



EV driver insights

Understanding the experiences powering electric vehicle driver behavior

GEOTAB
Energy

About Geotab Energy

Electric vehicle adoption is catching on and world-wide we are witnessing a transition from internal combustion vehicles to fully electric alternatives. This transition is for the better, but it does come with new challenges and new opportunities for those willing to help solve them.

One such challenge is that unmanaged electric vehicle charging load can negatively impact the electric grid. Many electric networks simply weren't built for the demand EV charging places on them. As more electric vehicles hit the road, the increased impact of additional load from EV charging stands to degrade infrastructure and increase the reliance on back-up generation.

There is however a great opportunity for utility companies. By integrating electric vehicles with the grid, electricity demand managers stand to gain additional energy resources which can be deployed to stabilize system wide energy demand, increase utilization of baseline or sustainable generation and mitigate the risk of EV charging on transmission and distribution networks.

To learn more, please visit www.geotab.com/energy

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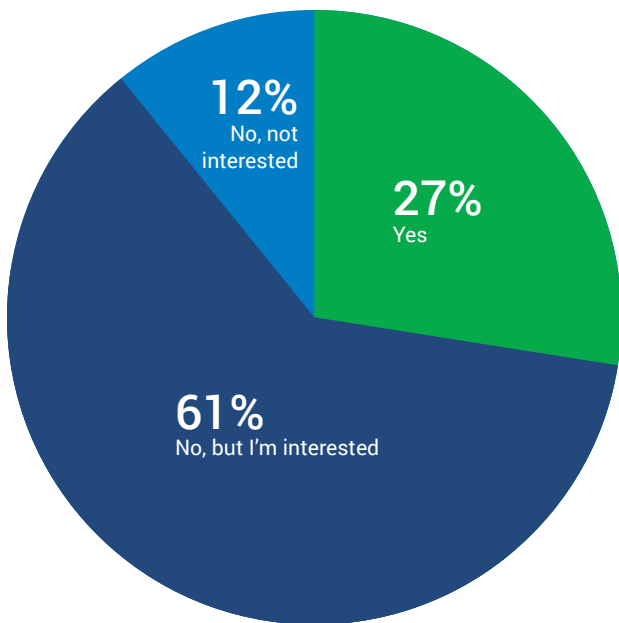
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Introduction

Geotab Energy sent out a survey to members of our SmartCharge Rewards® programs to better understand their charging behavior and to ask what is important to them for the future of the electric vehicle (EV) ecosystem. With over **1,500 responses**, this report will provide insight into everything from why they purchased an EV in the first place to what it would take from their utility company to shift their charging load.

What makes this report unique compared to other EV surveys is that these respondents have proven that they are willing to participate in demand-side management programs. In fact, 27% of respondents said they are already participating in a household Energy Efficiency program and 61% said they weren't, but would be interested in joining one.

Are you participating in a household Energy Efficiency program unrelated to an EV?



Overall, there were a few main conclusions from this survey:

- + Long-range electric vehicles are critical for satisfying consumer needs
- + Most drivers prefer the ability to charge at home as opposed to public charging stations
- + If provided with the right incentives, EV drivers are ideal customers for electric utilities

“Charging at home is very convenient and I am willing to do it off hours if it saves money and reduces strain on the grid.”

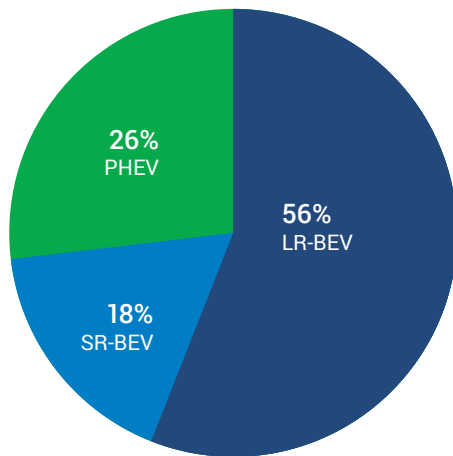
— Owner of a long-range BEV who has had an EV for less than a year.



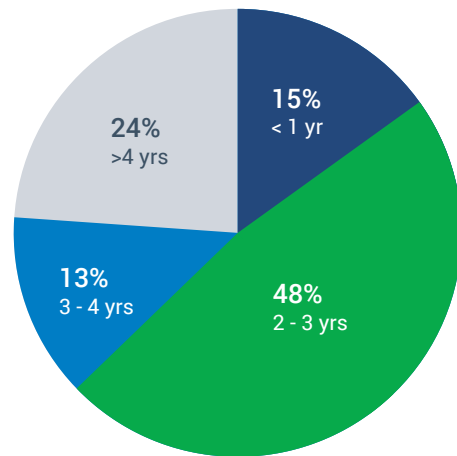
Who are the survey participants and what motivated them to drive electric?

Results for this report have been gathered from an EV market research survey sent to participants in one of several SmartCharge Rewards® programs from across North America. The majority of respondents own a long-range Battery Electric Vehicle (BEV) and have been driving an EV less than four years. This is an accurate representation to the overall EV market in North America and emphasizes the need for up-to-date data, a topic covered in our EV Growing Pains study.

What type of EV do you drive?



How many years have you been an EV driver?



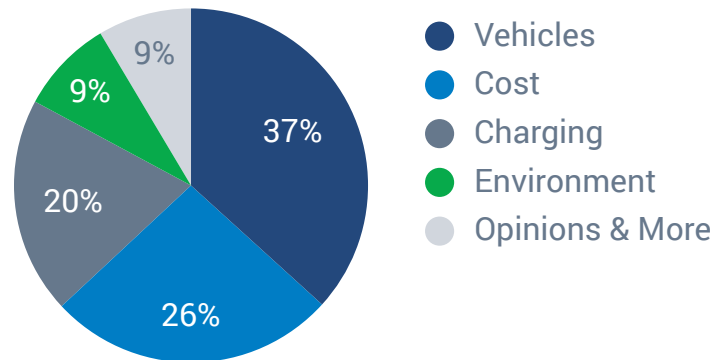
The participants were well informed and had conducted a lot of research prior to obtaining an electric vehicle. When asked what motivated them to purchase an EV the top responses were that they were concerned about environmental impacts and were interested in the cost savings of driving an EV.



What did you research before you purchased your EV?

Vehicles	2,926	37%
Battery capacity	844	11%
EV range	1,054	13%
EV models	1,028	13%
Cost	2,066	26%
Total cost	858	11%
Electricity rates	444	6%
Incentives	764	10%
Charging	1,580	20%
Home charging	908	11%
Public charging	672	9%
Environment	684	9%
Environmental impact	684	9%
Opinions & More	672	9%
EV driver opinions	557	7%
Other	92	1%

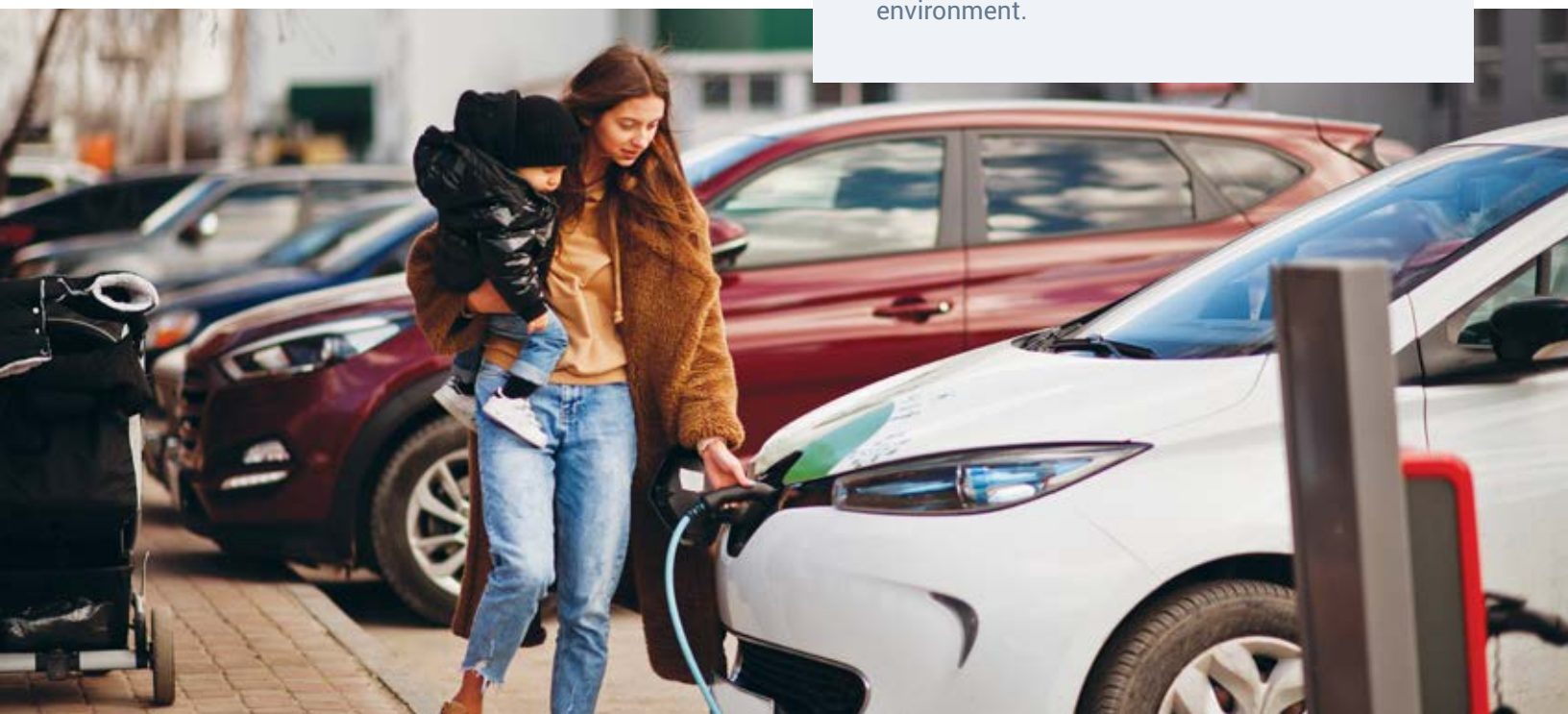
Rank the top reason(s) why you chose to drive an EV?



There was no incentive given to encourage EV owners to complete this survey. They took the time to complete it for one simple reason: they are enthusiastic and passionate about electric vehicles.

“I would love to use green electricity! I have signed up to do community solar but it has not started yet.”

— Long-range BEV owner who bought an EV because they were concerned about the environment.



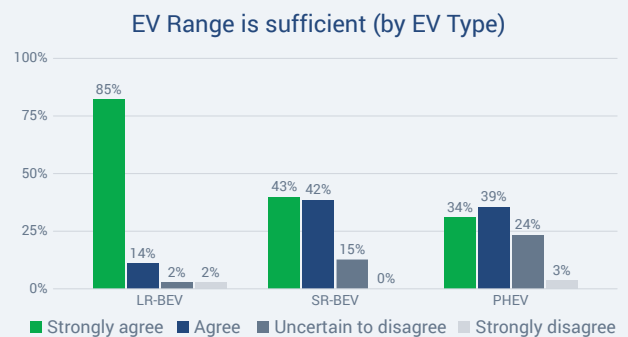
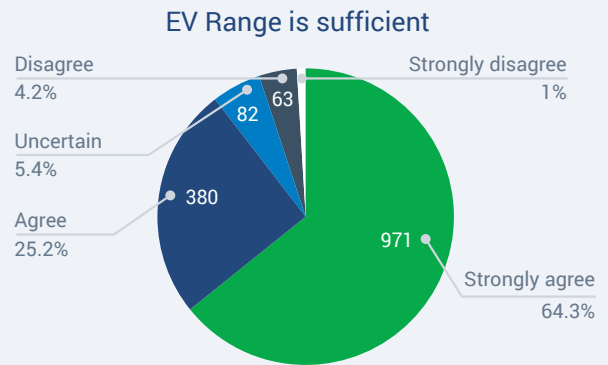
Is range anxiety still a concern for EV owners?

When asked about range anxiety the vast majority indicated that it is really not a problem anymore. This is especially true for those who drive long-range BEVs. Overall, 89% of respondents said that the range of their EV is sufficient for their daily needs and this increases to 98% for long-range BEV owners.

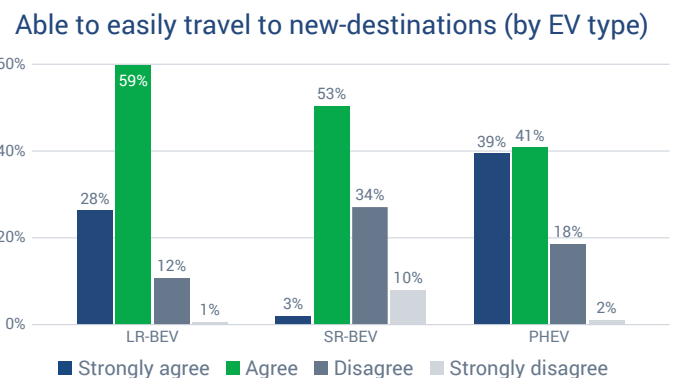
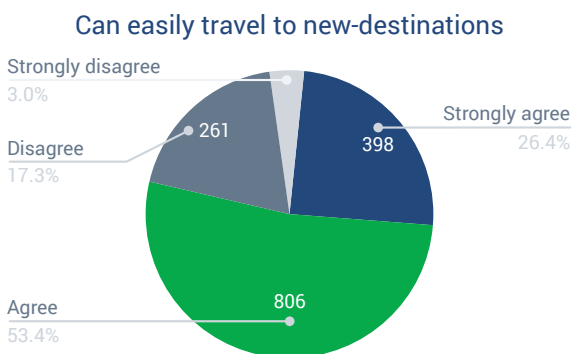
Interestingly, PHEV owners had the lowest satisfaction for their range even though they have the backup option of running on gasoline. This could be a result of typically having the smallest EV battery capacity but they still want to take advantage of running on electricity as much as possible.

There are concerns that drivers are confident using their EV for day-to-day life but that they are not comfortable traveling to new locations. The results of this survey appear to contradict this as 79% of participants said that they regularly travel to new locations with only some planning. This comfort level is heavily dependent on vehicle-type as both long-range BEV and PHEV owners appear to be much more likely to travel to new destinations.

