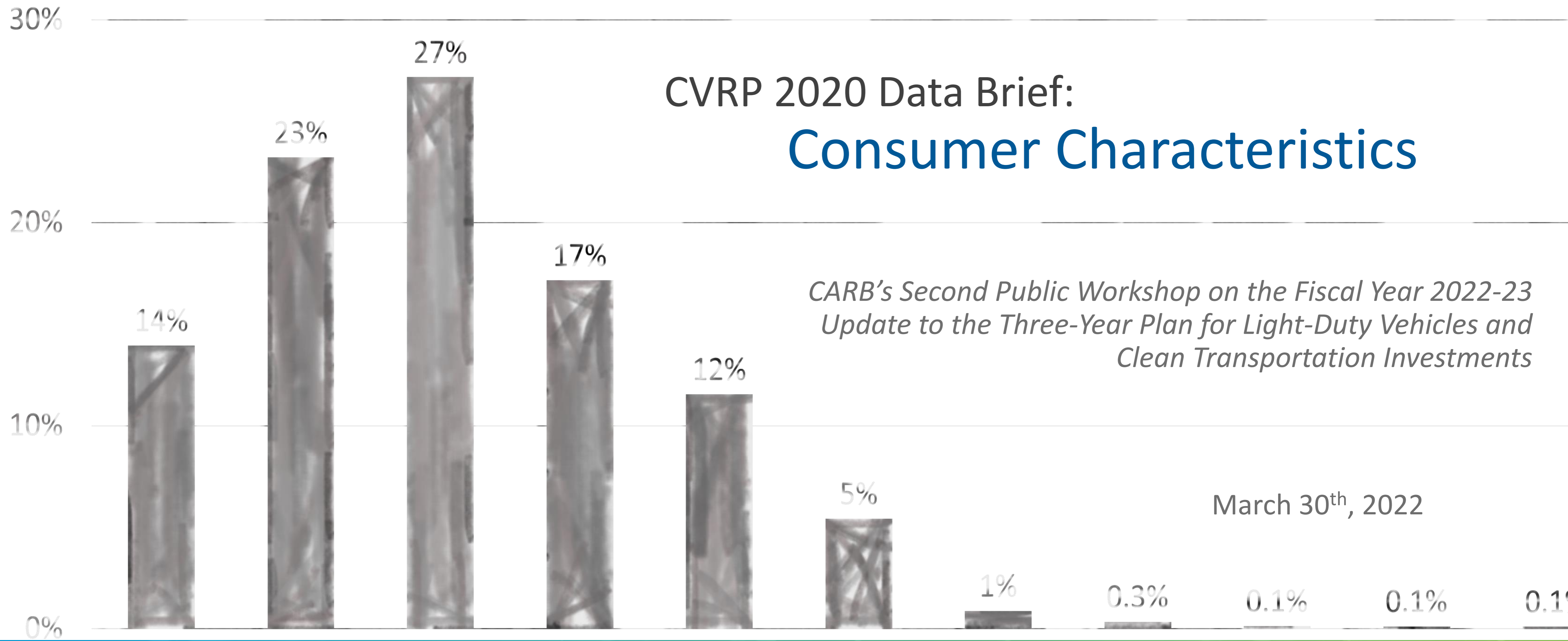CVRP 2020 Data Brief:
Consumer Characteristics

CARB's Second Public Workshop on the Fiscal Year 2022-23 Update to the Three-Year Plan for Light-Duty Vehicles and Clean Transportation Investments

March 30th, 2022

Percent of Funding

30%

20%

10%

0%

14% 23% 27% 17% 12% 5% 1% 0.3% 0.1% 0.1% 0.1%

Brett Williams, PhD – Principal Advisor, EV Programs, CSE

Nicholas Pallonetti – Research Analyst, CSE

with thanks to J. Bowers and others at the Center for Sustainable Energy (CSE)

CALIFORNIA
CLEAN VEHICLE
REBATE PROJECT℠

Outline: Consumer Characteristics

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

Context

Consumer Eligibility Criteria & Other Program Features

3

Program Design Shapes Outcomes

□ = in effect during 2020

CALIFORNIA CLEAN VEHICLE REBATE PROJECT™

as of Mar. 2010	as of Dec. 2013	as of Dec. 2014 / Jan. 2015	as of Mar. 2016	as of Nov. 2016
• Incentive stacking permitted • 36-month ownership requirement • Rebates per year limit = 20	• Rebates per year limit = 2 **as of May 2014** • 18-month application window	• 30-month ownership requirement (retroactive) • Total rebate limit = 2	• $250k–$500k income cap (PEVs) • +$1,500 for income-qualified households (≤ 300% FPL), excluding ZEMs	• $150k–$300k income cap (PEVs) • +$2,000 for income-qualified households (≤ 300% FPL), excl. ZEMs • ≥ 20 UDDS electric miles

as of Jan. 2018	as of Jan. 2019	as of Dec. 2019	as of Apr. 2020	as of Apr. 2021
• $150k–$300k income cap on stacking HOV decal • (only binding on FCEVs) • Rebate Now San Diego County preapproval pilot with point-of-sale option	• Stacking with CVAP grant not permitted (retroactive)	• Base MSRP ≤ $60k (PEVs) • ≥ 35 UDDS electric miles • +$2,500 † for income-qualified households (≤ 300% FPL), excl. ZEMs • Total rebates limit = 1 § • 3-month application window ‡	• Stacking with CVAP grant permitted **as of Jan. 2021** • +$2,500 for income-qualified households (≤ 400% FPL), excl. ZEMs	• ≥ 30 U.S. EPA electric miles (45 UDDS) • Rebate Now preapproval option limited to income-qualified households, expanded to include SJ Valley

PEVs = plug-in EVs. FPL = Federal Poverty Level. ZEMs = zero-emission motorcycles. UDDS = Urban Dynomometer Driving Schedule. HOV = high-occupancy-vehicle. FCEVs = fuel-cell EVs. CVAP = Clean Vehicle Assistance Program. MSRP = manufacturer suggested retail price.

† Change due to $500 decrease in standard rebate amounts.   ‡ COVID exemptions on application window effectively delayed implementation until 4/15/2021.

§ A second rebate can be approved for a FCEV if the first rebate was for a PEV.

Base Rebate Amount for Most Individuals Decreased $500

	as of Mar. 2010	as of Jun. 2011	as of Jul. 2013	as of Jun. 2014	as of Mar. 2016	as of Nov. 2016	as of Dec. 2019
Fuel-Cell EVs	$3,000–$5,000 ‡	$1,500–$2,500 ‡	$2,500	$5,000	$5,000 *	$5,000**	$4,500***
Battery EVs †	$3,000–$5,000 ‡	$1,500–$2,500 ‡	$2,500	$2,500	$2,500 *	$2,500**	$2,000***
Plug-in Hybrid EVs	$3,000	$1,500	$1,500	$1,500	$1,500 *	$1,500**	$1,000***
Zero-Emission Motorcycles	$1,500	$900	$900	$900	$900	$900	$750
Neighborhood EVs	$1,500	$900	$900	$900	$900	None eligible	None eligible
Commercial Zero-Emission Vehicles	$20,000						

† Includes range-extended battery electric vehicles.

‡ Amounts varied by ZEV type. For definitions, see CCR 1962.1.

* Lower-income consumers eligible for an additional $1,500.

