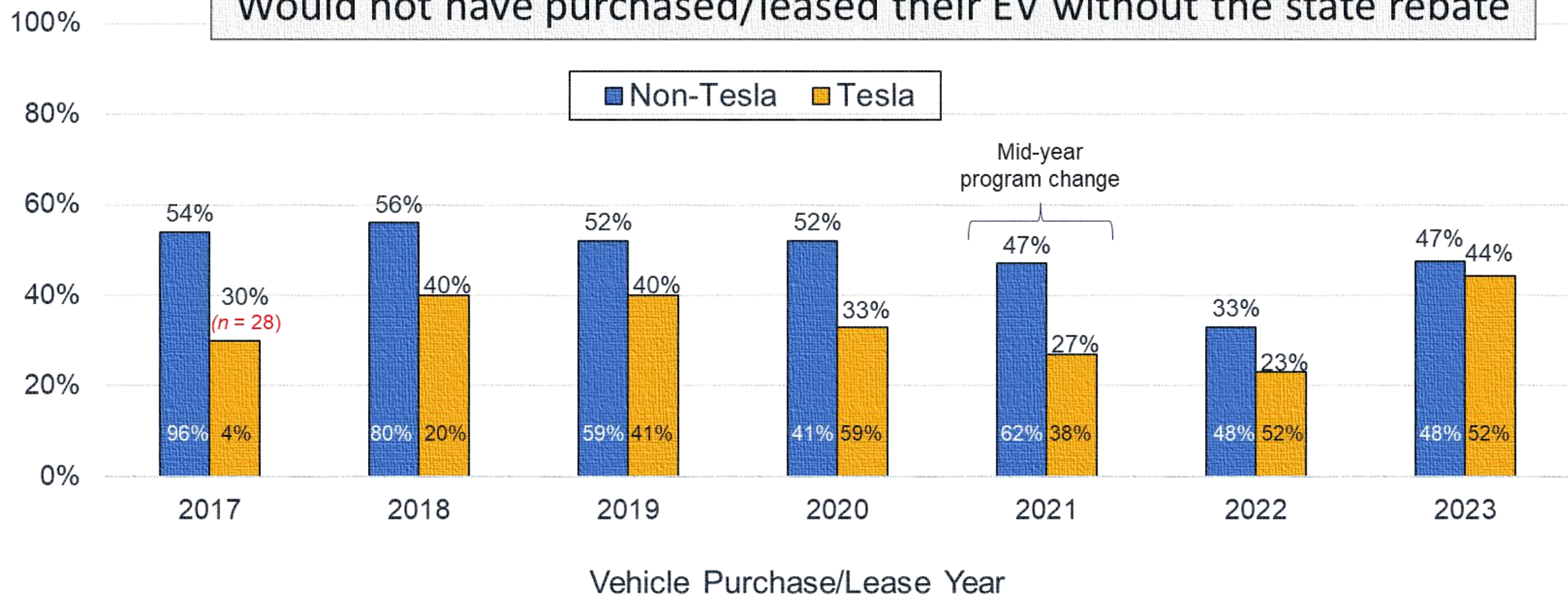


Would not have purchased/leased their EV without the state rebate

Weighted Percent of Rebates



Rebate Influence through 2023 and Designing for Cost-Effectiveness

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

Nicholas Pallonetti – Research Analyst, CSE

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



NYSERDA

March 2025

Preview of Select Findings for 2023 Purchases/Leases

Rebate Influence

- **DCRP rebates were substantially more influential in 2023** than in 2022, unusually so for Tesla.
- Latest data confirm influence highest for \$2,000 rebates, households with income < \$300k, and EVs < \$60,000 MSRP.

Conclusions & Recommendations

- **Unambiguously lower influence** for households (HHs) with **income >\$400k/year**, EVs with **MSRP > \$60k**.
 - **To improve cost-effectiveness and equity**, consider additional ways to **target away from these categories** (e.g., hard MSRP cap, soft income cap, funding restrictions, outreach & messaging).
- To increase equity, and probably cost-effectiveness, **consider a focus on larger rebate amounts**.
- **It's also complicated** for MSRP \$50–60k, HH income \$300–400k, and \$500 rebates...
- **Proposal to iteratively inform designing for program cost-effectiveness and equity within a given budget constraint** or other goal: Develop and use a “Free-Rider Abatement Curve” tool and process.

Outline

Context

Are rebates effective?

- *Rebate Importance*
- *Rebate Essentiality*

How can rebate influence inform cost-effective program design?

- Free-Rider Abatement Curve

Wrap Up

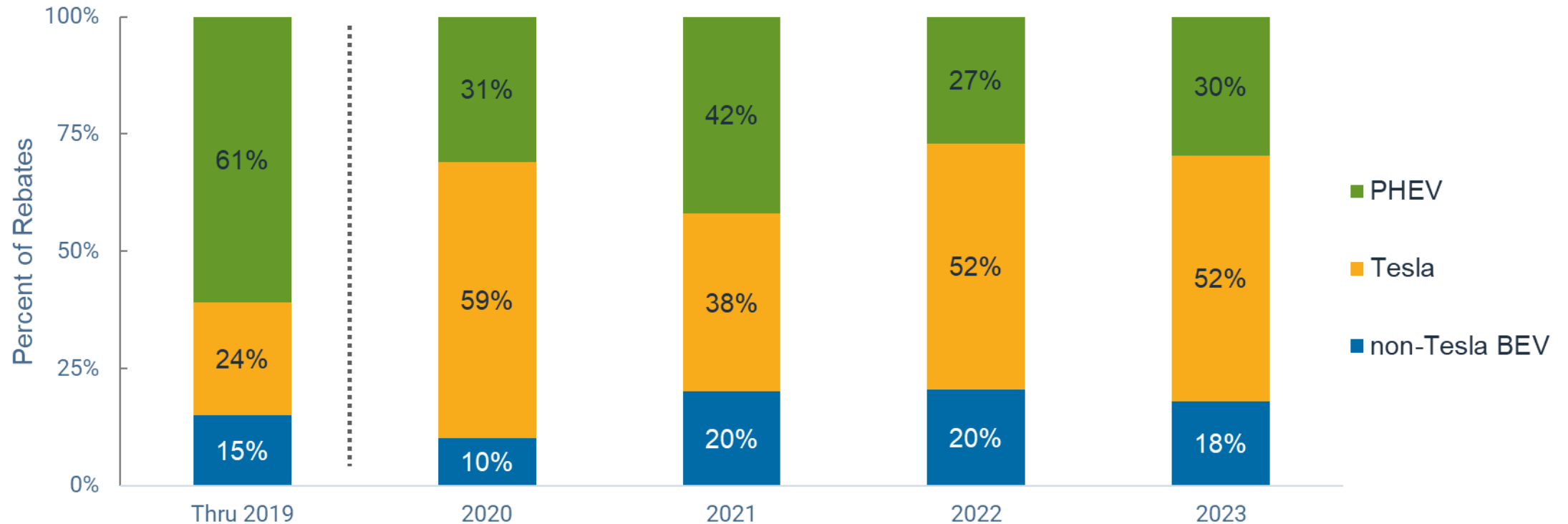
Appendix

Context

- **Distribution of rebates by vehicle category and rebate amount**

Since 2020, the majority of rebates went to BEVs

Most were **Tesla**, which we analyze separately

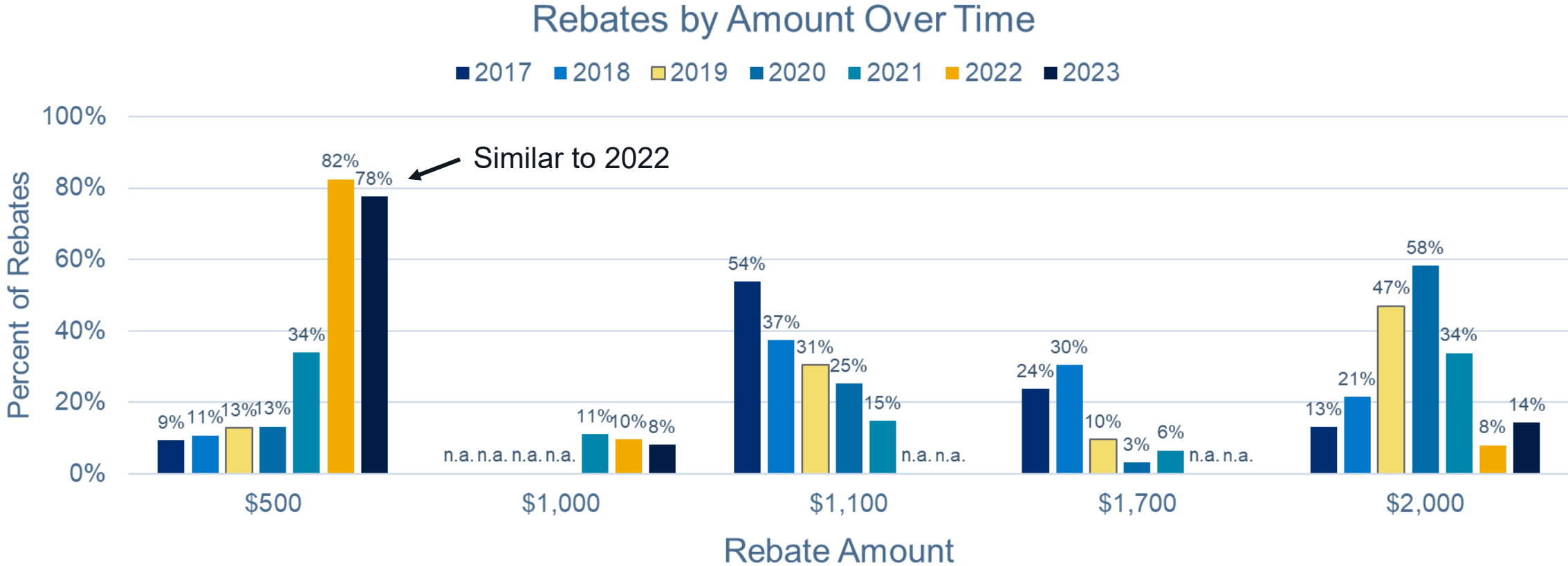


For Additional Context, See: “NY Drive Clean Rebated Vehicle Characteristics through 2023” (forthcoming, preview follows...)