Is the range of your EV sufficient for your daily driving needs?



I regularly travel to new destinations in my EV.

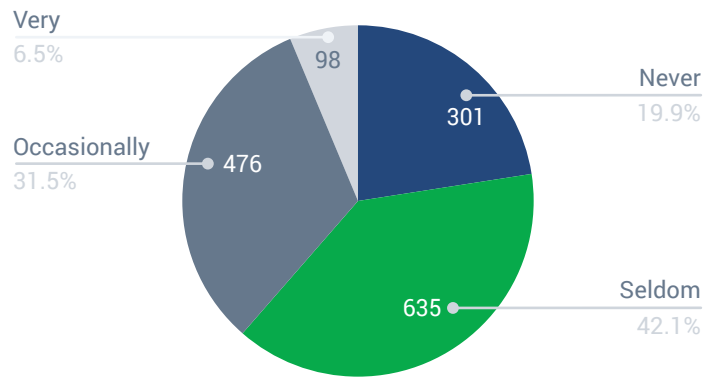


How would you describe your level of concern regarding running out of EV range?

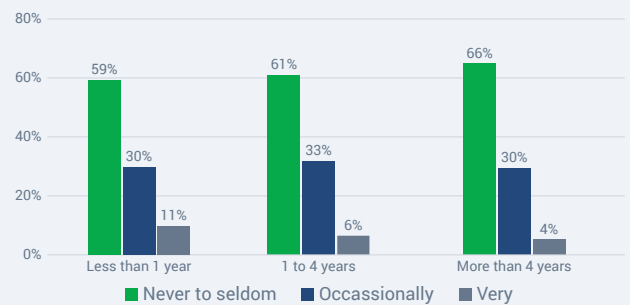
There are some EV owners who are still worried about running out of range. However, this is changing with the introduction of newer long-range capable fully electric models with 62% saying they are seldom or never concerned. This percentage is heavily influenced on vehicle-type as only 5% of long-range BEV owners said they were very concerned and 28% said they are occasionally concerned.

It should also be noted that range anxiety decreases for all types of electric vehicles based on EV driving experience. Range anxiety is the highest among new EV drivers and declines gradually with experience. As more long-range capable EVs enter the market, and more drivers become familiar with electric vehicles, it appears that range anxiety will continue to be less of a concern.

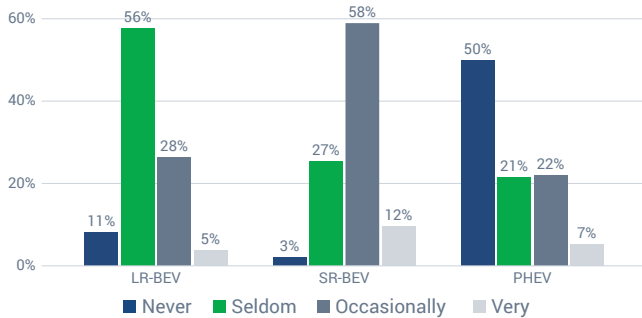
Concerned with running out of range



Range anxiety (by years driving electric)

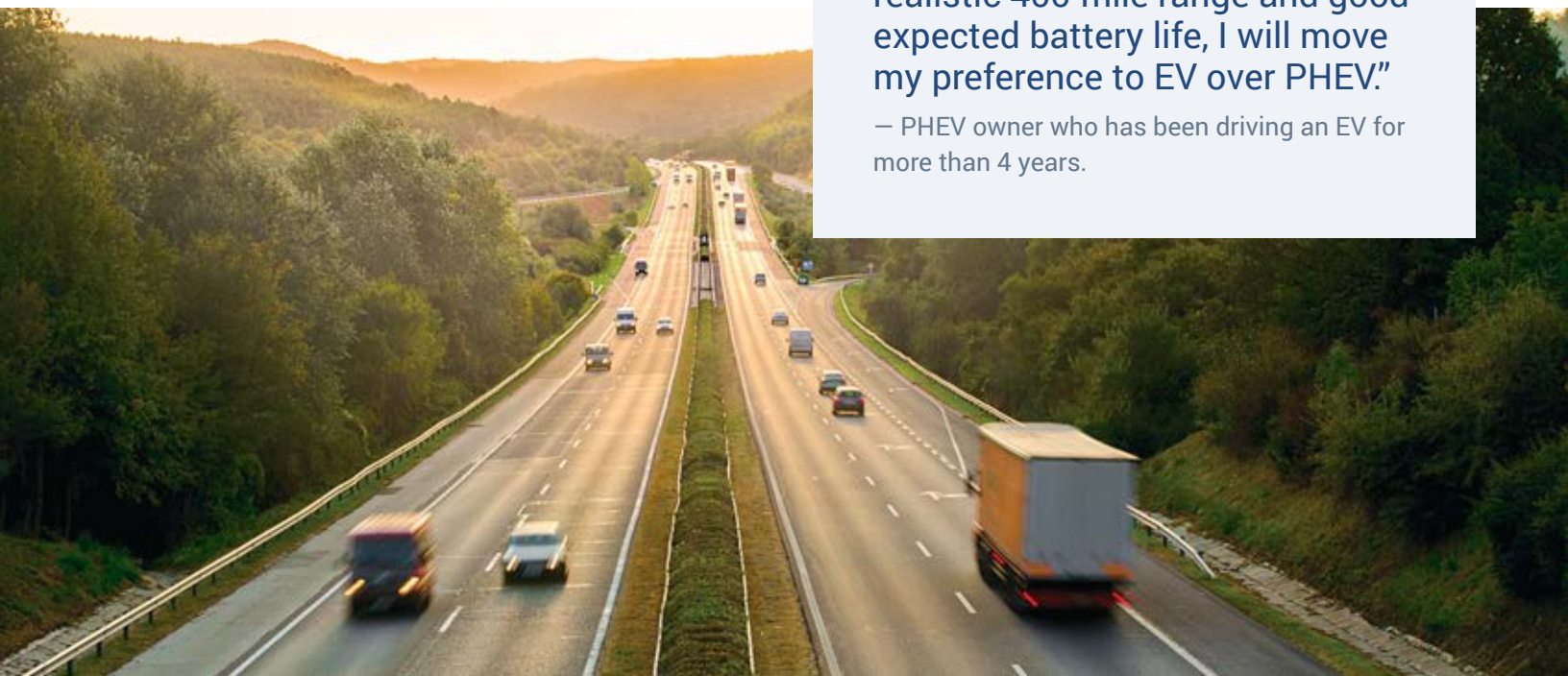


Concerned with running out of range by EV type



“If EVs can be purchased with a realistic 400-mile range and good expected battery life, I will move my preference to EV over PHEV.”

– PHEV owner who has been driving an EV for more than 4 years.



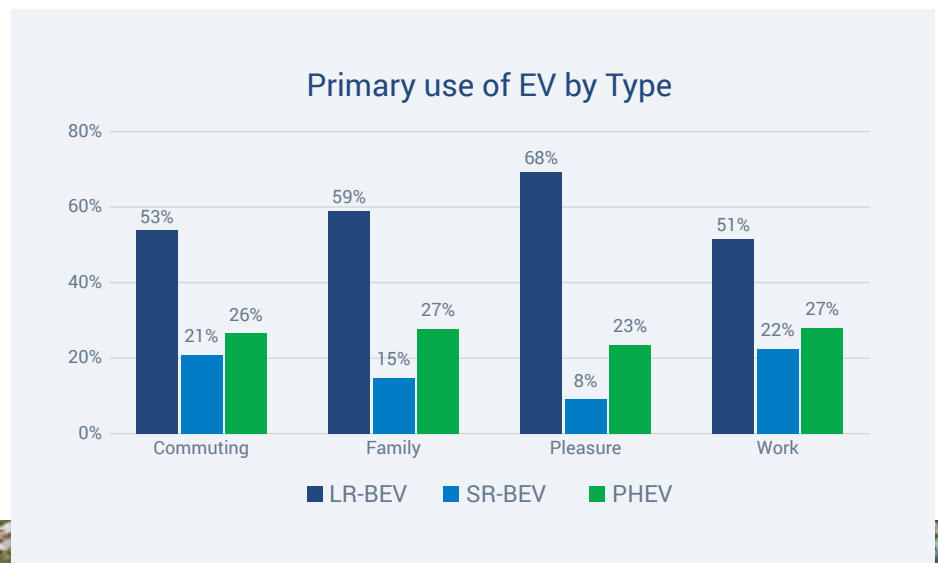
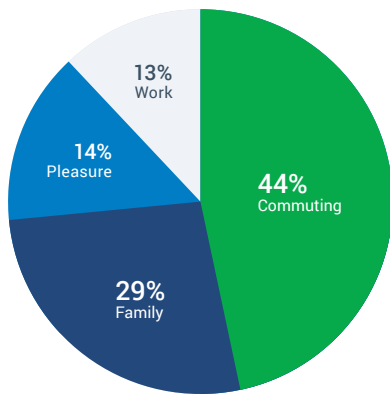
How is range defining EV ownership?

With the vast improvements over the years, electric vehicles are becoming a stable part of people's day-to-day lives. When asked about their primary use for their EV, 44% said commuting to and from a place of employment. When you break this down by vehicle-type, long-range BEVs prevail as the preferred type of EV, indiscriminate of the primary use. The popularity of BEVs is likely because of their versatility.

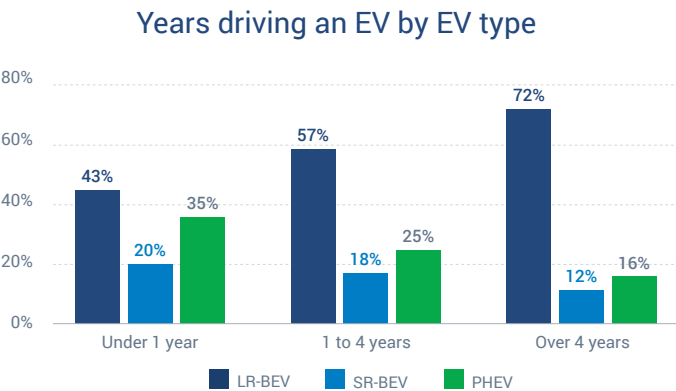
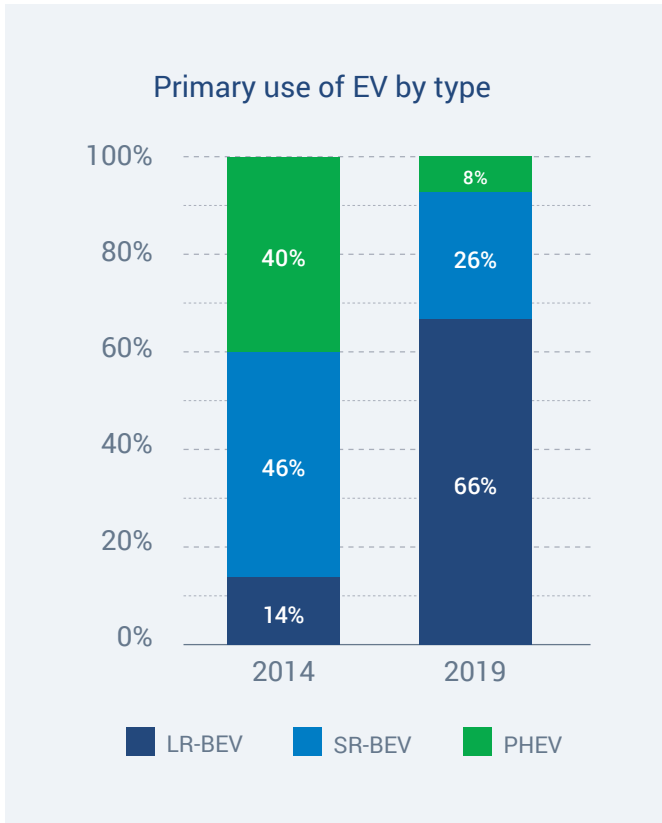
Regardless of their current model type, all EV owners want their vehicle to have a greater electric range. The greater their range is the less often they need to go out of their way to refuel. This is the same mindset for someone driving an ICE (Internal Combustion Engine) vehicle who is concerned about fuel efficiency. What is different with an EV owner is that they have a very different refueling experience. Charging will never be as quick as filling up at a gas station, but if their range is long enough they can just refuel at their destination.

You can see the desire for more range based on the change in electric vehicle market share. Long-range BEVs have increased in proportion to new electric vehicle sales from 14% in 2014 to 66% in 2019 in the United States. This trend can also be seen in this survey as newer drivers are much more likely to have a long-range BEV.

What is the primary use of your EV?



When considering the need for a long-range EV there is another factor that has to be considered: do they have access to an ICE vehicle? If they have access to an ICE vehicle, they may be satisfied with a short-range BEV for their routine and fairly localized travel while relying on an ICE vehicle for longer trips. This appears to be the case, as on average, 48% of respondents said they also drove an ICE vehicle. The most common being the short-range BEV owner, 64% of whom also had an ICE vehicle.

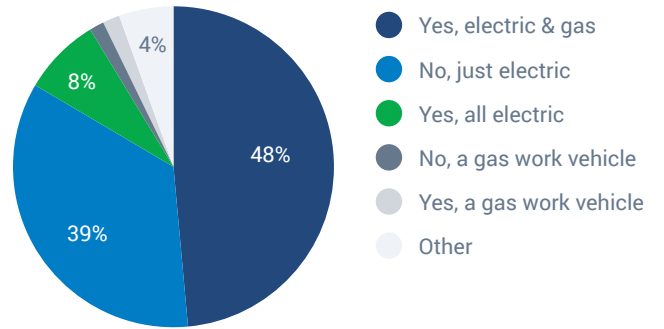


Do you drive more than one vehicle?