** Lower-income consumers eligible for an additional $2,000.

*** Lower-income consumers eligible for an additional $2,500.

Applications Saw Dramatic Decline But Significant Recovery
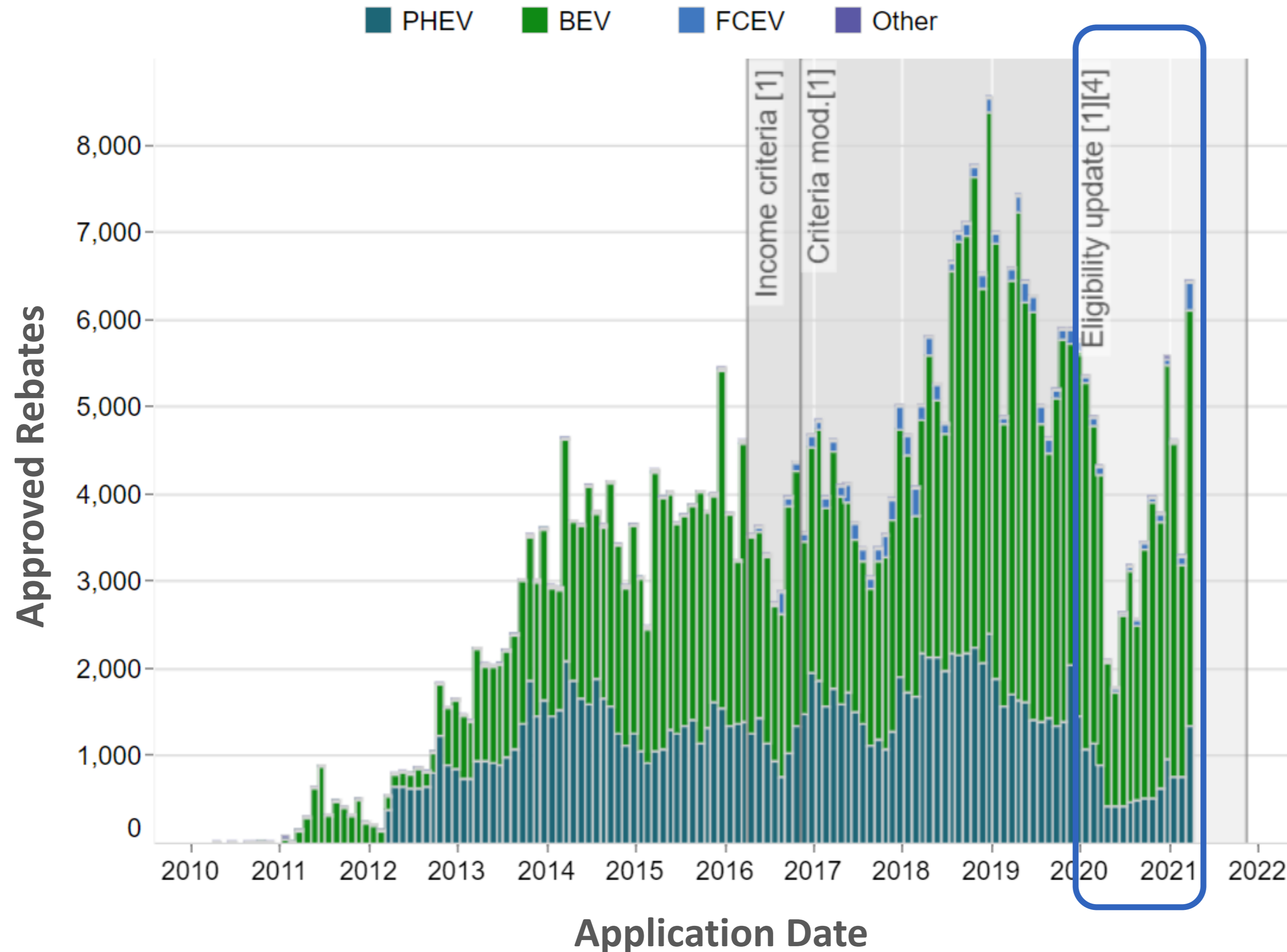
With COVID exemptions, rebate applications for calendar year 2020 purchases/leases for individuals spanned 1/1/2020 – 4/15/2021.

12% applied in 2021.

12/29/21 image from https://cleanvehiclerebate.org/eng/rebate-statistics

Program Outputs

Consumers Rebated

Rebate Statistics Dashboard: Equity Tab

2/4/22 images from https://cleanvehiclerebate.org/eng/rebate-statistics

CVRP Consumer Survey Editions

(Shows Rebates to Individuals for Plug-in EVs Only)

	2013–2015 Edition	2015–2016 Edition	2016–2017 Edition	2017–2020 Edition	Total
Vehicle Purchase/ Lease Dates	Sep. 2012 – May 2015	April 2015 – May 2016	May 2016 – May 2017	June 2017 – Nov. 2020	Sep. 2012 – Nov. 2020
Survey Responses (total *n*)*	19,460	11,611	8,957	32,524	72,552
Program Population (*N*)**	91,100	45,700	46,800	193,200	376,800

* Subsequently weighted to represent the program population along the dimensions of vehicle category, vehicle model, buy vs. lease, and county (weighting dimensions for the 2017–20 Edition also included year of purchase/lease).

** Small numbers of rebated vehicles are not represented in the time frames due to application lags. Rounded to nearest 100.

Consumer Survey Dashboard: Demographics

Data from three survey editions (2013–15, '15–16, and '16–17) online…

Select Demographic*

Annual Household Income ▼

| Annual Household Income |
| Education |
| Housing Type |
| Housing Ownership |
| Gender |
| Age |

Vehicle Category*

(All) ▼

Make

(All) ▼

Weighted Survey Responses: Annual Household Income

33,067

County

(All) ▼

Disadvantaged Community (DAC)*

(All) ▼

Project Representativeness (Weights)*

Weighted ▼

Responses

$500,000 or more $100,000 to $199,000

Consumer Survey Dashboard Demographics: Sex/Gender
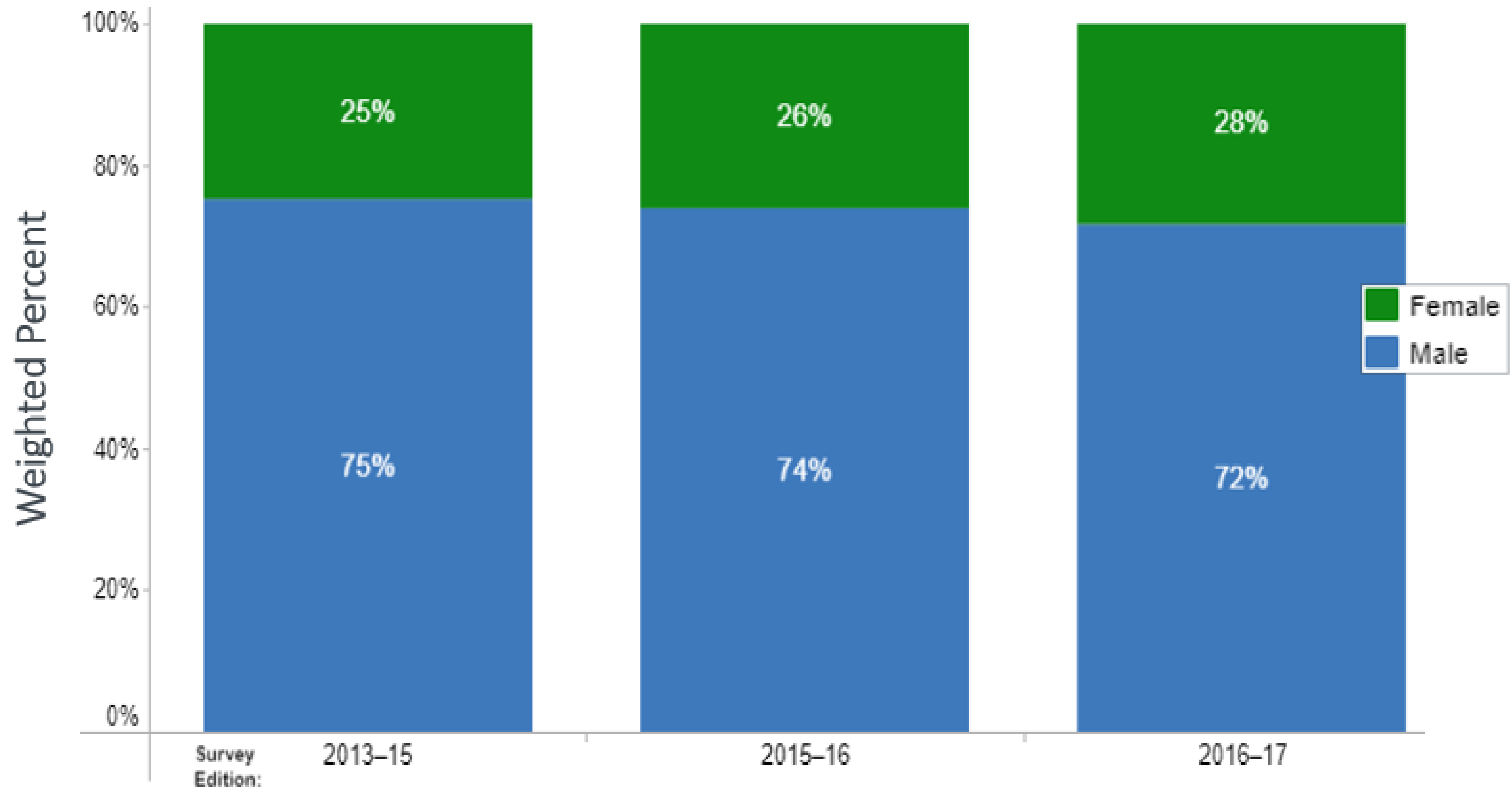
Consumer Survey Dashboard Demographics: Household Income

