

Brett Williams, PhD – Principal Advisor, EV Programs, CSE Nicholas Pallonetti – Research Analyst, CSE with thanks to M. Eluganti, M. Jones, and others at the Center for Sustainable Energy (CSE)



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# **Outline: MSRP Brief**

## I. Context: MSRP-Based Vehicle Eligibility Criteria

- II. Program Outputs: Vehicles Rebated by MSRP
- III. Program Impacts: <u>Rebate Influence by MSRP</u>
- IV. Conclusions: <u>Summary & Select Findings</u>

## **Additional Resources**

EVs = light-duty plug-in hybrid, battery, and fuel-cell electric vehicles (PHEVs, BEVx vehicles, BEVs, and FCEVs)

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#### State EV Rebate Programs Administered by CSE (as of 12/3/2019)





	CALIFORNIA CLEAN VEHICLE REBATE PROJECT	MOR-EV Massachusetts Offers Rebates for Electric Vehicles	Connecticut Hydrogen and Electric Automobile Purchase Rebate		Oregon CVRF
Fuel-Cell EVs	\$4,500	\$1,500	\$5,000	<ul> <li>≥ 120 e-miles \$2,000</li> <li>≥ 40 e-miles \$1,700</li> <li>≥ 20 e-miles \$1,100</li> <li>&lt; 20 e-miles \$500</li> </ul>	≥ 10 kWh \$2,50 < 10 kWh \$1,50
All-Battery EVs	\$2,000	\$1,500	≥ 200 e-miles \$1,500 < 200 e-miles \$500		
Plug-in Hybrid EVs	BEVx: \$2,000 \$1,000	BEVx only: \$1,500	\$500		
Zero-Emission Motorcycles	\$750	\$450			\$750 (and NEV
Program Design Elements	<ul> <li>Base MSRP ≤\$60k (except fuel-cell EVs)</li> <li>≥35 UDDS e-miles</li> <li>Income cap</li> <li>Increased rebates for lower-income households (+\$2,500)</li> </ul>	<ul> <li>Purchase price ≤\$50k</li> <li>No fleet rebates</li> <li>(Program ended 9/30/19, restarted 1/1/20)</li> </ul>	<ul> <li>BEVs &amp; PHEVs ≤\$42k base MSRP, FCEVs ≤\$60k</li> <li>Point-of-sale option</li> <li>\$125/\$75 dealer incentive</li> </ul>	<ul> <li>Base MSRP &gt;\$60k = \$500</li> <li>Point-of-sale</li> </ul>	<ul> <li>Base MSRP &lt;\$!</li> <li>Point-of-sale option</li> <li>Increased rebat for lower-incor households (+\$2,500), used EVs also</li> </ul>







## State EV Rebate Programs Administered by CSE (as of 4/6/2021)







¢	CALIFORNIA CLEAN VEHICLE REBATE PROJECT <sup>M</sup>	Massachusetts Offers Rebates for Electric Vehicles	Connecticut Hydrogen and Electric Automobile Purchase Rebate		OREGON CLEAN VEHICLE REBATE PROGRAM	Rew Jersey
Fuel-Cell EVs	\$4,500	\$2,500	\$5,000	≥ 120 e-miles*: \$2,000 > 40 e-miles:	≥ 10 kWh:	
All-Battery EVs	\$2,000	\$2,500	≥ 200 e-miles*: \$1,500	≥ 40 c miles. \$1,700 ≥ 20 e-miles:	\$2,500 < 10 kWh:	\$25 per elect
Plug-in Hybrid EVs	BEVx = \$2,000 Others = \$1,000	BEVx = \$2,500 Others = \$1,500	< 200 e-miles: \$500	s: \$1,100 < 20 e-miles: \$500	\$1,100 < 20 e-miles: \$500 \$500	mile*, up to a r of \$5,000
Zero-Emission Motorcycles	\$750				\$750 (and NEVs)	
Program Design Elements	<ul> <li>Base MSRP: - PEVs ≤ \$60k</li> <li>≥ 30 electric miles*</li> <li>Income cap</li> <li>+\$2,500 for income- qualified households</li> </ul>	<ul> <li>Purchase price ≤ \$50k</li> <li>≥ 25 electric miles*</li> </ul>	<ul> <li>Base MSRP: - FCEVs ≤ \$60k</li> <li>- PEVs ≤ \$42k</li> <li>Point-of-sale option</li> <li>\$125/\$75 dealer incentive</li> </ul>	<ul> <li>Base MSRP &gt;\$60k = \$500</li> <li>Point-of-sale</li> </ul>	<ul> <li>Base MSRP &lt;\$50k</li> <li>Point-of-sale option</li> <li>+\$2,500 for income-qualified households, used EVs also qualify</li> </ul>	<ul> <li>Trim-specific MSRP &lt;\$55k</li> <li>Post-purchas to be replace with point-of sale rebate a later date</li> </ul>

\* Electric miles (e-miles) are U.S.-EPA-rated all-electric miles.