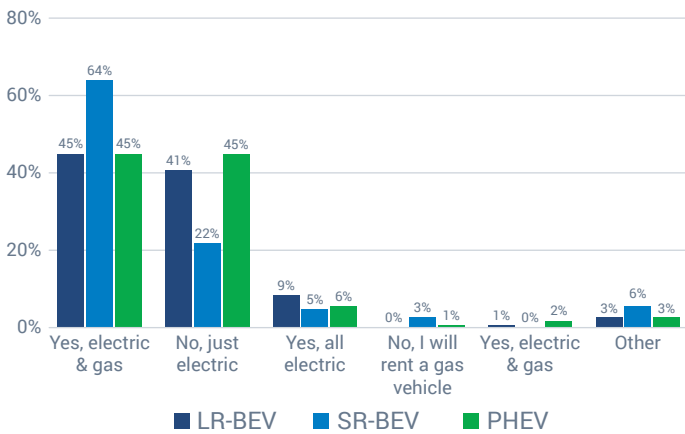
It is interesting to note that while long-range BEV owners were as likely to drive a second vehicle as the others, they were the most likely to exclusively drive electric vehicles. In fact, 50% of those surveyed did so, while 9% of long-range BEV owners drove multiple electric vehicles.

As the range of these vehicles continues to increase, along with the availability of fast chargers, we will continue to see more drivers transition to fully electric vehicles. We will also see more homes with more than one EV.

Number of vehicles, gas & electric

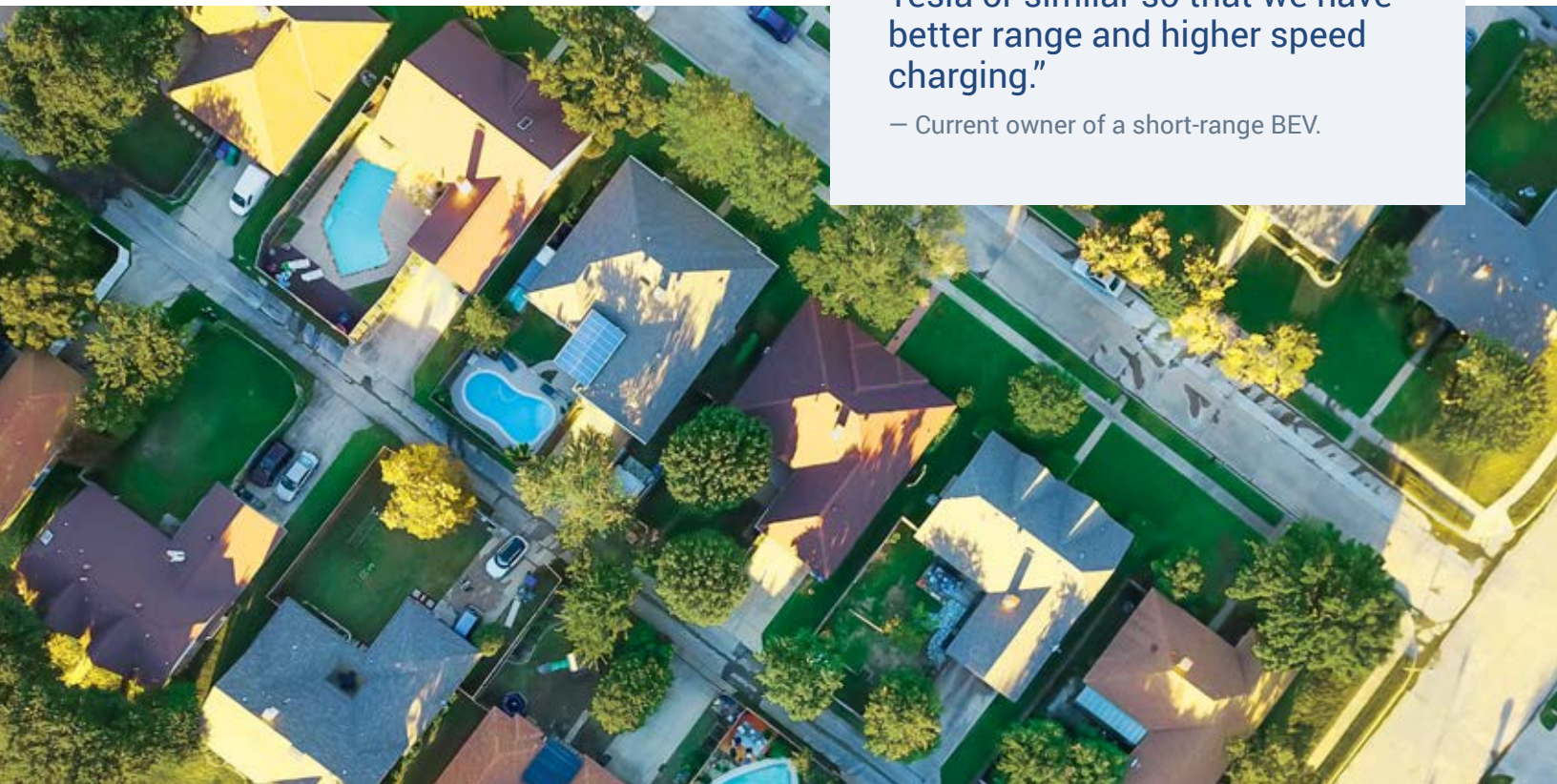


Number and types of vehicles (by EV type)



“We will likely upgrade to a Tesla or similar so that we have better range and higher speed charging.”

— Current owner of a short-range BEV.



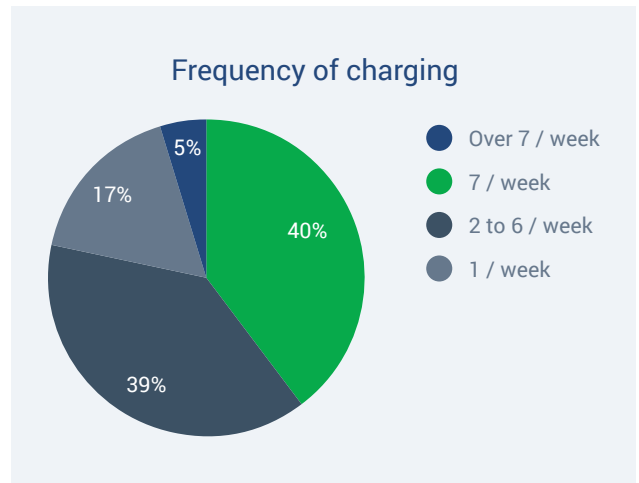
Is charging behavior changing and where do EV drivers want to charge?

In the past, EV owners would usually plug in their vehicle as soon as they got home. These survey responses show that this is no longer the case as only 45% said they charge every day. The majority of remaining responses said they charge multiple times a week, but not every day.

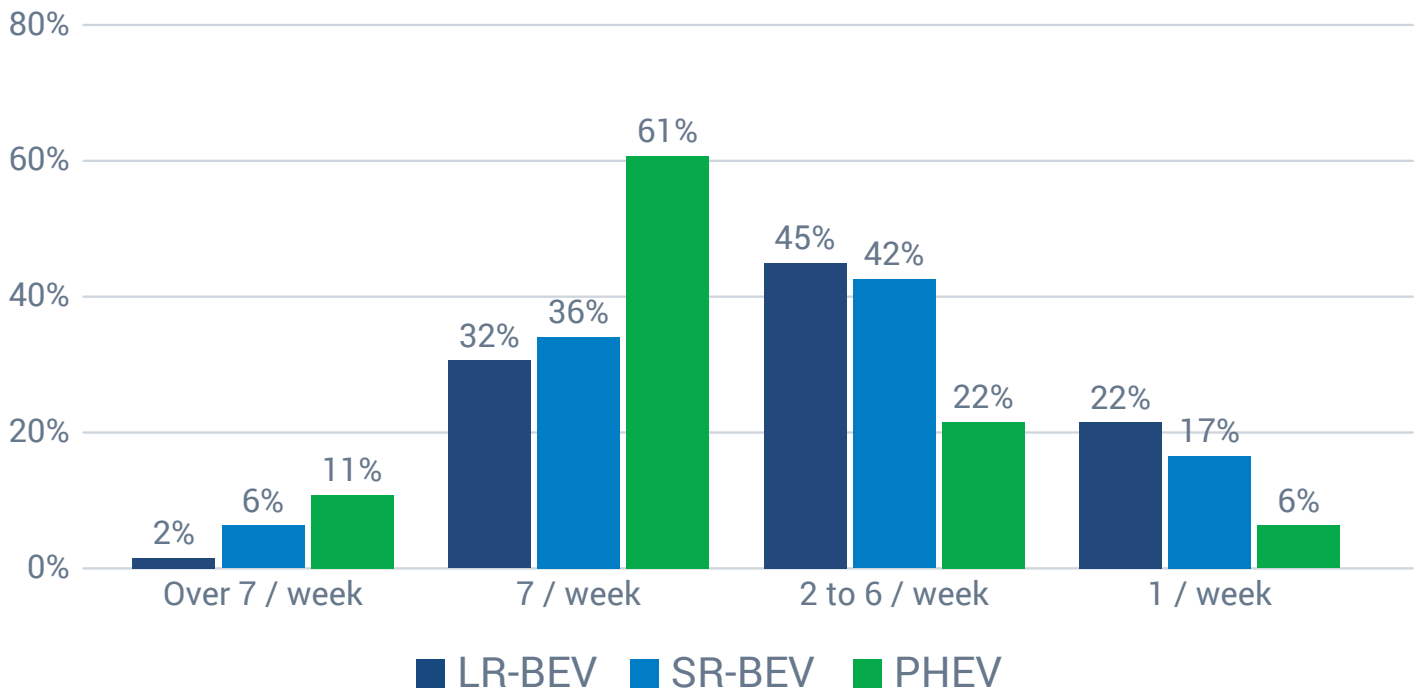
This is a result of vehicles having more range, which can be seen when you review the data by vehicle-type. PHEVs with the shortest electric range charge the most frequently and long-range BEVs with the most range charge less frequently. These trends means that EV charging load is less predictable, making it harder for utilities to manage it effectively.

This survey shows that even though public charging infrastructure is improving, the vast majority of charging still occurs at home. Overall, 86% of respondents said they primarily charge at home using their own private charging station. This preference for home charging is consistent across all vehicle types.

How often do you charge your EV?



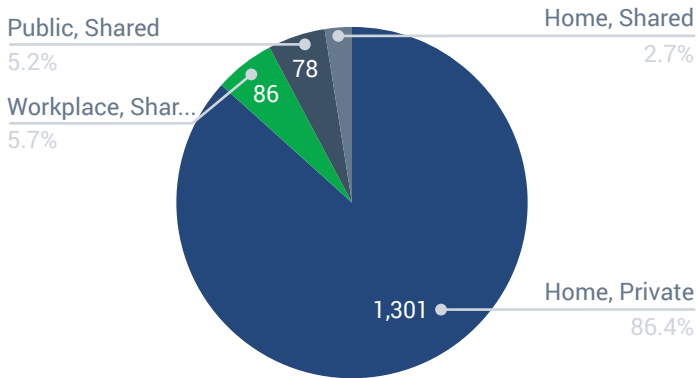
Frequency of charging (by EV type)



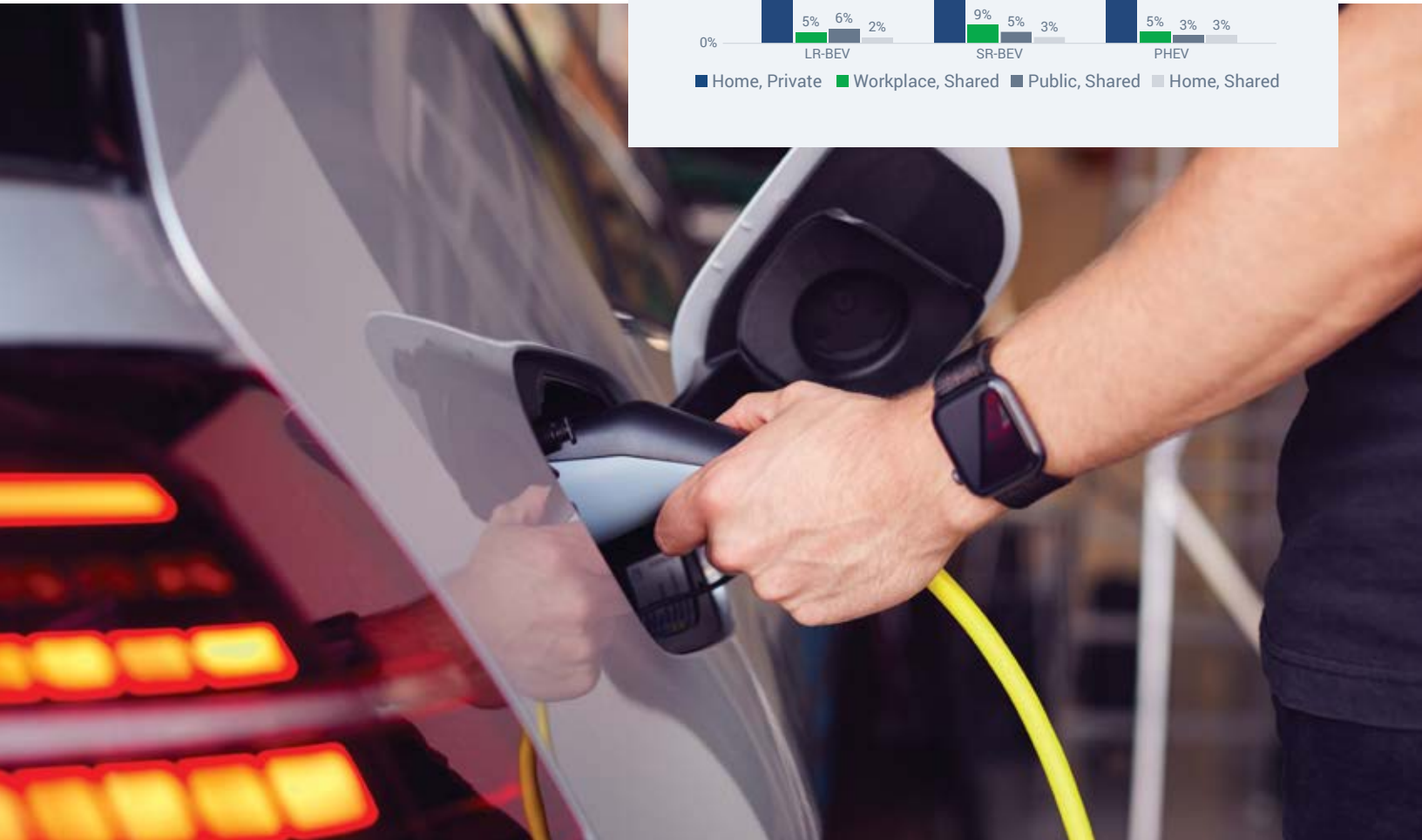
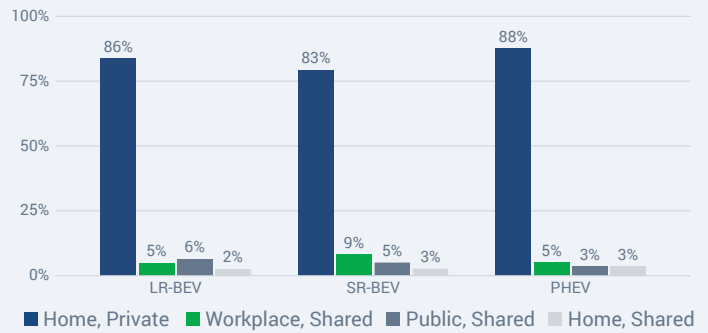
My primary charging location is:

Once an EV owner has established their primary charging location, they don't often stray from it. When asked how often a secondary location is used, 65% selected "rarely," meaning it represents less than 5% of charging. This was even higher for people who responded that they primarily charge at home, 71% of whom said they rarely do.