8/2021 images excerpted from https://cleanvehiclerebate.org/eng/survey-dashboard/ev
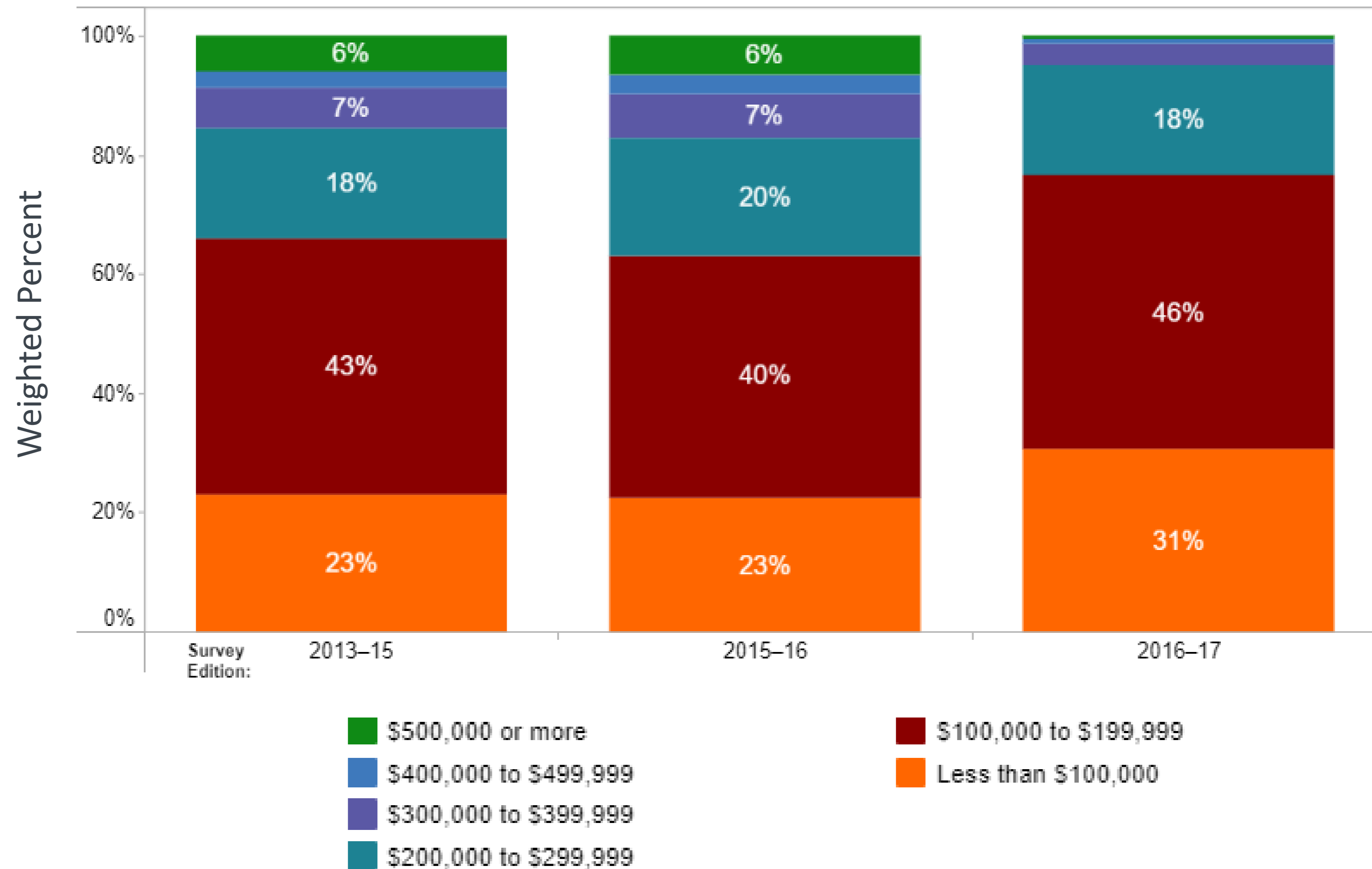
Select Additional Resources: Consumer Characteristics
(Reverse Chronological, as of 12/21/21)

Presentations

- Data from Statewide Electric Vehicle Rebate Programs: Vehicles, Consumers, Impacts, and Effectiveness
- CVRP CY 2019 Data Brief: Consumer Characteristics
- EV Purchase Incentives: Program Design, Outputs, and Outcomes of Four Statewide Programs with a Focus on Massachusetts
- Electric Vehicle Incentives and Policies
- CVRP: Data and Analysis Update
- Electric Vehicle Rebates: Exploring Indicators of Impact in Four States
- 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 Findings
- Electric Vehicle Rebates in Disadvantaged Communities: Evaluating Progress with Appropriate Comparisons
- Implementation Status Update

Publications

- B.D. Williams, J. Orose, M. Jones, J.B. Anderson, Summary of Disadvantaged Community Responses to the Electric Vehicle Consumer Survey, 2013–2015 Edition, Clean Vehicle Rebate Project, San Diego CA, 2018.

- C. Johnson, B.D. Williams, C. Hsu, J.B. Anderson, Summary Documentation of the Electric Vehicle Consumer Survey, 2013–2015 Edition, Clean Vehicle Rebate Project, San Diego CA, 2017.

CVRP Consumer Survey Data Used

(Shows Rebates to Individuals for Plug-in EVs Only)

	2017–2020 Edition	2018 purchases/leases subset	2019 purchases/leases subset	"2020" purchases/leases subset
Vehicle Purchase/ Lease Dates	June 2017 – Nov. 2020	Jan. 2018 – Dec. 2018	Jan. 2019 – Dec. 2019	Jan. 2020 – Nov. 2020
Survey Responses (total *n*)	32,524*	14,757	8,991	4,331*
Program Population (*N*)**	193,200	78,600 (filtered subset of weighted Edition)	61,300 (filtered subset of weighted Edition)	26,500

* Subsequently weighted to represent the program population along the dimensions of vehicle category, vehicle model, buy vs. lease, county, and year of purchase/lease. The 2020 subset was also independently weighted, producing only minor differences compared to the filtering approach.

** Small numbers of rebated vehicles are not represented in the time frames due to application lags. Rounded to nearest 100.

