WASHINGTON EV INFRASTRUCTURE PLANNING INVESTIGATION

Observe • Compare • Identify Gaps • Design • Defend

Name: _____	**Class Period:** _____	**Date:** _____

THE CHALLENGE You are part of a Washington transportation planning team. Use current electric-vehicle registration and public-charging data to decide where future charging stations should go, whether important gaps exist, and whether King County appears adequately served.

Driving Question

How should Washington expand public charging so future EV drivers can travel reliably across cities, rural communities, and highway corridors?

PLANNING CONTEXT Washington is preparing for a much larger share of new vehicles to meet zero-emission requirements beginning in 2035. The live model is a current infrastructure snapshot, not a prediction of future demand.

1 Read the Data Carefully

Understand what the model measures before making a claim.

- **Registered EVs:** vehicles currently present in the Washington registration dataset; model year is not a sales timeline.
- **Public charging site:** one mapped location. A site may contain several charging ports.
- **Public charging port:** one connection that can charge one vehicle at a time.
- **EVs per public port:** a comparison ratio. A lower value means more public ports relative to registered EVs, but it does not prove that drivers never wait.
- **Not included:** most home charging, many private or workplace chargers, station reliability, wait time, and future growth.

1. Why is a charging site not the same as a charging port?

_____

2. Before examining the map, do you predict King County has enough public charging? ☐ Yes ☐ No ☐ Unsure

Explain your prediction.

_____

_____

2 Explore the Statewide Pattern

Reset the model so all vehicle types, model years, networks, connectors, and charging speeds are shown.

Record the current statewide snapshot. For DC fast and Level 2 sites, change the Charging Speed filter and record the Public Charging Sites total shown at the top.

Measurement	Model result	Where I found it
Vehicle-data snapshot date		Bottom status bar
Registered EVs in Washington		Filtered vehicles
Available public charging sites		Public charging sites
Reported public charging ports		Bottom status bar
Sites with DC fast charging		Filter: DC fast
Sites with Level 2 charging		Filter: Level 2

Write three statewide patterns you can directly observe. Describe location, clustering, or differences between western and eastern Washington.

Do public charging sites appear evenly distributed across Washington? ☐ Yes ☐ No ☐ Partly

Use one visible pattern to explain your answer.

Where do you see the strongest concentration of registered EVs? Where do you see the weakest concentration of charging sites?

3 Choose Comparison Counties

King County is required. Select two additional counties that create useful contrasts.

County B: _____ Reason selected: _____

County C: _____ Reason selected: _____

4 Compare County Evidence

Use the Compare Counties panel twice: King vs. County B, then King vs. County C.

County	Registered EVs	Public sites	Reported ports	DC fast ports	EVs per public port	BEV share
King						
County B: _____						
County C: _____						

RATIO CHECK EVs per public port = registered EVs ÷ reported public ports. Use the model value when available. A higher ratio suggests more vehicles are sharing each public port.

1. Rank the three counties from most public charging capacity relative to registered EVs to least. Use the EVs-per-port ratio.

2. Which county has the largest number of chargers but may still face pressure because it also has many EVs?

3. Which county appears to have the strongest DC fast-charging support? Give one number.

4. Describe one pattern that would be hidden if you looked only at the number of charging sites and ignored port counts.

Evidence statement 1: _____

Evidence statement 2: _____

5 Evaluate King County

Decide whether current charging appears sufficient, while stating the limits of the evidence.

King County indicator	Current model value	What the value suggests
Registered EVs		Demand for charging
Public charging sites		Number of locations
Reported public ports		Vehicles that can charge at once
DC fast ports		Long-trip and rapid-turnover support
EVs per public port		Relative pressure on public infrastructure
Map distribution		Clusters and blank areas inside the county

CLASSROOM FUTURE STRESS TEST Assume King County registrations increase by 50% while its number of public ports stays unchanged. This is a hypothetical test, not an official forecast.

