



Home Charging Accessibility Trends within the Clean Vehicle Rebate Project

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With thanks to Aria Gehrman and others at CSE

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Center for Sustainable Energy® (CSE) is a national nonprofit that accelerates adoption of clean transportation and distributed energy through effective and equitable program design and administration.

- Administer cutting-edge programs valued at over \$4 billion for governments, utilities and the private sector across the U.S.
- Leader in data-driven incentive program design and administration, for:
 - Electric vehicle and EV charging incentive programs
 - Renewable energy incentive programs (solar and storage)
- Headquartered in San Diego with more than 250 employees across the nation

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- Governments, utilities and the private sector trust CSE for its data-driven and software-enabled approach, deep domain expertise and customer-focused team.
- CSE's fee-for-service business model frees it from the influence of shareholders, members and donors, and ensures its independence.
- CSE's data and insights have informed policy at the local, state and federal level.

One mission —

DECARBONIZE.®

Our vision is a future with sustainable, equitable and resilient transportation, buildings and communities.



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Agenda

- Clean Vehicle Rebate Project (CVRP) Data & Methodology
- Home Charging Access & Barriers
- Home Charging Participant Demographics
- Closing Thoughts

Home Charging Analysis

- Compared/contrasted home-charging and non-home-charging consumers within the CVRP
- Relevance:
 - By 2035, 100% of new vehicles in California must be zero-emission vehicles
 - Assess potential barriers and opportunities

Clean Vehicle Rebate Project History

- The CVRP awards rebates to individual and fleet applicants who purchase a plug-in electric vehicle in California
- Active since 2010-present
- Awarded over 500,000 rebates as of May 3, 2023

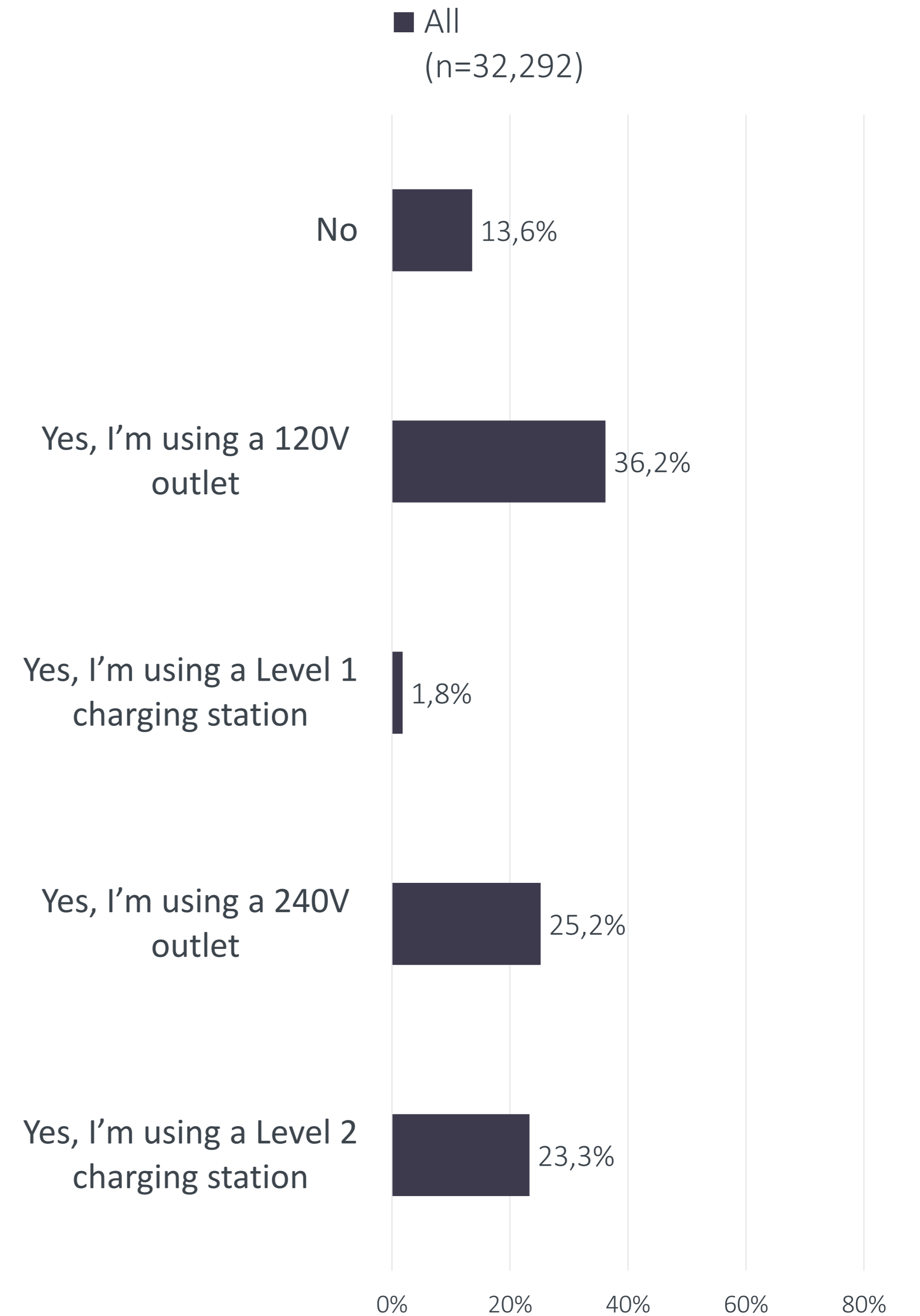
Purchase/Lease Dates	June 1, 2017 – November 30, 2020
Program Participants (Applications)	N = 198,922
	PHEV: 57,162 (29%)
	BEV: 136,005 (68%)
	FCEV: 5,755 (3%)
Survey Response Dates	August 1, 2017 – March 23, 2021
Survey Respondents (17% of program participants)	n = 33,524
	PHEV: 9,599 (29%)
	BEV: 22,925 (68%)
	FCEV: 1,000 (3%)
Program as % of EV Market	43% (with FCEV, 42% without FCEV)

Most Applicants Charge at Home With 120V Outlets

“Presently, do you charge your plug-in electric vehicle at home?”

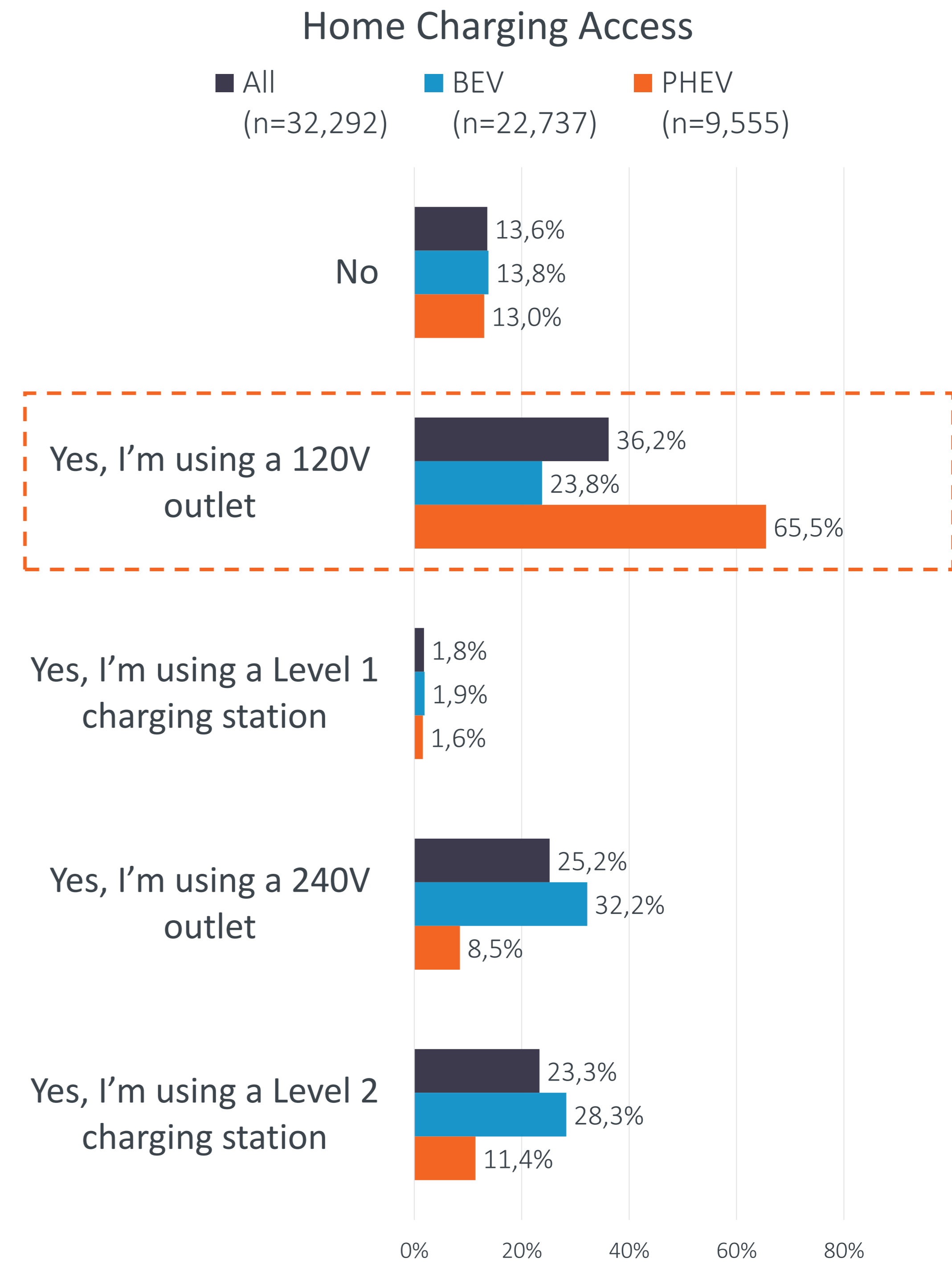
- ~1/8 participants do not charge have home charging access
- ~1/3 participants have 120v charging speeds
- ~1/2 participants have 240v charging speeds