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Distribution of Plug-in EV *Rebates* by Household Income:
Calendar Year (CY) 2020 Purchases/Leases
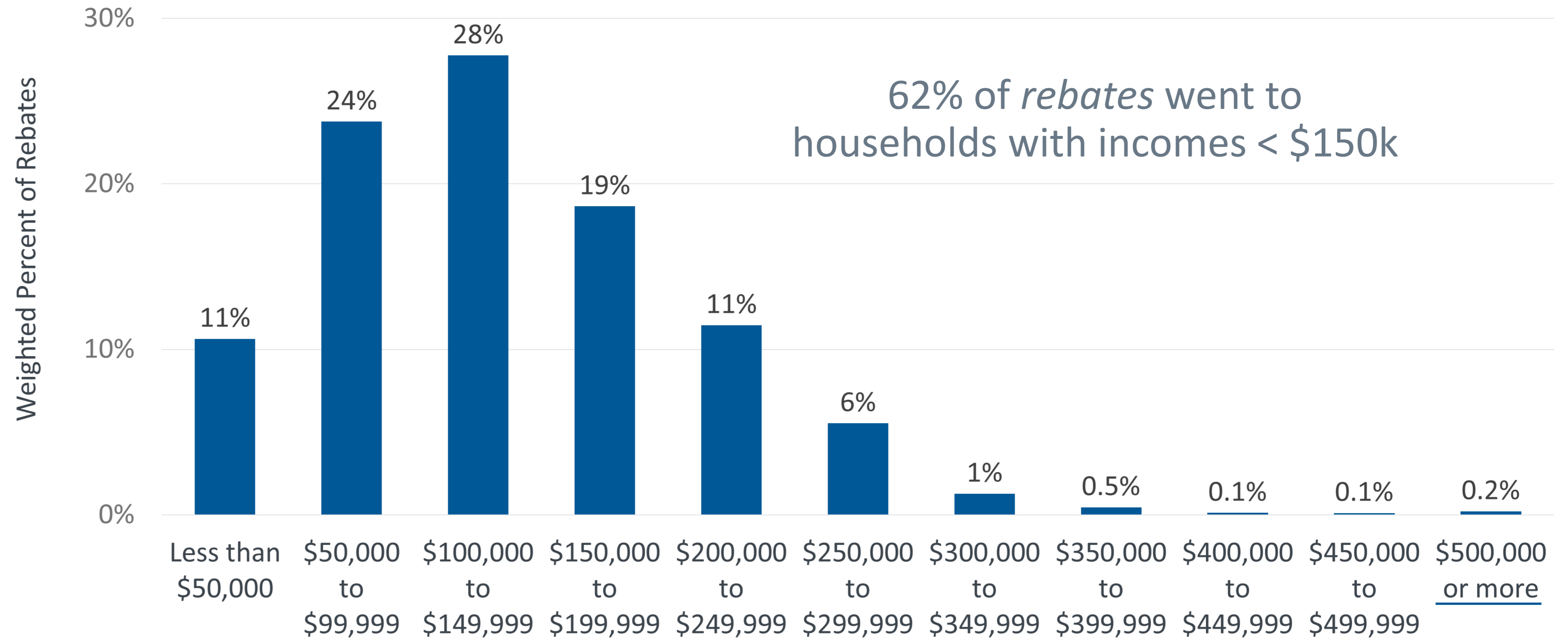
62% of *rebates* went to households with incomes < $150k

Weighted Percent of Rebates

Income	%
Less than $50,000	11%
$50,000 to $99,999	24%
$100,000 to $149,999	28%
$150,000 to $199,999	19%
$200,000 to $249,999	11%
$250,000 to $299,999	6%
$300,000 to $349,999	1%
$350,000 to $399,999	0.5%
$400,000 to $449,999	0.1%
$450,000 to $499,999	0.1%
$500,000 or more	0.2%

CVRP Consumer Survey, 2017–2020 Edition.
Filtered, question-specific *n* = 3,831.

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Distribution of Plug-in EV *Funding* by Household Income:
Calendar Year (CY) 2020 Purchases/Leases
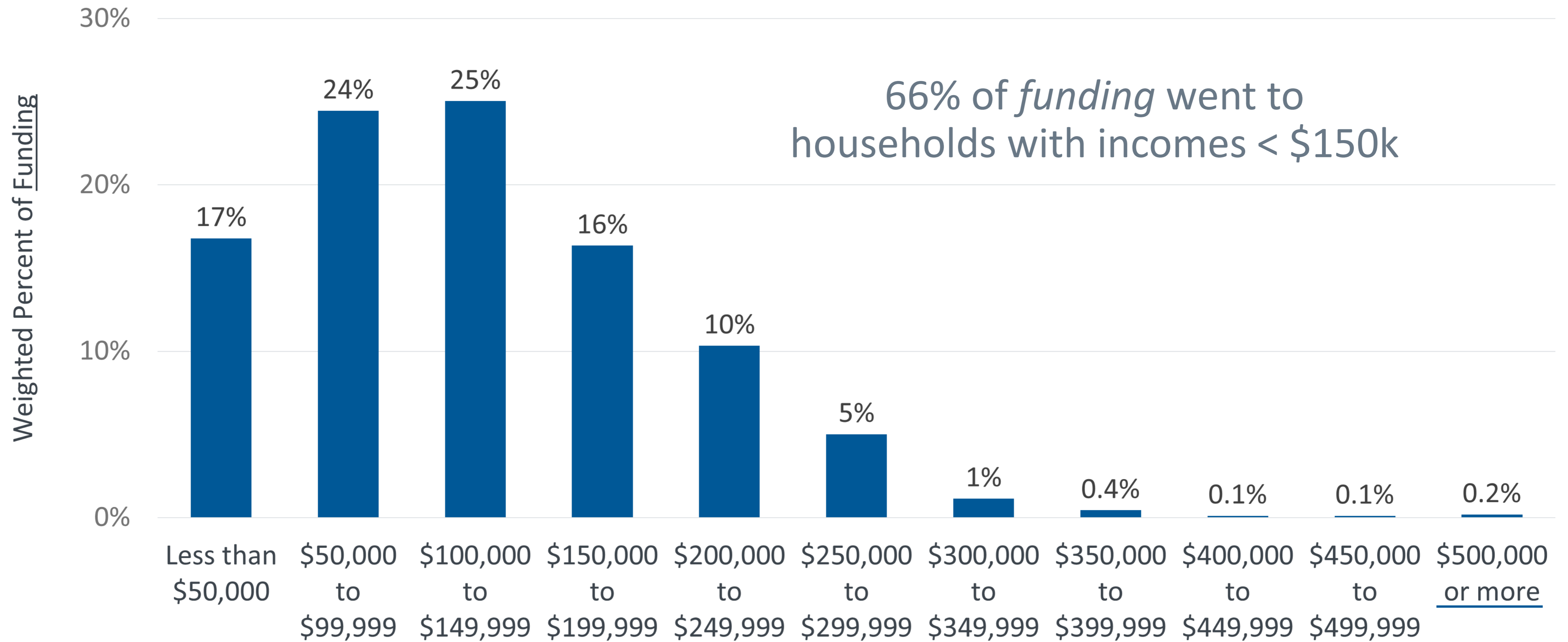
66% of *funding* went to households with incomes < $150k

Weighted Percent of Funding

Income Bracket	Percent
Less than $50,000	17%
$50,000 to $99,999	24%
$100,000 to $149,999	25%
$150,000 to $199,999	16%
$200,000 to $249,999	10%
$250,000 to $299,999	5%
$300,000 to $349,999	1%
$350,000 to $399,999	0.4%
$400,000 to $449,999	0.1%
$450,000 to $499,999	0.1%
$500,000 or more	0.2%

Funding Continues to Shift Toward Lower-Income Households

CY 2019 and CY 2020 Plug-in EV Purchases/Leases

■ CY 2019 ■ CY 2020

Weighted Percent of Funding

Income bracket	CY 2019	CY 2020
Less than $50,000	14%	17%
$50,000 to $99,999	23%	24%
$100,000 to $149,999	27%	25%
$150,000 to $199,999	17%	16%
$200,000 to $249,999	11%	10%
$250,000 to $299,999	6%	5%
$300,000 to $349,999	1%	1%
$350,000 to $399,999	0.3%	0.4%
$400,000 to $449,999	0.2%	0.1%
$450,000 to $499,999	0.1%	0.1%
$500,000 or more	0.2%	0.2%

