Leading the Charge: Predicting the Demand for Electric Vehicles and Chargers in Washington State

E. Berke Tezcan

The Market at a Glance

- Car manufacturers like Volvo, Audi, and Volkswagen planning to go fully electric
- Bipartisan Infrastructure deal
- States like Washington and California working on going fully electric in 2030 and 2035
- Washington Department of Transportation is planning to spend $8 million on charging infrastructure projects between 2021 and 2023

Objectives & Data Analysis

Goal

Inform investment decisions of EV charging companies.

Data

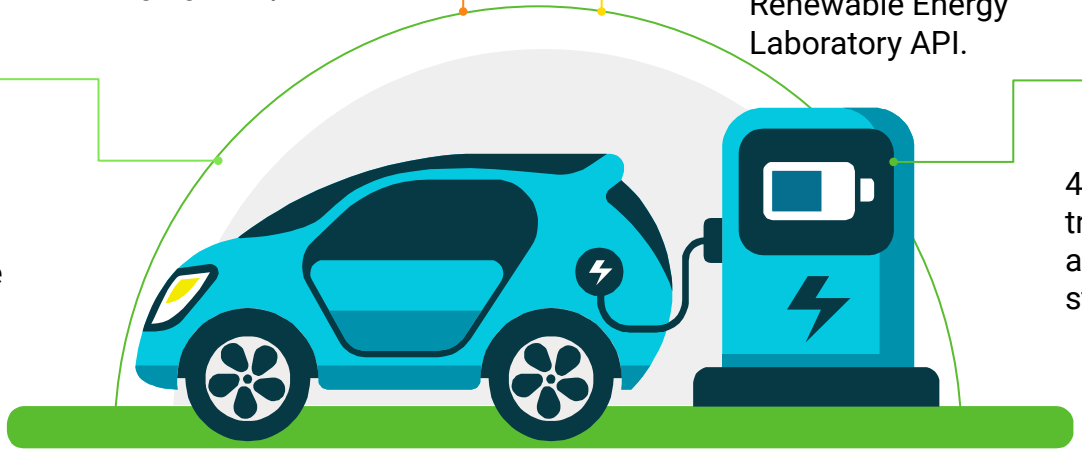
Data from Washington State API and National Renewable Energy Laboratory API.

Objective

Find counties in Washington with the most potential for future electric vehicle demand and least amount of chargers.

Sample Sizes

433,172 title/registration transactions (2010-2021) and 1,686 charging stations.



Defining “Electric Vehicle”

BEV (Battery Electric Vehicle) - **73% of data**

All-electric vehicle using one or more batteries to store the electrical energy that powers the motor and is charged by plugging the vehicle in to an electric power source.

PHEV (Plug-in Hybrid Electric Vehicle) - **27% of data**

A vehicle that uses one or more batteries to power an electric motor; uses another fuel, such as gasoline or diesel, to power an internal combustion engine or other propulsion source; and is charged by plugging the vehicle in to an electric power source.

