Vehicle Affordability and Incentive Amounts

Public Work Group for Clean Transportation Equity and Light-Duty Vehicle Investments
August 1, 2023
John Anderson, Transparency and Insights, Center for Sustainable Energy
With thanks to Christian Sheja, Janet Bowers, Keir Havel, Stephanie Wilson, Ben MacNeill and others at CSE
Affordability calculation purposes

Does a given incentive mix enable meaningful vehicle choice for consumers?
Outline

Cost Calculations

Affordability calculations overview

Results

Cost assumptions, inputs, and sensitivities
2023 median CVRP rebated vehicle purchase price for households with < 300% FPL income: $47,630

Data Source: Clean Vehicle Rebate Project application data
Applications received in 2023 and processed as of June 2023.
Application Status = Application Approved, Check Sent
Median examined new 2023 BEV MSRP: $63,995

Data from auto manufacturer websites, Car and Driver, and GM Authority, Excludes model years newer than 2021 and vehicles with prices > $100,000.
Median examined used BEV prices: $33,600

Data from Kelley Blue Book.
Excludes model years newer than 2021 and vehicles with prices > $100,000.
Market context important to affordability conversation

- New vehicles are more expensive nominally and relative to income than years past
  - Prices may be stabilizing
- Reports that used vehicle inventory is building and prices are falling
- EVs generally remain more expensive than conventional vehicles
- New EV incentive programs aimed at lower-income consumers must overcome EV cost premium AND higher new vehicle costs to make vehicles affordable
What do we mean by “affordable”? 
Affordability calculations

- 10% down payment
- 5-year (60-month) loan

\[ \text{TOTAL MONTHLY OPERATING COSTS} < \frac{15\% \text{ of monthly income}}{\text{household purchase power adjustment}} \]
Cost calculations

Loan Costs
- Principal (incl. tax & fees)
- Interest

Operating Costs
- Insurance
- Fuel
- Avg. other maintenance

TOTAL MONTHLY OPERATING COSTS
Maximum monthly cost

Including interest, insurance, fuel, and lifetime-average maintenance costs

<table>
<thead>
<tr>
<th>Three-person household / Joint-filers</th>
</tr>
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<tbody>
<tr>
<td>Income Level</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>225% of FPL</td>
</tr>
<tr>
<td>300% of FPL</td>
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<tr>
<td>400% of FPL</td>
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<tr>
<td>600% of FPL</td>
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</tbody>
</table>
Vehicle inputs

New
- 2023 model year vehicles from FuelEconomy.gov
- Make, model, and trim combinations where trim is related to electric range
- Where price information is available

Used
- 2021 and earlier model year vehicles
- Where vehicle is present in the fueleconomy.gov database
- Make, model, and trim combinations where trim is related to electric range
- Where price information is available
Vehicle cost assumptions

- Vehicle cost: MSRP or KBB Fair Purchase Price without options
- Interest rate: avg. for new and used (~17%)
- Insurance premium: $251/month
- Maintenance: $65/month (lifetime average)
- DMV and doc fees: $762
- Sales tax rate: 8.82% (average via taxfoundation.org)
- Fuel costs: varies by vehicle, based on FuelEconomy.gov (electricity and gas)
- Purchasing power adjustment for larger households
Most sensitive input: cost to income ratio

- Most sensitive inputs: cost to income ratio
- Other inputs: annual fuel cost, PHEV maintenance costs, BEV maintenance costs, insurance premium, sales tax rate, fees, new interest rate, used interest rate, finance term, down payment percent, and annual fuel cost.