Home Charging Access



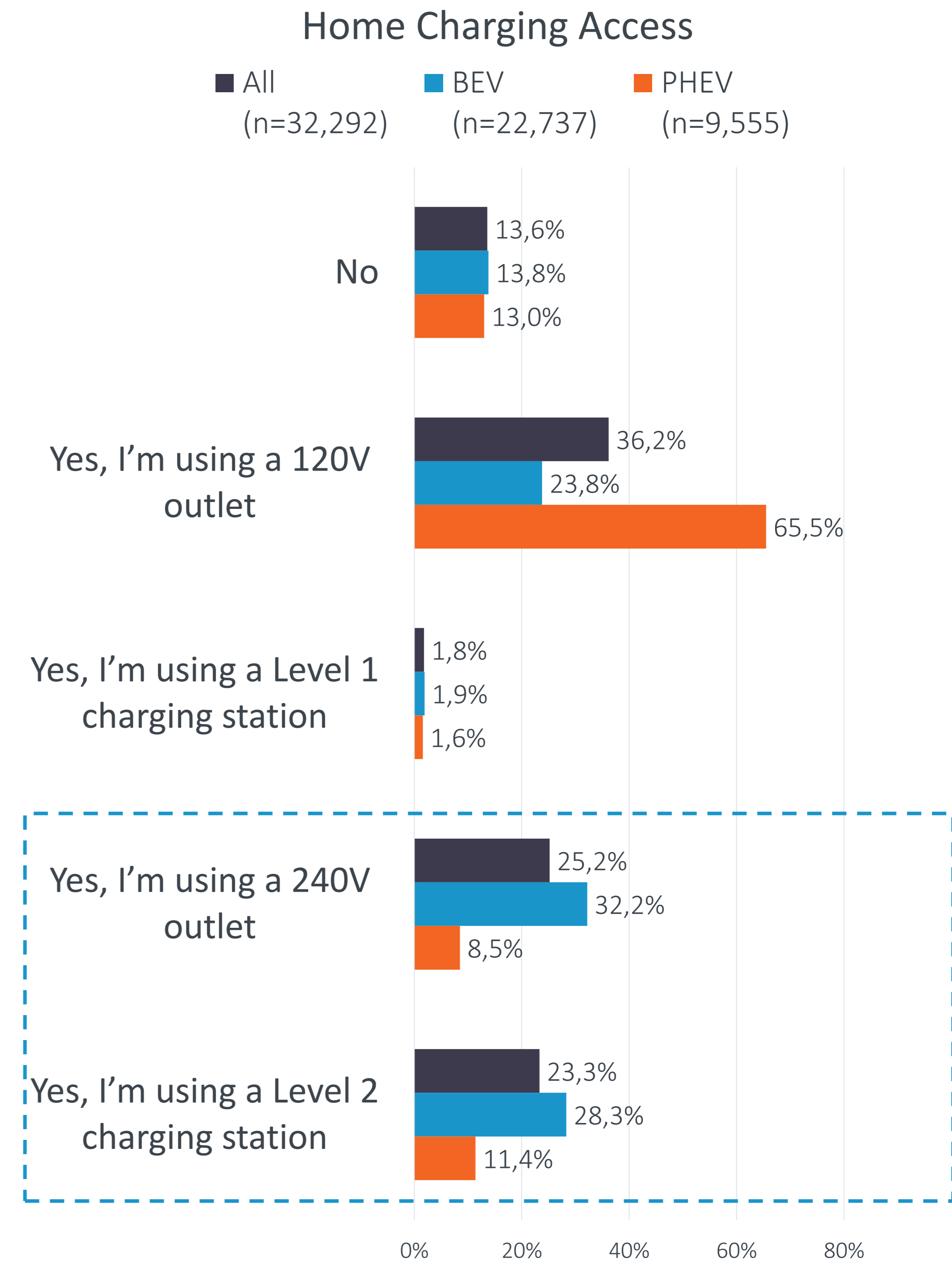
BEV & PHEV Owners Have Different Charging Access

- PHEV owners more frequently charge with 120V outlets



BEV & PHEV Owners Have Different Charging Access

- PHEV owners more frequently charge with 120V outlets
- BEV owners have higher rates of access to faster charging speeds



Top 3 Barriers to Charging at Home*

1

56.0 percent selected “I rent or have a homeowners association and am not authorized to make changes at my residence”

2

32.0 percent selected “I can charge for free or at a lower cost somewhere else”

3

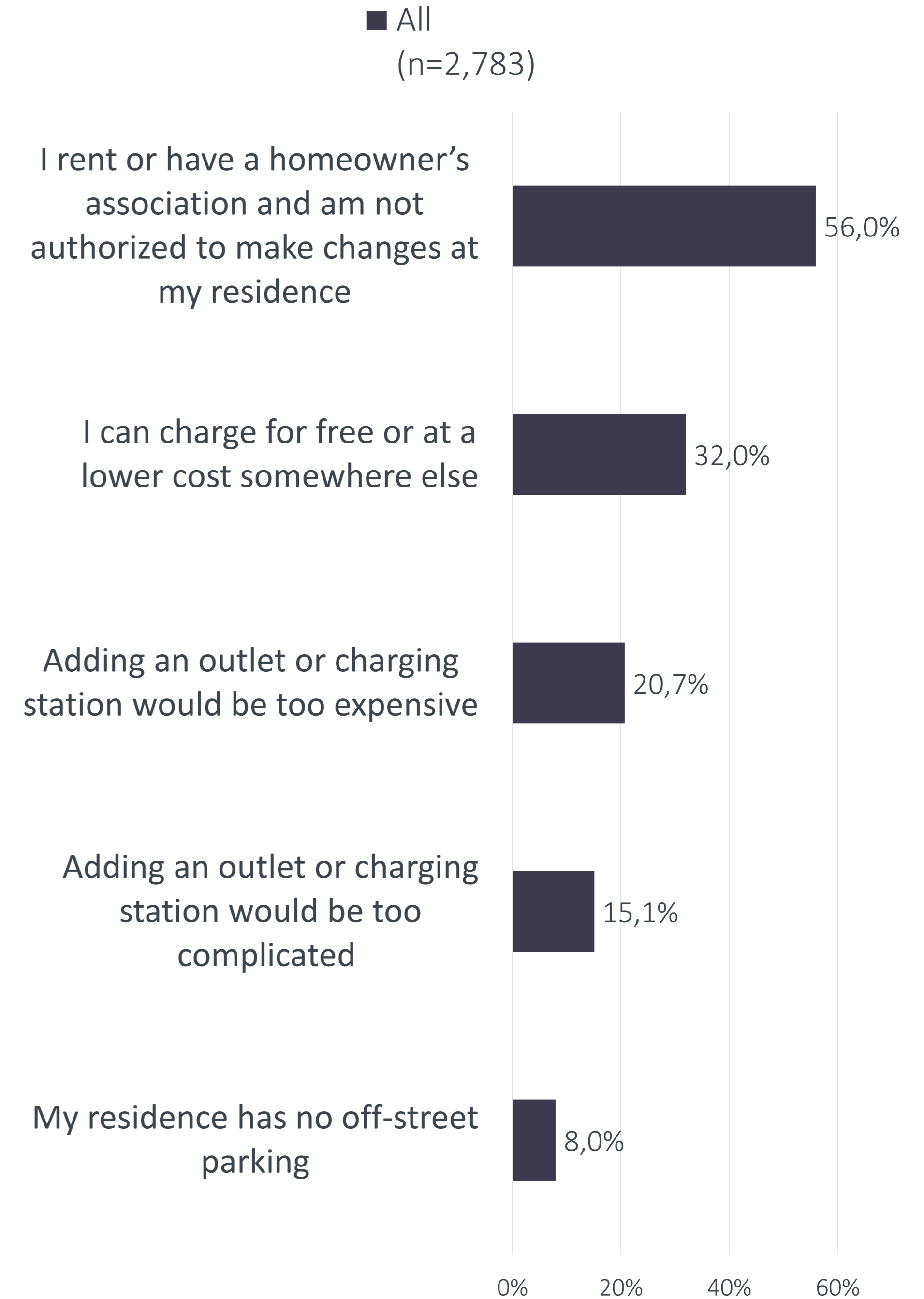
20.7 percent selected “Adding an outlet or charging station would be too expensive”

Home Charging Barriers

- Renting or a homeowner's association is the greatest barrier

**Respondents could check all that apply.*

Why won't you be charging at home?