Methodology

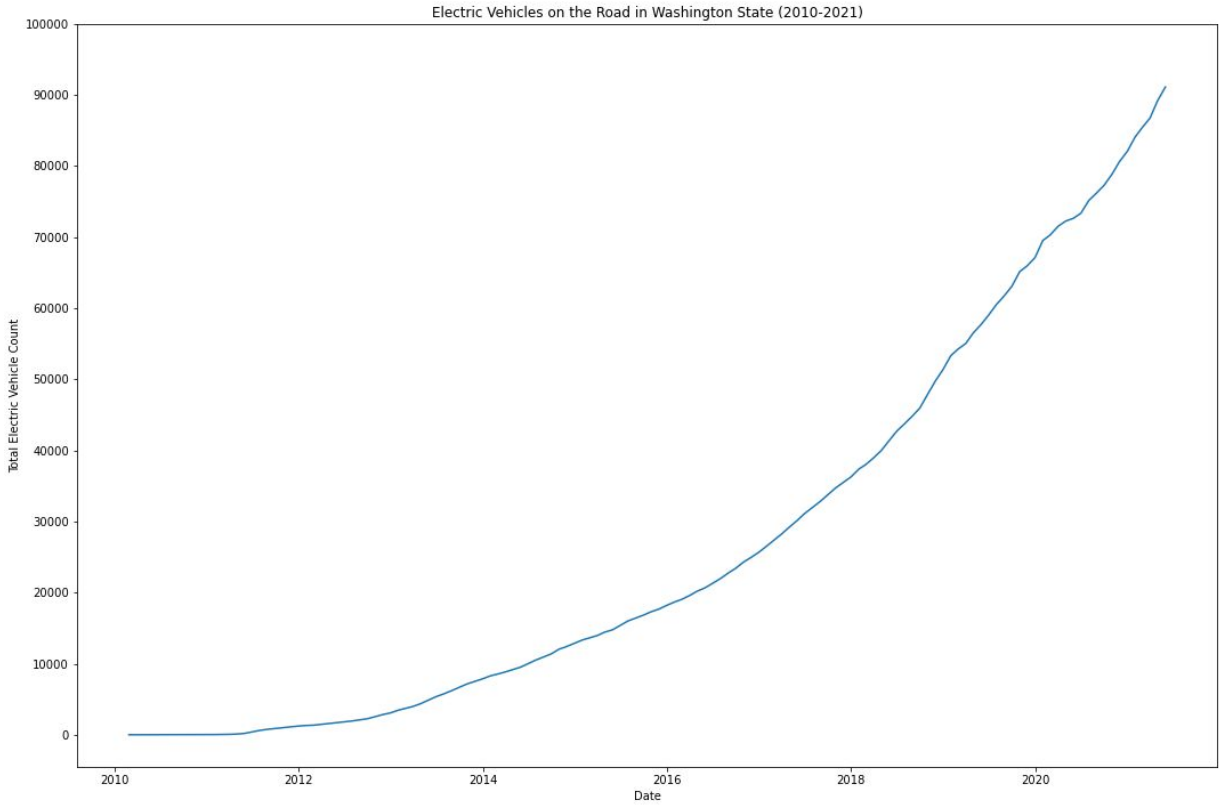
- Focused on top 10 counties with the greatest number of EV purchases
- Used a machine learning model to predict the future count of electric vehicles in each county
- Compared these counts to existing charging infrastructure