Primary charging location



Primary charging location (by EV Type)



How much of your charging takes place at a secondary charging location?

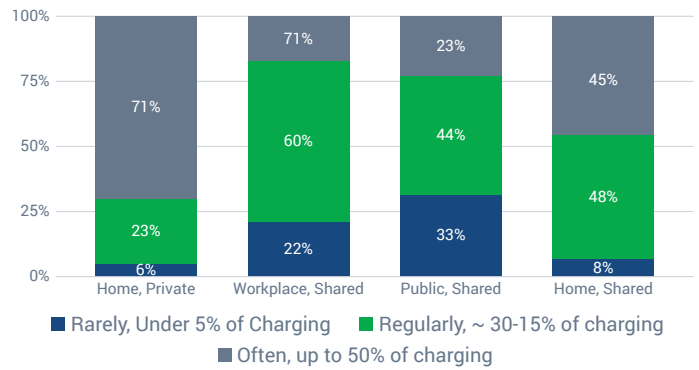
There was one factor that had a significant impact on whether a driver charged at home and their use of secondary chargers: the type of building they live in. Survey respondents who live in a multi-unit residence, such as an apartment or condo, are much less likely to have access to their own charging station.

Only 64% of these respondents said they primarily charge at home compared to 92% of respondents who indicated they live in a single home. There are numerous barriers for getting a charging station installed at a condo or apartment. This means EV owners who live there must often rely on public or workplace charging.

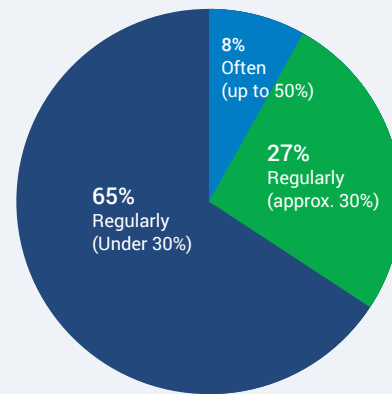
Regardless of where the EV owner lives, there is a clear desire for the ability to charge at home and for some this is actually seen as a necessity. When asked what they would do if they could no longer charge at home, 30% said they would not be able to drive an EV.

While this isn't a majority, it is a significant amount. Especially when you consider that these are existing EV owners. This also doesn't take into account prospective drivers who might not make the switch without the capability.

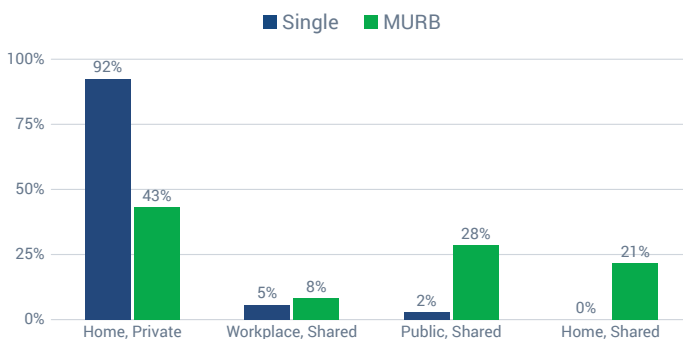
Use of a secondary charging location



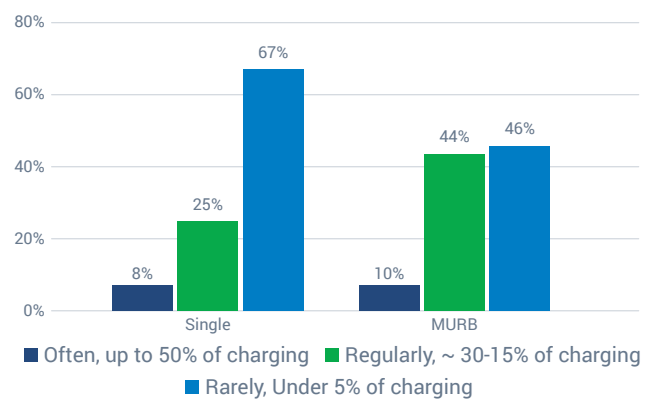
How often do participants cite using a secondary charging location?



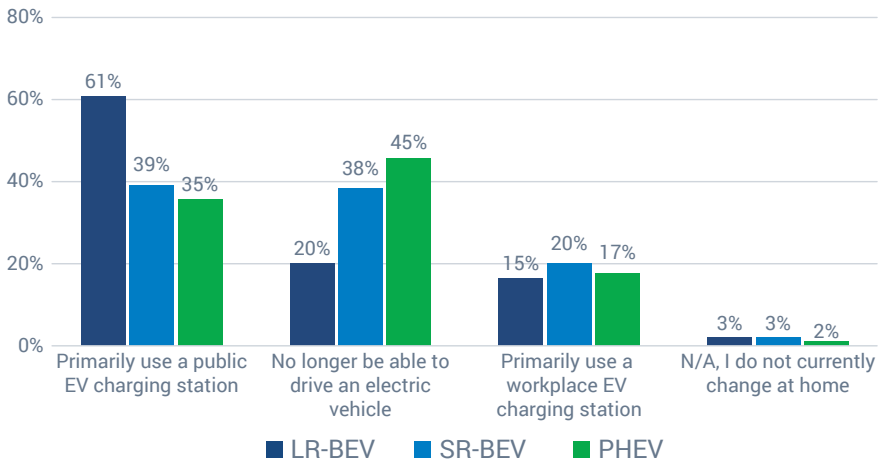
Single home vs Multi-unit residence (MURB)



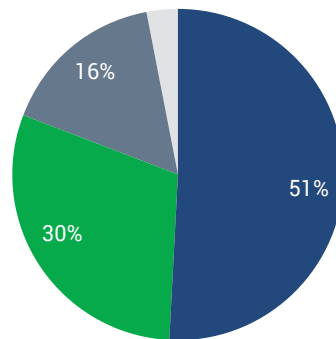
Use of secondary charging location (by MURB)



What if home charging were not an option? (by EV type)



If home charging were not an option



- Primarily use a public EV charging station
- No longer be able to drive an electric vehicle
- Primarily use a workplace EV charging station
- N/A, I do not currently charge at home

“I find charging at home and never going to a gas station to be a major incentive. I always hated going to the gas station and am now almost never faced with that inconvenience.”

— Long-range BEV owner who is seldomly concerned about their range.



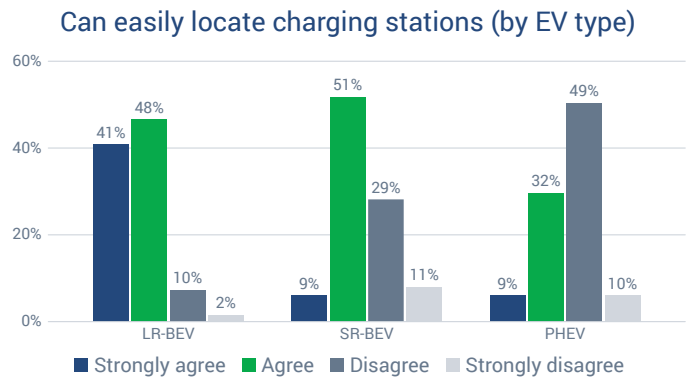
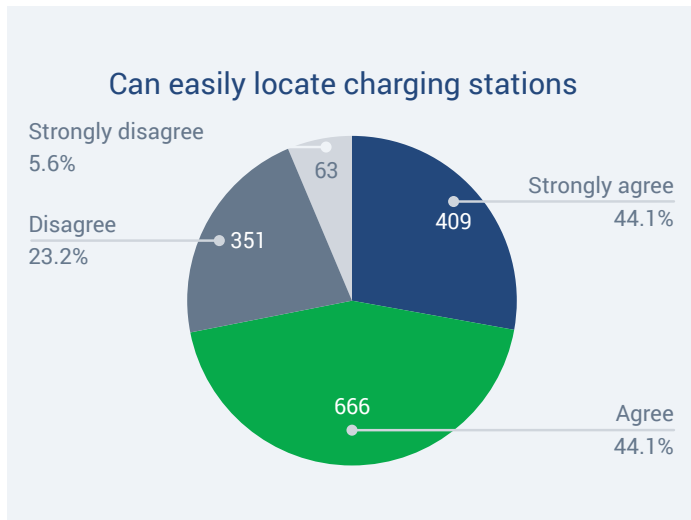
How do EV drivers feel about the current public charging experience?

Although the majority of EV charging occurs at home, public charging stations are seen as being crucial for EV adoption. In response to the open ended question at the end of the survey, the majority said that they want more public charging options, even if it is not how they regularly charge.

This could elude to the fact that they desire the ability to go on longer trips with their EV. Alternatively, they may see these charging stations as a form of insurance. They might not use them on a regular basis, but they want them readily available in case the need arises. Public charging is also critical to accommodate those who do not have access to a home charger, such as those who live in an apartment or condo.

Over recent years, increasing the availability of public charging stations has been a priority. This could also explain why 71% of respondents said they could easily find a public station. However, this response is skewed by long-range BEV owners, as only 60% of short-range BEV and 41% of PHEV owners agreed with this statement. This is most likely due to Tesla's integrated navigation software which directs drivers to available stations.

Availability of charging stations is not the only concern that EV owners have. There were also a large number of complaints about the current experience. There were stories of charging stations being broken for extended periods of time, being buried in snow and driver's not being able to find the correct connectors. Even paying for the charging itself is not simple. It often requires having multiple apps or accounts based on individual electric vehicle supply equipment (EVSE) providers.



Open-ended responses regarding public charging:

- “Not only more charging stations, but quality stations that stay repaired. There’s like a 90% chance that a charger, often multiple chargers, will be broken for weeks or months on end. And these are major charging stations.”
- “I’m not sure that public EV charging stations have the price clearly displayed like on a gas pump so I can make a decision based on price.”
- “More EV charging stations that cost comparably the same as charging at home.”
- “Slow, obsolete government chargers help almost no one, and disappoint new EV owners.”
- “Take into account locations that get cold and have snow, like the Northeast, as it greatly impacts range due to heating and access to charging stations blocked by snow banks.”
- “Fewer memberships and apps needed to charge at public stations, I must have 6 different apps and plans. Half the time I charge publicly, I have to spend 10-15 minutes dealing with this.”
- “Please provide more charging stations without charging for parking.”
- “We love EV ownership, but we absolutely cannot place any trust in public charging infrastructure. It’s often broken or inoperable, or there’s often so few charging stations that you need to wait hours in line to hopefully get a turn. We’ve stopped going on day trips due to the high chance of becoming stranded due to spotty charger availability.”

Public charging certainly plays an important role in the EV ecosystem and will be a driving factor for future EV adoption. If you ask an EV owner about their current experience using these networks, you may receive a tepid response, but this indicates there is room for improvement.

“We need a national standard charging infrastructure. Different plugs and plans make it more difficult than it needs to be. Just let me swipe a credit card or something. I don’t need to have an Exxon membership.”

– Long-range BEV owner who primarily charges at home.

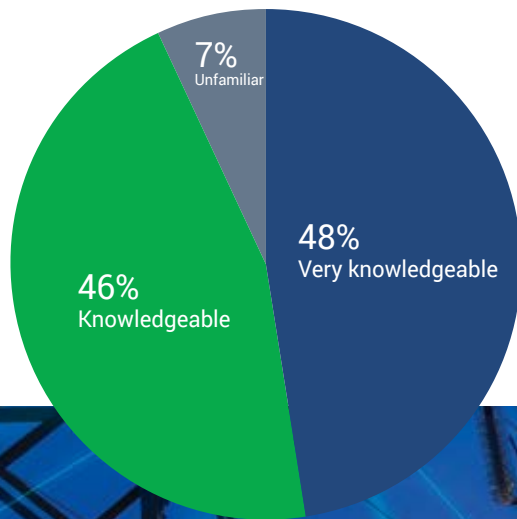


Are drivers making the connection between their utility and their EV?

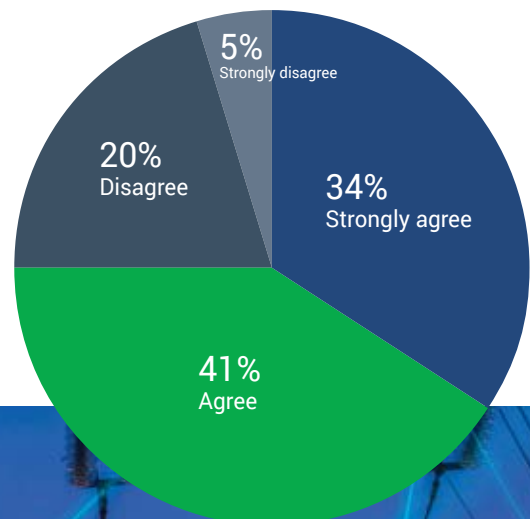
In many ways EV owners are the ideal customers for electric utilities as they are informed, engaged and appear willing to do more to help their community. Over 90% of respondents said they were knowledgeable in regards to the grid and terms like peak demand. The majority also indicated that they are aware of how their electricity is generated.