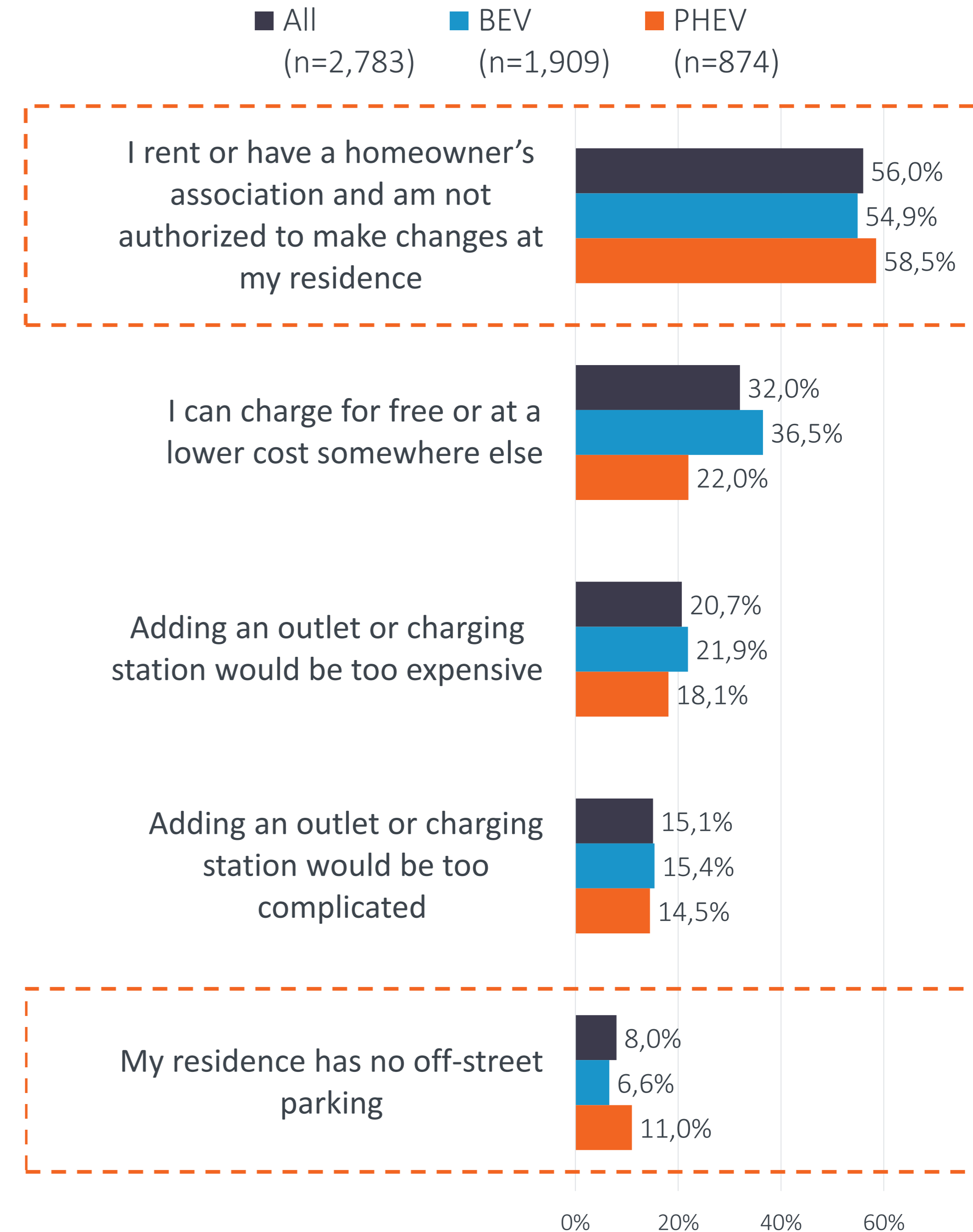


Home Charging Barriers

- Renting or a homeowner's association is the greatest barrier
- More PHEV owners are restricted by their living arrangement
 - HOAs and parking limitation

**Respondents could check all that apply.*

Why won't you be charging at home?

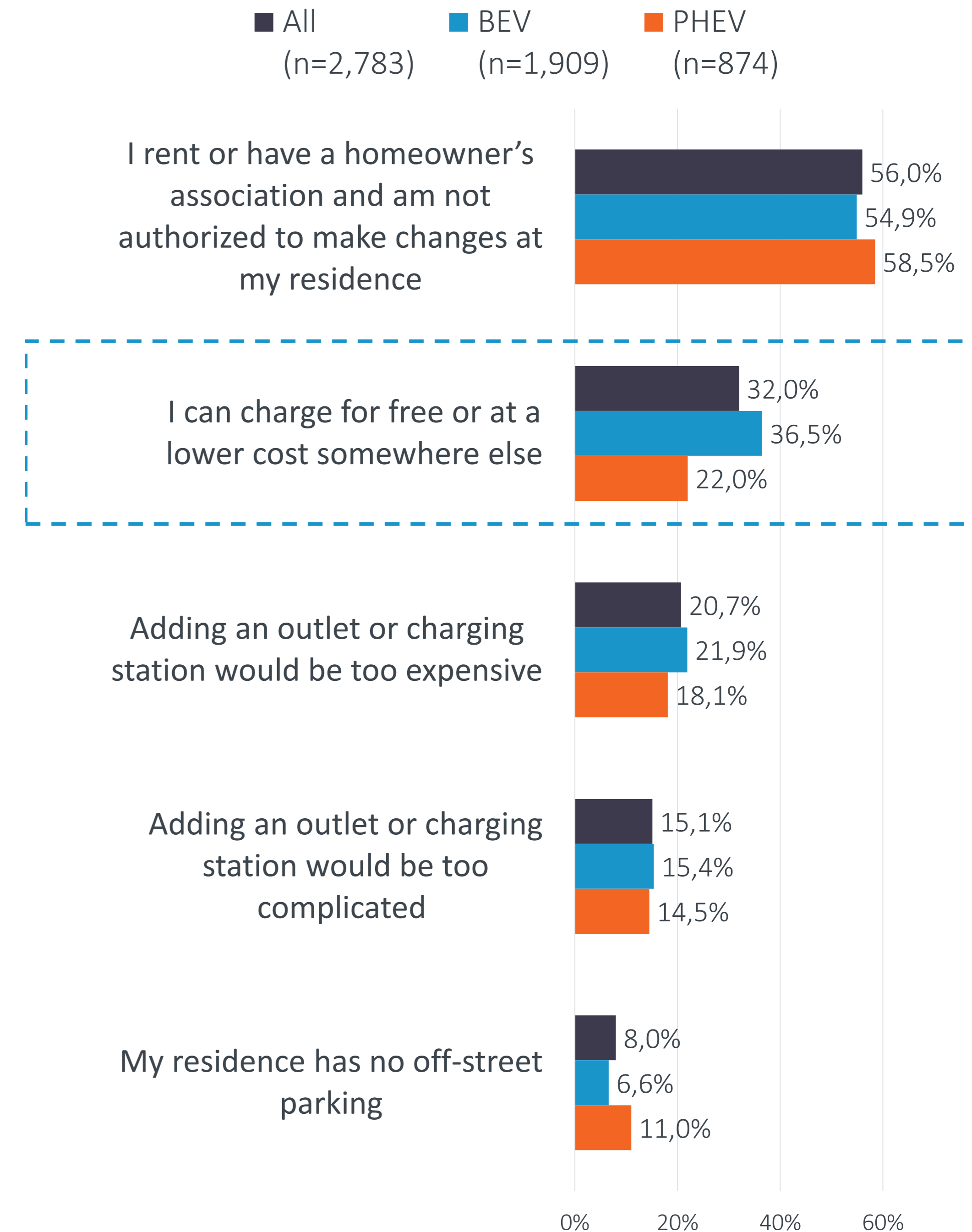


Home Charging Barriers

- Renting or a homeowner's association is the greatest barrier
- More PHEV owners are restricted by their living arrangement
 - HOAs and parking limitation
- More BEV owners are able to charge elsewhere compared to PHEV owners
 - 14 percentage point difference

**Respondents could check all that apply.*

Why won't you be charging at home?



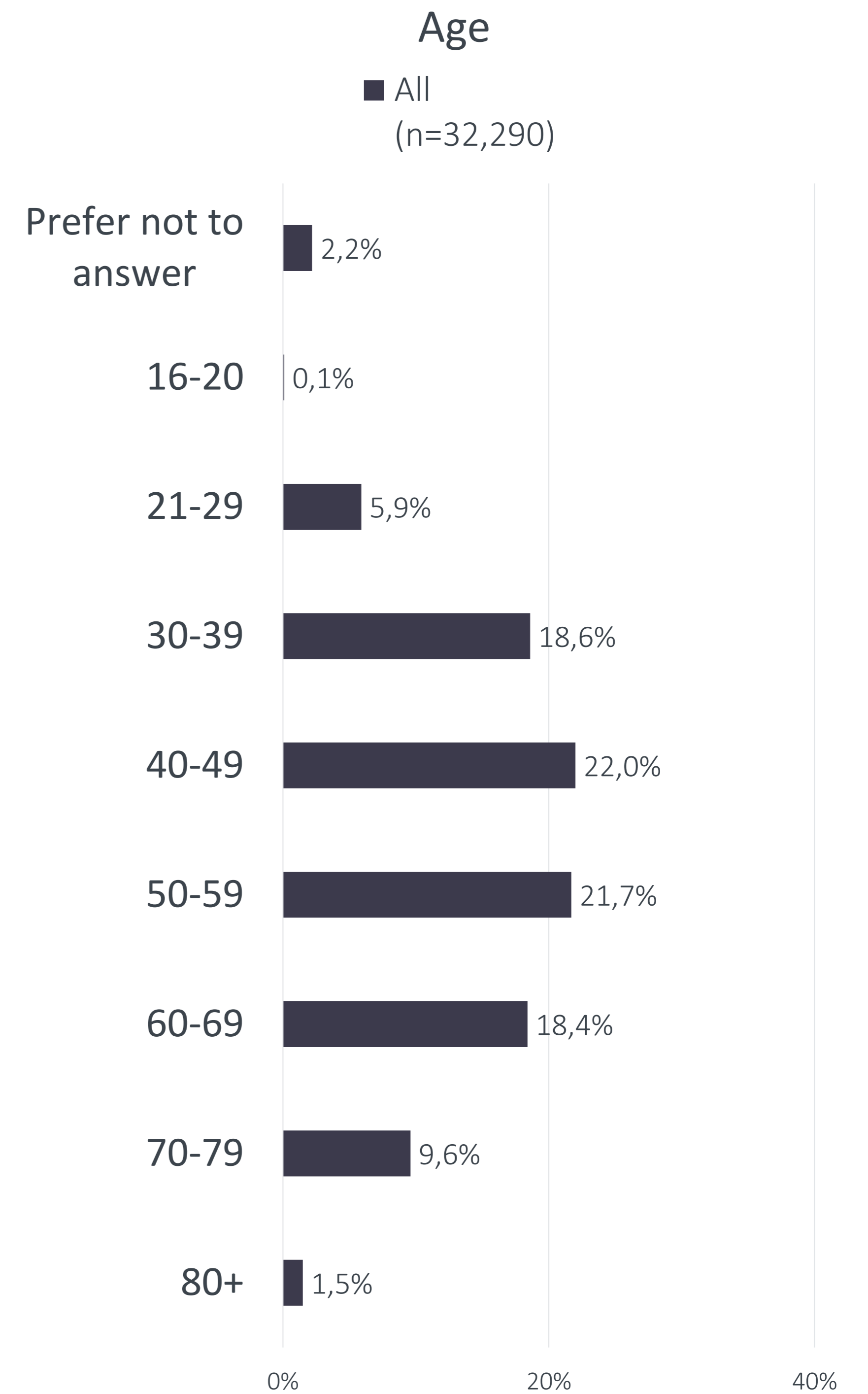
Home Charging vs Non-Home Charging Participant Demographics