Calculation	Your work	Result
Future registered EVs	Current EVs × 1.50	
Future EVs per port	Future EVs ÷ current ports	
Extra ports to preserve today's ratio	Current ports × 0.50	

Based on the available evidence, King County currently appears: ☐ Well served ☐ Mixed ☐ Under-served ☐ Unclear

Support your provisional claim with at least three pieces of evidence, including one ratio or calculated future value.

Additional evidence needed before making a final government decision:

☐ Station reliability ☐ Wait time / use rate ☐ Home charging ☐ Future EV growth
☐ Travel routes ☐ Electric-grid capacity ☐ Charging price ☐ Access for renters

6 Identify Statewide Charging Gaps

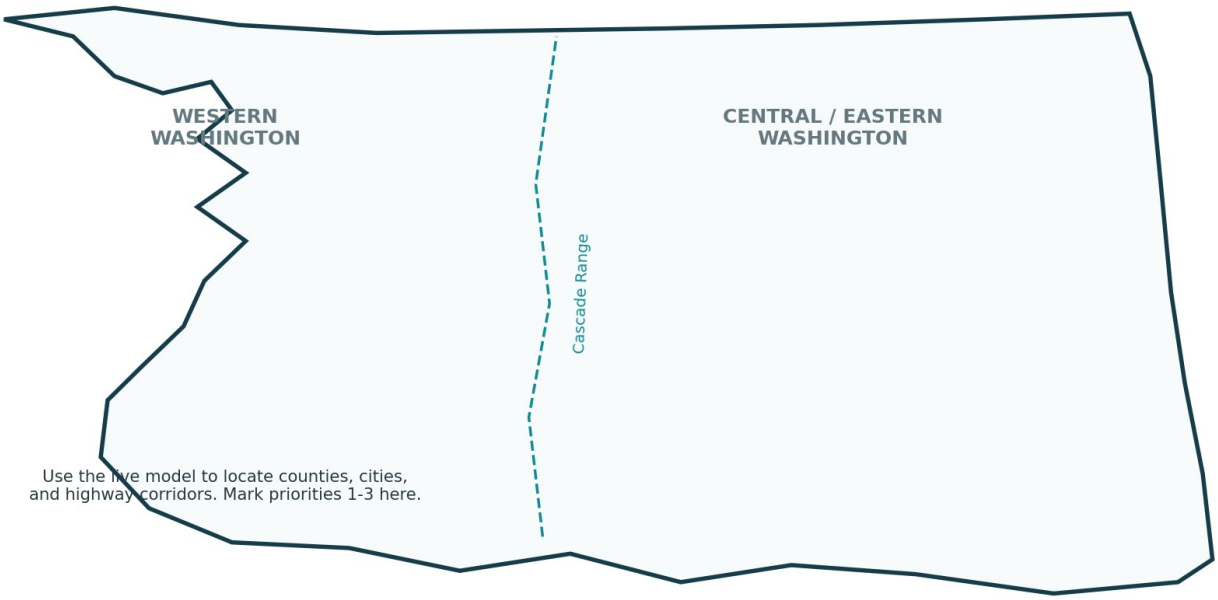
Use the full charging layer, then filter to DC fast charging and zoom into possible gaps.

A gap may be a county with a high EVs-per-port ratio, an area with few stations, or a highway corridor where drivers may need fast charging between communities.

Priority gap	County, city, or corridor	Type of gap	Model evidence	Why it matters
1				
2				
3				

Gap type choices: low site count • high EVs per port • limited DC fast charging • long distance between stations • uneven distribution within a county

EVIDENCE CHECK A blank area is not automatically a charging gap. A low-population county may need fewer local sites, while a highway corridor may need DC fast charging even when relatively few EVs are registered there.



Planning sketch - not to scale

Which of your three gaps should be addressed first? Explain why its evidence is stronger than the other two.

7 Design Washington's Future Network

Propose six new public charging sites and meet every classroom criterion and constraint.

ENGINEERING DESIGN SCENARIO Washington can add six new public charging sites. Your goal is to reduce important gaps while supporting both local charging and long-distance travel. These classroom requirements are not an official state budget.