66% of CY 2020 *funding* went to households with incomes <$150k
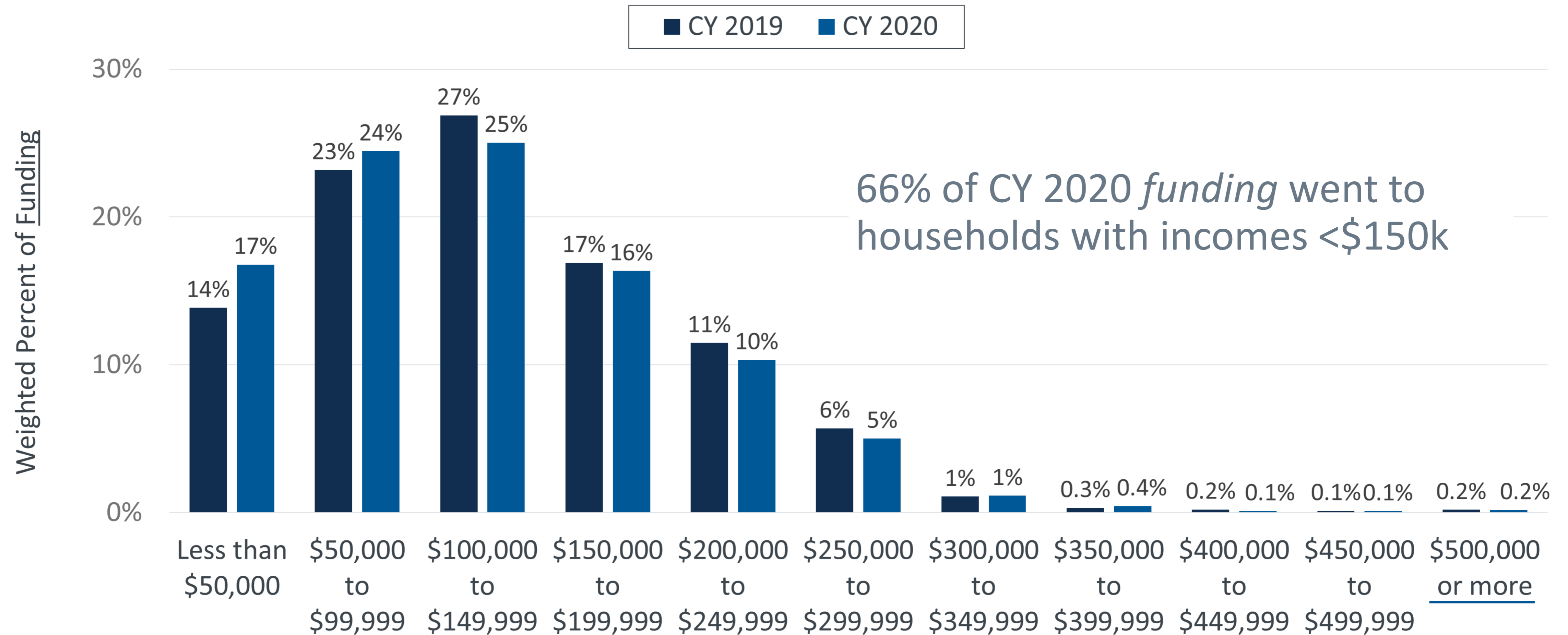
CVRP Consumer Survey, 2017–2020 Edition. CY 2019 filtered, question-specific *n* = 7,992.
CY 2020 filtered, question-specific *n* = 3,831. CY 2020 weights specific to 2020 purchases/leases.

Household Income Distribution:
CA, MA, and NY Plug-in EV Rebates (most recent year available)

Center for Sustainable Energy™

Weighted Percent of Rebates

Legend:
- ■ CVRP (CY 2020)
- ▨ MOR-EV (CY 2019)
- ■ Drive Clean NY (CY 2019)

Income Range	CVRP (CY 2020)	MOR-EV (CY 2019)	Drive Clean NY (CY 2019)
Less than $100,000	34%	18%	31%
$100,000 to 199,999	46%	45%	39%
$200,000 to $299,999	17%	24%	15%
$300,000 to $399,999	2%	6%	6%
$400,000 or more	0.5%	7%	10%
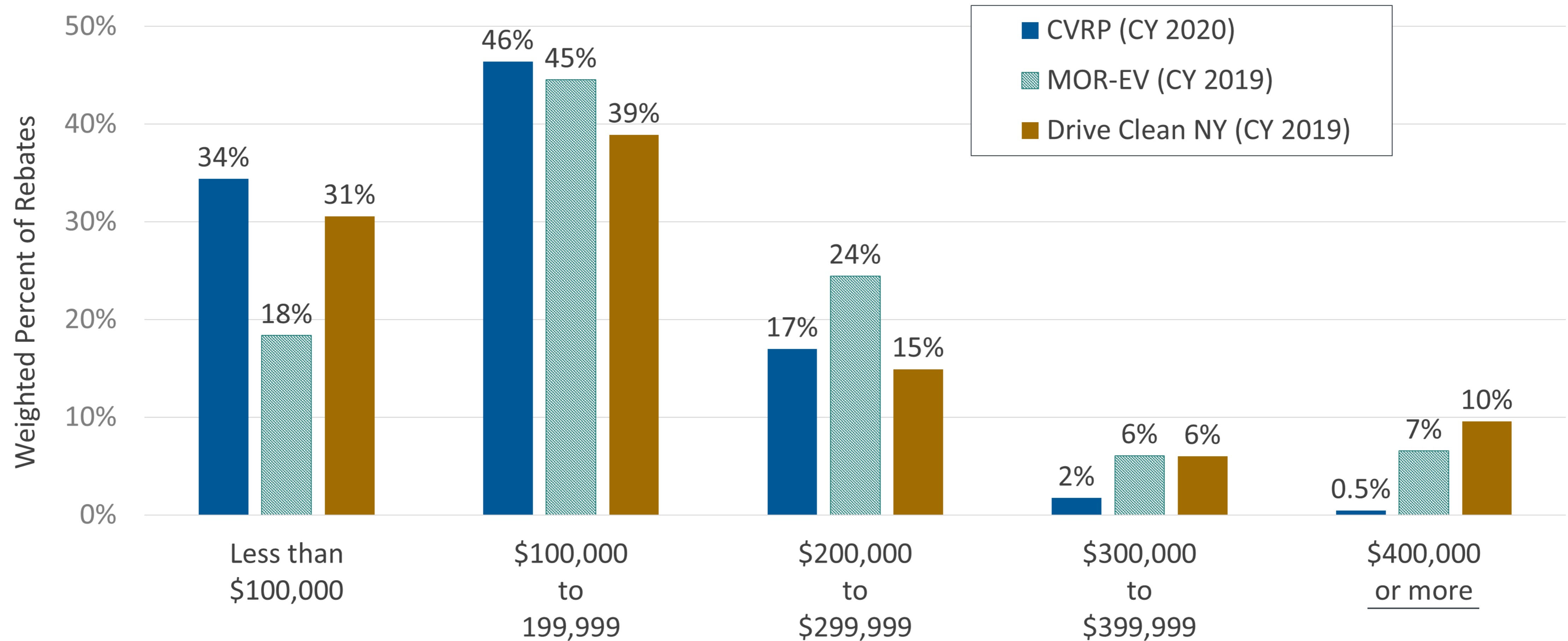
CVRP Consumer Survey, 2017–2020 Edition. Filtered, question-specific *n* = 3,831.
MOR-EV Consumer Survey, 2014–2020 Edition. Filtered, question-specific *n* = 508.
Drive Clean NY Consumer Survey, 2017–2019 Edition. Filtered, question-specific *n* = 1,817

Setting an Appropriate Baseline:
U.S. Car Buyers Are Different Than the Population

	U.S. Population 2015–2019 (Census 2019)		U.S. New-Vehicle Buyers MYs 2016–17 (2017 NHTS)
Selected solely white/Caucasian	61%	<<	74%
≥ 50 Years Old	35%	<<	51%
≥ Bachelor's Degree	24%	<<<<	57%
≥ $75k HH Income*	42%	<<<	62%
Own Residence*	64%	<<	77%
Selected Male	49%	≈	51%

New-car buyers are different on almost every dimension.

- More frequently:
  - White
  - Older
  - Degree holders
  - Higher income
  - Residence owners
- *Some* of the difference explained by driving or buying age
- The rest may be due in part to *social inequities*

* Based upon household level data.

Census 2019: 2015–2019 American Community Survey, PUMS. NHTS 2017 is weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned. "Prefer not to answer," "I don't know," and similar responses are excluded throughout.