Results

Growth in Electric Vehicles

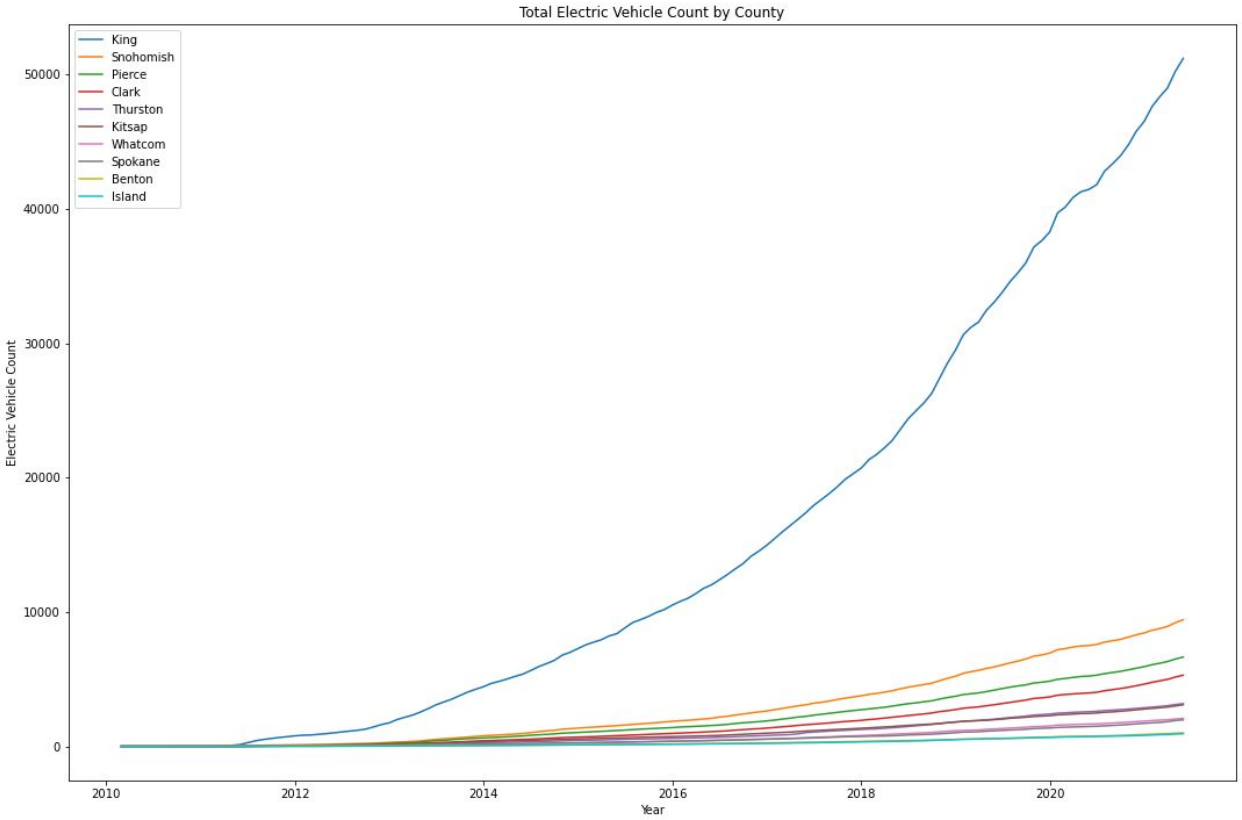
EV Count - Washington State

- Exponential growth in EV count
- Demand trend is strong



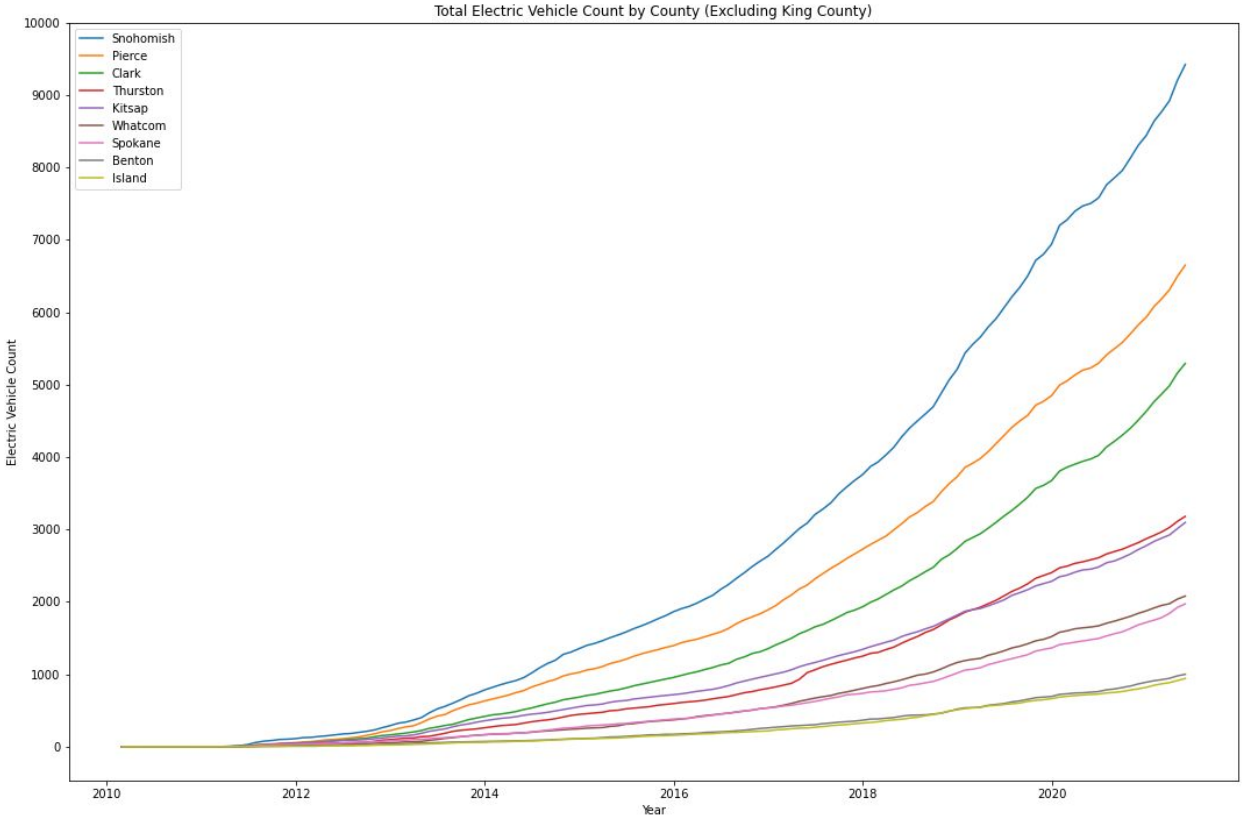
EV Counts - Counties with Most EVs

- King County has the most amount of EVs and fastest growth rate
- Seattle has a large impact on this trend