Demographic	Home Charging Participants	Non-Home Charging Participants
Age	Older	Younger
Homeownership	Owners	Renters
Residence Type	Detached Houses	Apartments Condominiums
Solar Access	Higher	Lower



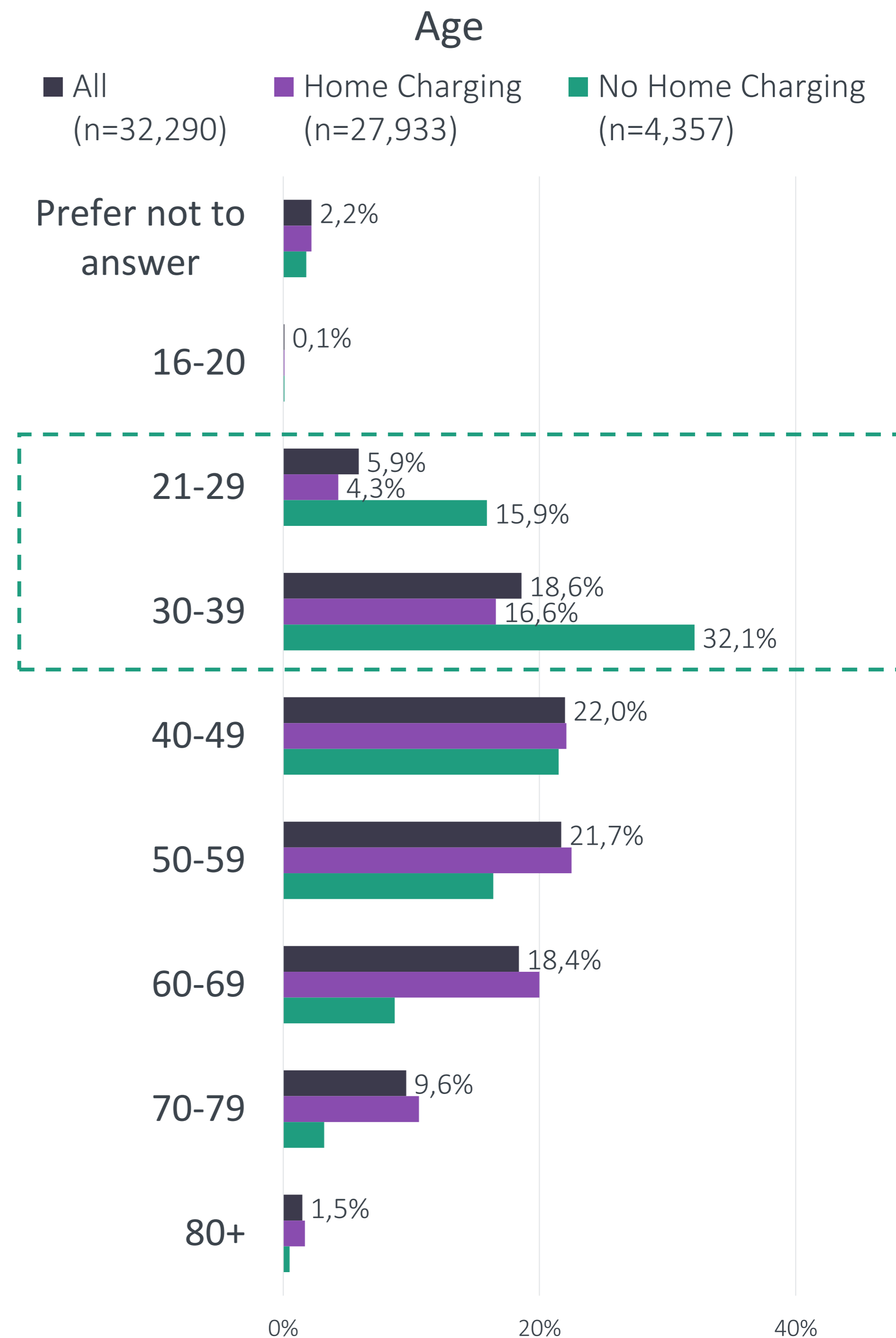
CVRP Participants Tend to be Older

- CVRP participants tend to be between 40-59



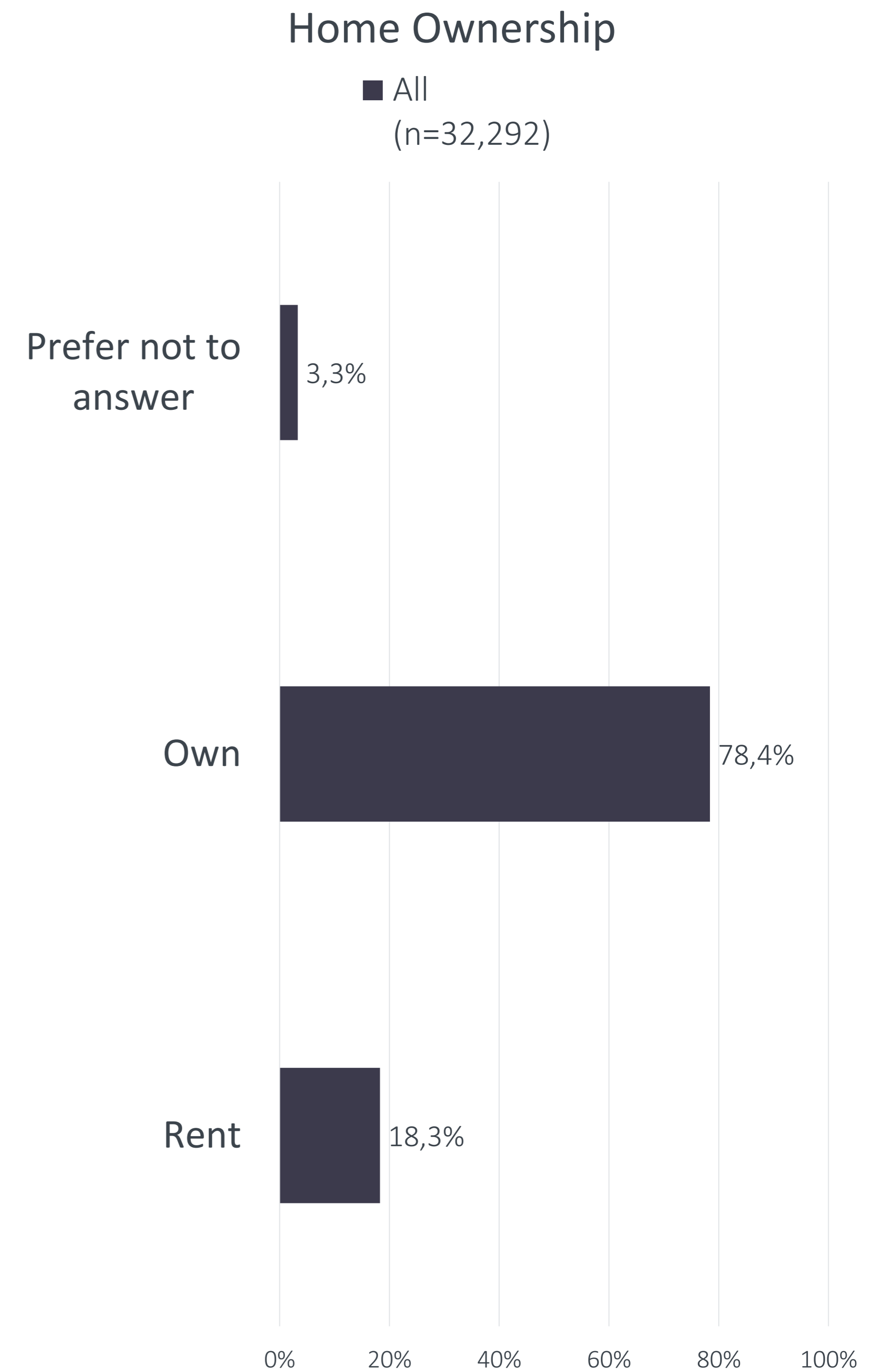
Non-Home Charging Participants are Younger in Age

- CVRP participants tend to be between 40-59
- Non-home charging participants tend to be younger in age
 - Most are between 30-39