These customers understand that EVs are just one aspect of moving to greener energy, so they aren't only interested in EV-specific programs. Many expressed a desire for moving to a household time-of-use (TOU) program while others wanted to investigate DER initiatives, such as adding solar panels. In fact, 27% said they are already participating in a household Energy Efficiency program. 61% also said they aren't currently participating, but are interested in joining one.

How familiar are you with regards to the electric grid and terms like peak demand?



I know where the electricity used to charge my EV comes from (Ex. Nuclear, coal, solar etc.).

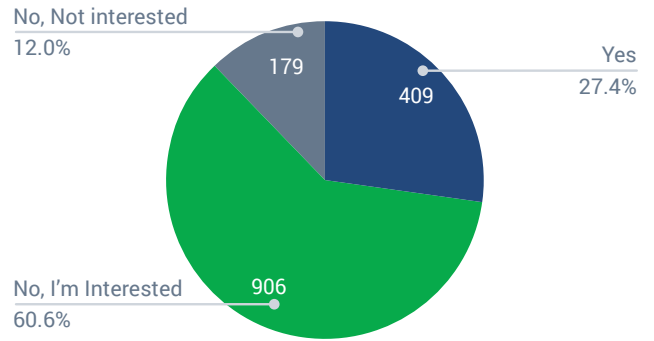


Are you participating in a household Energy Efficiency program unrelated to an EV?

This information shows that there is an excellent opportunity for utilities to improve their relationship with their customers and increase participation in their various programs.

Unfortunately, there is one potential disconnect: EV driver's don't necessarily think of their utility when buying an EV.

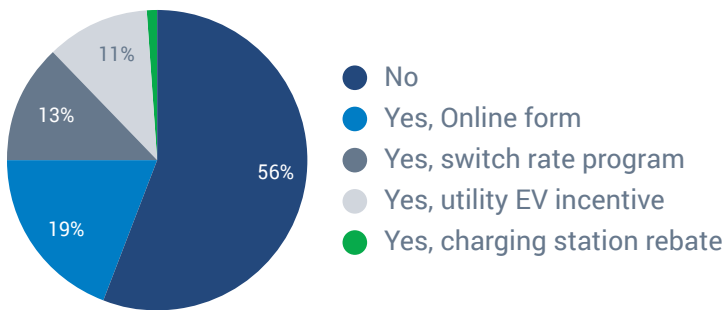
When asked if they informed their utility company when they purchased their EV, 56% said that they did not and that they don't believe that their utility knows that they own one.



Did you notify your electric utility upon purchasing an electric vehicle?

This is a significant portion of respondents and this sample may not represent all EV drivers. These respondents are EV drivers who took the time to join a loadshifting program and fill out this survey. It would be safe to assume that other, less engaged EV drivers would also not have contacted their utility upon purchasing their vehicle.

Did you notify your electric utility upon purchasing an electric vehicle?



“Please push the government and utility companies to incentivize solar and battery backup. All future power investment should go to battery storage, whether it be large scale solutions, or home-based virtual power plants.”

– Long-range BEV owner who would be interested in participating in other household energy efficiency programs.

How can electric utilities improve the experience of their EV customers?

When reviewed as a whole, this survey paints a positive picture for the future of both EV owners and their utility companies. Current EV owners want a better charging experience and future drivers will need positive reinforcement to help guide them in the journey of going electric.

Utilities are able to satisfy these needs, while also achieving their own. This is done by focusing their efforts on two key initiatives:

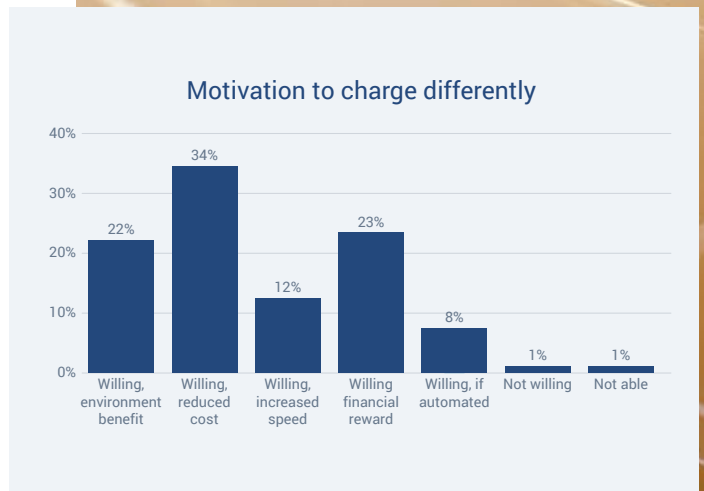
- Improving the home charging experience
- Helping educate those who want to make the switch to driving electric

Establishing the best home charging behavior

The majority of charging occurs at home, and the greatest threat that EVs pose to the grid is at street-level. Because of this, the first avenue that should be explored is shifting their charging load.

When asked if they would be willing to have their charging shifted, assuming they would still receive a full charge, only 2% said that they were unwilling or unable. The majority responded that they would be open to having their load shifted if they received some form of financial benefit, such as a cheaper rate or a reward. 23% said they would do it if it was more environmentally friendly. Another 18% said they would if it was more convenient, being automated or faster. This would require a level 2 charging station which can be seen as a costly additional expense.

If utilities were to offer an incentive, like SmartCharge Rewards, they could inform their customer how charging off-peak was better for the environment and provide a rebate on a level 2 charging station so they could appeal to virtually every EV driver.



“How about incentives to install level 2 charging at home so that I can schedule my EV to charge off peak? With the trickle charger it takes so long to charge I can’t afford to schedule it for off-peak only.”

— PHEV owner who would shift charging if it were more environmentally friendly.

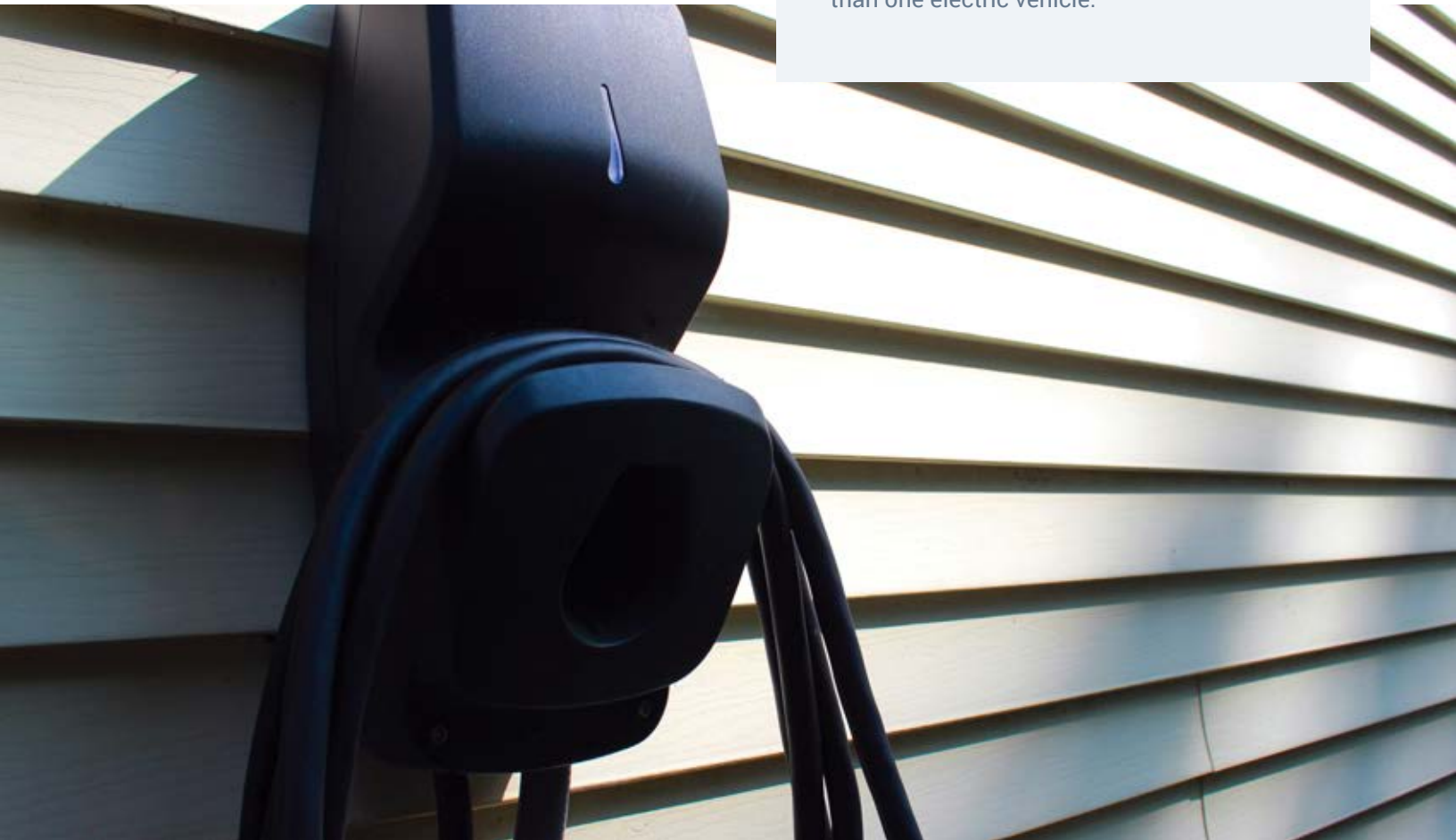
Education is critical for increased EV adoption

EV owners are passionate about driving electric and want to encourage as many people as possible to make the change. They are frustrated hearing all of the misconceptions surrounding EVs and often feel as though they need to defend them. Many of them admit that they originally believed many of these myths until they did the research themselves. They are looking for an authority figure to help spread the truth about electric vehicles and utilities are in the perfect position to step into this role.

Utilities can start by incorporating EV-related content into their current marketing efforts. This could include advertising charging load management programs, rebates, upcoming ride and drive events or even just providing general education about EVs. This will not only help increase EV adoption but also plant the idea that utilities are going to be an ongoing partner in this aspect of life.

“More education for non EV drivers is necessary. Far too many people have misconceptions about electric cars.”

– Long-range BEV owner who owns more than one electric vehicle.



Conclusion

Even with some of the issues that come with being an early adopter, EV owners continue to have a passion for electric vehicles and will never go back to driving an ICE vehicle. If utilities can harness this enthusiasm, and help encourage others to drive electric, they will be in a position to gain the most. They can ensure the proper integration of EVs with the grid, while simultaneously increasing participation in their existing load management initiatives and improving their overall relationship with their customers.

To learn more about Geotab Energy, visit www.geotab.com/energy

“I’m thrilled to be part of all programs and be an owner of an EV. When I purchase my next vehicle it will be an EV and my husband will inherit the Volt so we will be a completely EV household!”

– PHEV owner who has been driving an EV for 2 to 3 years.



GEO TAB[®]

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2020 EV driver insights:

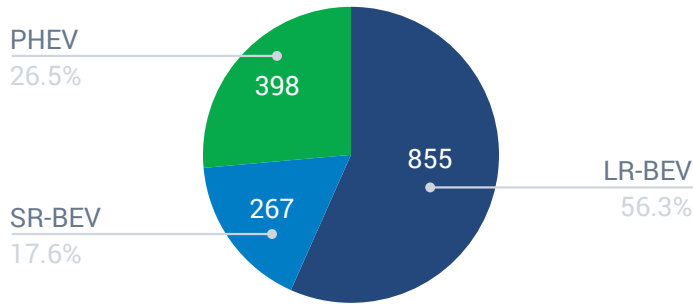
Survey Results

GEOTAB
Energy

1. What type of electric vehicle do you drive?

EV Type	Responses	%
LR-BEV	855	56%
SR-BEV	267	18%
PHEV	398	26%

Respondents type of electric vehicle

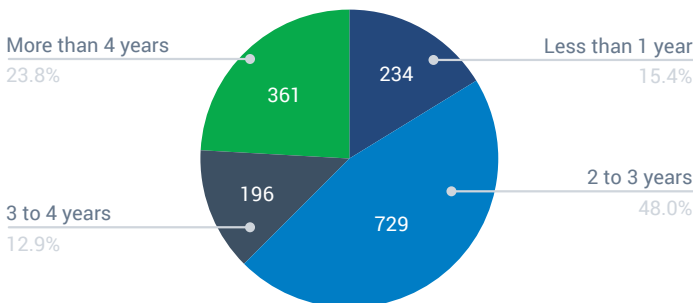


2. How many years have you been an electric vehicle driver?

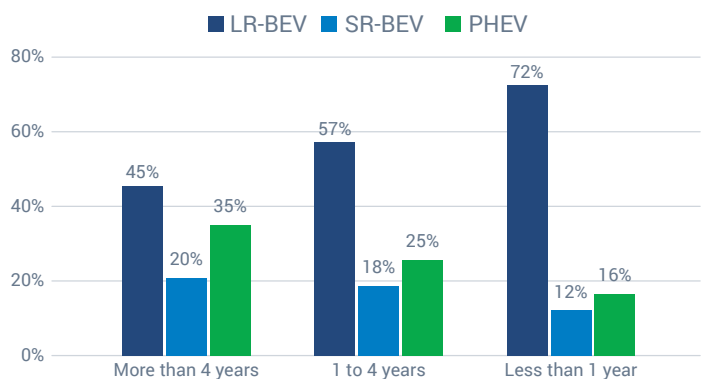
	Responses	%
Less than 1 year	234	15%
2 to 3 years	729	48%
3 to 4 years	196	13%
More than 4 years	361	24%

	LR-BEV	SR-BEV	PHEV
More than 4 years	45%	20%	35%
1 to 4 years	57%	18%	25%
Less than 1 year	72%	12%	16%

