Addendum 7.1.4: Sagacity Research: EV survey report

Regulatory proposal for the ACT electricity distribution network 2024–29

UNDERSTANDING EV BEHAVIOUR

evoenergy

RESEARCH REPORT

March 2022

Commercial in confidence

SAGACITY RESEARCH
CUSTOMER & MARKET INSIGHTS

Business and Research objectives

Understand residents attitudes towards electric vehicles (EVs) and their charging behaviour to help inform tariff reform

- Understand the drivers for EV ownership, including the desire to save money.
- Provide a detailed understanding of EV ownership and usage.
- Understand charging behaviour, and the role of price in deciding when and how to charge.
- Assess willingness to adapt charging behaviour based on price.

EXEC SUMMARY

Exec Summary

Ownership

- Half of EV owners are in their first year, which may suggest they are still figuring out their optimal charging behaviour, and could be more open to adapting their behaviour.
  - Owners are skewed toward the higher income brackets, and half of whom own Teslas.
  - They are also more likely to be 'early adopters' and have solar systems in their home.

- Their motivations for purchasing an EV were as much about the environment as they were about saving money off fuel and running costs.
  - The cost of charging is of little concern or importance, potentially indicating that they may be fairly price inelastic.

EV Use

- In a typical week, EVs are on average being used for 7 (return) trips, covering just over 200km.
  - While this might suggest a need to charge the EV just once per week, most do not charge to 100% and are reluctant to go below a range of 170km.
  - Consequently, they are charging their EVs about 4 times per week on average.

Charging Behaviour

- Not all charging is done at home, with a quarter stating that their main location is a public charging station or at work.

- At home, while EV owners are avoiding the early morning peak time, charging is fairly evenly spread across the rest of the day.
  - This would appear to be strongly influenced by the use of solar.
  - Most owners closely monitor their solar use, are aware of the savings it provides, and state they charge during the day for this reason.

- Reasons given for charging during the overnight off-peak period are more practical, wanting to be ready for tomorrow, than they are about cost savings.
  - In part this is likely because few have a ToU tariff – most are on a single use tariff or simply do not know.

- However, there is potentially some price elasticity.
  - Owners state that ToU tariffs do (or would) influence when they charged their EV.
  - Similarly the concept of a low off-peak 11am and 3pm period would also be influential, as would trickle charging overnight to save money.

Exec Summary cont…

Willingness to Adapt

- Firstly, there is room to adapt, with most stating that they are flexible in when they charge their EV.

- In order to avoid charging at peak times (7am-9am in the morning and 5pm-8pm in the evening) as much as possible, EV owners stated they would need to save on average $160 off the cost of charging per year.
  - This equates to approximately 29% off their total cost of charging.

- When prompted, we see a similar result, with the optimal point to influence behaviour being a saving of between 20% and 40%.
  - At 40%, 9 in 10 would at least try and avoid peak times, with half stating they would avoid them altogether.
  - Incrementally, there is less benefit to going above 40%.

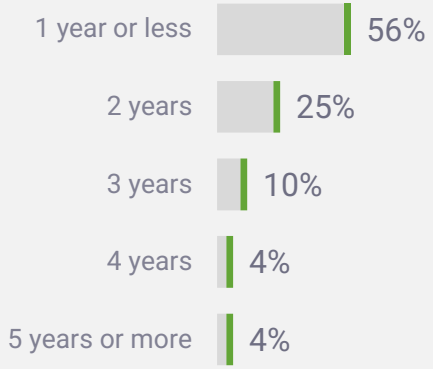
- A third of EV owners were extremely open to the concept of a third party taking control of their charging.
  - This increased to almost half of those intending to purchase an EV.
  - While a quarter of owners were not open at all to the idea, this still represents a strong result to a concept that would typically generate a negative reaction.

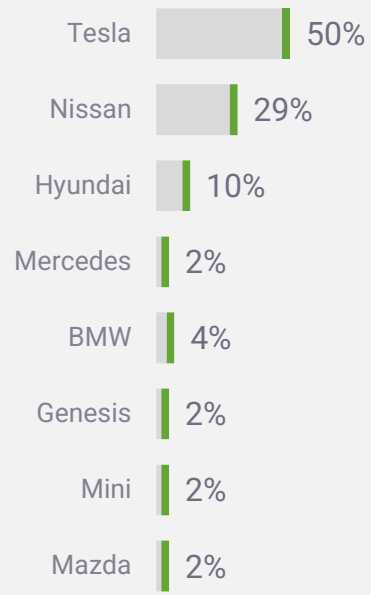
WHAT DID WE DO?