Based on the year of purchase/lease. 2017–19 values for DCRP are from: B.D.H. Williams (2021), [An Electric-Vehicle Consumer Segmentation Roadmap: Strategically Amplifying Participation in the New York Drive Clean Rebate Program](#), NYSERDA Report 21-30.

The program has shifted dramatically toward \$500 rebates

These rebates acknowledge EV adoption, but have lower influence (see next section)



Excludes 12 rebates with irregular amounts (< 0.1% of rebates).

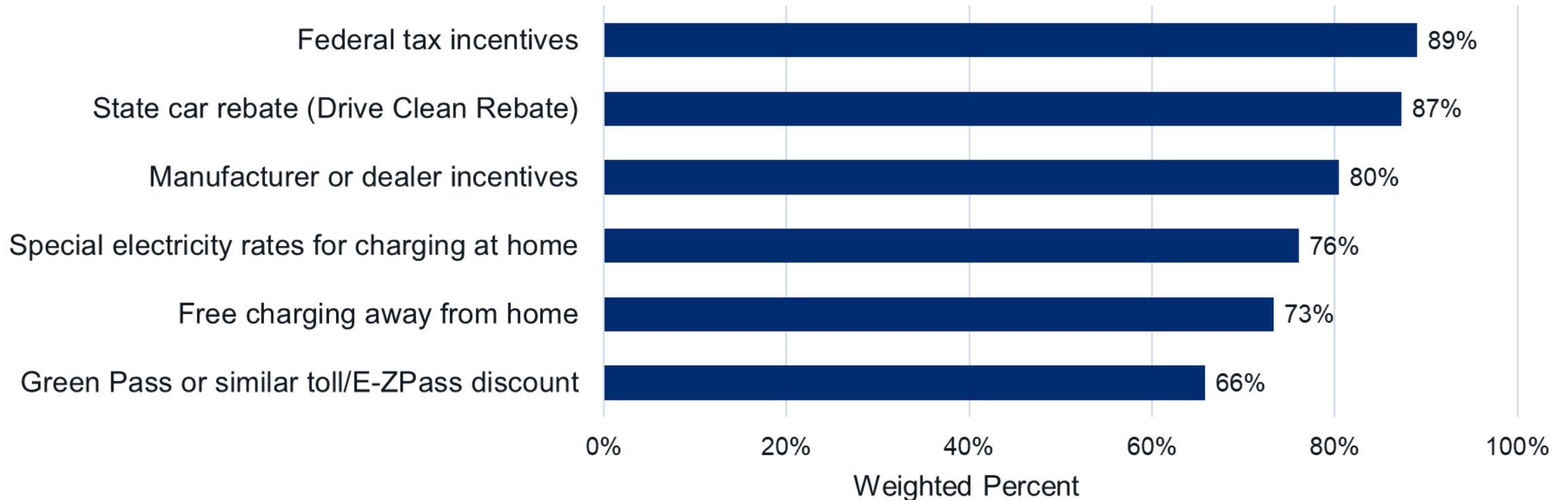
Are rebates effective?

- **Rebate Importance**
- **Rebate Essentiality**

Importance of rebate is among highest of all factors examined

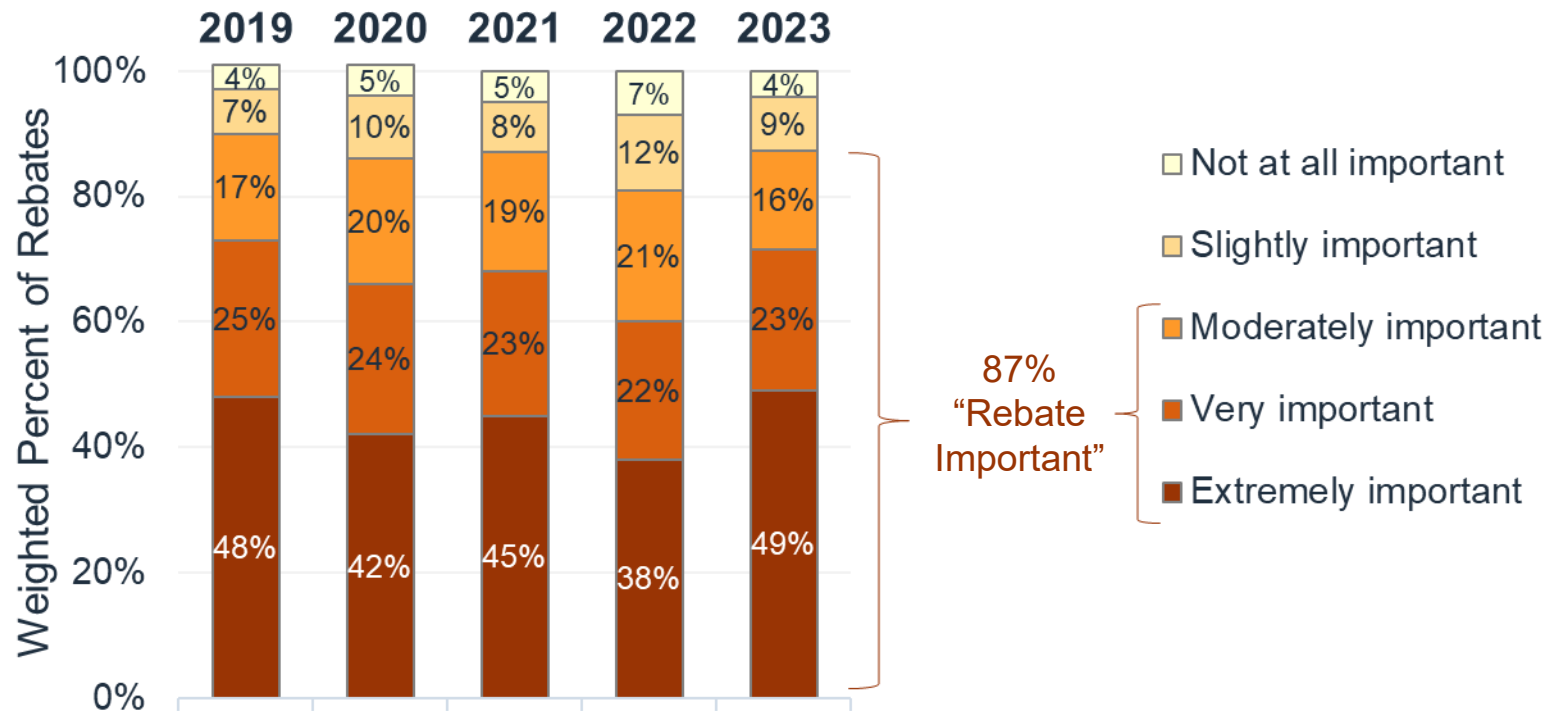
2023 purchases/leases

Percent **Extremely**, **Very**, or **Moderately** important in “**making it possible** for you to acquire your electric car”?



Rebate Importance rebounded to 87% in 2023

How **important** was the state rebate in **making it possible** for you to acquire your electric car?



However, *Rebate Importance* can mean different things to different consumers and can be confounded by the influence of other factors. This is why we focus on the more direct and counterfactual "*Rebate Essentiality*" ...

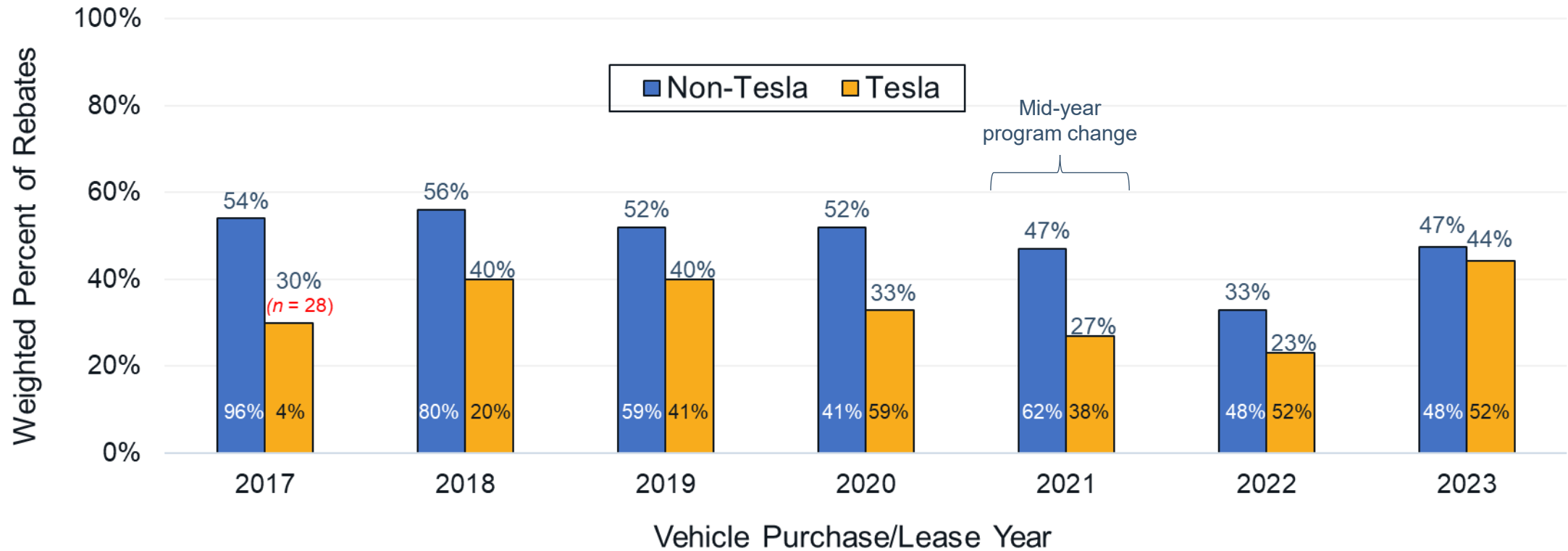
NY DCRP Adoption Survey. 2019 $n = 2,175$; 2020 $n = 4,269$; 2021 $n = 4,881$; 2022 $n = 5,274$; 2023 $n = 6,981$.

n -values are filtered and question-specific. 2020–2023 weights specific to 2020–2023 purchases/leases, respectively.