# Moderately-Priced Vehicles Receive Most Rebates



\*Does not reflect sales price:

Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model/MY on fueleconomy.gov. Tesla Model 3's were assigned an MSRP of \$35k. Where MY 2019 MSRPs were unavailable, MY '18 MSRPs were used.



### Moderately-Priced Vehicles Receive Most Rebates (especially non-Tesla)

#### Rebated MY 2018 Plug-in Electric Vehicles (Purchased/Leased 1/2017–4/2020)



#### **Model Minimum MSRP\***

\*Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model on fueleconomy.gov and does not reflect sale price. Where MY 2018 MSRPs were unavailable, MY'17 MSRPs (Chevrolet Volt & Bolt EV) or MY'19 MSRP (Kia Soul EV) were used. All Tesla Model 3's were assigned an MSRP of \$49k (that of the predominantly available model variant at the time, the Long Range).



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# **Program Impacts: Market Additions** Rebate Influence by MSRP





### Rebate Importance (CY 2019 Plug-in EVs)



CVRP Consumer Survey: 2017–2019 edition. Question weighted n = 6,120. Starting Dec. 2019, PEVs with base MSRP greater than \$60k became ineligible.



#### How important was the state rebate in making it possible for you to acquire your clean vehicle?





### Rebate Importance Decreases Above \$60k MSRP (CY 2019 Plug-in EVs)



\*Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model/MY on fueleconomy.gov and does not reflect sale price. Where MSRPs were unavailable for a given MY, MSRPs from the previous or following MY were used. Tesla Model 3's were assigned an MSRP of \$49k for MY 2018, \$35k for MY 2019 and 2020.

CVRP Consumer Survey: 2017–2019 edition. Question weighted n = 6,120. Starting Dec. 2019, PEVs with base MSRP greater than \$60k became ineligible.



#### How important was the state rebate in making it possible for you to acquire your clean vehicle?





### **Rebate Essentiality** (CY 2019 Plug-in EV Purchases/Leases)

#### Would not have purchased/leased their EV without the state rebate

100%
80%
60%
40%
20%
0%

CVRP Consumer Survey: 2017–2019 edition. Filtered question, weighted n = 6,158. Starting 12/2019, PEVs with base MSRP > \$60k became ineligible. \* Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model/MY on fueleconomy.gov and does not reflect sale price. Where MSRPs were unavailable for a given MY, MSRPs from the previous or following MY were used. Tesla Model 3's were assigned an MSRP of \$49k for MY 2018, \$35k for MY 2019 and 2020.







### Rebate Essentiality Decreases Above \$60k MSRP (CY 2019 Plug-in EV Purchases/Leases)



CVRP Consumer Survey: 2017-2019 edition. Filtered question, weighted n = 6,158. Starting 12/2019, PEVs with base MSRP > \$60k became ineligible. \* Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model/MY on fueleconomy.gov and does not reflect sale price. Where MSRPs were unavailable for a given MY, MSRPs from the previous or following MY were used. Tesla Model 3's were assigned an MSRP of \$49k for MY 2018, \$35k for MY 2019 and 2020.





### Rebate Essentiality Similar But Lower for Tesla (CY 2019 Plug-in EV Purchases/Leases)



CVRP Consumer Survey: 2017-2019 edition. Filtered question, weighted n = 6,158. Starting 12/2019, PEVs with base MSRP > \$60k became ineligible. \* Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model/MY on fueleconomy.gov and does not reflect sale price. Where MSRPs were unavailable for a given MY, MSRPs from the previous or following MY were used. Tesla Model 3's were assigned an MSRP of \$49k for MY 2018, \$35k for MY 2019 and 2020.





### Rebate Essentiality High for Cars Below \$60k MSRP (CY 2019 Plug-in EV Purchases/Leases)



CVRP Consumer Survey: 2017–2019 edition. Filtered question, weighted n = 6,158. Starting 12/2019, PEVs with base MSRP > \$60k became ineligible. \* Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model/MY on fueleconomy.gov and does not reflect sale price. Where MSRPs were unavailable, MSRPs from the previous or following MY were used. Tesla Model 3's were assigned an MSRP of \$49k for MY 2018, \$35k for MY 2019 and 2020.



#### Model Minimum MSRP\*



### Rebate Essentiality: More Data Needed for SUVs/Van (CY 2019 Plug-in EV Purchases/Leases)



CVRP Consumer Survey: 2017–2019 edition. Filtered question, weighted n = 6,158. Starting 12/2019, PEVs with base MSRP > \$60k became ineligible. \* Each vehicle was assigned the minimum Manufacturer's Suggested Retail Price (MSRP) for that model/MY on fueleconomy.gov and does not reflect sale price. Where MSRPs were unavailable, MSRPs from the previous or following MY were used. Tesla Model 3's were assigned an MSRP of \$49k for MY 2018, \$35k for MY 2019 and 2020.