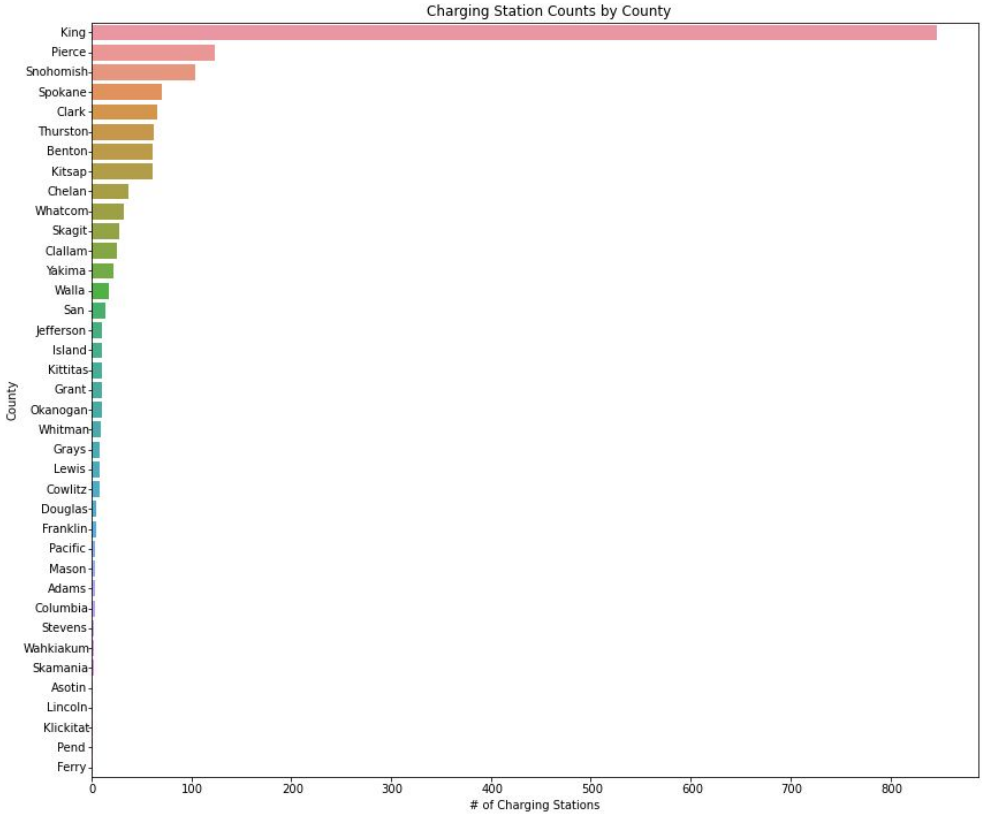
EV Counts - Counties with Most EVs, Excluding King County

- Snohomish, Pierce and Clark are on top.
- Exponential trend similar to King County.



Existing Infrastructure

Chargers Available in Washington as of July, 2021



- 1,686 active charging stations
- About 50% of charging stations are located in King County (846)
- Pierce (123) and Snohomish (104) counties are second and third