Across the ACT, we spoke to a total of 48 EV owners, and 81 residents intending to purchase an EV in the next 3 years

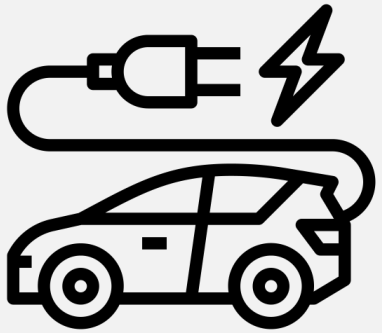
- Many owners are new to having an EV, having purchased in the last year, with half of all EVs being Teslas.
- Results have been explored by both recency of ownership and Tesla owners, with significant differences reported.

Owners

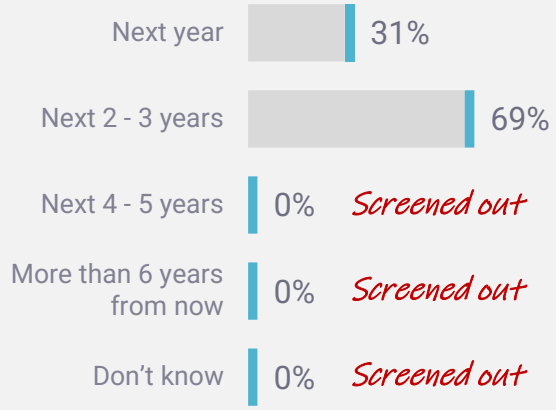




More likely to be earning in excess of $300k p.a. (13% versus 1%)



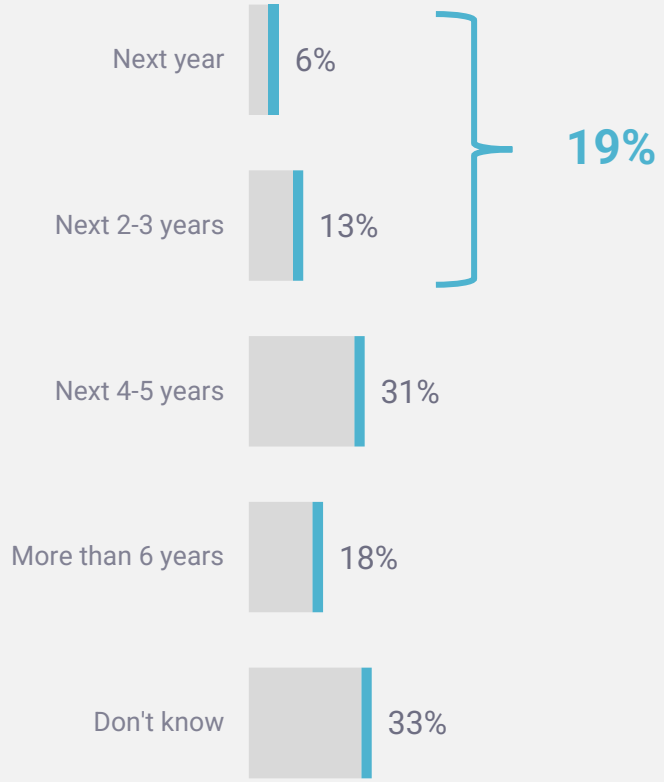
Intenders



Q1.1: Do you currently own a fully electric vehicle (EV)? That is a vehicle that you need to plug in to charge, and does not include hybrids. **Q1.2**: When, if at all, might you be likely to purchase a fully Electric Vehicle (EV)? **Q2.0a:** How long have you owned an Electric Vehicle (EV)? **Q2.0b:** What make and model(s) of EV do you currently own?
Base: All owners (n=48), All intenders (n=81)

Results continue to show a high level of intent to purchase an EV, with 1 in 5 stating they intend to in the next 3 years

When, if at all, might you be likely to purchase an electric vehicle?



Same result as recorded in our poll for the proposal

Q1.2: When, if at all, might you be likely to purchase a fully Electric Vehicle (EV)?
Base: All non-owners (n=439)

EV Owners are typically older, post family and often retired, or earning a higher income compared to the intenders

Age (%)	Owners	Intenders
18 – 29	33	33
30 – 39	15	36
40 – 49	6	11
50 – 59	13	6
60 – 69	21	11
70+	8	1
Prefer not to say	4	1

Gender (%)	Owners	Intenders
Male	58	28
Female	42	72

Half of all Evs are used (& charged) by two people in the household, so gender is more a reflection of who has completed the survey than ownership.