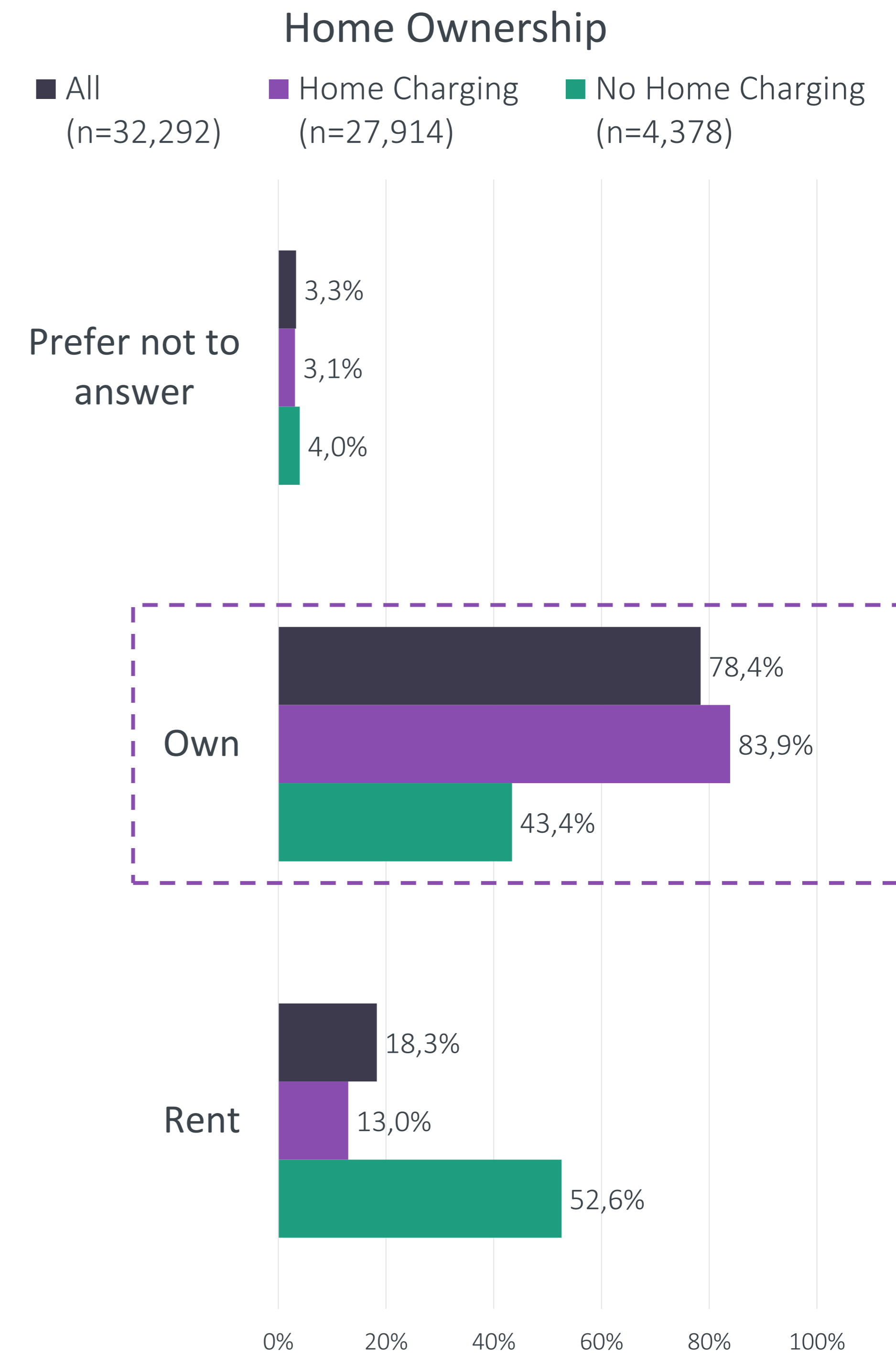
The Majority of CVRP Participants are Homeowners

- Most CVRP participants own their home



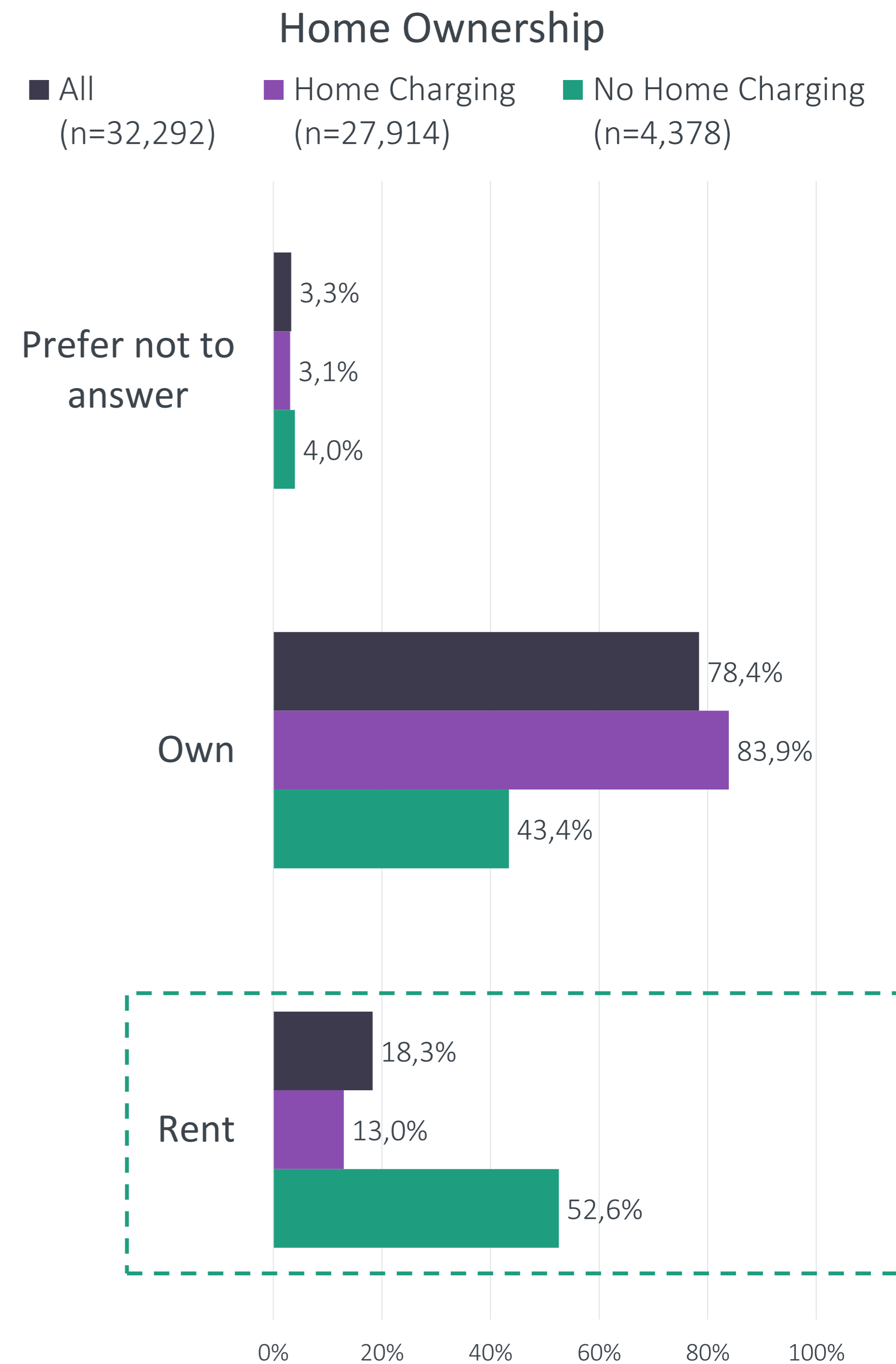
Home Charging Participants Have Higher Home Ownership Percentages

- Most CVRP participants own their home
- Home charging participants have slightly higher rates of home ownership



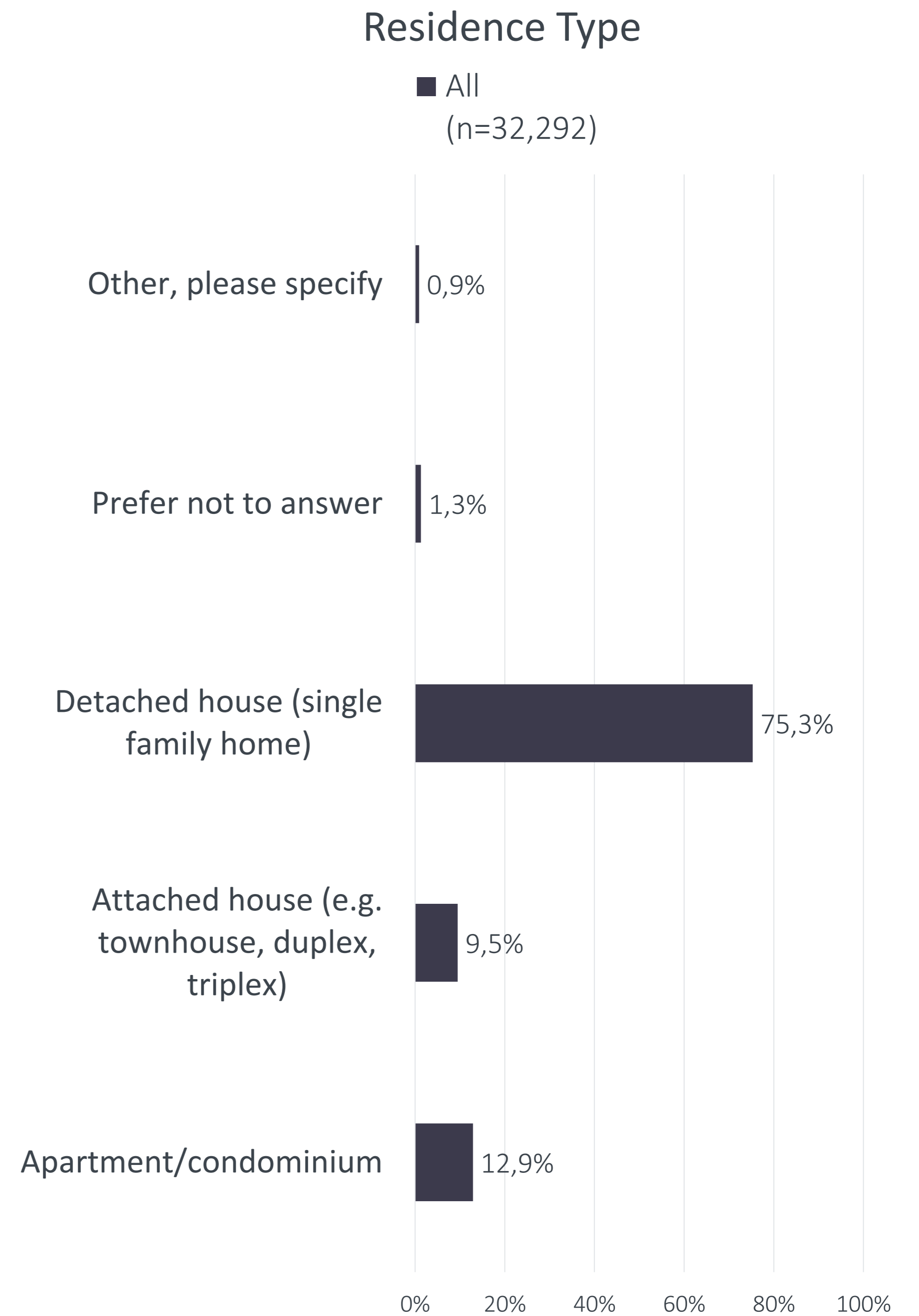
The Majority of Non-Home Charging Participants are Renters

- Most CVRP participants own their home
- Home charging participants have slightly higher rates of home ownership
- Majority of non-home charging participants are renters
 - Aligns with the top barrier to home charging, “I rent or have a homeowner’s association...”