Years driving an electric vehicle

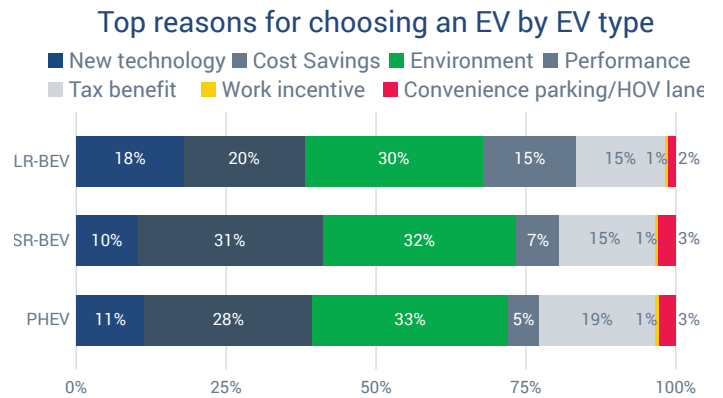


Years driving an EV by EV type



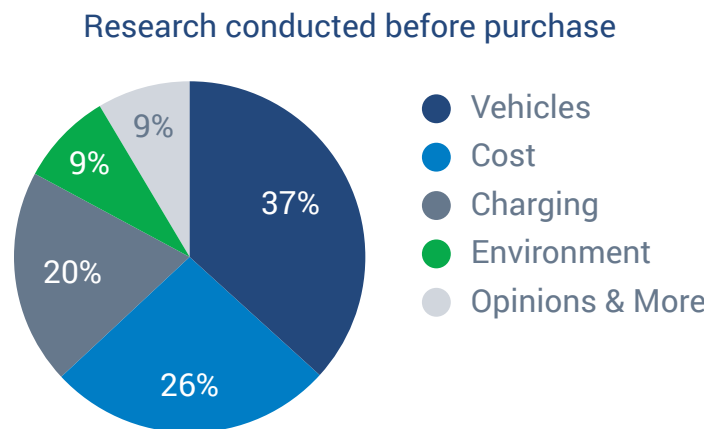
3. Rank the top reason(s) why you chose to drive an EV? (Choose up to 3)

	LR-BEV	SR-BEV	PHEV
New technology	18%	10%	11%
Cost savings	20%	31%	28%
Environment	30%	32%	33%
Performance	15%	7%	5%
Tax benefit	15%	15%	19%
Work incentive	1%	1%	1%
Convenience parking / HOV lane	2%	3%	3%



4. What did you research before you purchased your EV? Select all that apply:

Vehicles	2,926	37%
Battery capacity	844	11%
EV range	1,054	13%
EV models	1,028	13%
Cost	2,066	26%
Total cost	858	11%
Electricity rates	444	6%
Incentives	764	10%
Charging	1,580	20%
Home charging	908	11%
Public charging	672	9%
Environment	684	9%
Environmental impact	684	9%
Opinions & More	672	9%
EV driver opinions	557	7%
Other	92	1%

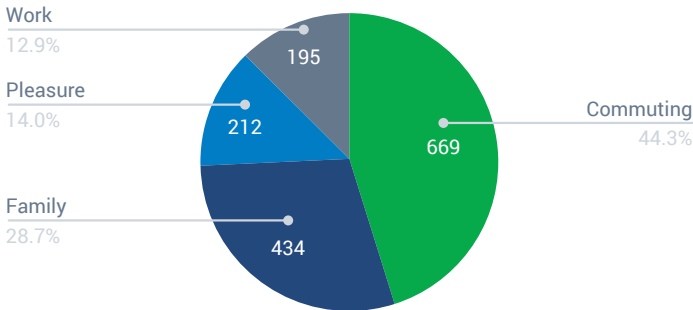


5. What is the primary use of your EV?

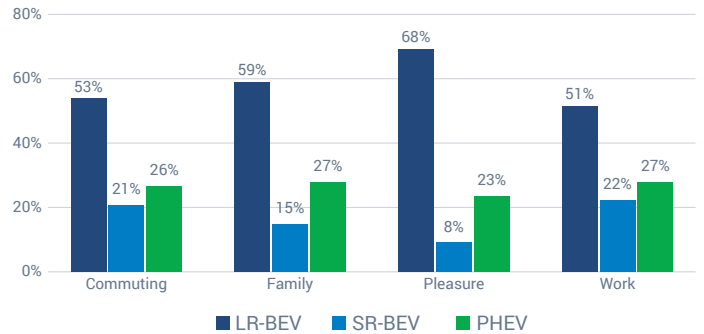
	Responses	%
Commuting	669	44%
Family	434	29%
Pleasure	212	14%
Work	195	13%

	LR-BEV	SR-BEV	PHEV
Commuting	53%	21%	26%
Family	59%	15%	27%
Pleasure	68%	8%	23%
Work	51%	22%	27%

Primary use of an EV



Primary use of EV by Type

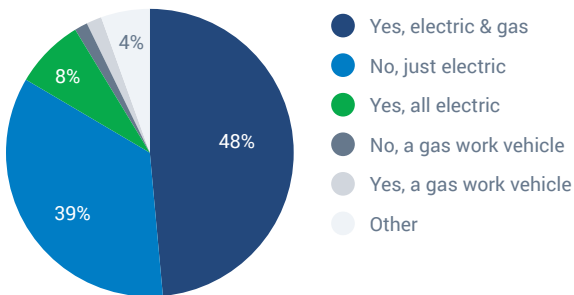


6. Do you drive more than one vehicle?

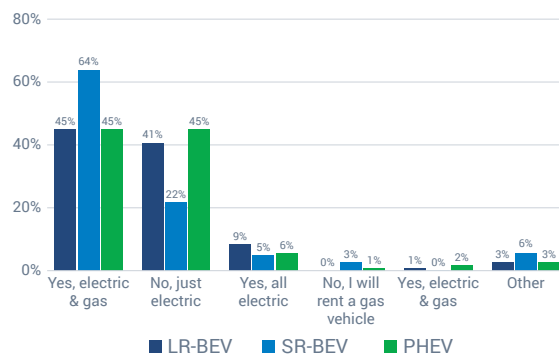
	Responses	%
Yes, electric & gas	726	48%
No, just electric	585	39%
Yes, all electric	115	8%
No, I will rent a gas vehicle	14	1%
Yes, a gas work vehicle	15	1%

	LR-BEV	SR-BEV	PHEV
Yes, electric & gas	45%	64%	45%
No, just electric	41%	22%	45%
Yes, all electric	9%	5%	6%
No, I will rent a gas vehicle	0%	3%	1%
Yes, a gas work vehicle	1%	0%	2%
Other	3%	6%	3%

Number of vehicles, gas & electric



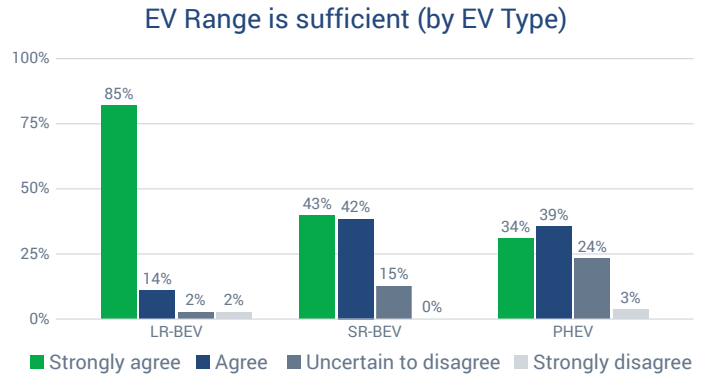
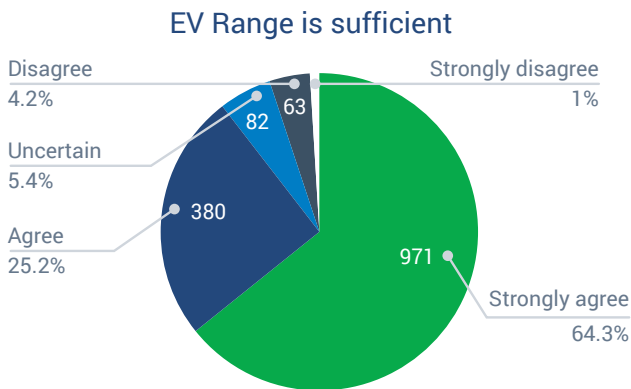
Number and types of vehicles (by EV type)



7. Is the range of your EV sufficient for your daily driving needs?

	Responses	%
Strongly agree	971	64%
Agree	380	25%
Uncertain	82	5%
Disagree	63	4%
Strongly disagree	14	1%

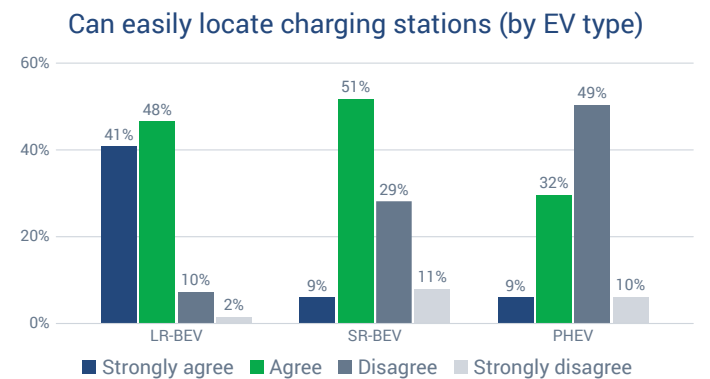
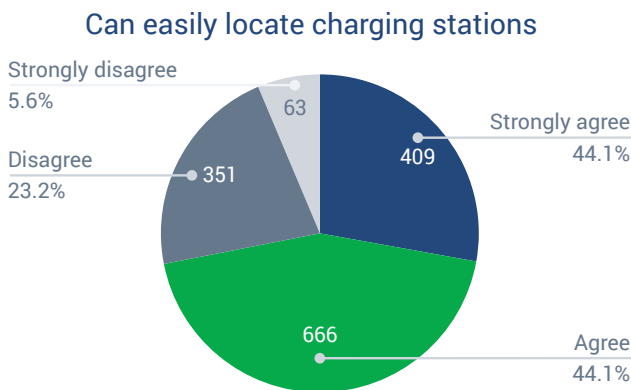
	LR-BEV	SR-BEV	PHEV
Strongly agree	85%	43%	34%
Agree	14%	42%	39%
Uncertain to Disagree	2%	15%	24%
Strongly disagree	0%	0%	3%



8. It is easy to locate and use EV charging stations wherever I drive to

	Responses	%
Strongly agree	409	27%
Agree	666	44%
Disagree	351	23%
Strongly disagree	84	6%

	LR-BEV	SR-BEV	PHEV
Strongly agree	41%	9%	9%
Agree	48%	51%	32%
Disagree	10%	29%	49%
Strongly disagree	2%	11%	10%

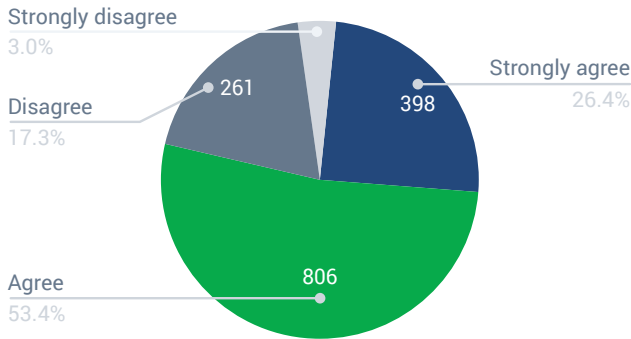


9. I regularly travel to new-destinations in my EV

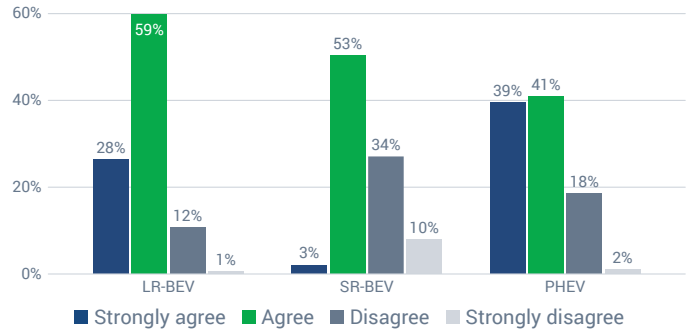
	Responses	%
Strongly agree	398	26%
Agree	806	53%
Disagree	261	17%
Strongly disagree	45	3%

	LR-BEV	SR-BEV	PHEV
Strongly agree	28%	3%	39%
Agree	59%	53%	41%
Disagree	12%	34%	18%
Strongly disagree	1%	10%	2%

Can easily travel to new-destinations



Able to easily travel to new-destinations (by EV type)

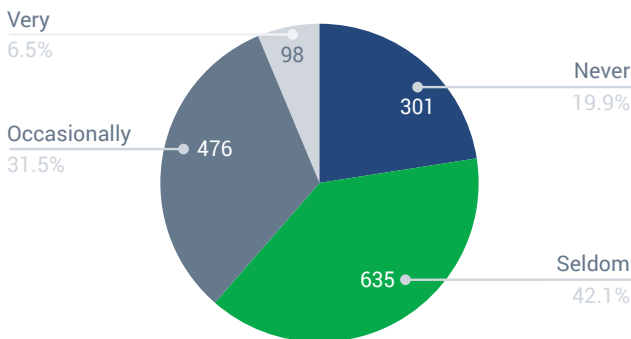


10. How would you describe your level of concern regarding running out of EV range?

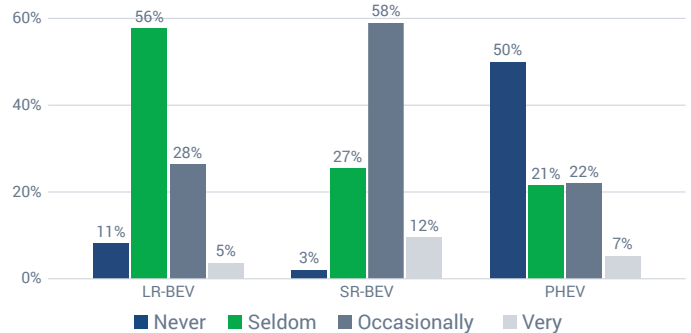
	Responses	%
Never	301	20%
Seldom	635	42%
Occasionally	476	32%
Very	98	6%

