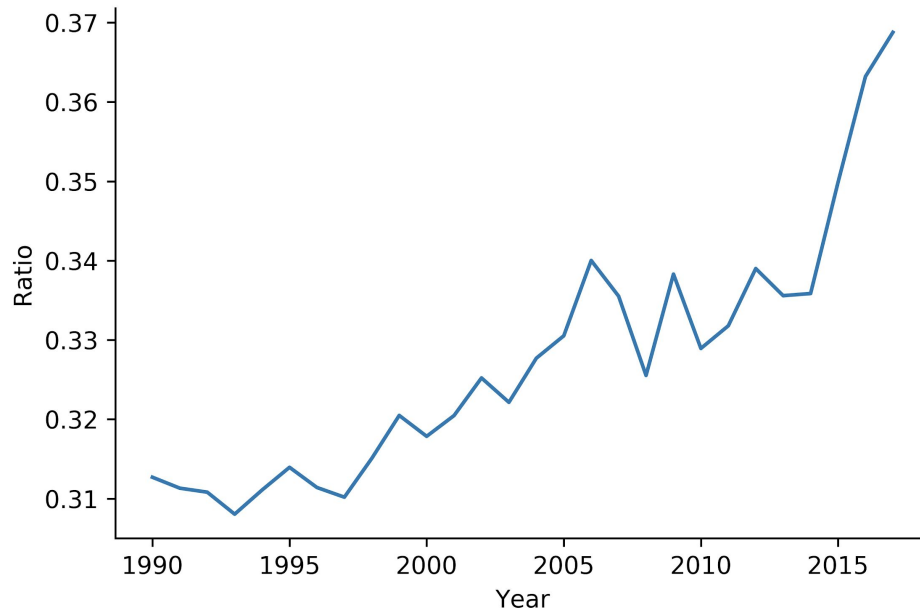


Insurance Cost



Environment Factor

Ratio of CO₂ Emissions in Transportation over Total Emissions

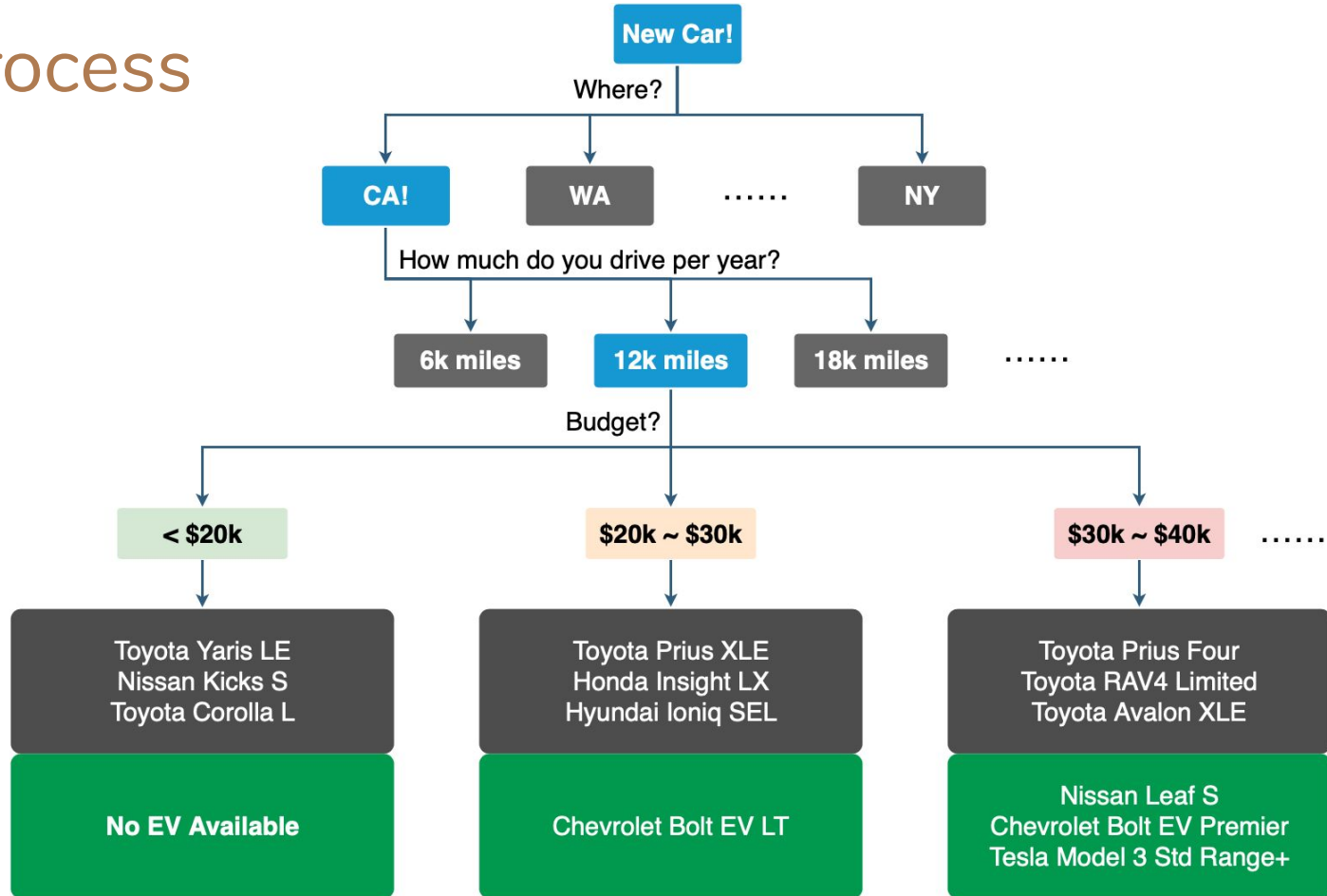


- On average, it costs about **\$50** to reduce the impact of 1 ton of CO₂