In 2023, *Rebate Essentiality* increased substantially

Especially for **Tesla**

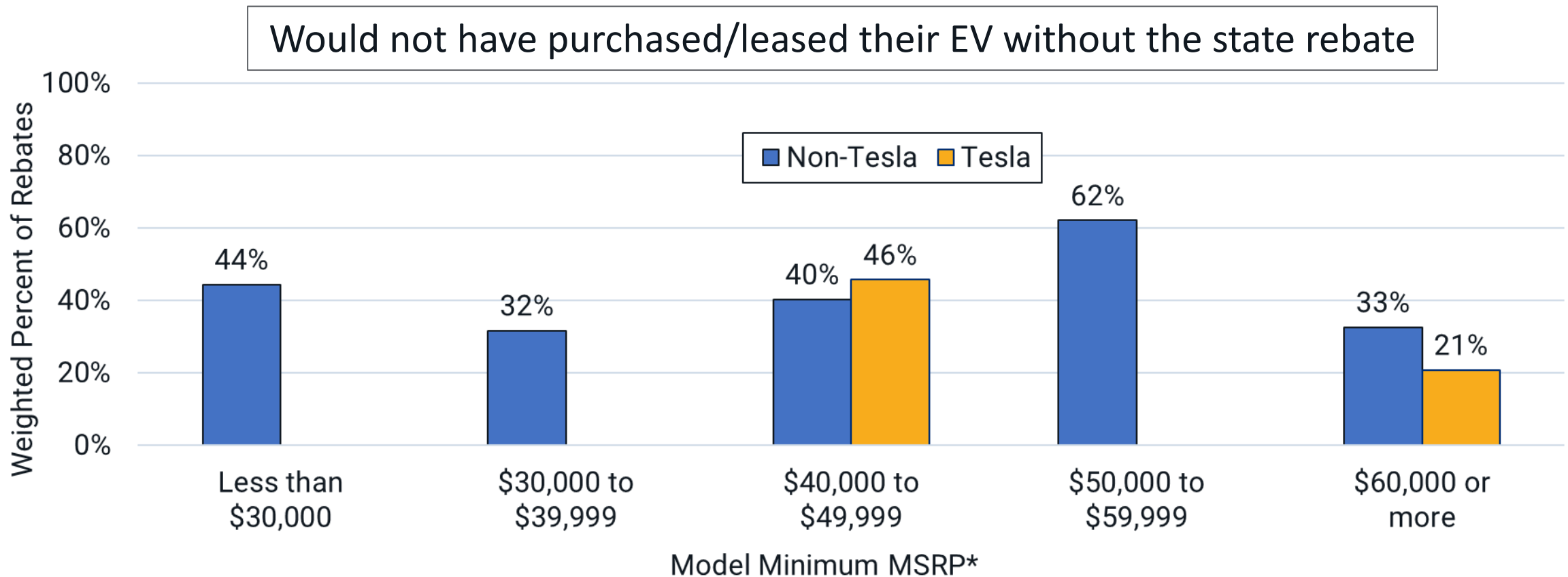
Would not have purchased/leased their EV without the state rebate



NY DCRP Adoption Survey. 2017 *n* = 1,012; 2018 *n* = 2,201; 2019 *n* = 2,245; 2020 *n* = 3,401; 2021 *n* = 5,081; 2022 *n* = 5,454; 2023 *n* = 7,212. *n*-values are filtered and question-specific. 2020–2023 weights specific to 2020–2023 purchases/leases, respectively. Italicized percentages inside columns are the percent of total rebates given to individual consumers.

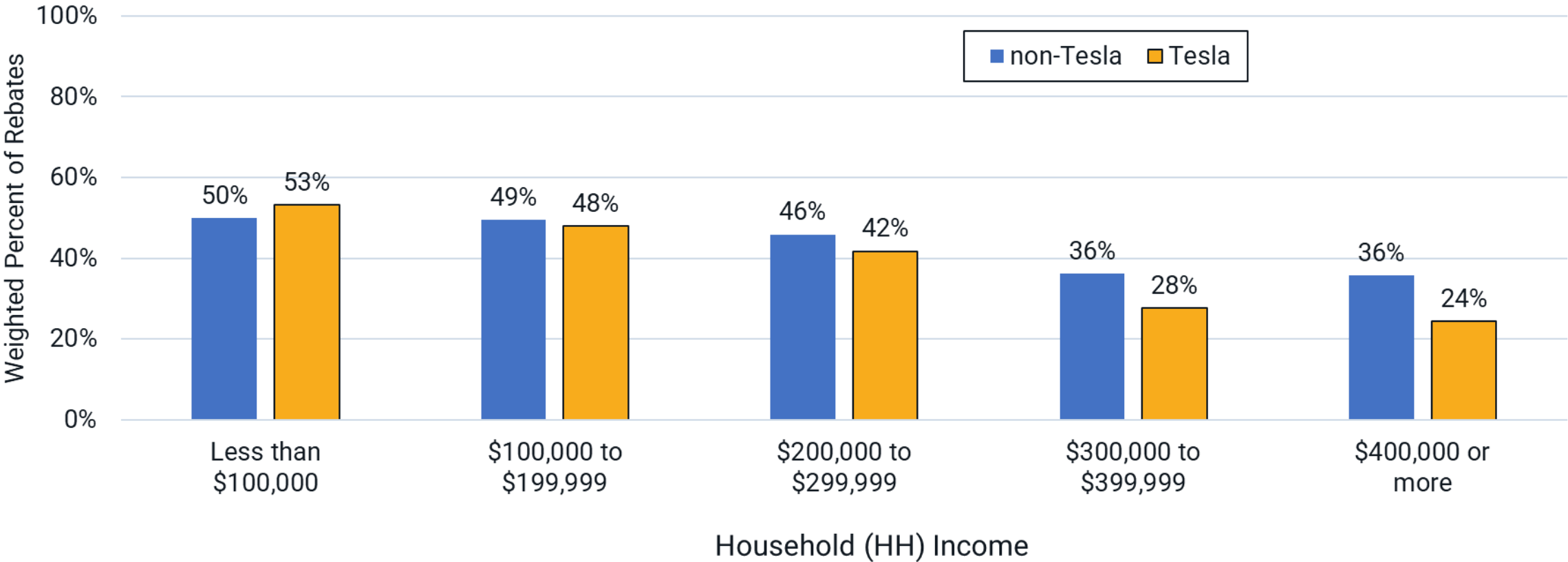
Rebate Essentiality low above \$60k model-minimum MSRP

2023 purchases/leases



*Each vehicle was assigned the minimum 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 MSRPs change mid-MY and were assigned as follows: Models 3 and Y = \$40–49k, Models S and X = \$60k or more. *Rebate Essentiality* from NY DCRP Adoption Survey. Filtered, question-specific $n = 7,212$. $n > 160$ for all columns.

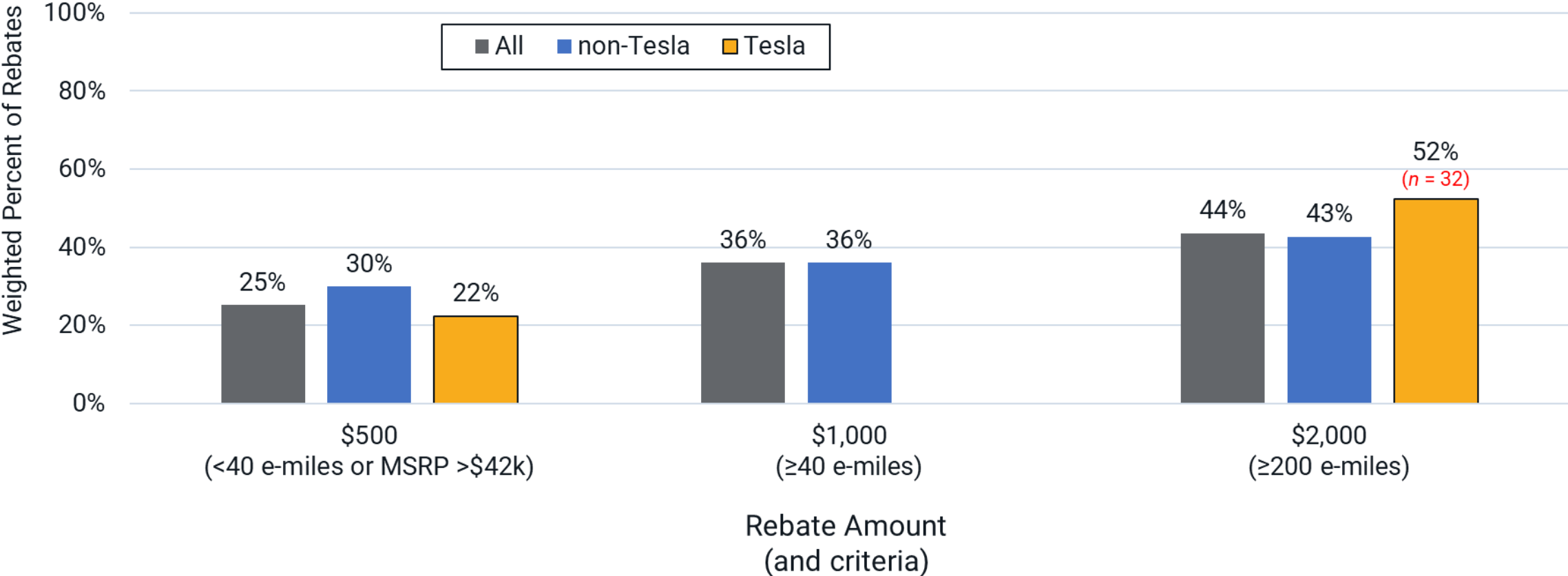
Rebate Essentiality high across incomes, but fades for households >\$300k/y 2023 purchases/leases



NY DCRP Adoption Survey. Filtered, question-specific $n = 6,148$.