Number of affordable EV choices
Not accounted for

- Cost of installing vehicle charging infrastructure at home, if applicable
- Financial flexibility to make a cash down payment or sufficient trade value from other vehicles
- Access to credit assumed regardless of credit score
Affordable New Vehicles
Cash incentives and 8% interest cap reduces cost, but does not enable affordable choices

- Three-person household
- $74,580 income (300% FPL)
- $9,500 PHEV and $10,000 BEV CC4A incentive applied to down payment
- 8% interest rate cap applied through Finance Assistance

<table>
<thead>
<tr>
<th>Vehicle Technology</th>
<th>BEV</th>
<th>PHEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Size</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0</td>
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<tr>
<td>Large</td>
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</table>

New 2023 Model Year Options = 0
FTC enables four choices, two eligible for FTC

- Three-person household
- $74,580 income (300% FPL)
- $9,500 PHEV and $10,000 BEV CC4A incentive applied to down payment
- 8% interest rate cap applied through Finance Assistance
- $7,500 FTC applied to down payment

New 2023 Model Year Options = 2
- Chevrolet Bolt EV
- Chevrolet Bolt EUV

<table>
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<th>Vehicle Size</th>
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<th>PHEV</th>
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<td>Large</td>
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</table>
Affordable Used Vehicles
Many affordable used small EV options even without incentives

- Three-person household
- $74,580 income (300% FPL)

Used EV Options = 39

<table>
<thead>
<tr>
<th>Vehicle Size</th>
<th>BEV</th>
<th>PHEV</th>
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<tr>
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<tr>
<td>Large</td>
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</table>
Addition of CC4A incentive more than doubles choice

- Three-person household
- $74,580 income (300% FPL)
- $9,500 PHEV and $10,000 BEV CC4A incentive applied to down payment
Interest rate cap enables 18 additional choices

- Three-person household
- $74,580 income (300% FPL)
- $9,500 PHEV and $10,000 BEV CC4A incentive applied to down payment
- Interest capped at 8% through Finance Assistance

<table>
<thead>
<tr>
<th>Vehicle Size</th>
<th>BEV</th>
<th>PHEV</th>
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</table>

Used EV Options = 121
Additional $4,000 FTC enables 22 more choices

- Three-person household
- $74,580 income (300% FPL)
- $9,500 PHEV and $10,000 BEV CC4A incentive applied to down payment
- Interest capped at 8% through Finance Assistance
- $4,000 FTC applied to down payment

<table>
<thead>
<tr>
<th>Vehicle Size</th>
<th>BEV</th>
<th>PHEV</th>
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</thead>
<tbody>
<tr>
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<td>85</td>
<td>57</td>
</tr>
<tr>
<td>Large</td>
<td>3</td>
<td>2</td>
</tr>
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</table>

Used EV Options = 147
Appendix
Cox Auto: June average new car transaction price $48,808

Graph and June average from:
Cox Auto, Moody’s: Vehicle prices relative to income high, declining?

Most of the new car market has household income > 400% FPL

CVRP Income Caps:
- $250,000 for single individuals,
- $340,000 for a head of household,
- $500,000 for joint filing

Data source: Strategic Vision’s New Vehicle Experience Survey.
California new vehicles purchased in calendar year 2019.
Weighted to new vehicle registrations from S&P Global Mobility.
Contains data from S&P Global Mobility ©2020.
17% of CVRP participants have household income ≤ 300%

Data Source: Clean Vehicle Rebate Project application data
Applications received between Jan 1, 2021 and March 1, 2023
Application Status = Application Approved, Check Sent;
Application Type = Individual; n = 90,149
2019: Median new car price for households with income < 300% FPL: $30,000

Data source: Strategic Vision’s New Vehicle Experience Survey.
California new vehicles purchased in calendar year 2019.
FPL percentages weighted to new vehicle registrations from S&P Global Mobility.
Contains data from S&P Global Mobility ©2020.
2019 median CVRP rebated vehicle purchase price for households with income < 300% FPL: $38,200

Data Source: Clean Vehicle Rebate Project application data
Applications received in 2019 and processed as of June 2023.
Application Status = Application Approved, Check Sent
Cox Auto: June average used vehicle price $27,147

Graph and June average from:
(July 14, 2023). “Used-Vehicle Inventory, Prices Hold Steady as Sales Edge Higher.” Cox Automotive.
https://www.coxautoinc.com/market-insights/used-vehicle-inventory-june-2023/
Challenges accessing full tax credit at lower income levels

- Households with income 300% FPL or less may be unable to use the entire federal tax credit for a new vehicle.
- Households at the federal poverty level may not be able to access the full used vehicle tax credit