#### Model Minimum MSRP\*



# CY 2019 Plug-In EV SUVs and Vans

- Audi e-tron
- Chrysler Pacifica
- Hyundai Kona Electric
- Jaguar I-PACE
- Mitsubishi Outlander PHEV
- Subaru Crosstrek Hybrid
- Tesla Model X
- Volvo XC60
- Volvo XC90





CVRP Consumer Survey: 2017–2019 edition. Filtered guestion, weighted n = 6,158.



# Illustrative Upcoming EV Model Announcements (with uncertainties)

Make	Model	Model Year	Vehicle Class
Atlis	XT	2021	Standard Pick-up Trucks
Audi	Q4 e-tron	2021	Small Sport Utility Vehicle
BMW	iNext	2021	Standard Sport Utility Vehicle
BMW	i4	2021	Large Cars
BMW	i7	2022	Large Cars
BMW	X8	2023	Standard Sport Utility Vehicle
BMW	5 series electric	TBD	Compact Cars
BMW	X1	TBD	Large Cars
BMW	7 Series PHEV	TBD	Compact Cars
BMW	7 Series EV	TBD	Compact Cars
Byton	M-Byte	2021	Small Station Wagons
Cadillac	Lyriq	2021	Standard Sport Utility Vehicle
Cadillac	Celestiq	2023	Large Cars
Fisker	Ocean	2021	Small Sport Utility Vehicle
Ford	F-150 Electric	2022	Standard Pick-up Trucks
Ford	Transit EV	2023	Special Purpose Vehicle
GMC	Hummer	2021	Standard Sport Utility Vehicle
GMC	Hummer SUV	2023	Standard Sport Utility Vehicle
GMC	Electric Van	2023	Special Purpose Vehicle
Honda	E	2024	Compact Cars
Hyundai	Ioniq 5	2022	Sport Utility Vehicle
Hyundai	Ioniq 6	2022	TBD
Hyundai	loniq 7	2024	Standard Sport Utility Vehicle
Hyundai	Tucson PHEV	2022	Small Sport Utility Vehicle
Jeep	Grand Cherokee	TBD	Sport Utility Vehicle
Kandi	K23	2021	Subcompact Cars
Karma	GS series sedan	2022	TBD

Make	Model	Model Year	Vehicle Class
Kia	Soul EV (relaunch)	2021	Small Station Wagons
Kia	EV6	2022	Small Sport Utility Vehicle
Land Rover	Range Rover	2022	Sport Utility Vehicle
Lordstown	Endurance	2021	Standard Pick-up Trucks
Mazda	MX-30	TBD	Small Sport Utility Vehicle
Mercedes-Benz	EQC	2021	Small Sport Utility Vehicle
Mercedes-Benz	EQA	2021	Small Station Wagons
Mercedes-Benz	EQB	2022	Small Sport Utility Vehicle
Mercedes-Benz	EQS	2022	Large Cars
Mercedes-Benz	EQE	2023	Compact Cars
Mitsubishi	Eclipse Cross	2022	Small Sport Utility Vehicle
Nikola	Badger 600-mi FC REx	TBD	Standard Sport Utility Vehic
Nikola	Badger 300-mi	TBD	Standard Pick-up Trucks
Nissan	Ariya	2021	Small Station Wagons
Nissan	Maxima	2023	Midsize Cars
Polestar.	Polestar 3	TBD	Large Cars
Porsche	Macan	2023	Small Sport Utility Vehicle
Porsche	718 Boxster	2023	TBD
Porsche	718 Cayman	2023	TBD
Rivian	R1T 180 kWh	2021	Standard Pick-up Trucks
Rivian	R1S	2021	Standard Sport Utility Vehic
Rivian	R1T 105 kWh	TBD	Standard Pick-up Trucks
Rivian	Delivery Van	TBD	Special Purpose Vehicle
Tesla	Cybertruck	2021	Standard Pick-up Trucks
Volkswagen	ID.Buzz	TBD	Special Purpose Vehicle, M
Volkswagen	ID.Buggy	TBD	Two Seaters
Volvo	C40	2022	Sport Utility Vehicle

Excludes super-luxury cars (with expected MSRP >\$90,000)





# **Summary and Select Findings**





# Summary & Select Findings: MSRP

## **Program Design**

- MSRP criteria introduced into CVRP eligibility effective 12/3/2019
   MSRD come are a common facture throughout state relate programs.
- MSRP caps are a common feature throughout state rebate programs, but use a variety of different approaches