Rebate Essentiality increased with rebate amount

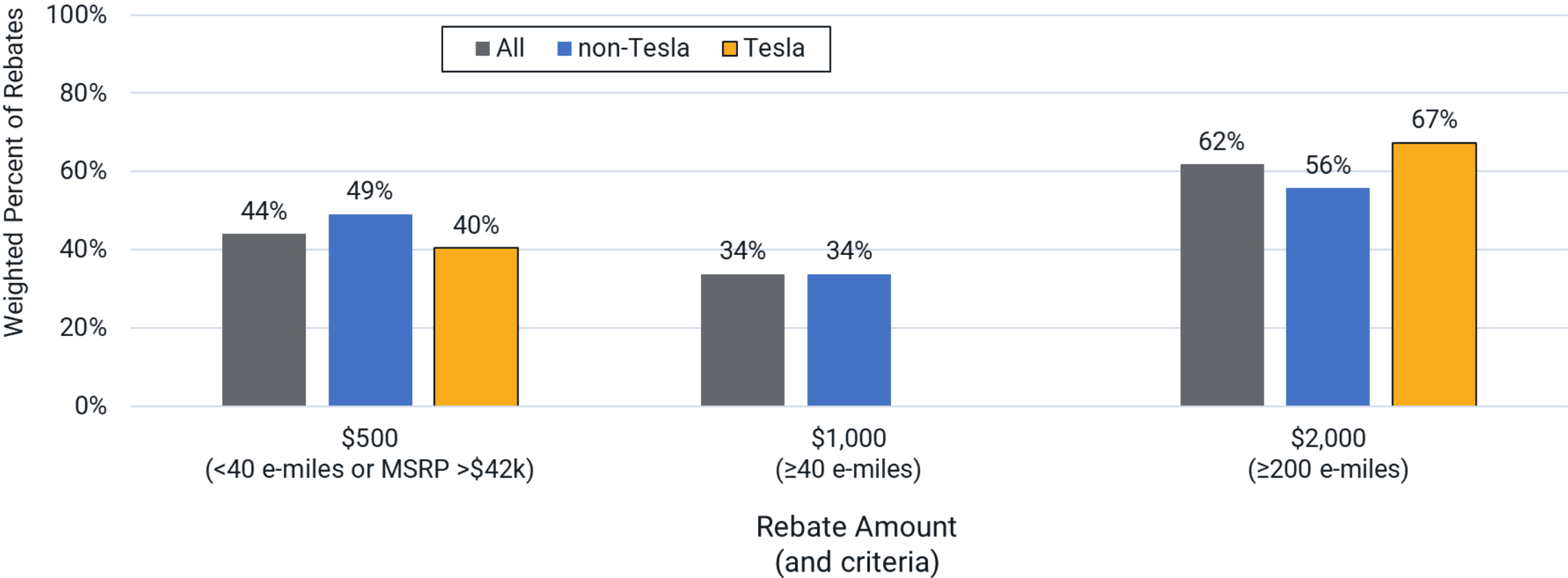
2022 purchases/leases



NY DCRP Adoption Survey. Filtered, question-specific n = 5,454.

Rebate Essentiality highest for \$2,000 rebates, lower for Prime products

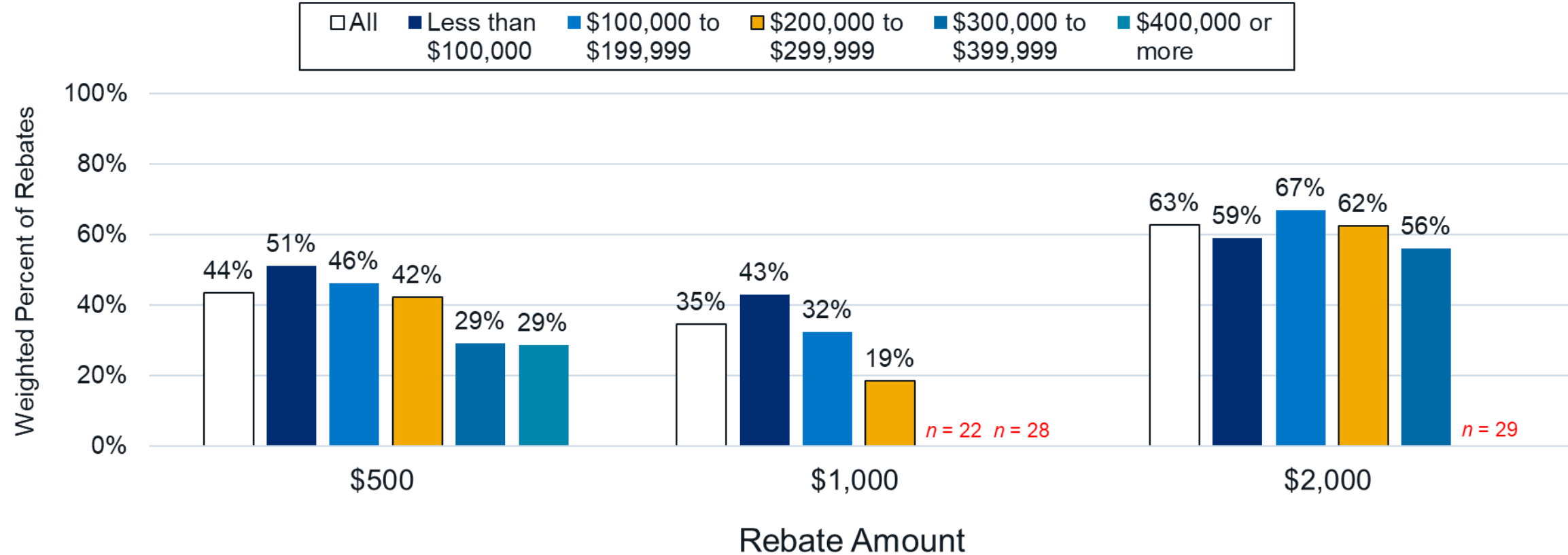
2023 purchases/leases



NY DCRP Adoption Survey. Filtered, question-specific $n = 7,212$.

Rebate Essentiality high for \$2,000 rebates across wide income range

2023 purchases/leases



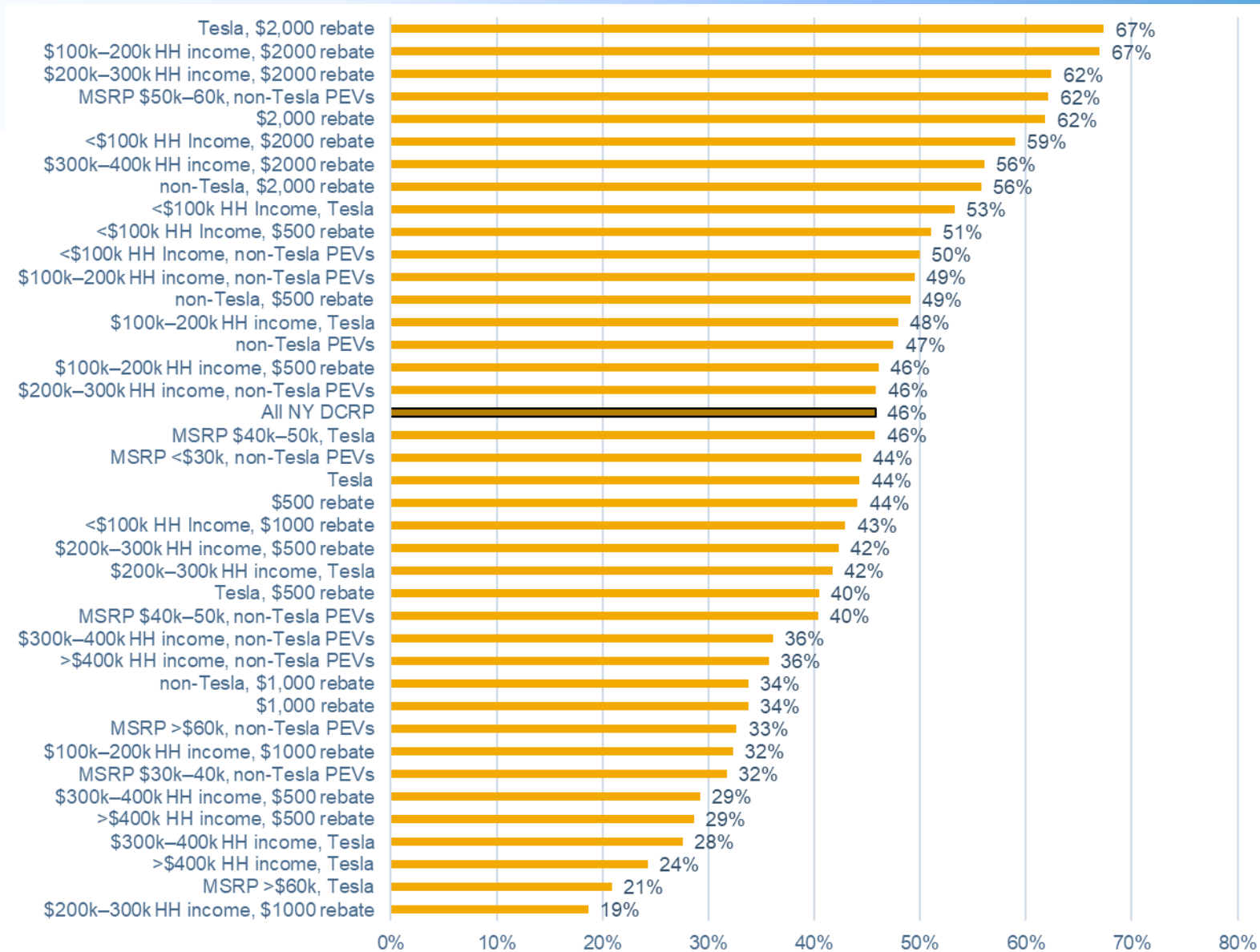
NY DCRP Adoption Survey. Filtered, question-specific *n* = 6,148.