<table>
<thead>
<tr>
<th>FPL Bin</th>
<th>Average Tax Liability</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 100% FPL</td>
<td>$2,293</td>
</tr>
<tr>
<td>100% - 200% FPL</td>
<td>$4,301</td>
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<tr>
<td>200% - 300% FPL</td>
<td>$6,214</td>
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<tr>
<td>300% - 400% FPL</td>
<td>$7,200</td>
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<td>400% - 500% FPL</td>
<td>$7,500</td>
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<tr>
<td>500% - 600% FPL</td>
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<tr>
<td>600% - 700% FPL</td>
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<td>700% - 800% FPL</td>
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<tr>
<td>800% - 900% FPL</td>
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<td>900% - 1000% FPL</td>
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<td>1000% - 1100% FPL</td>
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<td>1100% - 1200% FPL</td>
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<td>1200% - 1300% FPL</td>
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<tr>
<td>1300% - 1400% FPL</td>
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<tr>
<td>1400% - 1500% FPL</td>
<td>$7,500</td>
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<tr>
<td>1500% - 1600% FPL</td>
<td>$7,500</td>
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<tr>
<td>1600% - 1700% FPL</td>
<td>$7,500</td>
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</tbody>
</table>
Maintenance cost inputs insignificant to affordable choices

- Value chosen: $65 per month
- Why this was chosen: Maintenance cost per mile of BEV $0.06 at 13,000 miles a year
- Source: Cost per mile from DOE, annual mileage from Forbes
- Possible alternative: $33 per month (Consumer Reports), $97.50 per month (PHEV via April 2021 DOE report)
Insurance cost inputs insignificant

- Best guess: $251 per month
- Why this was chosen: $3,012 per year National EV average
- Source: Value Penguin
- Possible alternatives: $179 per month (Hyundai Kona); $394 (Porsche Taycan)
Fuel costs not significant

- Best guess: Varies by vehicle
- Why this was chosen: Default values from FuelEconomy.gov
- Source: FuelEconomy.gov
- Possible alternatives: $400 (lowest EV default value), $1,500 (double highest EV default value)
Sales tax assumptions insignificant

- Value chosen: 8.82% tax rate
- Why this was chosen: California average sales tax rate
- Source: Tax Foundation and CA DTF
- Other options: 7.25% (minimum CA sales tax rate via CA DTF), 10.75% (highest CA sales tax rate via CA DTF)
High markups and optional extras have small impact

- Value chosen: $762
- Why this was chosen: Highest DMV fee for a new EV
- Source: DMV.ca.gov
- Other options: $410 (lowest DMV fee for a new EV), $4,421 (average Feb. 2023 cost over MSRP via iseecars.com plus assumed fees)
Interest rates assumptions modestly impactful

- Values chosen:
  - 16.89% for new
  - 17.14% for used
- Why this was chosen: Average interest rate during the first quarter of 2023 assuming credit score from 600–699.
- Sources: [US News](https://news.yahoo.com), [Lending Tree](https://www.lendingtree.com)
- Possible alternatives:
  - 11.96–21.53% for new (credit scores 700–750 or 451–560, respectively)
  - 12.21–21.78% for used (assuming same credit scores)
Spreading loan over more time increases monthly affordability, debt

- Value chosen: 5 years
- Why this was chosen: average loan term for used vehicles rounded to nearest year
- Sources: Lending Tree
- Possible alternatives: 48 months (financial health recommendation), 74 months (new car average)
Increasing down payment increases monthly affordability, but may be inaccessible to many households

- Value chosen: 10%
- Why this was chosen: Typical Finance Assistance program down payment level
- Sources: CARB Finance Assistance programs
- Possible alternatives: 0% (lowest barrier to entry), 20% (financial health recommendation)
Transportation spending relative to income the highest impact input

Cost to income ratio

- Value chosen: 15%
- Why this was chosen: Between financial health literature recommendation of 10% and actual average US household spend of 16.4% (2021 via US BTS)
- Sources: US BTS
- Possible alternatives: 10% (financial health recommendation), 26.9% (average for lowest income quintile via US BTS)