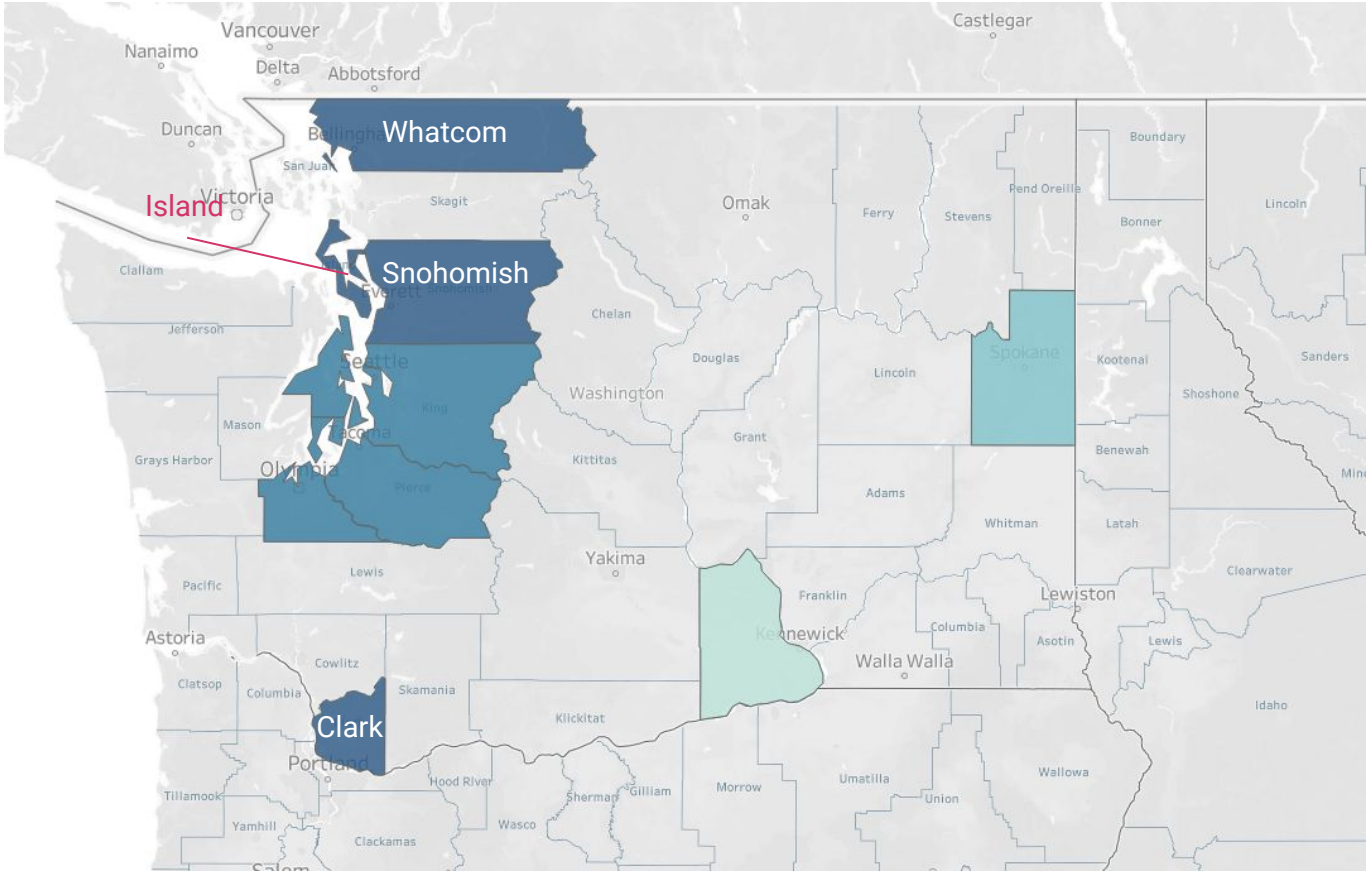
How can we compare counties and find ones to invest in?

$$\text{EVs per charger ratio} = \frac{\text{Future electric vehicle count}}{\text{Existing charging stations}}$$

Dashboard

https://public.tableau.com/app/profile/berke.tezcan/viz/ElectricVehiclePredictionsandExistingChargingInfrastructureinWashingtonState/Dashboard1