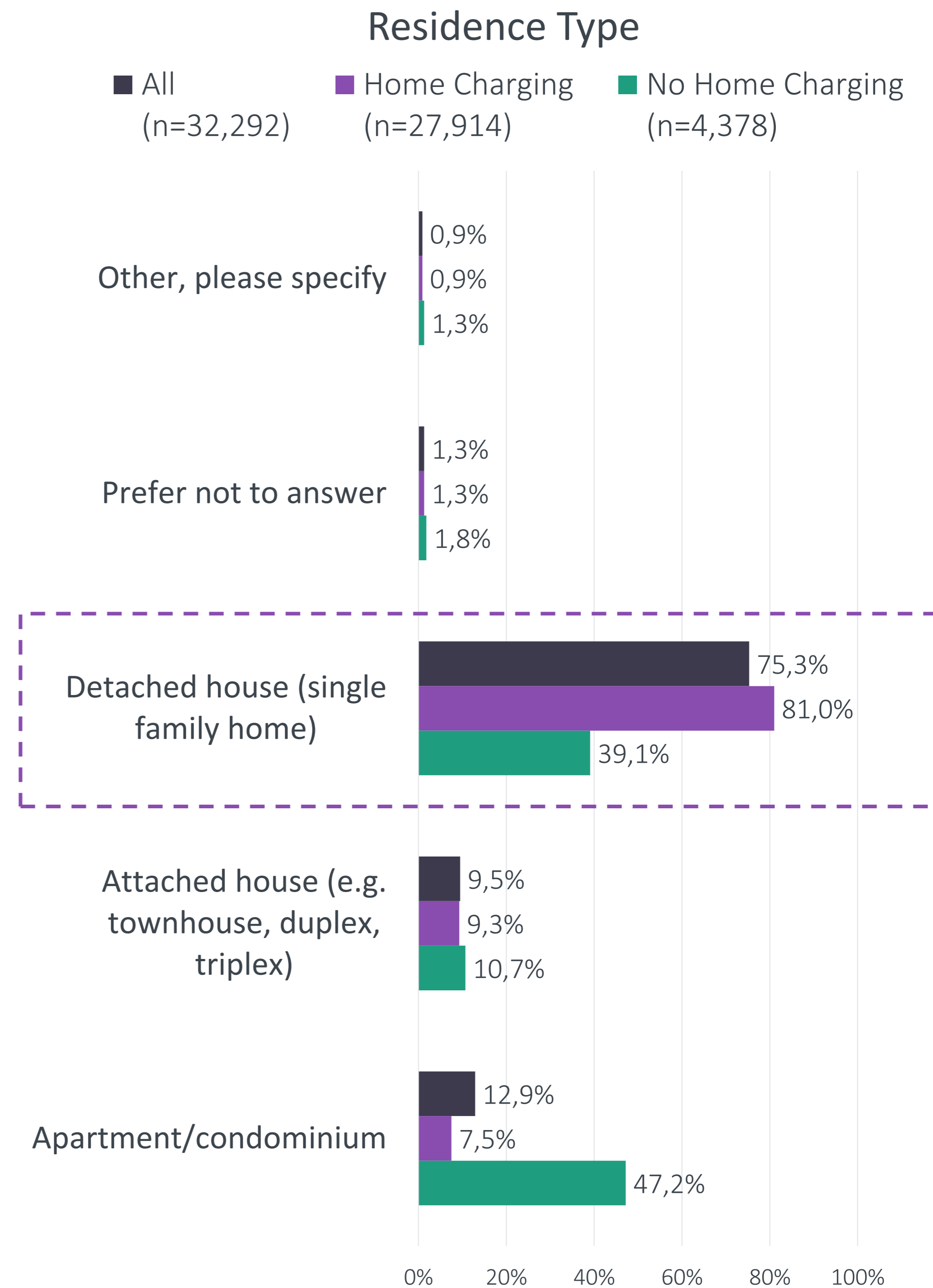
CVRP Participants Tend to Live in Detached Houses

- Majority of CVRP participants live in detached houses



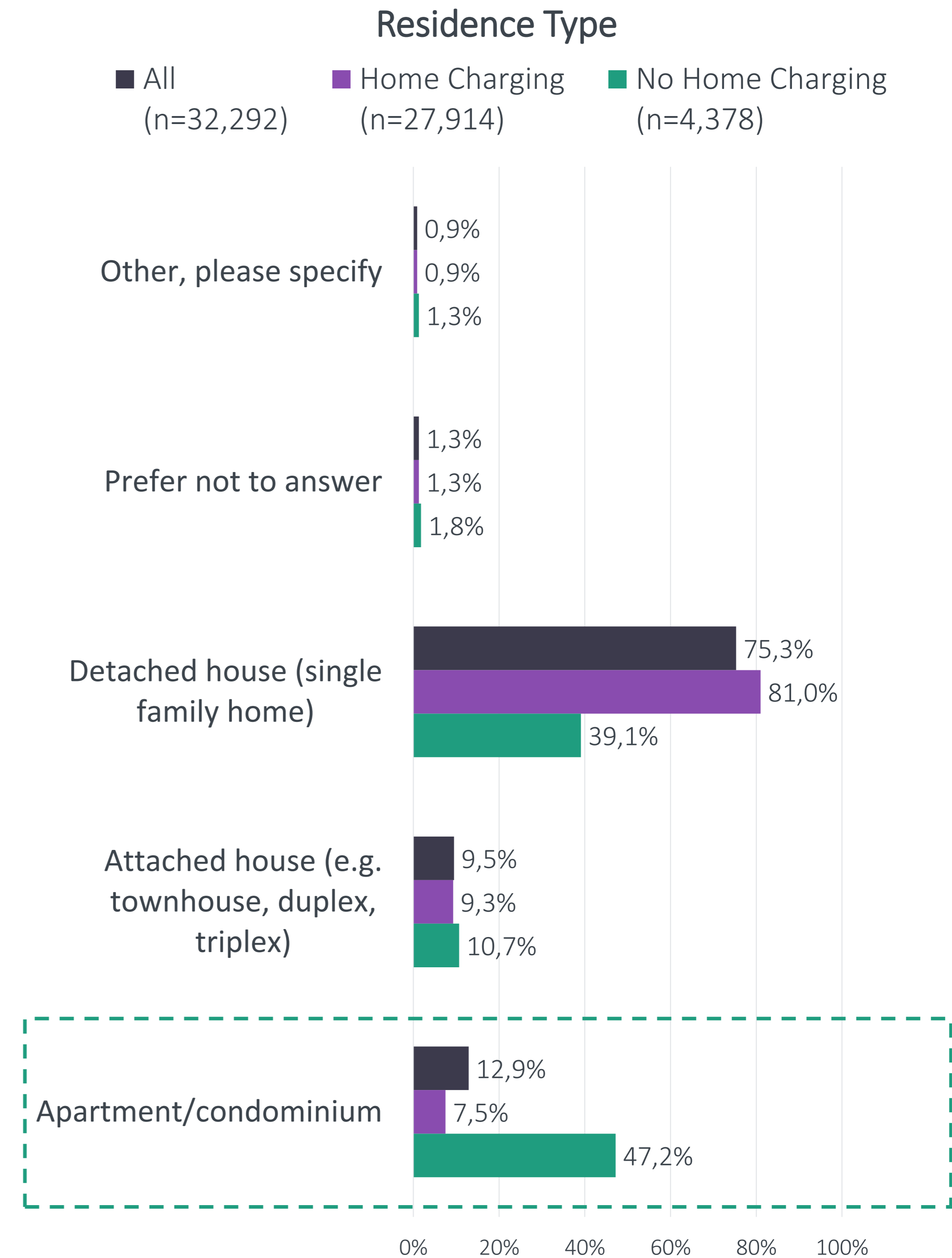
Residence Type Differences Align with Charging Differences

- Majority of CVRP participants live in detached houses
- Home charging participants have higher rates of detached housing