Type	Classroom requirement
Criterion	Place 6 new public charging sites.
Criterion	At least 3 proposed sites must include DC fast charging.
Criterion	Serve at least 4 different counties.
Constraint	No county may receive more than 2 of the 6 sites.
Constraint	At least 2 sites must be east of the Cascade Range.
Constraint	At least 2 sites must address a long-distance highway or regional travel gap.

Priority	Proposed location	County	Site type	Evidence and planning reason
1			☐ DC fast ☐ Level 2	
2			☐ DC fast ☐ Level 2	
3			☐ DC fast ☐ Level 2	
4			☐ DC fast ☐ Level 2	
5			☐ DC fast ☐ Level 2	
6			☐ DC fast ☐ Level 2	

DESIGN CHECK ☐ 6 total sites ☐ 3 or more DC fast ☐ 4 or more counties ☐ No county above 2 sites ☐ 2 or more east of Cascades ☐ 2 or more long-distance gaps ☐ Every location uses model evidence

Why did your plan place some stations in high-demand counties and others in lower-density travel gaps?

8 Evaluate Trade-offs

A strong plan does not maximize one goal while ignoring every other need.

Planning choice	Benefit	Possible cost or disadvantage
More sites in King County	Serves the largest concentration of EVs	Leaves fewer sites for statewide coverage
More DC fast sites	Supports long trips and faster turnover	May limit how many total locations can be built
More Level 2 sites	Useful where vehicles remain parked longer	Less useful for rapid highway travel
Prioritize current registrations	Responds to measured demand now	May miss areas where EV use grows later
Prioritize geographic coverage	Reduces long-distance gaps	Some sites may initially serve fewer vehicles
Add locations instead of ports	Improves geographic access	Existing busy sites may still lack capacity

Describe the most important trade-off in your plan. Why is your choice reasonable?

9 Critique the Model

Separate what the model can show from what would still need field data or additional research.

The model can show...	The model cannot directly show...
Current registered EV counts by county	How many drivers rely on public charging
Public station locations and reported ports	Whether every port is working and available
DC fast, Level 2, connector, and network filters	Actual charging power, wait times, and use rates
County comparisons and EVs-per-port ratios	Future growth, project cost, grid capacity, or land access
Visible clusters and geographic blank areas	Population, income, renter access, or exact travel demand

How could one model limitation change your recommendation about King County or a statewide gap?

10 Make a Final Washington Recommendation

Use a claim, evidence, and reasoning to defend your infrastructure plan.

My final judgment about current King County public charging is: ☐ Adequate ☐ Partly adequate ☐ Not adequate ☐ Unclear

My highest-priority new charging location or corridor is: _____

My second priority is: _____

CLAIM State where Washington should place new charging stations and whether King County needs additional capacity.

EVIDENCE Include at least three numerical or mapped observations: EV counts, sites, ports, DC fast ports, ratios, or calculated future values.

REASONING Explain how your evidence meets the criteria, addresses gaps, and justifies the trade-offs in your plan.

NGSS ALIGNMENT Direct focus: HS-ETS1-1 - define a complex transportation-infrastructure problem using quantitative and qualitative criteria and constraints; HS-ETS1-3 - evaluate and defend solutions using prioritized criteria and trade-offs. Supporting focus: HS-ETS1-2 - break a statewide problem into county, corridor, charging-speed, and capacity decisions. Practices: analyzing and interpreting data; constructing explanations and designing solutions; argument from evidence. Core ideas: ETS1.A, ETS1.B, ETS1.C. Crosscutting concepts: Patterns; Systems and System Models; Cause and Effect.

Science and planning sources: Washington State Department of Ecology, Vehicle Emissions Standards; Washington State Department of Transportation, Washington State Plan for Electric Vehicle Infrastructure Deployment and NEVI updates; U.S. Department of Energy Alternative Fuels Data Center; Next Generation Science Standards, HS-ETS1 Engineering Design.