	LR-BEV	SR-BEV	PHEV
Never	11%	3%	50%
Seldom	56%	27%	21%
Occasionally	28%	58%	22%
Very	5%	12%	7%

Concerned with running out of range

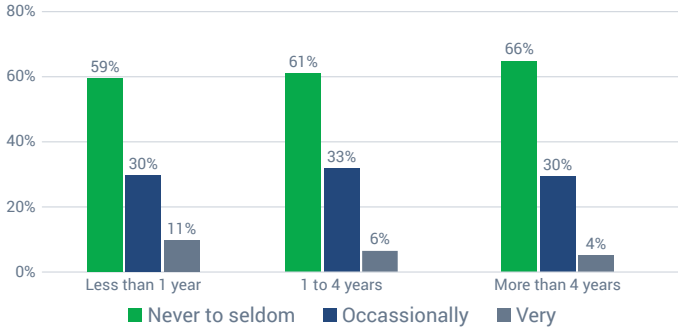


Concerned with running out of range by EV type



	- 1 Y	1 - 4 Y	+ 4 Y
Never to Seldom	59%	61%	66%
Occasionally	30%	33%	30%
Very	11%	6%	4%

Range anxiety (by years driving electric)

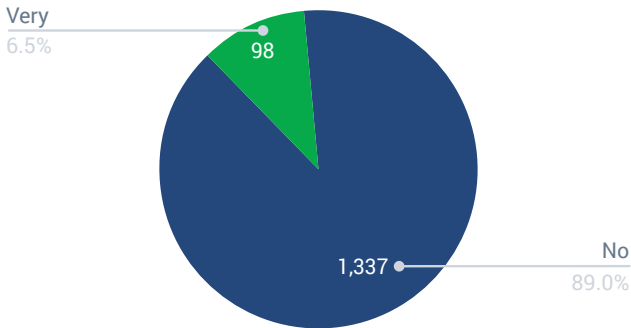


11. Do you live in an apartment, condo or other type of multi-unit residential building?

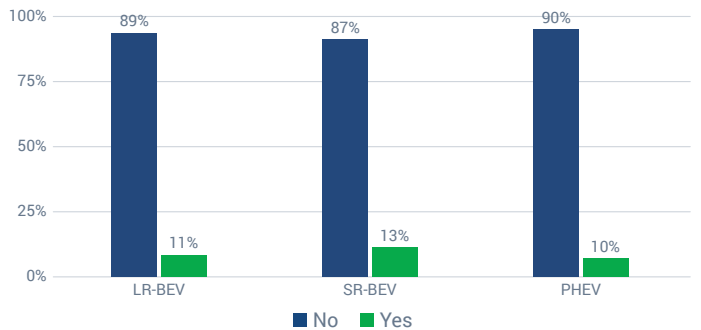
	Responses	%
No	1337	89%
Yes	166	11%

	LR-BEV	SR-BEV	PHEV
No	89%	87%	90%
Yes	11%	13%	10%

Likely to live in an apartment, condo or other MURB

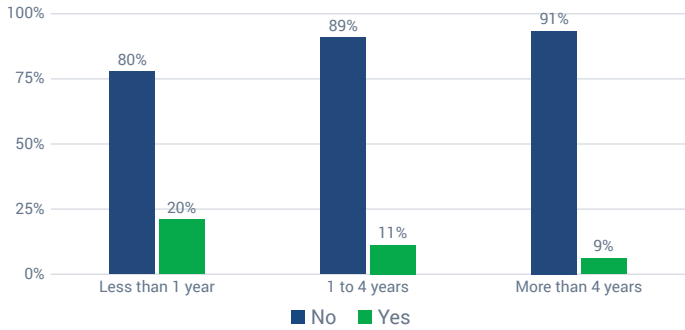


Live in a apartment, condo or other MURB (by EV type)



	- 1 Y	1 - 4 Y	+ 4 Y
No	80%	89%	91%
Yes	20%	11%	9%

Live in an apartment, condo or other MURB (by years driving electric)

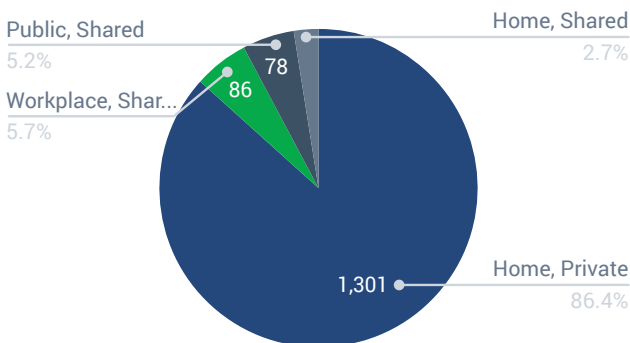


12. My primary charging location is:

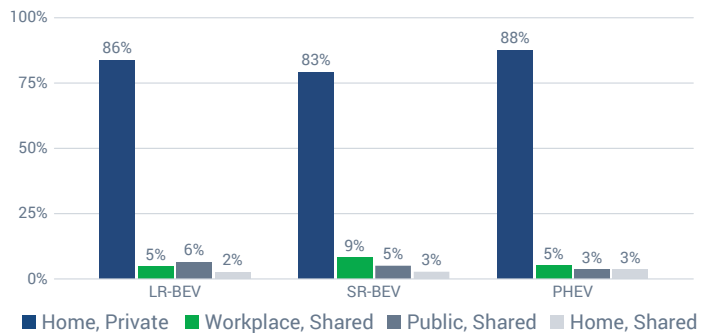
	Responses	%
Home, Private	1,301	86%
Workplace, Shared	86	6%
Public, Shared	78	5%
Home, Shared	40	3%

	LR-BEV	SR-BEV	PHEV
Home, Private	86%	83%	88%
Workplace, Shared	5%	9%	5%
Public, Shared	6%	5%	3%
Home, Shared	2%	3%	3%

Primary charging location

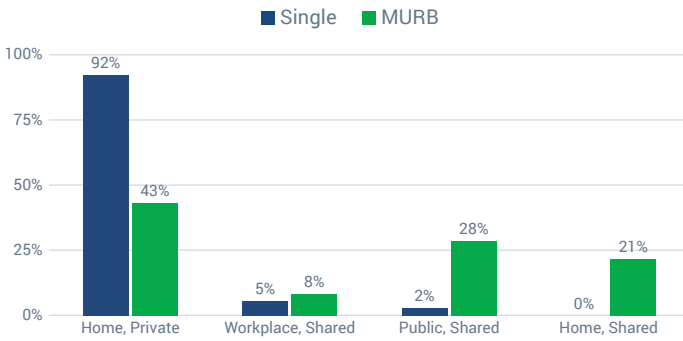


Primary charging location (by EV Type)



	Single	MURB
Home, Private	92%	43%
Workplace, Shared	5%	8%
Public, Shared	2%	28%
Home, Shared	0%	21%

Single home vs Multi-unit residence (MURB)

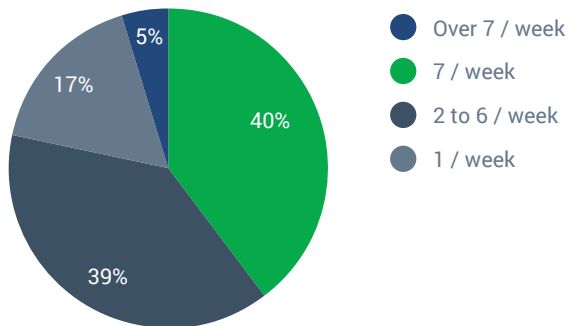


13. How often do you charge your EV?

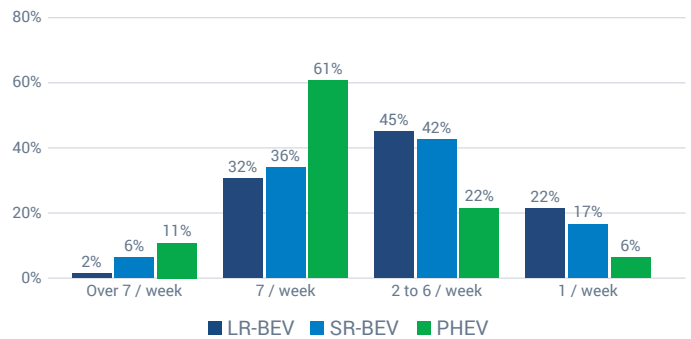
	Responses	%
Multiple times per day	73	5%
Once per day	600	40%
Several times a week	421	28%
Every other day	160	11%
Once per week	251	17%

	LR-BEV	SR-BEV	PHEV
Over 7 / week	2%	6%	11%
7 / week	32%	36%	61%
2 to 6 / week	45%	42%	22%
1 / week	22%	17%	6%

Frequency of charging

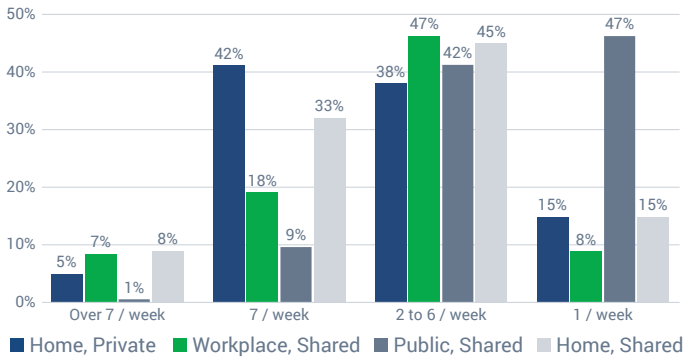


Frequency of charging (by EV type)



	Home, Private	Work, Shared	Public, Shared	Home, Shared
Over 7 / week	5%	7%	1%	8%
7 / week	42%	38%	9%	33%
2 to 6 / week	38%	47%	42%	45%
1 / week	15%	8%	47%	15%

Frequency of charging (by primary charging location)

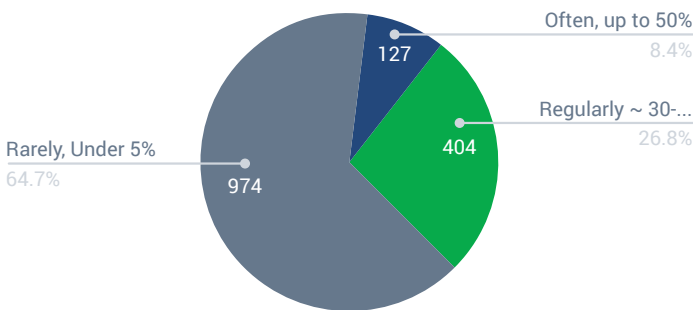


14. How much of your charging takes place at a secondary charging location?

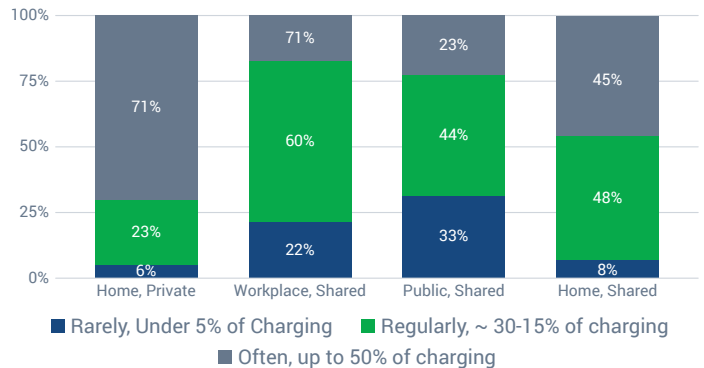
	Responses	%
Often, up to 50%	127	8%
Regularly, ~ 30%	124	8%
Sometimes, ~ 15%	280	19%
Rarely, ~ 5%	719	48%
Never, 0%	255	17%

	LR-BEV	SR-BEV	PHEV
Often, up to 50%	7%	11%	10%
Regularly, ~ 30%	9%	9%	5%
Sometimes, ~ 15%	24%	16%	9%
Rarely, ~ 5%	50%	44%	44%
Never, 0%	9%	20%	32%

Use of a secondary charging location



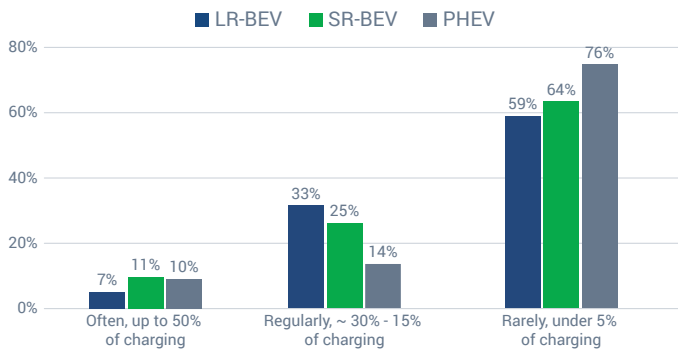
Use of a secondary charging location



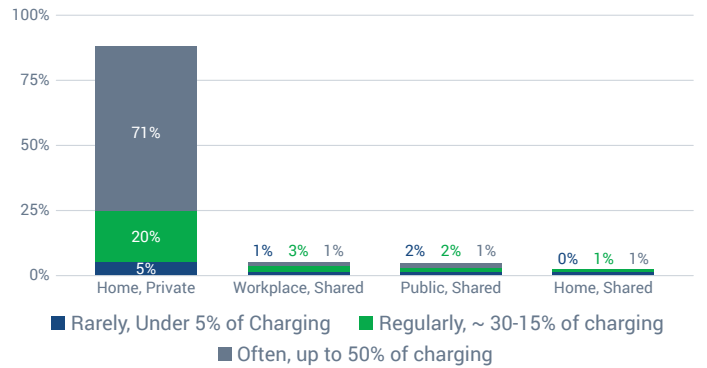
	LR-BEV	SR-BEV	PHEV
Often, up to 50% of charging	7%	11%	10%
Regularly, ~ 30-15% of charging	33%	25%	14%
Rarely, Under 5% of charging	59%	64%	76%

	Home, Private	Work, Shared	Public, Shared	Home, Shared
Often, up to 50%	5%	1%	2%	0%
Regularly, ~ 30-15%	20%	3%	2%	1%
Rarely, Under 5%]	61%	1%	1%	1%

Use of a secondary charging location (by EV type)