## **Vehicles Rebated**

Predominantly moderate-MSRP models:
 MY 2019: 92% with model-minimum MSRP <\$40,000 before incentives</li>

## **Rebate Influence and Impacts**

- At MSRP greater than \$60k, rebate influence decreases substantially
- Rebate Essentiality (an indicator of program cost-effectiveness) indicates \$60k model-minimum MSRP cap is still appropriate for cars
- Too early (insufficient data) to judge SUV/van MSRP cap
  - Initial, limited data points to *lower* MSRP cap for SUVs/vans than cars, but that counterproductively wouldn't leave room for new releases









# **Select Publications** (*Reverse Chronological*)

- ${}^{\bullet}$ *Energies*. 14 (2021) 1899.
- EVS33, and Zenodo, Portland OR, 2020. https://doi.org/10.5281/ZENODO.4021408
- Plug-in Hybrid and Electric Vehicle Research Center, 2019.
- ${\bullet}$ Rebate Project, in: 98th Annu. Meet. Transp. Res. Board, National Research Council, Washington DC, 2019.
- $\bullet$ Survey, 2013–2015 Edition | Clean Vehicle Rebate Project, Center for Sustainable Energy (CSE), San Diego CA, 2018.
- Clean Vehicle Rebate Project, Center for Sustainable Energy (CSE), San Diego CA, 2017.
- for Sustainable Energy (CSE), 2017.
- Rebate, Transp. Res. Rec. 2628 (2017) 23–31.

B.D.H. Williams, J.B. Anderson, Strategically Targeting Plug-In Electric Vehicle Rebates and Outreach Using "EV Convert" Characteristics,

B.D.H. Williams, J.B. Anderson, A. Lastuka, Characterizing Plug-in Hybrid Electric Vehicle Consumers Who Found the U.S. Federal Tax Credit Extremely Important in Enabling Their Purchase, in: 33rd Electr. Veh. Symp., Electric Drive Transportation Association (EDTA),

S. Hardman, P. Plötz, G. Tal, J. Axsen, E. Figenbaum, P. Jochem, S. Karlsson, N. Refa, F. Sprei, B.D. Williams, J. Whitehead, B. Witkamp, Exploring the Role of Plug-In Hybrid Electric Vehicles in Electrifying Passenger Transportation, International EV Policy Council, UC Davis

Pallonetti, B.D. Williams, Exploratory Estimation of Greenhouse-Gas Emissions Reductions Associated with California's Clean Vehicle

B.D. Williams, J. Orose, M. Jones, J.B. Anderson, <u>Summary of Disadvantaged Community Responses to the Electric Vehicle Consumer</u>

B.D. Williams, J.B. Anderson, Strategically Targeting Plug-in Electric Vehicle Rebates and Outreach Using Characteristics of 'Rebate-Essential" Consumers in 2016–2017, in: 31st Int. Electr. Veh. Symp., Society of Automotive Engineers of Japan, Inc., Kobe, Japan, 2018.

• C. Johnson, B.D. Williams, C. Hsu, J.B. Anderson, <u>Summary Documentation of the Electric Vehicle Consumer Survey, 2013–2015 Edition</u>

• C. Johnson, B.D. Williams, J.B. Anderson, N. Appenzeller, Evaluating the Connecticut Dealer Incentive for Electric Vehicle Sales, Center

C. Johnson, B.D. Williams, Characterizing Plug-In Hybrid Electric Vehicle Consumers Most Influenced by California's Electric Vehicle



# Select Presentations (Reverse Chronological)

- EV Purchase Incentives: Program Design, Outputs, and Outcomes of Four Statewide Programs with a Focus on Massachusetts
- What Vehicles Are Electric Vehicles Replacing and Why?
- **Electric Vehicle Incentives and Policies**
- Proposed FY 2019–20 Funding Plan: Final CVRP Supporting Analysis
- CVRP: Data and Analysis Update
- Cost-Effectively Targeting EV Outreach and Incentives to "Rebate-Essential" Consumers
- Electric Vehicle Rebates: Exploring Indicators of Impact in Four States
- Targeting EV Consumer Segments & Incentivizing Dealers
- Supporting EV Commercialization with Rebates: Statewide Programs, Vehicle & Consumer Data, and Select Findings
- Yale Webinar: Supporting EV Commercialization with Rebates: Statewide Programs, Vehicle & **Consumer Data, and Select Findings**
- CVRP Income Cap Analysis: Informing Policy Discussions

6/17/21 update



**Recommended citation:** 

B.D.H. Williams and N. Pallonetti, Presentation: "CVRP Data Brief: MSRP Considerations," Clean Vehicle Rebate Project, administered by the Center for Sustainable Energy on behalf of the California Air Resources Board, June 2021.





#### CleanVehicleRebate.org