Household Income Distribution: CA New-Vehicle Buyers

Legend: CA New-Vehicle Buyers (NHTS 2017, MYs 2016–2017)

Y-axis: Weighted Percent (0% to 30%)

Bar values:
- Less than $50,000: 17%
- $50,000 to $99,999: 27%
- $100,000 to $149,999: 24%
- $150,000 to $199,999: 13%
- $200,000 or more: 19%

56% of new-vehicle buyers in HH with income >$100k

Household Income Distribution:
CVRP Plug-in EV _Funding_ and CA New-Vehicle Buyers
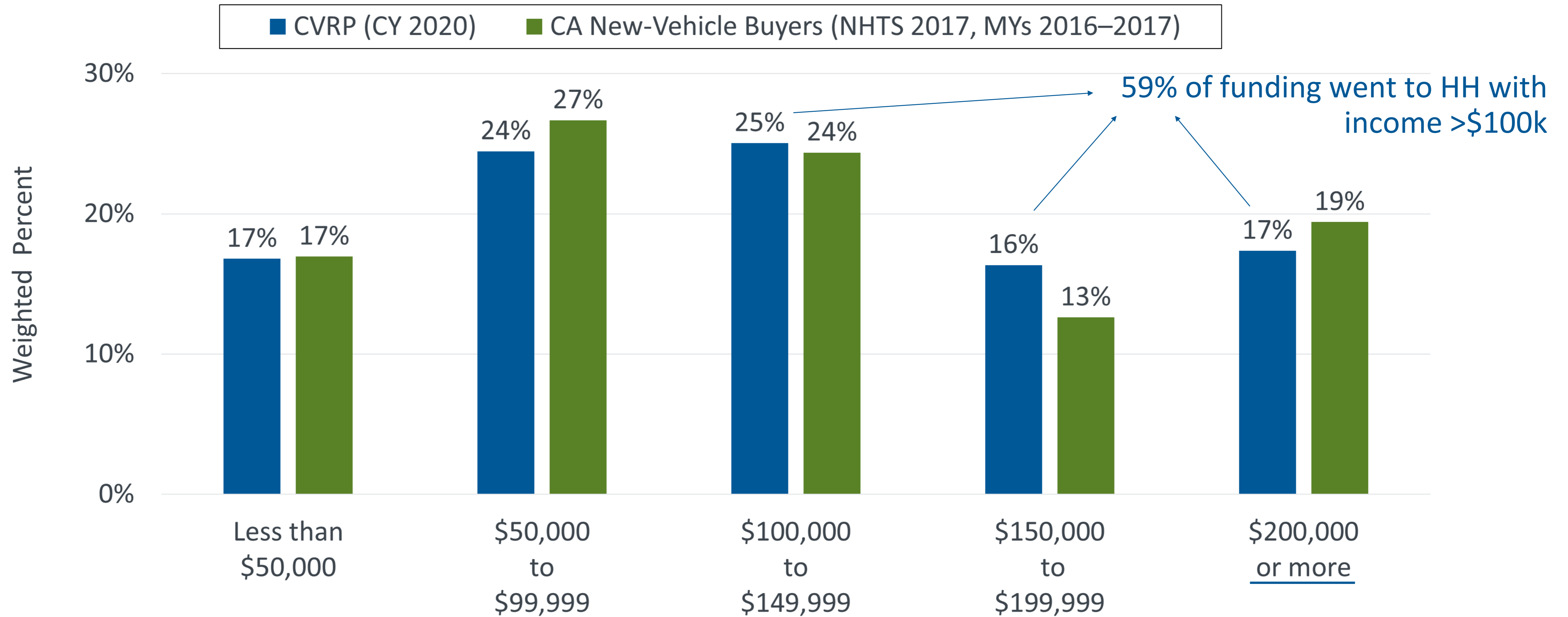
Legend: CVRP (CY 2020) ■ | CA New-Vehicle Buyers (NHTS 2017, MYs 2016–2017) ■

Weighted Percent (y-axis: 0%, 10%, 20%, 30%)

Income Category	CVRP (CY 2020)	CA New-Vehicle Buyers
Less than $50,000	17%	17%
$50,000 to $99,999	24%	27%
$100,000 to $149,999	25%	24%
$150,000 to $199,999	16%	13%
$200,000 or more	17%	19%

59% of funding went to HH with income >$100k

CVRP Consumer Survey, 2017–2020 Edition. Filtered, question-specific _n_ = 3,831.
NHTS 2017 (CA add-on) is weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.

Household Income Distribution:
CVRP Plug-in EV _Rebates_ and CA New-Vehicle Buyers

Legend: ■ CVRP (CY 2020) ■ CA New-Vehicle Buyers (NHTS 2017, MYs 2016–2017)

Y-axis: Weighted Percent (0% – 30%)

Income	CVRP (CY 2020)	CA New-Vehicle Buyers
Less than $50,000	11%	17%
$50,000 to $99,999	24%	27%
$100,000 to $149,999	28%	24%
$150,000 to $199,999	19%	13%
$200,000 or more	19%	19%

66% of rebates went to HH with income >$100k

CVRP Consumer Survey, 2017–2020 Edition. Filtered, question-specific _n_ = 3,831.
NHTS 2017 (CA add-on) is weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.
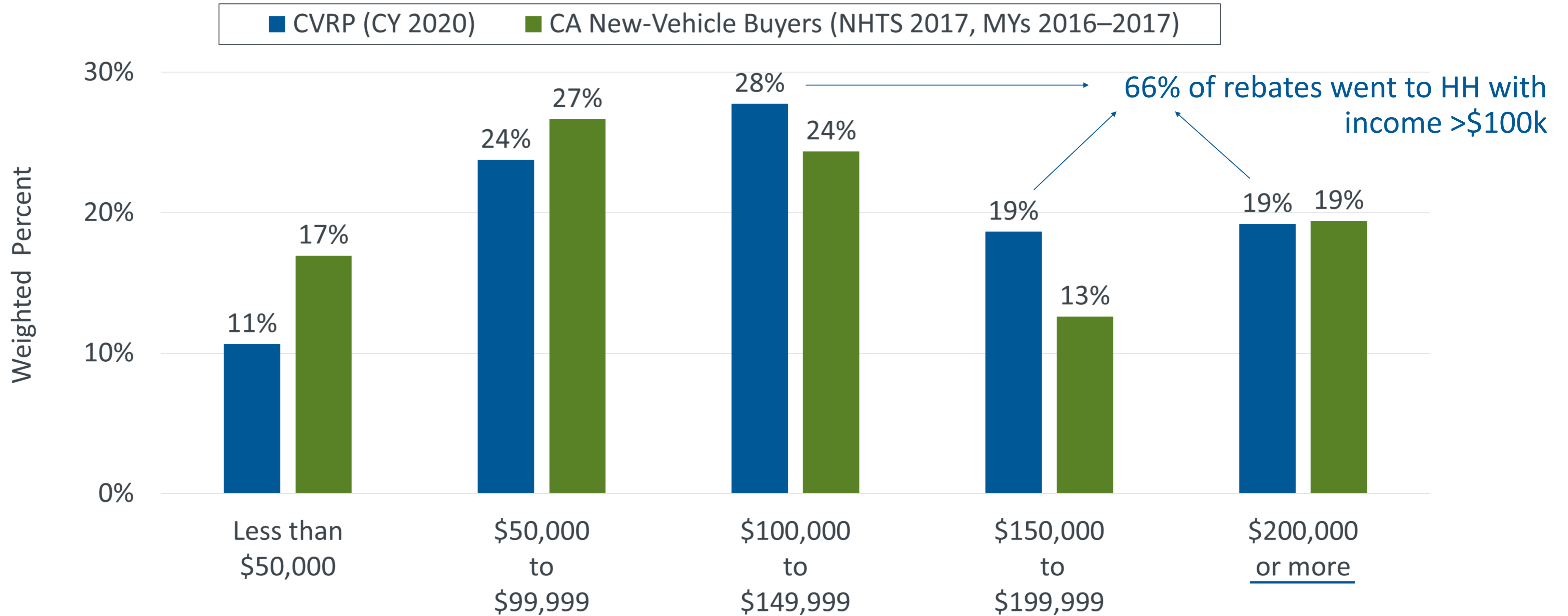
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Latest Characteristics with Comparisons

The majority of new-car buyers	CVRP Plug-in EV Rebates 2020 n = 4,331 Weighted results	CA New-Vehicle Buyers MYs 2016–17 (2017 NHTS CA add-on)	CA Population 2015–2019 (Census 2019)
Selected solely white/Caucasian	50%	51%	37%
≥ 40 years old	75%	68%	45%
≥ Bachelor's degree	79%	‡	‡
≥ $100k household income	66%	56% §	38% §
Own residence	80%	63% §	54% §
Selected male	71% ¶	50%	50%

‡ Census & NHTS data characterize individual educational attainment, whereas rebate data characterize highest household attainment. § Based upon household-level data. ¶ 100% includes non-binary options. "Prefer not to answer," "I don't know," and similar responses are excluded throughout. CY 2020 weights specific to 2020 purchases/leases. Census 2019: 2015–2019 American Community Survey, PUMS. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified by within-100-mile match between odometer and miles driven while owned.