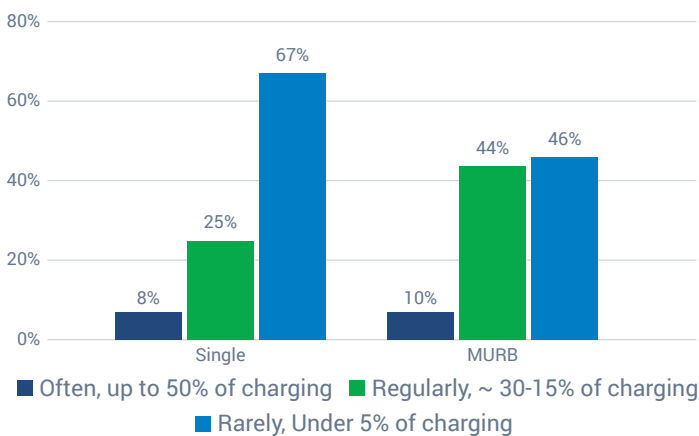


Use of a secondary charging location



	Single	MURB
Often, up to 50% of charging	8%	10%
Regularly, ~ 30-15% of charging	25%	44%
Rarely, Under 5% of charging	67%	46%

Use of secondary charging location (by MURB)

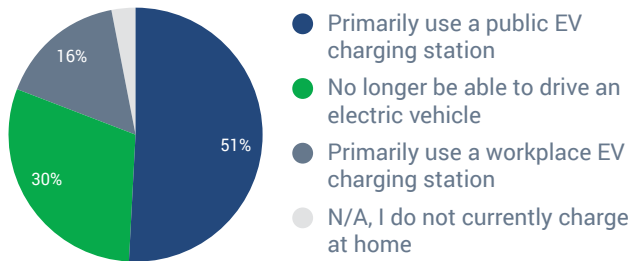


15. If you weren't able to charge your EV at home, would you...?

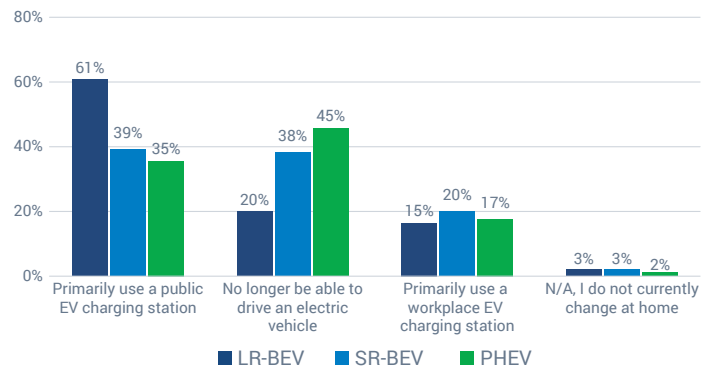
	Responses	%
Primarily use a public EV charging station	764	51%
No longer be able to drive an electric vehicle	453	30%
Primarily use a workplace EV charging station	248	16%
N/A, I do not currently charge at home	40	3%

	LR-BEV	SR-BEV	PHEV
Primarily use a public EV charging station	61%	39%	35%
No longer be able to drive an electric vehicle	20%	38%	46%
Primarily use a workplace EV charging station	15%	20%	17%
No longer be able to drive an electric vehicle	3%	3%	2%

If home charging were not an option

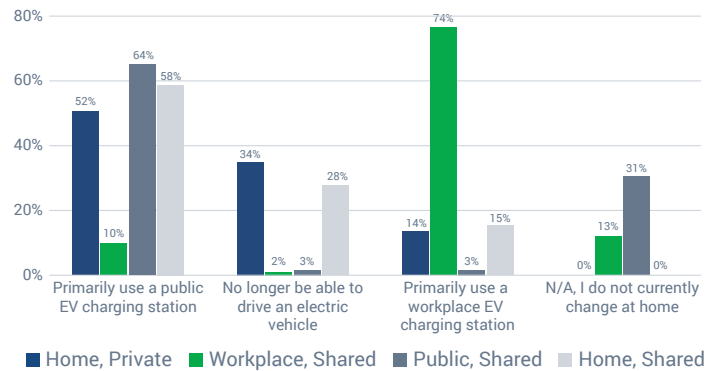


If home charging were not an option (by EV type)



	Home, Private	Work, Shared	Public, Shared	Home, Shared
Primarily use a public EV charging station	52%	10%	64%	58%
No longer be able to drive an electric vehicle	34%	2%	3%	28%
Primarily use a workplace EV charging station	14%	74%	3%	15%
N/A, I do not currently charge at home	0%	13%	31%	0%

If home charging were not an option (by primary charging location)

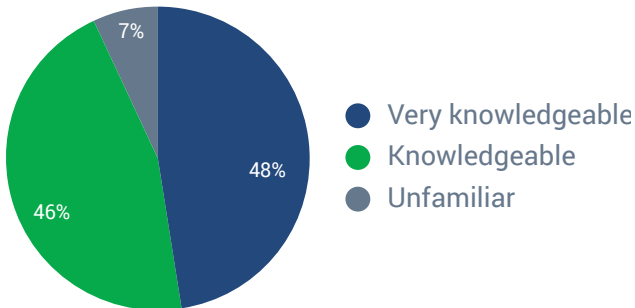


16. How familiar are you with regards to the electric grid and peak demand?

	Responses	%
Very knowledgeable	715	48%
Knowledgeable	680	46%
Unfamiliar	99	7%

	LR-BEV	SR-BEV	PHEV
Very knowledgeable	50%	47%	42%
Knowledgeable	43%	43%	50%
Unfamiliar	5%	9%	7%

Knowledge of demand management requirements

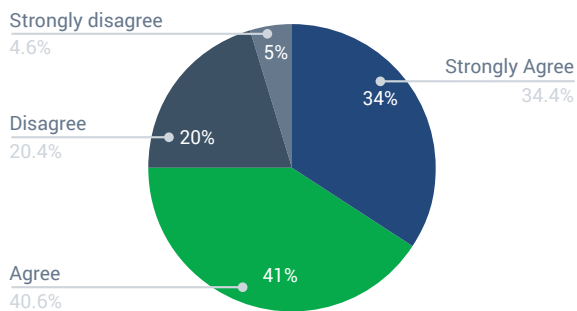


17. I know where the electricity used to charge my EV comes from

	Responses	%
Strongly Agree	514	34%
Agree	606	41%
Disagree	305	20%
Strongly disagree	69	5%

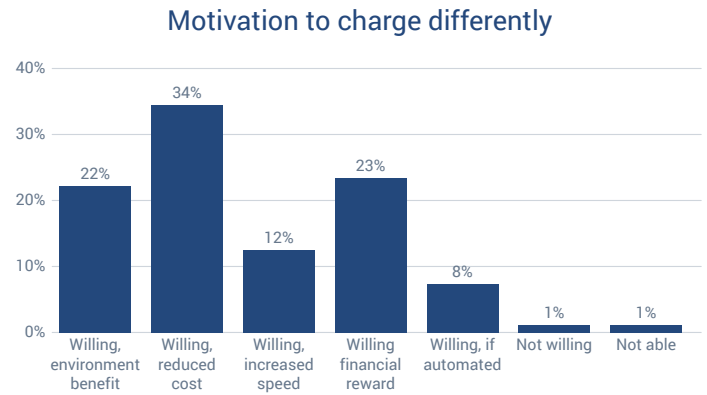
	LR-BEV	SR-BEV	PHEV
Strongly Agree	35%	37%	32%
Agree	40%	38%	44%
Disagree	21%	19%	19%
Strongly disagree	4%	6%	5%

Knows how their electricity is generated (energy mix)

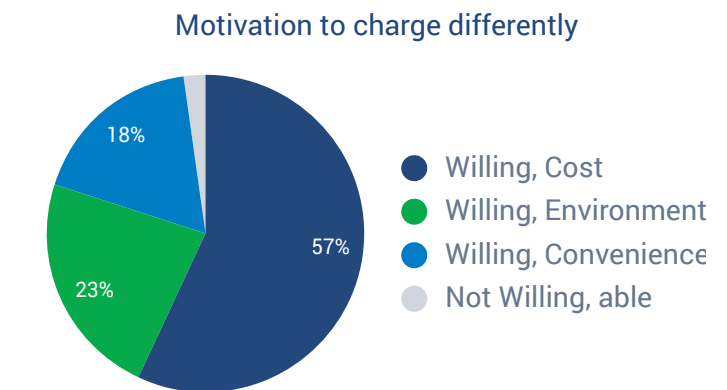


18. Assuming your EV received a full-charge, what would motivate you to charge at a different time of day? (Choose up to 3)

	Responses	%
Willing, environment benefit	822	23%
Willing, reduced cost	1,246	34%
Willing, increased speed	405	11%
Willing, financial reward	842	23%
Willing, if automated	268	7%
Not willing	20	1%
Not able	40	1%



	LR-BEV	SR-BEV	PHEV
Willing, environment benefit	23%	23%	21%
Willing, reduced cost	35%	32%	33%
Willing, increased speed	10%	12%	13%
Willing, financial reward	24%	22%	22%
Willing, if automated	7%	8%	9%
Not willing	0%	1%	1%
Not able	1%	2%	2%

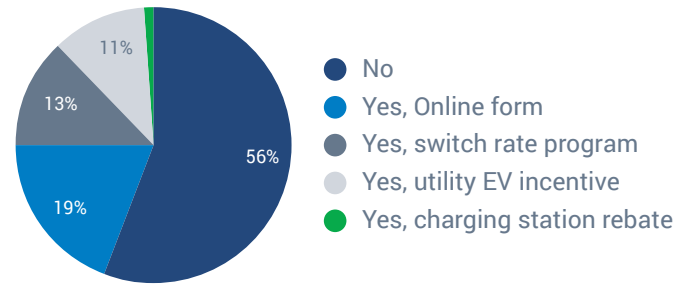


	LR-BEV	SR-BEV	PHEV
Willing, Cost	59%	54%	55%
Willing, Environment	23%	23%	21%
Willing, Convenience	17%	20%	21%
Not willing, able	1%	3%	3%

19. Did you notify your electric utility upon purchasing an EV?

	Responses	%
No	836	56%
Yes, online form	280	19%
Yes, switch rate program	187	13%
Yes, utility EV incentive	164	11%
Yes, charging station rebate	27	2%

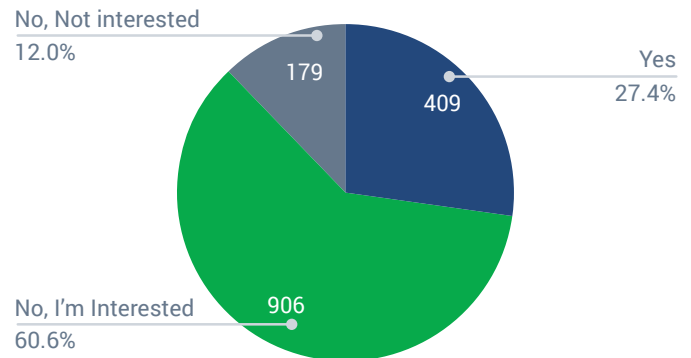
Did you notify your electric utility upon purchasing an electric vehicle?



20. Are you participating in a household Energy Efficiency program?

	Responses	%
Yes	409	27%
No, I'm interested	906	61%
No, Not interested	179	12%

Are you participating in a household Energy Efficiency program unrelated to an EV?

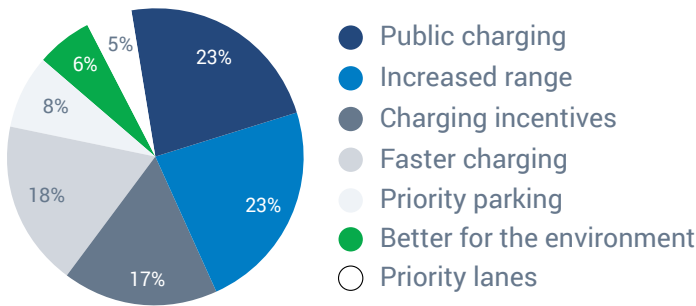


21. What would profoundly improve your EV ownership experience? (Choose up to 3)

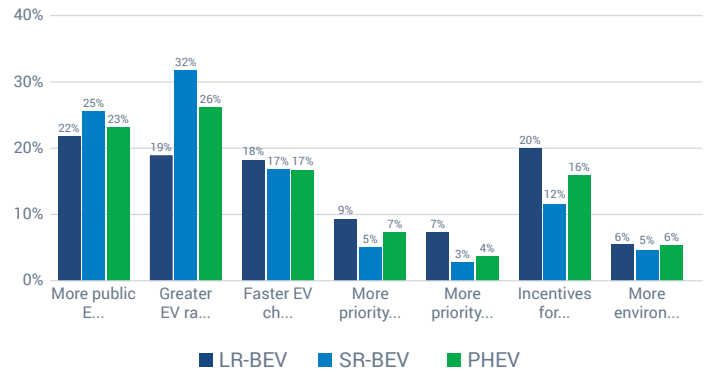
	Responses	%
More public EV charging stations	842	23%
Greater EV range	855	23%
Incentives for EV charging	650	17%
Faster EV charging	661	18%
More priority EV parking	283	8%
Better for the environment	232	6%
More priority EV lanes	205	5%

	LR-BEV	SR-BEV	PHEV
More public EV charging stations	22%	25%	23%
Greater EV range	19%	32%	26%
Faster EV charging	18%	17%	17%
More priority EV parking	9%	5%	7%
More priority EV lanes	7%	3%	4%
Incentives for EV charging	20%	12%	16%
Better for the environment	6%	5%	6%

What would profoundly improve your ownership experience?



What would profoundly improve your ownership experience? (by EV type)



	Home, Private	Work, Shared	Public, Shared	Home, Shared
More public EV charging stations	22%	25%	29%	28%
Greater EV range	23%	25%	22%	23%
Faster EV charging	18%	15%	20%	18%
More priority EV parking	8%	7%	6%	7%
More priority EV lanes	5%	7%	5%	6%
Incentives for EV charging	18%	15%	16%	12%
Better for the environment	6%	6%	2%	6%

What would profoundly improve your ownership experience? (by primary charging location)