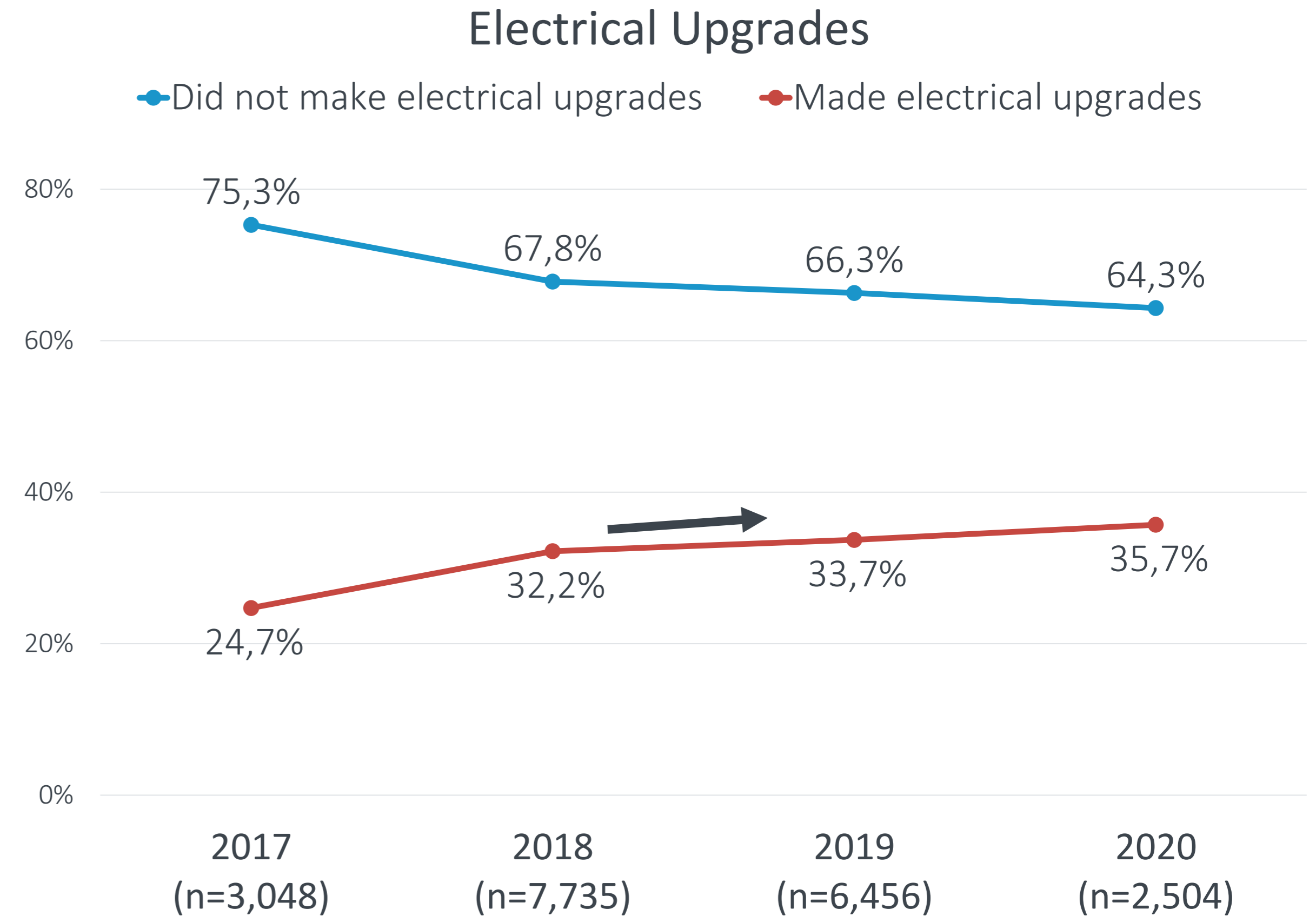
Residence Type Differences Align with Charging Differences

- Majority of CVRP participants live in detached houses
- Home charging participants have higher rates of detached housing
- Non-home charging participants have higher rates of living in apartments/condominiums



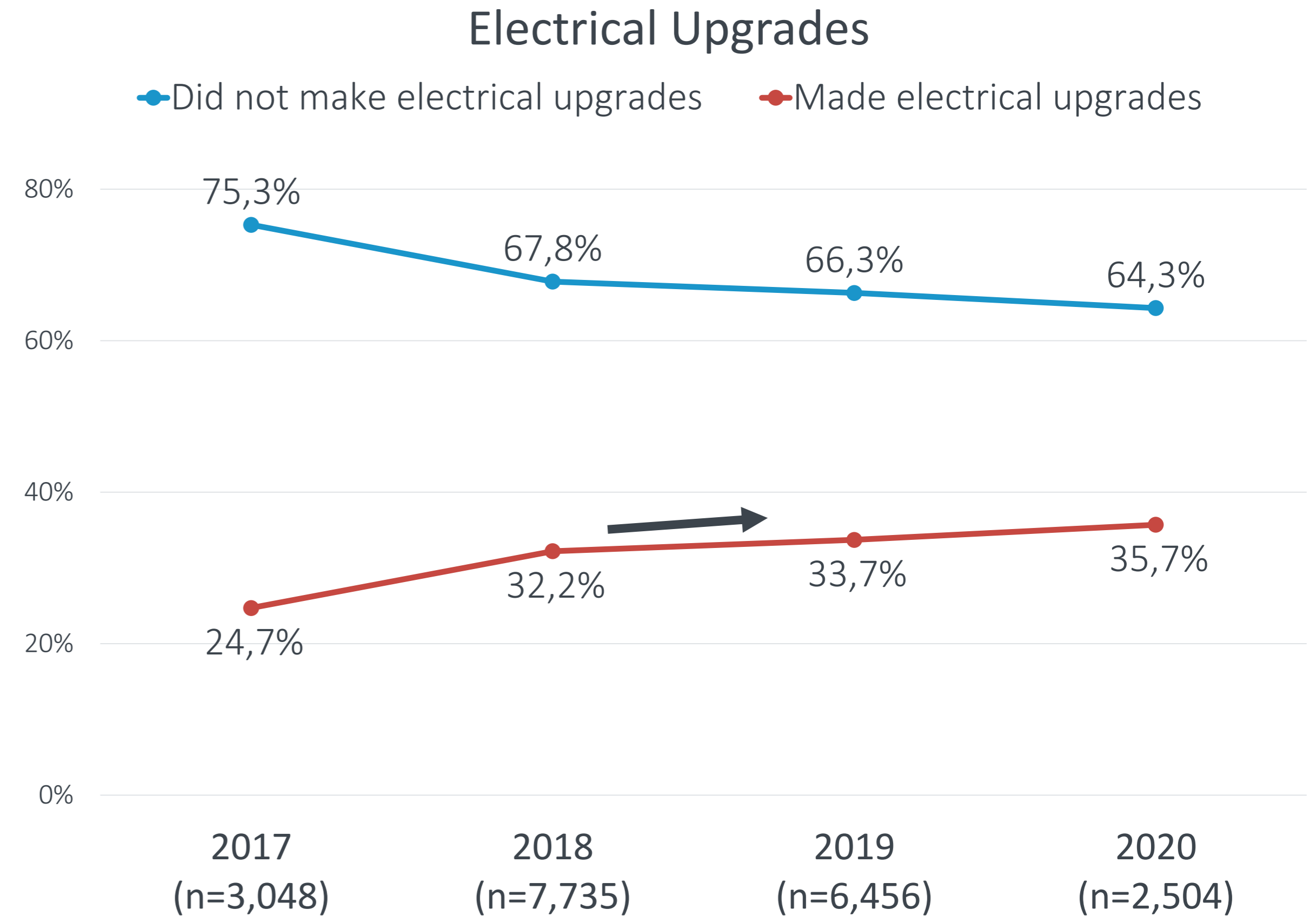
Electrical Upgrades Have Increased Over Time*

- Starting in 2017, the number of electrical upgrades increased through 2020.



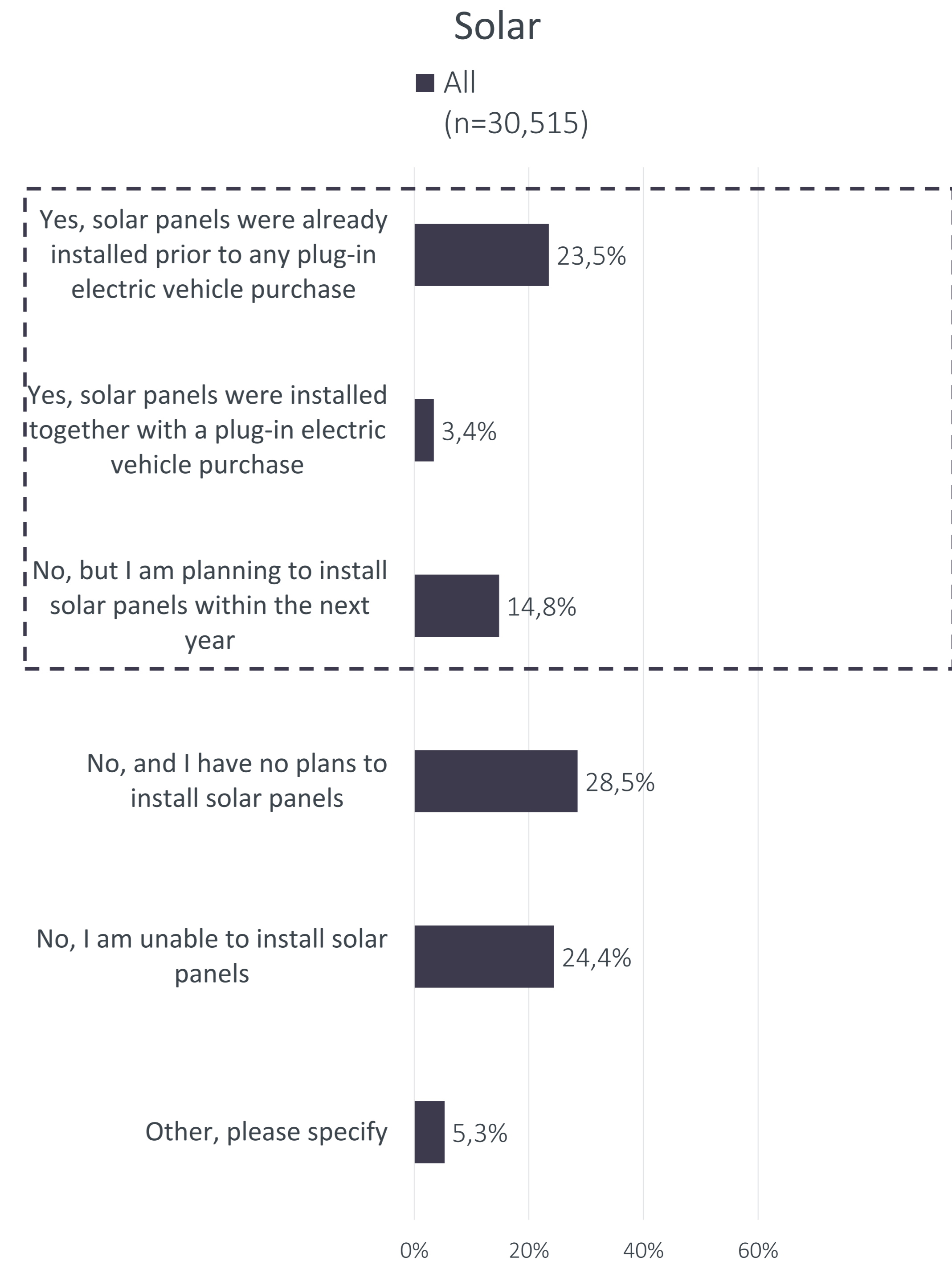
Electrical Upgrades Have Increased Over Time*