- Gasoline Car: Environmental cost is the equivalent cost to reduce the CO₂ generated by that car.
- Electric Car: Environment cost is assumed to be zero.



Should you buy an electric
vehicle?

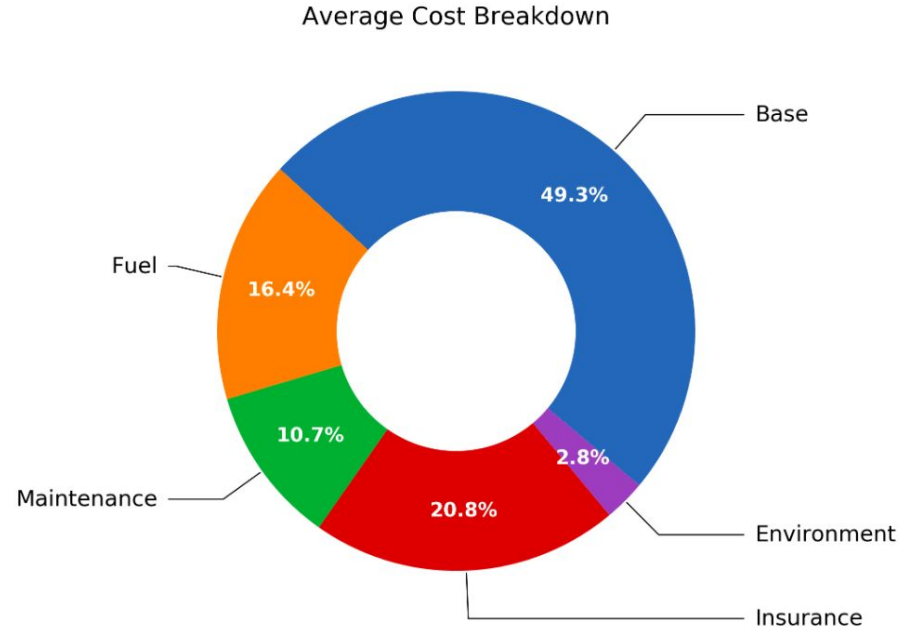
Process



Cost Model [10 year]