Explaining Differences with Appropriate Comparisons *(not population statistics)*

The majority of new-car buyers	CVRP Plug-in EV Rebates 2020 n = 4,331 Weighted results	Portion of total difference attributable to EVs	CA New-Vehicle Buyers MYs 2016–17 (2017 NHTS CA add-on)	Portion of total difference explained by car buying	CA Population 2015–2019 (Census 2019)
Selected solely white/Caucasian	50%	← −8% →	51%	← 108% →	37%
≥ 40 years old	75%	← 23% →	68%	← 77% →	45%
≥ Bachelor's degree	79%	n.a.	‡	n.a.	‡
≥ $100k household income	66%	← 36% →	56% §	← 64% →	38% §
Own residence	80%	← 65% →	63% §	← 35% →	54% §
Selected male	71% ¶	← 100% →	50%	← 0% →	50%

‡ Census & NHTS data characterize individual educational attainment, whereas rebate data characterize highest household attainment. § Based upon household-level data. ¶ 100% includes non-binary options. "Prefer not to answer," "I don't know," and similar responses are excluded throughout. CY 2020 weights specific to 2020 purchases/leases. Census 2019: 2015–2019 American Community Survey, PUMS. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified by within-100-mile match between odometer and miles driven while owned.

Latest Characteristics with Appropriate Comparisons (*not* population statistics)

The majority of new-car buyers	CVRP Plug-in EV Rebates 2020 n = 4,331 Weighted results	CA New-Vehicle Buyers MYs 2016–17 (2017 NHTS CA add-on)	CA Population 2015–2019 (Census 2019)
Selected solely white/Caucasian	50%	51%	37%
≥ 40 years old	75%	68%	45%
≥ Bachelor's degree	79%	‡	‡
≥ $100k household income	66%	56% §	38% §
Own residence	80%	63% §	54% §
Selected male	71% ¶	50%	50%

‡ Census & NHTS data characterize individual educational attainment, whereas rebate data characterize highest household attainment. § Based upon household-level data.
¶ 100% includes non-binary options. "Prefer not to answer," "I don't know," and similar responses are excluded throughout. CY 2020 weights specific to 2020 purchases/leases. Census 2019: 2015–2019 American Community Survey, PUMS. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified by within-100-mile match between odometer and miles driven while owned.

Quantifying the Road that Remains:
Percentage-Point Differences from the New-Vehicle-Buyer Baseline

The majority of new-car buyers	All CVRP		CA New-Vehicle Buyers
Selected solely white/Caucasian	-1		0
≥ 40 years old	7		0
≥ $100k HH income	10		0
Own residence	17		0
Selected male	21		0
Total points:	**54**		**0**

Assessing Progress with Appropriate Comparisons (*not* population statistics)

| The majority of new-car buyers | CVRP Plug-in EV Rebates Purchase/Lease Dates: | | | CA New-Vehicle Buyers | CA Population |
	CY 2018 n = 14,757 Weighted results	**CY 2019** n = 8,991 Weighted results	**CY 2020** n = 4,331 Weighted results	**MYs 2016–17** (2017 NHTS CA add-on)	2015–2019 (Census 2019)
Selected solely white/Caucasian	52%	50%	50%	51%	37%
≥ 40 years old	76%	73%	75%	68%	45%
≥ Bachelor's degree in HH	84%	83%	79%	‡	‡
≥ $100k household income	73%	68%	66%	56% §	38% §
Own residence	83%	79%	80%	63% §	54% §
Selected male	73%¶	71%¶	71%¶	50%	50%

‡ Census & NHTS data characterize individual educational attainment, whereas rebate data characterize highest household attainment. § Based upon household-level data. ¶ 100% includes non-binary options. "Prefer not to answer," "I don't know," and similar responses are excluded throughout. CY 2020 weights specific to 2020 purchases/leases. Census 2019: 2015–2019 American Community Survey, PUMS. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified by within-100-mile match between odometer and miles driven while owned.

Latest Progress by Vehicle Type

The majority of new-car buyers	CVRP Plug-in EV Rebates		CA New-Vehicle Buyers	CA Population
	Vehicle Type:			
	CY 2020 BEVs	CY 2020 PHEVs	MYs 2016–17	2015–2019
	n = 3,464 Weighted results	n = 867 Weighted results	(2017 NHTS CA add-on)	(Census 2019)
Selected solely white/Caucasian	50%	49%	51%	37%
≥ 40 years old	74%	76%	68%	45%
≥ Bachelor's degree in HH	80%	77%	‡	‡
≥ $100k household income	69%	52% < 56% [§]		38% [§]
Own residence	81%	75%	63% [§]	54% [§]
Selected male	72% [¶]	66% [¶]	50%	50%

‡ Census & NHTS data characterize individual educational attainment, whereas rebate data characterize highest household attainment. § Based upon household-level data.
¶ 100% includes non-binary options. "Prefer not to answer," "I don't know," and similar responses are excluded throughout. CY 2020 weights specific to 2020 purchases/leases. Census 2019: 2015–2019 American Community Survey, PUMS. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified by within-100-mile match between odometer and miles driven while owned.

Paths Forward
Strategic EV Market Segments

What is the Path Forward?
Expanding Market Frontiers Through Strategic Segmentation

Existing Adopters: Market Acceleration

Characterize existing, generally enthusiastic and pre-adapted consumers, to target similar consumers who have the highest likelihood of adoption and maximize scale

"*Rebate Essential*" Consumers: Minimizing Free Ridership

Characterize adopters most highly influenced by supportive resources to join the EV market, to improve the cost-effectiveness of outreach and program design

"*EV Converts*": Moving Mainstream

Characterize EV consumers with low initial interest in EVs, to look for additional opportunities to expand into the mainstream

Priority Populations: Increasing Equity

1. Characterize adoption by priority populations, to understand & reinforce adoption that is successfully overcoming hurdles
2. Identify and break down barriers, to further diversity and expand access

Starting Point: CA Plug-in Vehicle Rebates

	Low-Hanging Fruit (Existing Adopters) CY 2020 n = 4,331 **Weighted results**	CA New-Vehicle Buyers MYs 2016–17 (2017 NHTS)
The majority of new-car buyers		
Selected solely white/Caucasian	50%	51%
≥ 40 years old	75%	68%
≥ Bachelor's degree in HH	79%	*
≥ $100k HH income	66%	56% †
Own residence	80%	63% †
Selected male	71% ‡	50%

* NHTS data characterize individual educational attainment, whereas other data characterize highest household attainment. † Based upon household-level data. ‡ 100% includes non-binary options. Rebate data filtered by purchase/lease date. "Prefer not to answer," "I don't know," and similar responses are excluded throughout. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.

Paths Forward: CA Plug-in Vehicle Rebates

The majority of new-car buyers	Low-Hanging Fruit (Existing Adopters) CY 2020 n = 4,331 Weighted results	"Rebate Essentials" CY 2020 n = 1,669 Weighted results	"EV Converts" CY 2020 n = 834 Weighted results	CA New-Vehicle Buyers MYs 2016–17 (2017 NHTS)	Increased Rebate Recipients Low-/Moderate-Income CY 2020, n = 507 Weighted results
Selected solely white/Caucasian	50%	42%	36%	51%	34%
≥ 40 years old	75%	71%	67%	68%	67%
≥ Bachelor's degree in HH	79%	79%	75%	*	63%
≥ $100k HH income	66%	57%	58%	56% †	9%
Own residence	80%	76%	74%	63% †	60%
Selected male	71% ‡	71% ‡	70% ‡	50%	66% ‡

* NHTS data characterize individual educational attainment, whereas other data characterize highest household attainment. † Based upon household-level data. ‡ 100% includes non-binary options. Rebate data filtered by purchase/lease date. "Prefer not to answer," "I don't know," and similar responses are excluded throughout. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified based on within-100-mile match between odometer and miles driven while owned.