**How can
rebate
influence
inform cost-
effective
program
design?**

Free-Rider Abatement Curve
(Proposed Tool & Next Step)

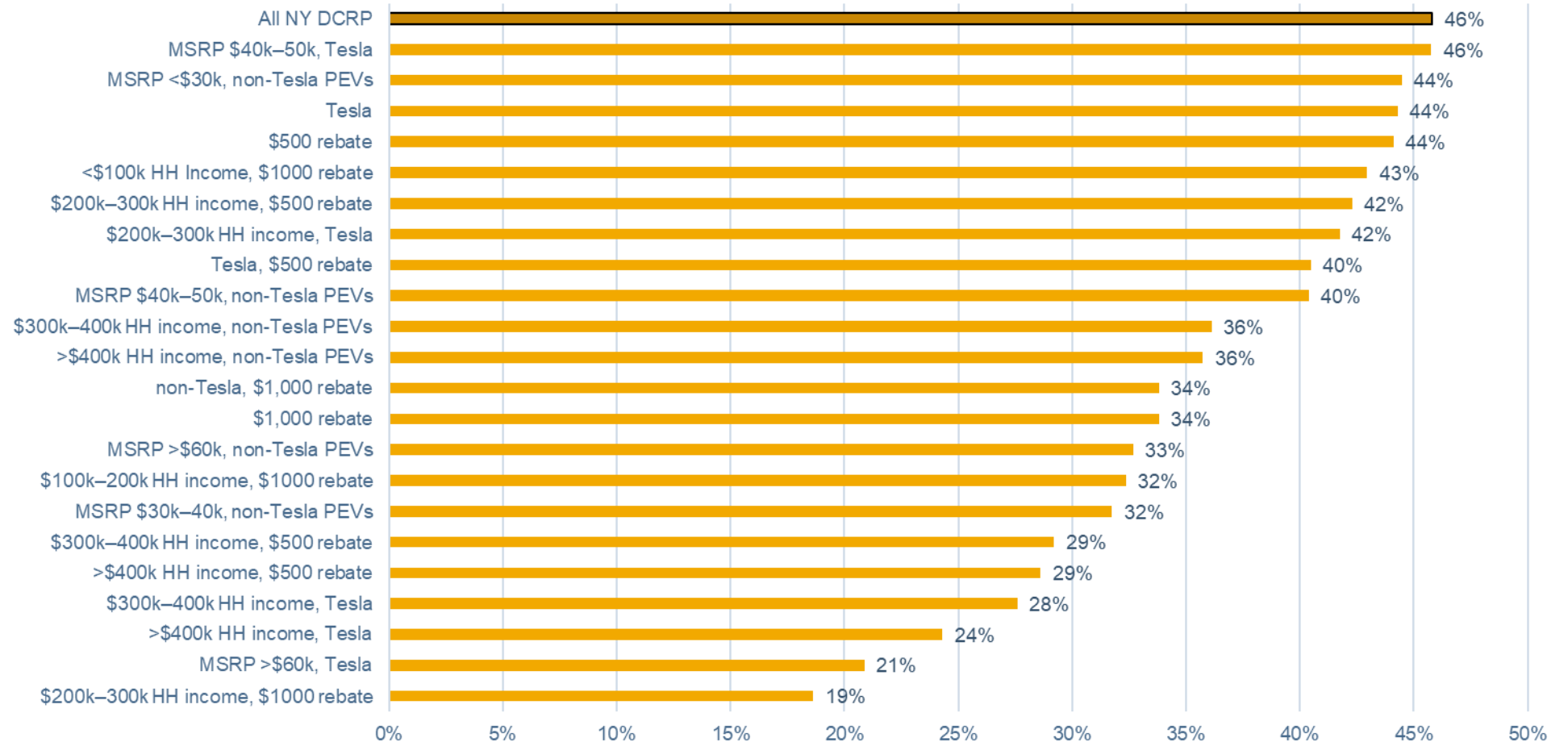
Builds on [presentation for EVS36](#)

DCRP 2023 *Rebate Essentiality* Compilation



Free-Rider Hunting

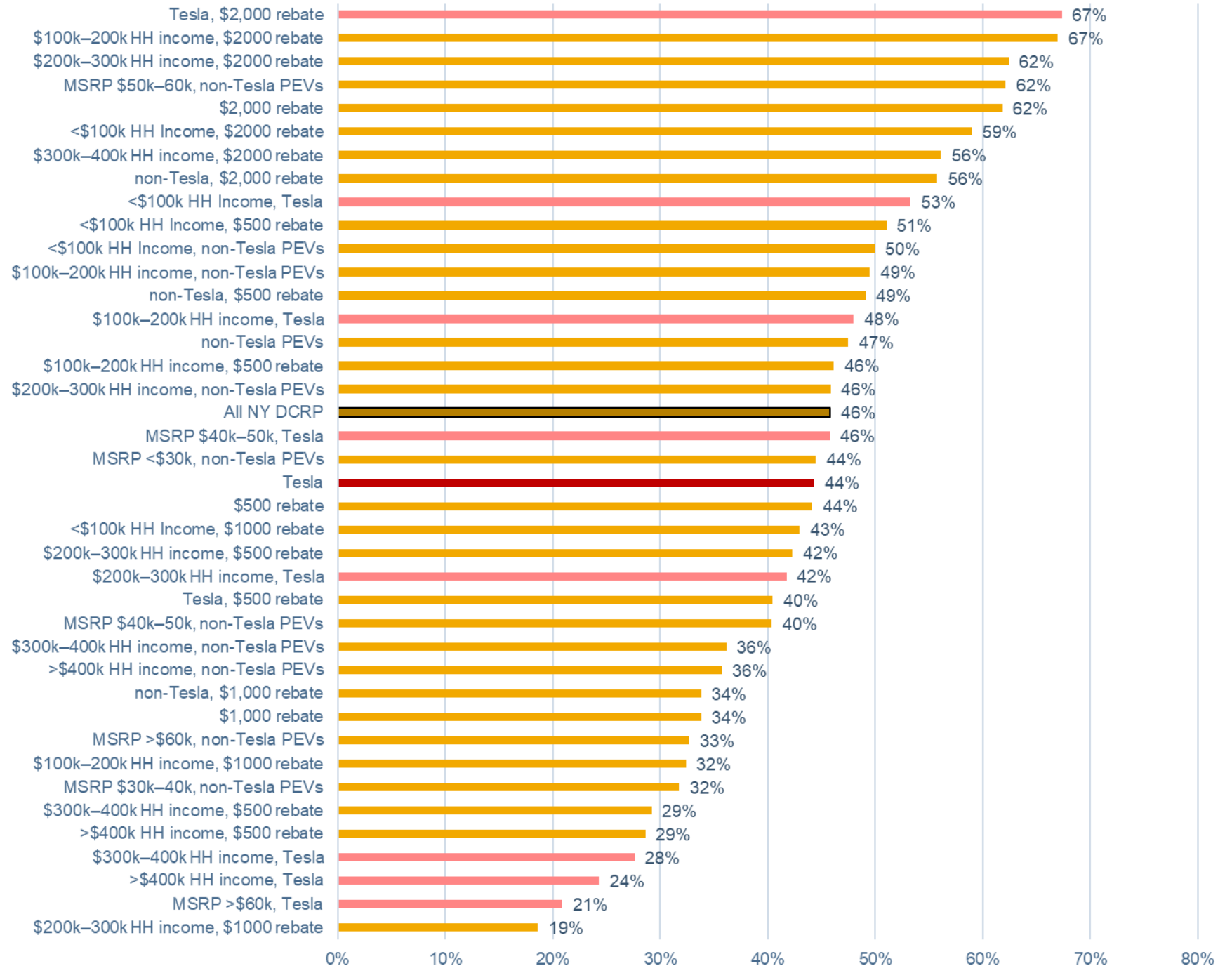
Focusing on groups with below-program-average *Rebate Essentiality %*



Starting from the bottom up...