- Starting in 2017, the number of electrical upgrades increased through 2020.
 - The increase may be influenced by the growing share of BEVs compared to PHEVs in the program.
 - BEVs reliance solely on electricity could explain the higher consumer demand for 240V charging.



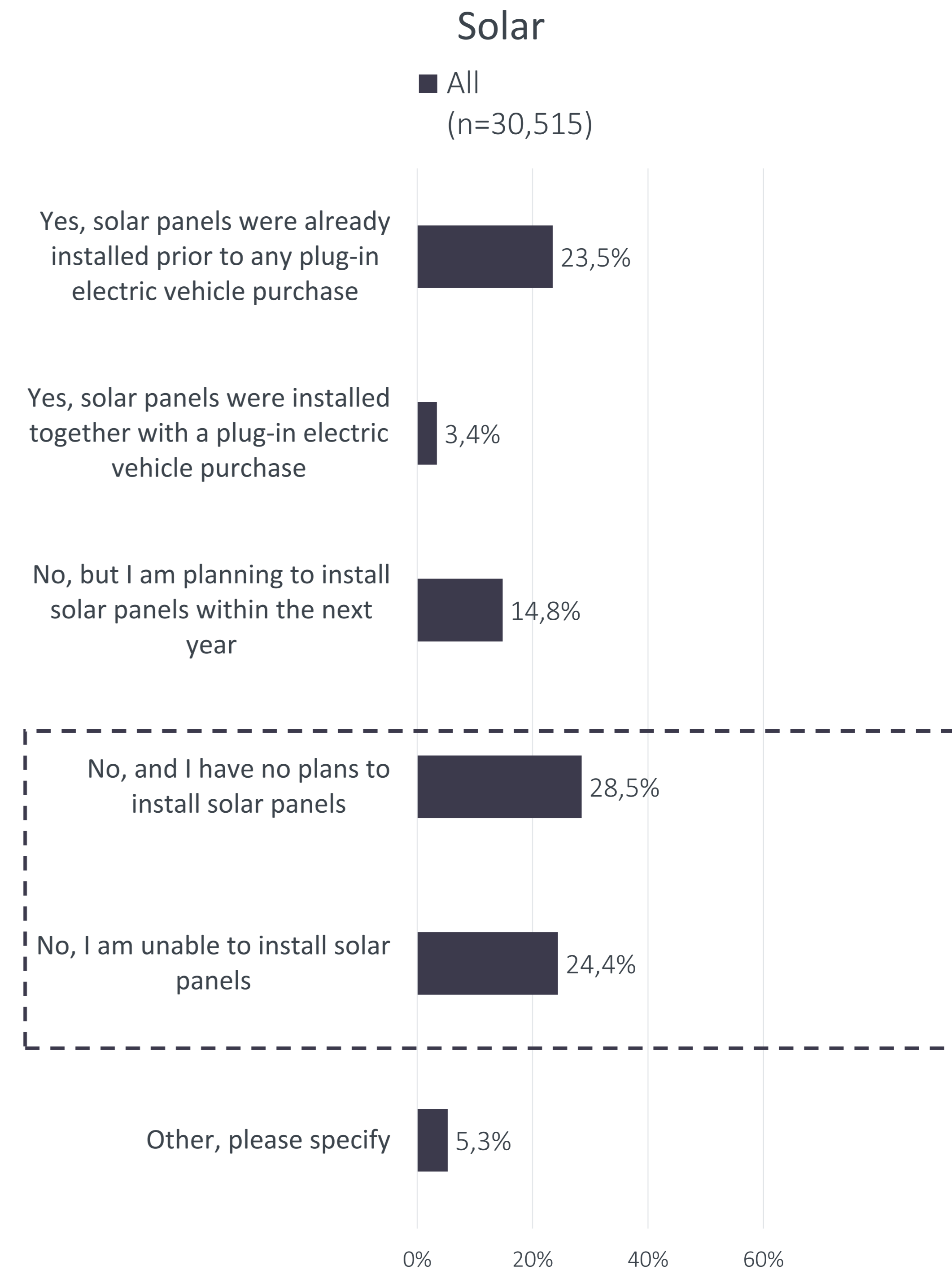
There Are High Rates of Solar Within CVRP

- Over 40% of participants currently have solar or will be installing solar



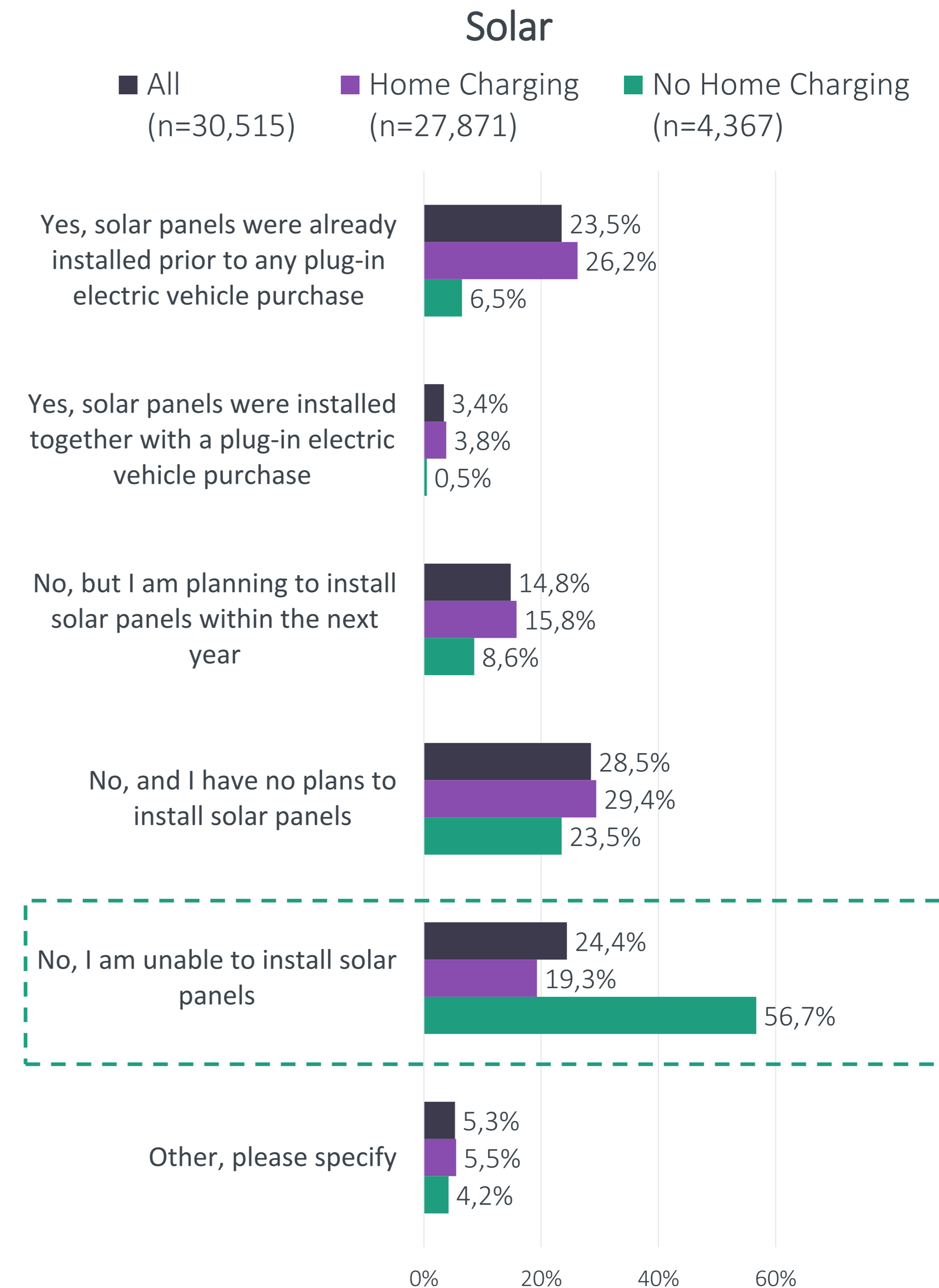
Majority of Participants do not Have Solar

- Over 40% of participants currently have solar or will be installing solar
- Over 50% of participants do not have solar



Non-Home Charging Participants Share Solar Barriers

- Over 40% of participants currently have solar or will be installing solar
- Over 50% of participants do not have solar
- Non-home charging participants have higher rates of not being able to install solar
 - Coincides with residence type restrictions



Closing Thoughts

1

Emphasizing plug-in electric vehicle conversion without home charging access

2

Partnering with multi-unit dwellings to install charging

3

Partnering with workplaces to install charging

- EMPOWER Nationwide project

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