Quantifying the Path Forward:
Percentage-Point Differences from the New-Vehicle-Buyer Baseline

The majority of new-car buyers	All CVRP	Rebate Essentials	EV Converts	CA New-Vehicle Buyers	Increased Rebate Recipients
Selected solely white/Caucasian	-1	-9	-15	0	-17
≥ 40 years old	7	3	1	0	-1
≥ $100k HH income	10	1	2	0	-47
Own residence	17	13	11	0	-3
Selected male	21	21	20	0	16
Total points:	**54**	**29**	**19**	**0**	**-52**
Percent of journey from segment to segment:		46%	19%	35%	96%
Percent of journey from start:		46%	65%	100%	196%

Summary & Select Findings

Summary & Select Findings: Consumer Characteristics

Program Design:

- Shapes impacts

Rebated Consumer Characteristics vs. CA New-Vehicle Buyers:

- Different picture than painted by population stats
  - Depending on the characteristic, up to 100% of the difference between rebate recipients and the population can be explained by new-vehicle buying (e.g., 64% of the income difference is not about EVs)
- Metric of *race/ethnicity comparable*
- Metric of *age somewhat higher*, stopped progressing (still within 7 percentage points)
- *Income:*
  - metric *trending toward* new-vehicle buyers (rebates within 10 percentage points, <u>funding even closer</u>)
    - percent of *PHEV participants ≥$100k <u>lower</u>* than new-car buyers
  - 66% of funding went to households <$150k, who are 68% of new-vehicle buyers
- *Home ownership* and *male gender much more frequent* (less so for PHEVs)
- Metrics can help *quantify "length of road ahead"*

Paths Forward:

- *Strategic consumer segments* present possible steppingstones on a path toward the mainstream and beyond to increased access (see related work)

Additional Details & Resources

Funding Availability Has Been Regularly Disrupted
(as of Sept. 2021)

Table 4: CVRP Waitlists

Waitlist Year	Start Date	End Date	Length in Days
2011*	Jun. 20	Sept. 30	102
2013*	May 1	Jun. 30	60
2014	Mar. 28	Jul. 22	116
2016	Jun. 11	Sept. 28	109
2017**	Jun. 30	Nov. 20	143
2019**	Jun. 5	Sept. 23	110
2021	Apr. 23	Sept. 15	145

Dates approximate.
** For standard applications only; no waitlist for income-qualified increased rebates.

Table adapted from https://cleanvehiclerebate.org/sites/default/files/attachments/Disruptions_Fact_Sheet_9_2021.pdf

Explaining Differences with Appropriate Comparisons (*not* population statistics)

The majority of new-car buyers	CVRP Plug-in EVs **CY 2019** n = 8,991 **Weighted results**	Portion of total difference attributable to EVs	CA New-Vehicle Buyers MYs 2016–17 (2017 NHTS CA add-on)	Portion of total difference explained by car buying	CA Population 2015–2019 (Census 2019)
Selected solely white/Caucasian	50%	← −8% →	51%	← 108% →	37%
≥ 40 years old	73%	← 18% →	68%	← 82% →	45%
≥ Bachelor's degree	83%	n.a.	‡	n.a.	‡
≥ $100k Household Income	68%	← 40% →	56% §	← 60% →	38% §
Own Residence	79%	← 64% →	63% §	← 36% →	54% §
Selected Male	71% ¶	← 100% →	50%	← 0% →	50%

‡ Census & NHTS data characterize individual educational attainment, whereas rebate data characterize highest household attainment. § Based upon household-level data.

¶ Starting in June 2017, 100% includes non-binary options.

"Prefer not to answer," "I don't know," and similar responses are excluded throughout. Census 2019: 2015–2019 American Community Survey, PUMS. NHTS weighted to represent population, not new-vehicle subset. New-vehicle buyers identified by within-100-mile match between odometer and miles driven while owned.

Consumer Survey Data: Plug-in EVs*

(Shows Rebates to Individuals Only)

	CALIFORNIA CLEAN VEHICLE REBATE PROJECT	MOR-EV Massachusetts Offers Rebates for Electric Vehicles	CHEAPR Connecticut Hydrogen and Electric Automobile Purchase Rebate	NEW YORK STATE	**Total**
Vehicle Purchase/ Lease Dates	Sep. 2012 – Nov. 2020	Jun. 2014 – Apr. 2020	May 2015 – Sep. 2018	Mar. 2017 – Dec. 2019	Sep. 2012 – Nov. 2020
Survey Responses (total *n*)**	72,552	6,616	1,565	5,474	86,207
Program Population (*N*)***	376,800	16,100	3,500	21,800	418,200

* Plug-in EVs (PEVs) include PHEVs and BEVs.

** Subsequently weighted to represent the program population along the dimensions of vehicle category, model, buy vs. lease, and county (weighting dimensions for CVRP 2017–20 Edition as included year of purchase/lease).

*** Small numbers of rebated vehicles are not represented in the time frames due to application lags. Rounded to nearest 100.

Select Publications (Reverse Chronological, as of 3/2022)

- N. Pallonetti and B.D.H. Williams (2022, Jan.), "Evaluating the Cost-Effectiveness of Greenhouse Gas Emission Reductions Associated with Statewide Electric Vehicle Rebate Programs in California and Massachusetts in 2019," for *International Energy Program Evaluation Conference 2022*.

- Williams, B. D. H. (2022, Jan.), Brief: PHEV Consumers Most Highly Influenced by the U.S. Federal Tax Credit. Clean Vehicle Rebate Project

- B.D.H. Williams (2021, Oct.), An Electric-Vehicle Consumer Segmentation Roadmap: Strategically Amplifying Participation in the New York Drive Clean Rebate Program, NYSERDA Report 21-30.

- N. Pallonetti and B. D. H. Williams (2021, Jul.), "Refining Estimates of Fuel-Cycle Greenhouse-Gas Emission Reductions Associated with California's Clean Vehicle Rebate Project with Program Data and Other Case-Specific Inputs," *Energies*, vol. 14, no. 15.

- B. D. H. Williams and J. B. Anderson (2021, Mar.), "Strategically Targeting Plug-In Electric Vehicle Rebates and Outreach Using '*EV Convert*' Characteristics," *Energies*, vol. 14, no. 7, p. 1899.

- B.D.H. Williams, J.B. Anderson, A. Lastuka (2020, Sep.), 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), EVS33 and Zenodo, Portland OR.

- 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 (2019), Exploring the Role of Plug-In Hybrid Electric Vehicles in Electrifying Passenger Transportation, International EV Policy Council, UC Davis Plug-in Hybrid and Electric Vehicle Research Center.

- B.D. Williams, J. Orose, M. Jones, J.B. Anderson (2018, Oct.), Summary of Disadvantaged Community Responses to the Electric Vehicle Consumer Survey, 2013–2015 Edition. Clean Vehicle Rebate Project.

- B.D. Williams, J.B. Anderson (2018, Sep.), 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.

- C. Johnson, B.D. Williams, J.B. Anderson, N. Appenzeller (2017, Jun.), Evaluating the Connecticut Dealer Incentive for Electric Vehicle Sales, Center for Sustainable Energy (CSE).

- C. Johnson, B.D. Williams (2017, Jan.), Characterizing Plug-In Hybrid Electric Vehicle Consumers Most Influenced by California's Electric Vehicle Rebate, *Transp. Res. Rec*. 2628, 23–31.

Select Presentations (Reverse Chronological, as of 2/22)

- Cost-Effectiveness of Greenhouse Gas Emission Reductions Associated with California's Clean Vehicle Rebate Project in 2019 (and 2020)
- California Plug-in Hybrid EV Consumers Who Found the U.S. Federal Tax Credit Extremely Important in Enabling Their Purchase
- Data from Statewide Electric Vehicle Rebate Programs: Vehicles, Consumers, Impacts, and Effectiveness
- CVRP CY 2019 Data Brief: Vehicle Replacement & Incentive Influence
- CVRP CY 2019 Data Brief: Consumer Characteristics
- CVRP Data Brief: MSRP Considerations
- 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 Findings
- CVRP Income Cap Analysis: Informing Policy Discussions

Recommended citation

B.D.H. Williams and N. Pallonetti, Presentation: "CVRP 2020 Data Brief: Consumer Characteristics," for CARB's *Second Public Workshop on the Fiscal Year 2022-23 Update to the Three-Year Plan for Light-Duty Vehicles and Clean Transportation Investments,* Clean Vehicle Rebate Project, 30 March 2022.

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