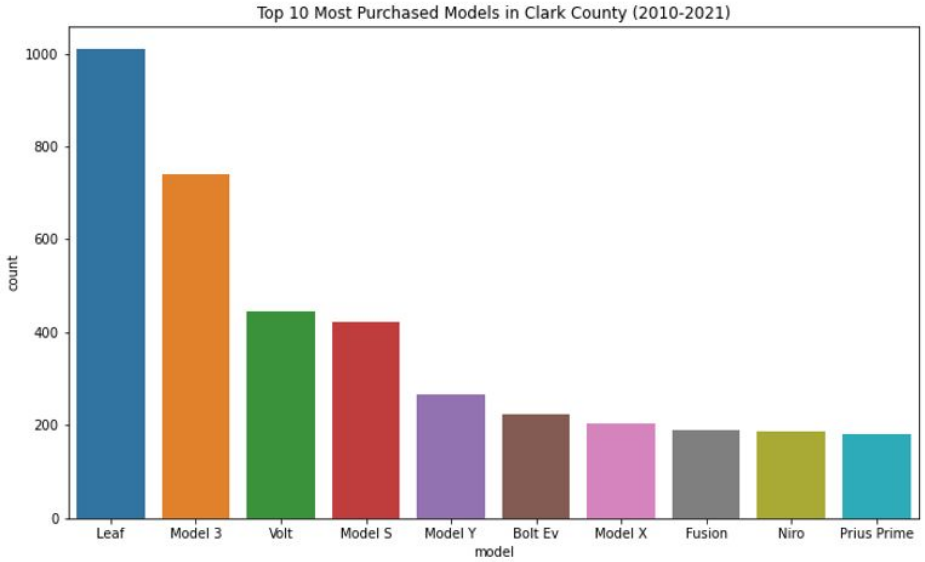
Counties with Most Potential

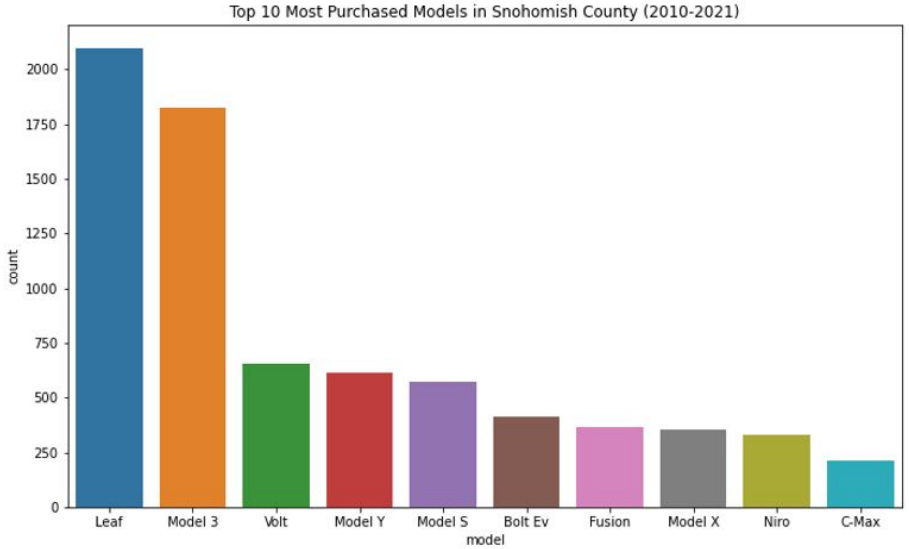


Most Purchased Models

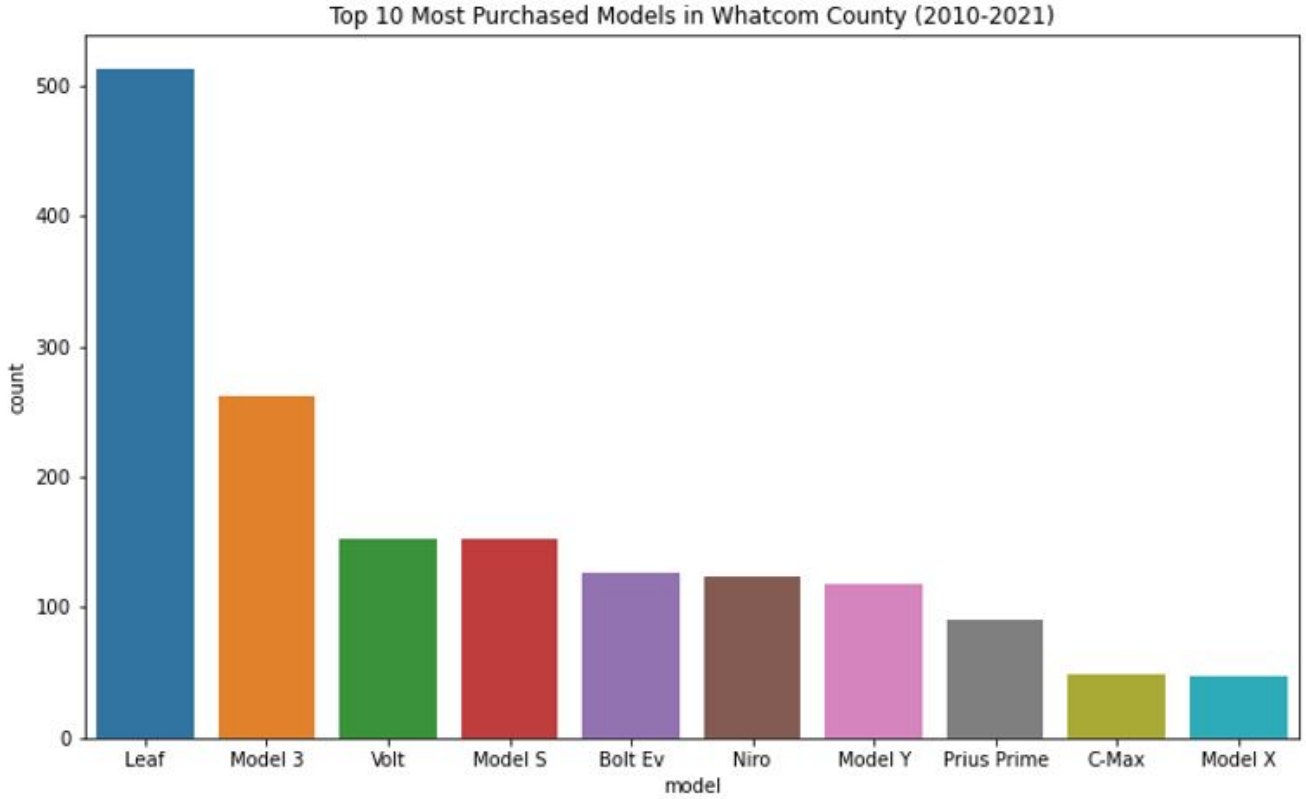
- What kind of charging station to build (level 1, level 2, level 3)
- Spacing of chargers based on the size of vehicles
- Whether to include adapters for different connector types (Tesla, CCS, CHAdeMO etc.)

Top 10 Most Purchased Models - Clark & Snohomish Counties



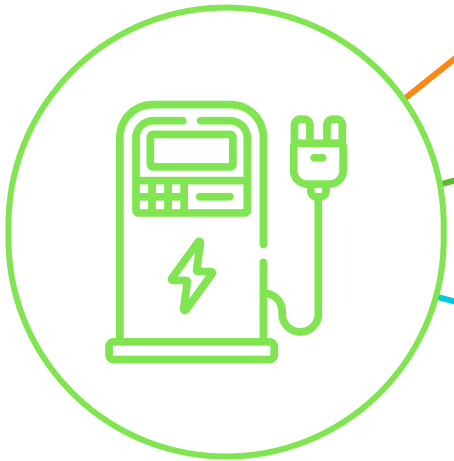


Top 10 Most Purchased Models - Whatcom County



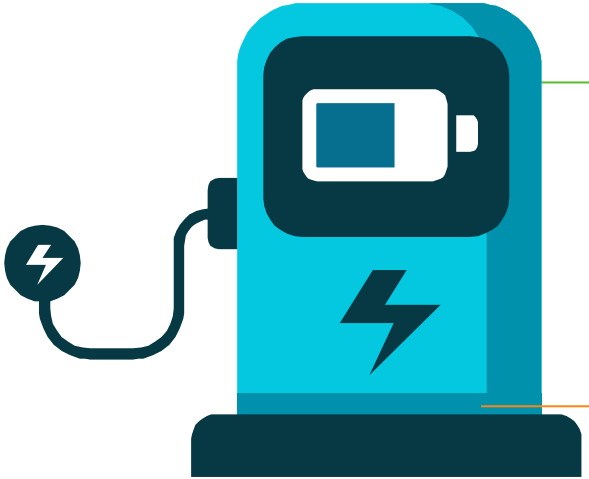
Conclusions & Recommendations

Best Counties to Invest In



	County	EVs per Charger Ratio
01	Clark County	180
02	Snohomish County	165
03	Whatcom County	98

Charger Configuration



Types of Chargers

Consider providing both level 2 and level 3 chargers since Chevy Volt is not compatible with level 3 charging.

Adapters

Include adapters for Tesla Model 3, Nissan Leaf and Chevy Volt.

Thank you

For more information github.com/ebtezcan or berketezcan@gmail.com

References

Infographics template by Slidesgo and Freepik.

https://energytransition.org/wp-content/uploads/2017/11/Charging_station_MIA_09_2017_5954.jpg

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