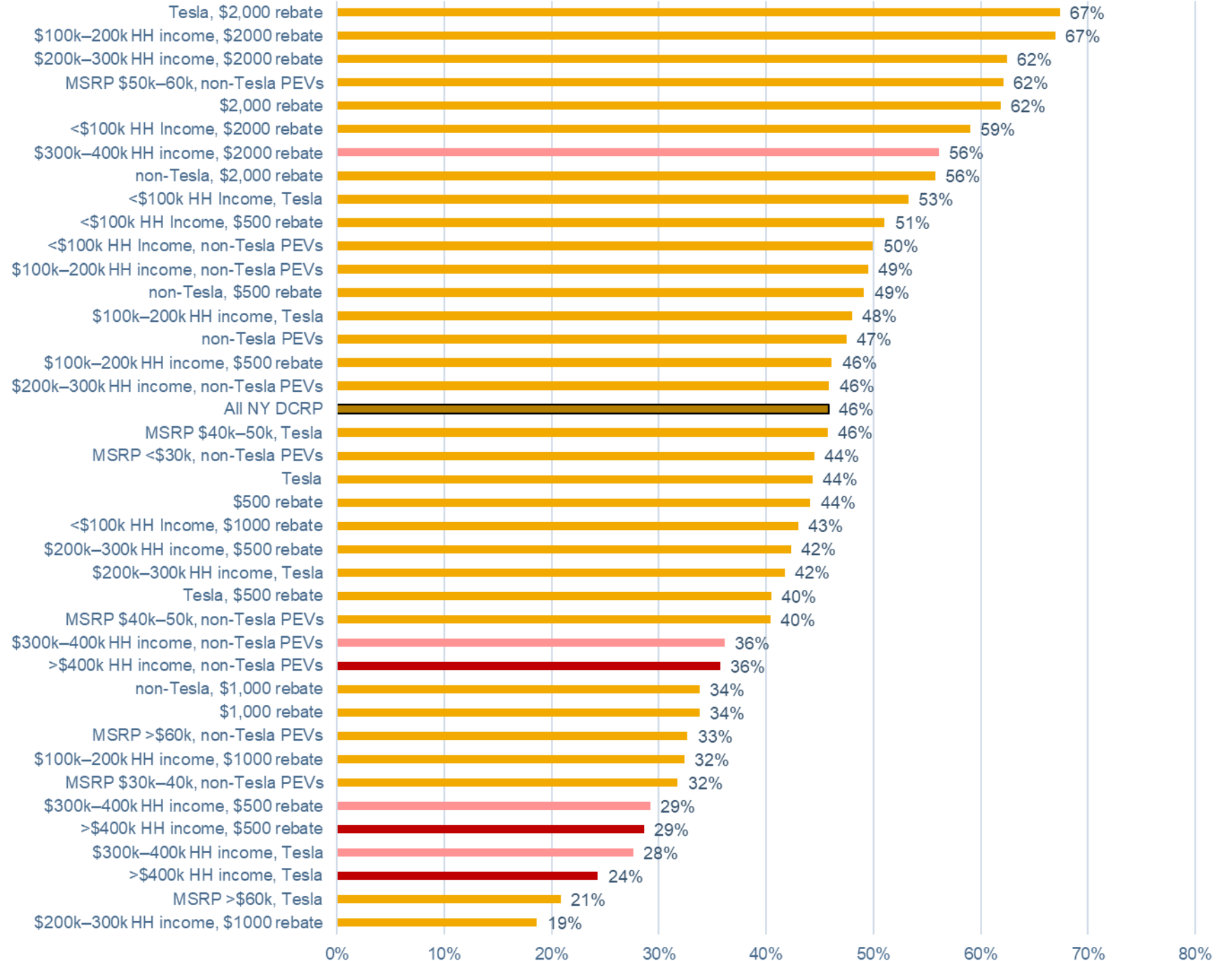
Double Check

Tesla Dilemma:
2023 Tesla consumers
among least and most
influenced



What about Income?

- >\$400k (dark red) among least influenced
 - particularly by \$500 rebate and for Tesla products
 - 42% even for \$2,000 rebate (not shown b/c of small sample size)
- \$300–400k (pink) more mixed because of effective \$2,000 rebate



What about MSRP?

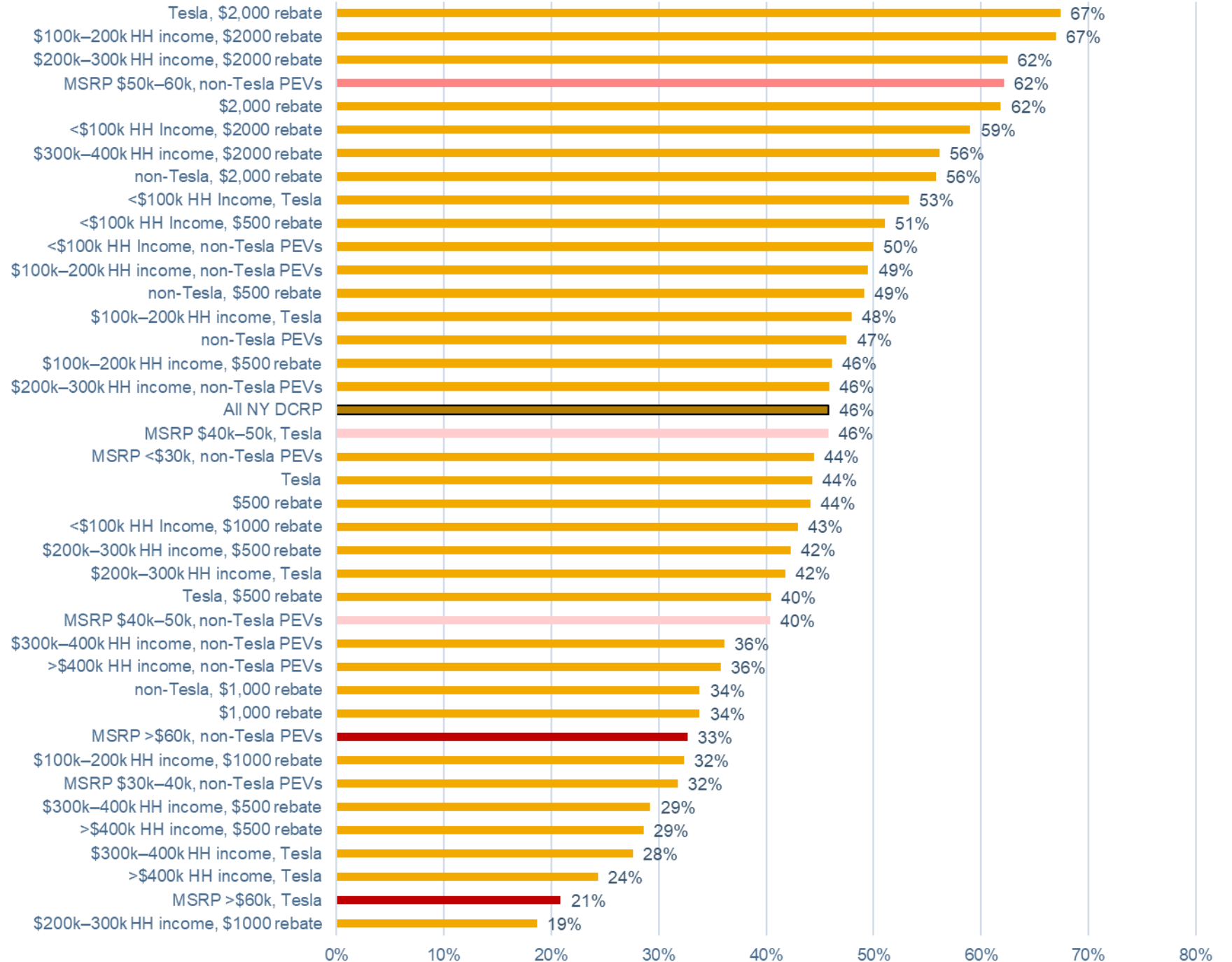
> \$60k (dark red)

\$50–60k (pink)

\$40–50k (light pink)

Which begs the follow-on question about what is in the \$50–60k category (and so, on to run each issue to ground).

...and so on, until the all questions have been worked through.



Wrap Up

- **Summary of Select Findings**

Summary of Select Findings for 2023 Purchases/Leases

(additions relative to earlier slide are bolded)

Context

- \$500 rebates continued to dominate (**78%**). Tesla Model Y remained the most popular (**36%**) and pricing dropped.

Rebate Influence

- DCRP rebates were substantially more influential in 2023 (**$RI=87%$, $RE=46%$**) than in 2022 (**$RI=81%$, $RE=28%$**).
 - Highest yet for Tesla consumers (**44%, more diverse and mainstream, see forthcoming 2023 Consumer Characteristics**)
- Latest data confirm influence highest for \$2,000 rebates, households with income < \$300k, and EVs < \$60,000 MSRP.

Conclusions & Recommendations

- **Overall tension: do you punish products that are “selling themselves”/doing some of the work of the rebate?**
- Unambiguously low influence for households (HHs) with income >\$400k/year, EVs with MSRP >\$60k.
 - To improve both cost-effectiveness and equity, consider additional ways to target away from these categories (e.g., hard MSRP cap, soft income cap, funding restrictions, outreach & messaging).
- To increase equity, and probably cost-effectiveness, consider a focus on larger rebate amounts.
- It's also complicated for MSRP \$50–60k, HH income \$300–400k, and \$500 rebates...
- Proposal: Develop and use a “Free-Rider Abatement Curve” tool and process to iteratively inform designing program cost-effectiveness and equity within a given budget or other goal.