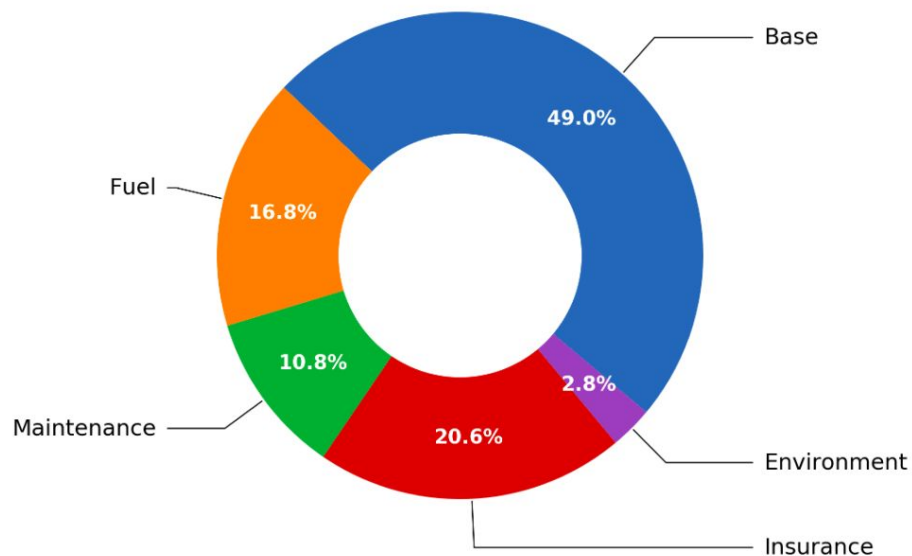
Components:

- Base Cost (market price)
- Maintenance Cost
- Miles driven per year (6k, 12k, 18k)
- Fuel Cost
- Insurance Cost
- Environmental Cost (Optional)