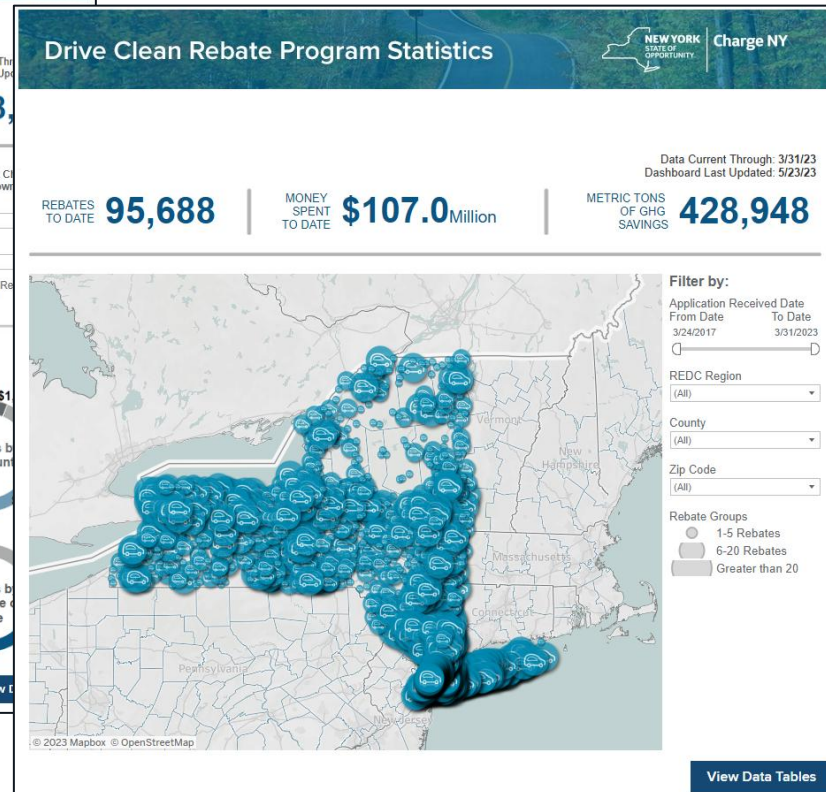
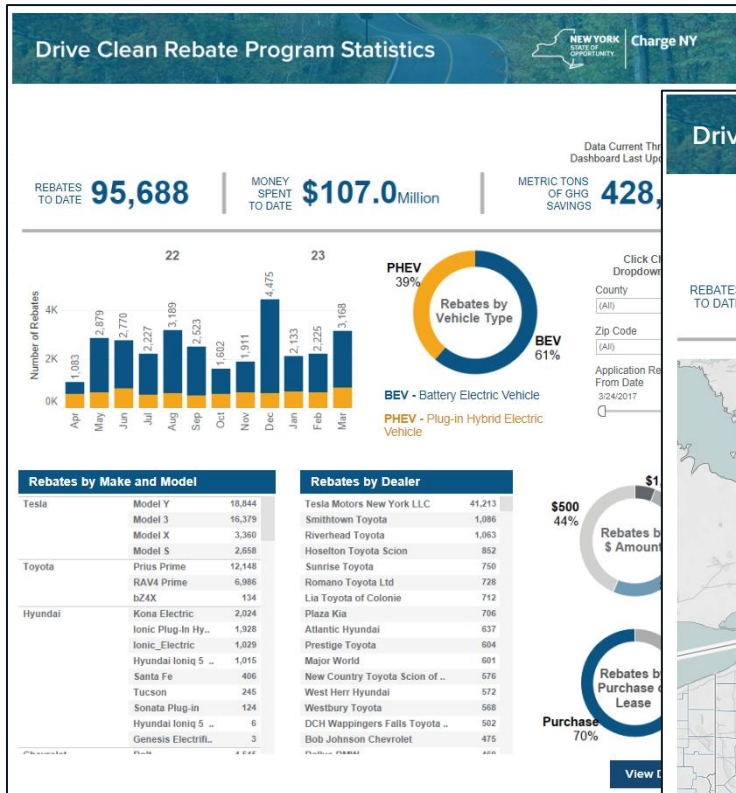
Appendix

- **Acronyms**
- **Additional Details**
- **Resources**

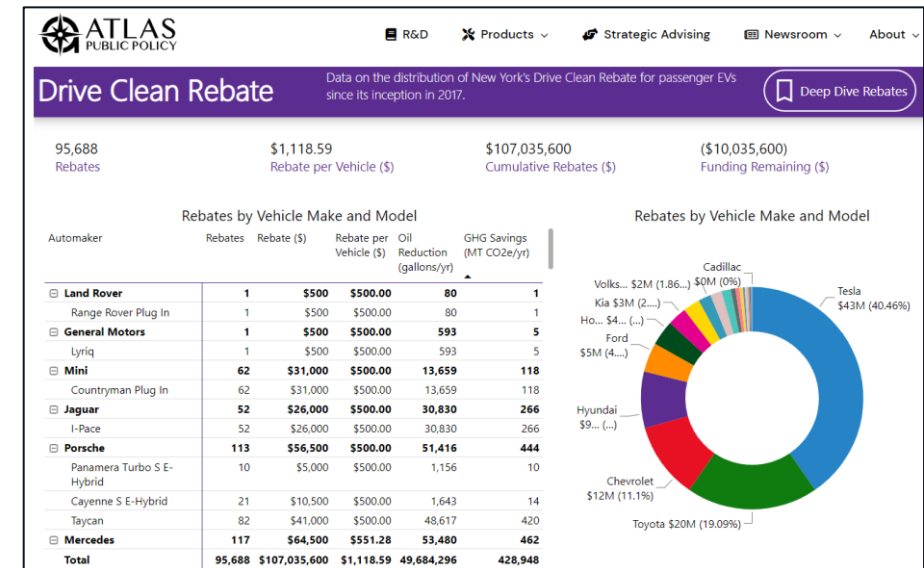
Acronyms

- **BEV – Battery Electric Vehicle**
- **CA – State of California**
- **CVRP – Clean Vehicle Rebate Project (CA statewide)**
- **DCRP – Drive Clean Rebate Program (NY statewide)**
- **e-mile – EPA-rated all-electric mile of driving range**
- **EPA – U.S. Environmental Protection Agency**
- **EV – Electric Vehicle (including PHEVs and BEVs; FCEVs not in the NY data)**
- **FCEV – Fuel-Cell Electric Vehicle**
- **FTC – Federal Tax Credit**
- **MSRP – Manufacturer's Suggested Retail Price**
- **MY – Model Year**
- **N.A. – Not Applicable**
- **NY – New York State**
- **PHEV – Plug-in Hybrid Electric Vehicle**

For Additional, Up-to-date Program Data (images as of 5/23/2023)



[Drive Clean Rebate Program Statistics Dashboard](#)



[EvaluateNY Dashboard](#)

Program data: a large number of applications and surveys

Survey data statistically represents all participants

Vehicle Purchase/Lease Dates	Annual →					Total
	3/23/2017 – 12/31/2019	1/2/2020 – 12/31/2020	1/1/2021 – 12/31/2021	1/2/2022 – 12/31/2022	1/1/2023 – 12/31/2023	
Survey Responses (<i>n</i>) [¶]	5,474	3,480	5,087	5,472	7,225	26,738
Program Applicant Population (<i>N</i>) [§]	21,843	13,038	23,098	27,187	46,237	131,403
Program as % of Market *	~56%	~72%	~65%	~66%	~61%	~63%

¶ Subsequently weighted to represent the program population along the dimensions of vehicle technology (PHEV vs. BEV), model, buy vs. lease, and county.

§ Small numbers of rebated vehicles are not represented in the time frames due to application lags.

* Based on approximate comparisons to total EV sales from [Autos Innovate EV Dashboard](#) (AAI & CSE 2024).

Rebate design shapes outcomes

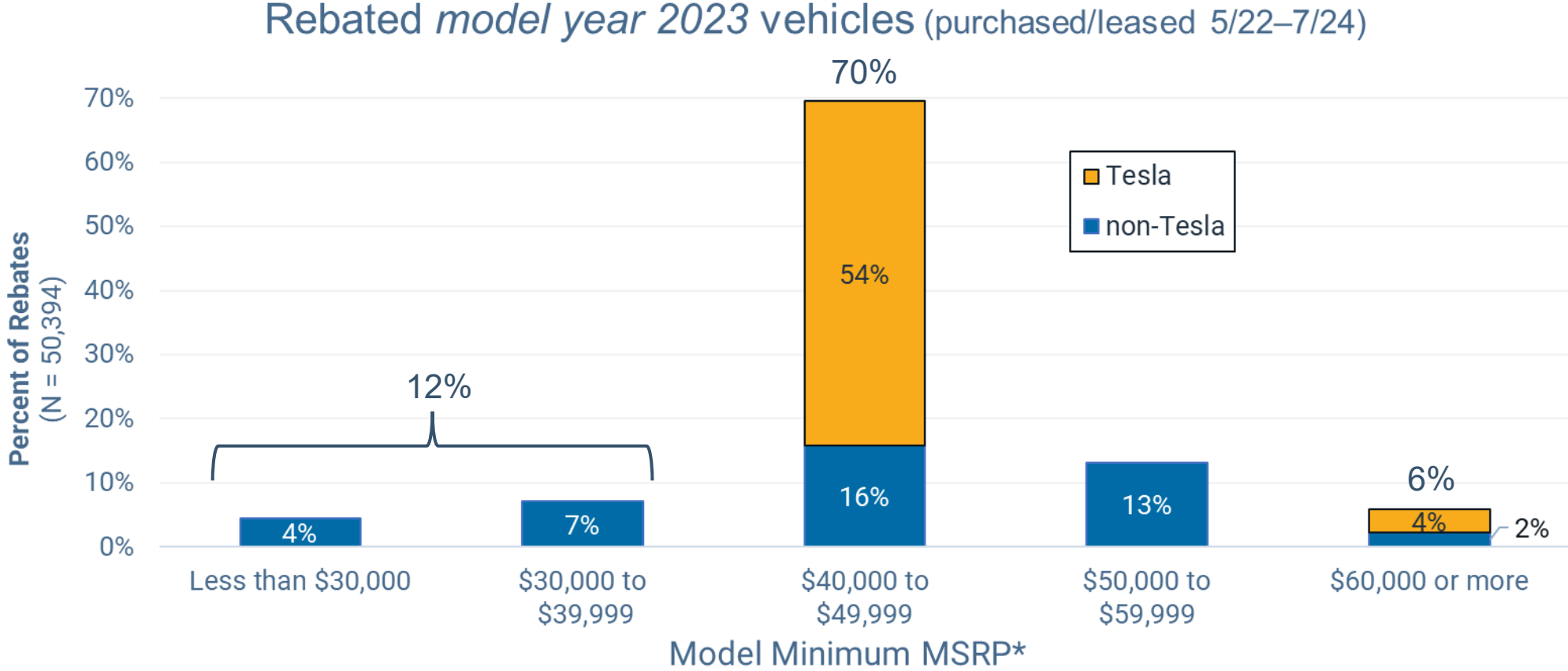
Program design changed mid-2021

Category	Purchase/lease dates <u>through</u> June 30, 2021	Purchase/lease dates <u>after</u> June 30, 2021
Fuel-Cell EVs*, All-Battery EVs (BEVs), and Plug-in Hybrid EVs (PHEVs)	≥ 120 e-miles [†] : \$2,000 ≥ 40 e-miles: \$1,700 ≥ 20 e-miles: \$1,100 < 20 e-miles: \$500	≥ 200 e-miles: \$2,000 ≥ 40 e-miles: \$1,000 < 40 e-miles: \$500
Misc.	MSRP > \$60,000 = \$500 Point-of-sale	MSRP > \$42,000 = \$500 Point-of-sale

* FCEVs eligible but unavailable in NY; none rebated. † Electric miles (e-miles) are U.S.-EPA-rated all-electric miles.

Prices shifted toward \$40–49k category as Model Y prices decreased

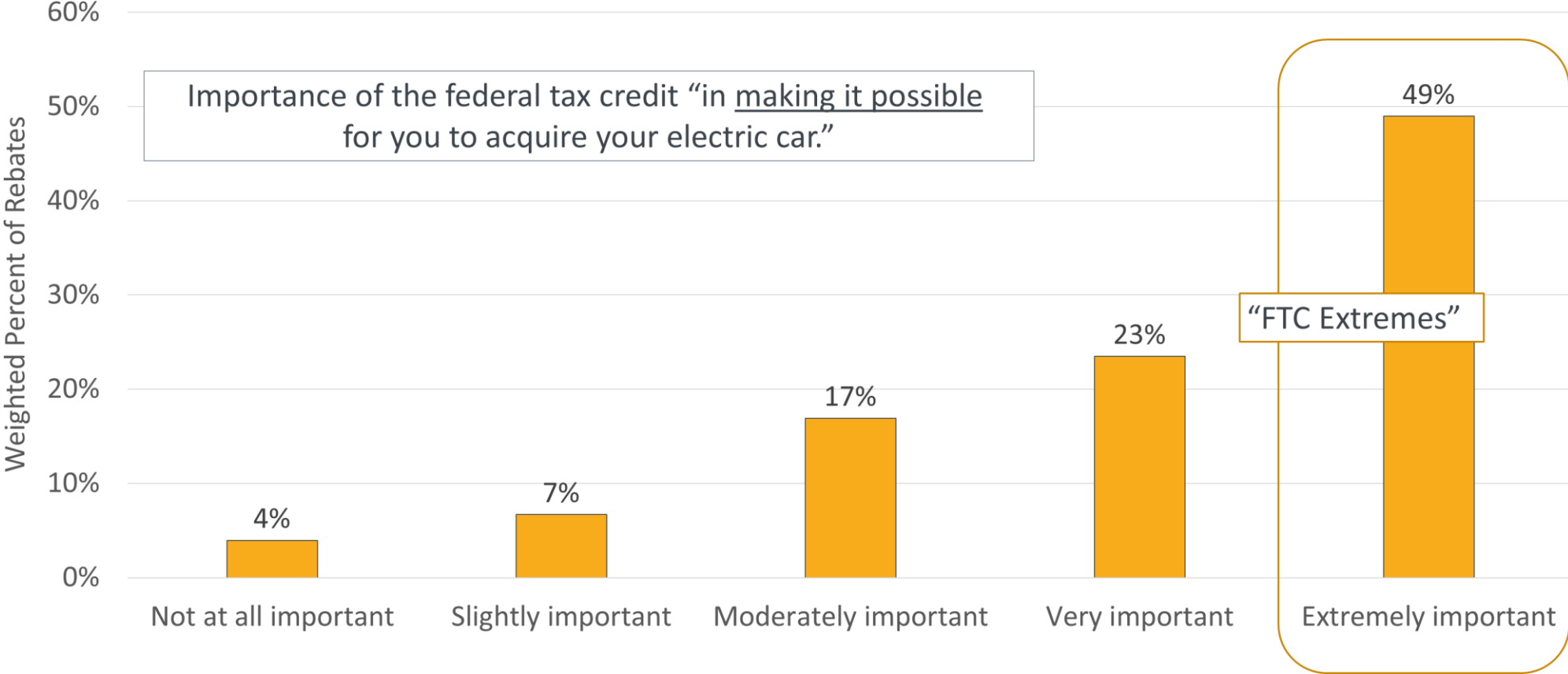
But MSRPs are complicated



*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 model year (MY) 2023 MSRPs were unavailable, MY 2022 MSRPs or MY 2024 MSRPs were used. Tesla MSRPs frequently changed within MY 2023 and were assigned as follows: Models 3 & Y = \$40–49k, Models S & X = \$60k or more.

Importance of Federal Tax Credit for Plug-in EVs

2019* purchases/leases



* Note: federal tax credit phase-out for Tesla began 1/1/2019 and concluded 12/31/2019. Phase out for GM began 4/1/2019 and concluded 3/31/2020. Filtered, question-specific $n = 2,151$

NY Drive Clean Rebates: Select Related Analysis



Rebate Impacts (DCRP Resources)

- ❖ Williams, B.D.H. and Pallonetti, N. (2024, Mar.). [Presentation: “NY Drive Clean Rebate: Vehicle Replacement & Rebate Influence thru 2022.”](#) New York State Drive Clean Program (DCRP), NYSERDA. [Slides](#).
- ❖ B.D.H. Williams and N. Pallonetti (2023, Mar.), [New York State’s Drive Clean Rebate for Electric Vehicles: Measures of Impact](#), for procs. *36th International Electric Vehicle Symposium (EVS36)*, EDTA, Sacramento CA, USA. [Paper](#). [CSE paper posting](#). [Slides](#).
- B.D.H Williams and N. Pallonetti (2022, Jun), Presentation: “NY Drive Clean Rebate: Select Impacts thru 2020 (and Lessons from Other State Electric Vehicle Programs),” Internal Presentation for NYSERDA, presented on 1 Sep. 2022.

Consumer Segmentation (NYSERDA Contract 66267 & Derivative Products)

- ❖ B.D.H. Williams and J.B. Anderson (2024, May). [Expanding Electric Vehicle Adoption in Disadvantaged Communities](#). *Transportation Research Record: Journal of the Transportation Research Board*. <https://doi.org/10.1177/03611981241242753>. [Paper](#). [CSE posting](#). Open-access data-summary [appendix](#). TRB 2024 [slides](#).
- B.D.H. Williams (2024, Jan. 9). [Presentation: “Amplifying Electric Vehicle Adoption in Disadvantaged Communities, Consumer Segmentation Roadmaps, and Additional Equity Considerations.”](#) *103rd Annual Meeting of the Transportation Research Board*. NASEM, Washington DC, USA. [Slides](#). [TRB posting](#).
- ❖ B.D.H. Williams and J.B. Anderson (2022, Sep.), [From Low Initial Interest to Electric Vehicle Adoption: “EV Converts” in New York State’s Rebate Program](#), *Transportation Research Record: Journal of the Transportation Research Board*. <https://doi.org/10.1177/03611981221118537>. [Paper](#). Open-access [data-summary supplement](#).
- ❖ B.D.H. Williams (2022, Jun.), [Targeting Incentives Cost Effectively: “Rebate Essential” Consumers in the New York State Electric Vehicle Rebate Program](#), for procs. *35th International Electric Vehicle Symposium (EVS35)*, AVERE. [Paper](#). [Slides](#).
- ❖ 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, [Clean Transportation Reports](#). Also linked to [ResearchGate](#).

Incorporated Into Multi-state Analysis

- B.D.H. Williams (2021, Jul. 28), [Presentation: “Data from Statewide Electric Vehicle Rebate Programs: Vehicles, Consumers, Impacts, and Effectiveness,”](#) *Collaboration for ZEV Success*, Multi-state ZEV Task Force and Alliance of Automotive Innovation. [Slides](#). [CSE posting](#).
- B.D.H. Williams (2020, Dec.), [Presentation: “EV Purchase Incentives: Program Design, Outputs, and Outcomes of Four Statewide Programs with a Focus on Massachusetts,”](#) *Behavior, Energy & Climate Change Conference 2020*, ACEEE, UC Berkeley CIEE, and SEEPAC. [Slides](#). [CSE posting](#).
- B.D.H. Williams (2019, Oct.), [Presentation: “Transportation Electrification: Incentives.”](#) *REV2019 Conference*, Burlington VT. [Slides](#). [CSE posting](#).
- Williams, B. D., & Jones, M. (2018, June 20). [Presentation: “Electric Vehicle Rebates: Exploring Indicators of Impact in Four States.”](#) *EV Roadmap 11 Conference*. [ResearchGate DOI](#). [CSE posting](#).

Reverse chronological within each section, as of 5/2024. Key resources marked with a diamond bullet.

For More Information



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Recommended citation:

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