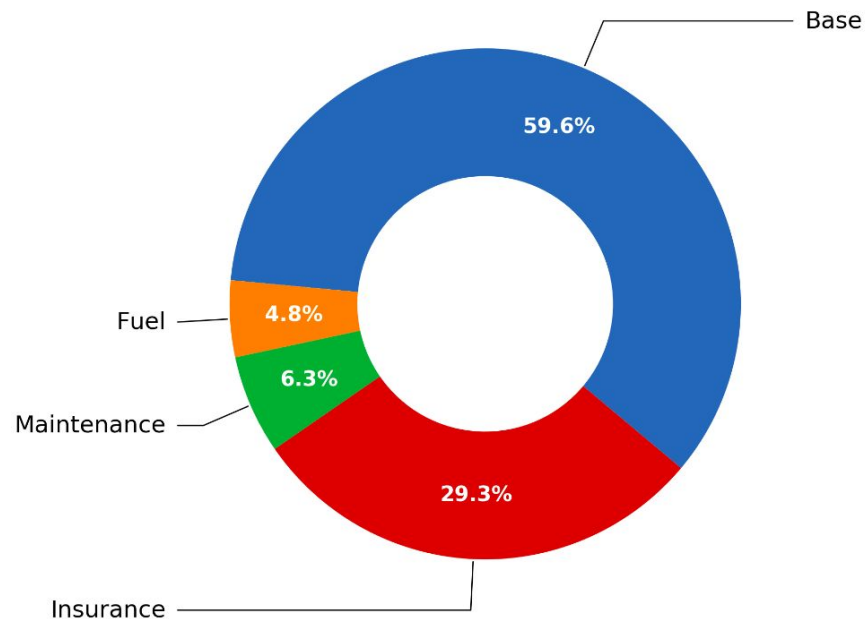


Gasoline vs Electric

Gasoline Vehicle Cost Breakdown

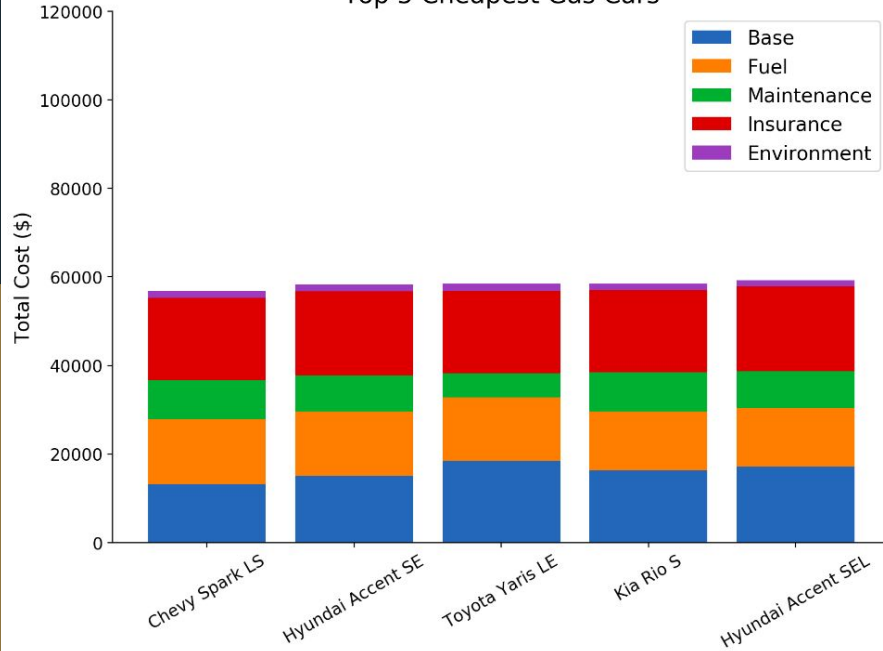


Electric Vehicle Cost Breakdown

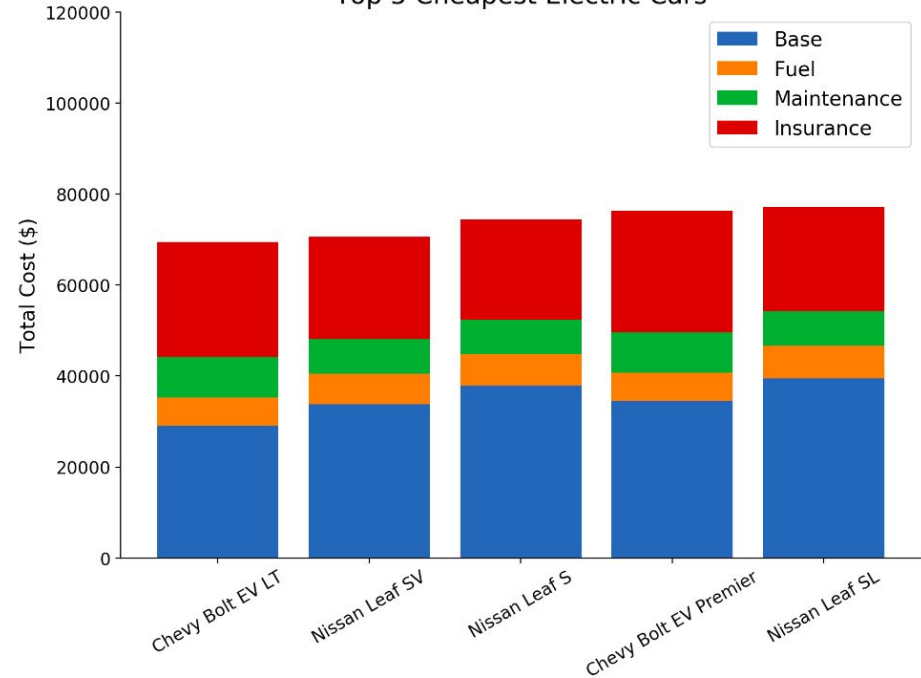


Top Cars for a Typical User (12k miles / year) in CA

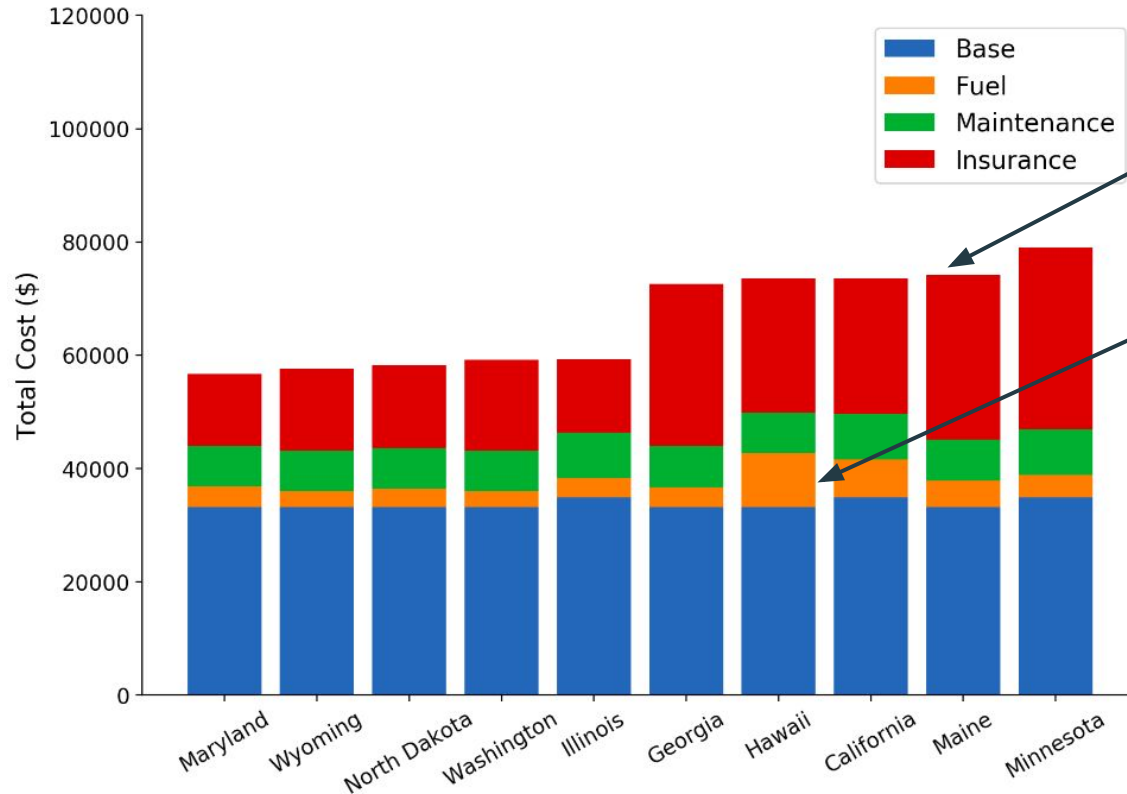
Top 5 Cheapest Gas Cars



Top 5 Cheapest Electric Cars

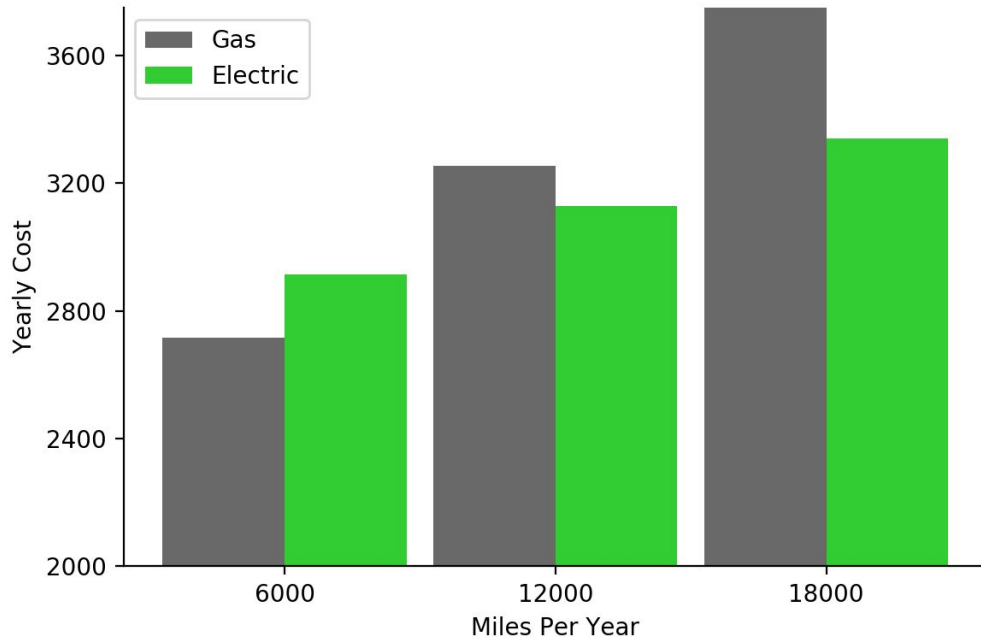


Average Cost of Electric Vehicles across States



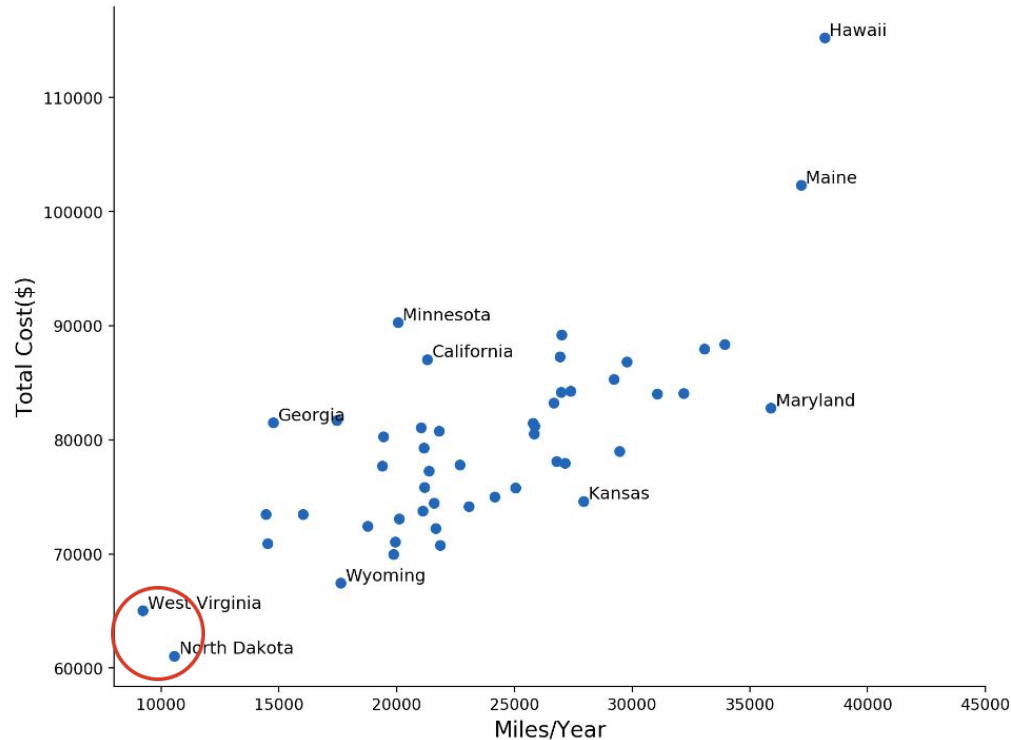
- Insurance is the biggest differentiator
- Fuel Cost is the second most important factor

Yearly Cost Comparison



- Comparing the lowest cost cars of each fuel-type.
- As yearly mileage goes up, gas vehicles become more expensive than EVs.
- The more you drive, the more you save.

Critical Point Analysis



Critical Point

The point at which the total cost of a gas vehicle becomes equal to the total cost of an electric vehicle, at a particular miles driven per year.

Each point represents

- Critical Point for each state
- The cost and number of miles per year

Best Choice (Total Cost)

GAS CAR



Chevrolet Spark LS

ELECTRIC CAR



Chevrolet Bolt EV LT

Best Choice (Yearly Cost)

GAS CAR



Toyota Prius Four

ELECTRIC CAR



Kia Niro EV EX Premium

Conclusion

- We presented most economical gas and electric cars based on 10-year cost estimate of owning the car both on total and yearly costs
- We showed that the **more you drive, the more you save** with an Electric Car as compared to a Gas Car
- Our forecast show that electric cars are going to account for **5%** of new car sales by 2021
- **Maryland** is the most economical state to own an electric car