Income (%)	Owners	Intenders
<$50k	6	4
$50 - $74k	4	1
$75 - $99k	25	14
$100 - $149k	21	37
$150k - $199	10	16
$200 - $249k	13	14
$250 - $299k	4	7
$300k+	6	1
Prefer not to say	10	6

Household (%)	Owners	Intenders
Single person home	25	12
One parent family	-	2
Couple no children	19	33
Couple with children	33	35
Couple after children	19	7
Other	4	10

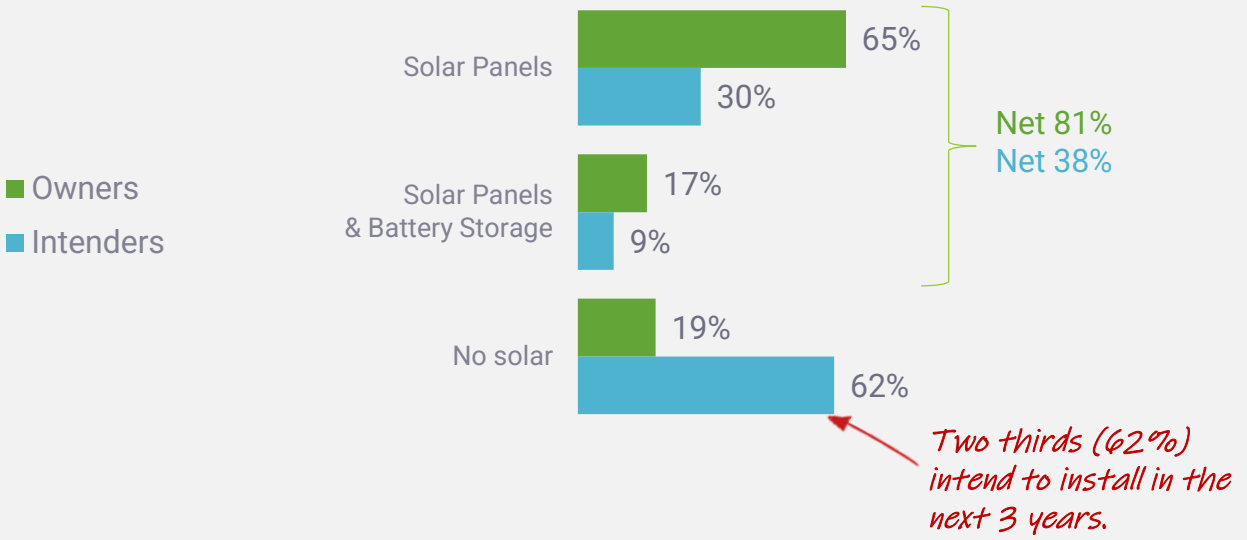
Work status (%)	Owners	Intenders
Student	2	7
Looking after home	-	1
Unemployed (looking)	-	1
Unemployed (unable)	-	4
Working p/t	10	14
Working f/t	63	63
Self-employed	4	5
Retired	19	5
Other	2	-

Q: Various
Base: All owners (n=48), All intenders (n=81)

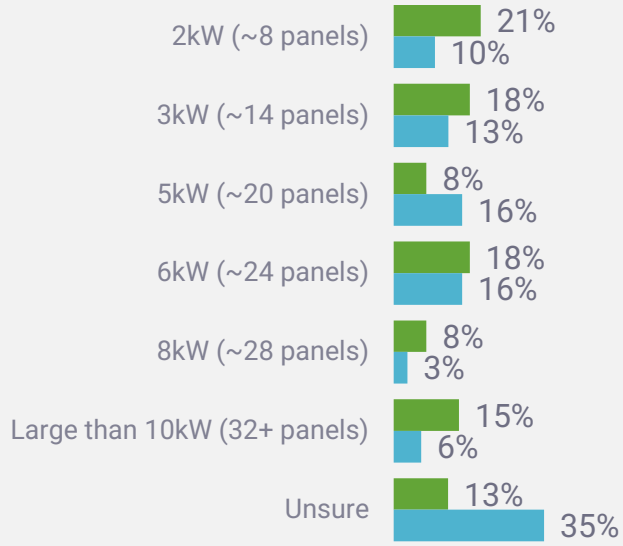
Four fifths of those with an EV also have a solar system in place, with almost 1 in 5 having solar & battery storage

- A high proportion of EV intenders without solar are though intending to install a solar system.

Solar Ownership



Size of solar system

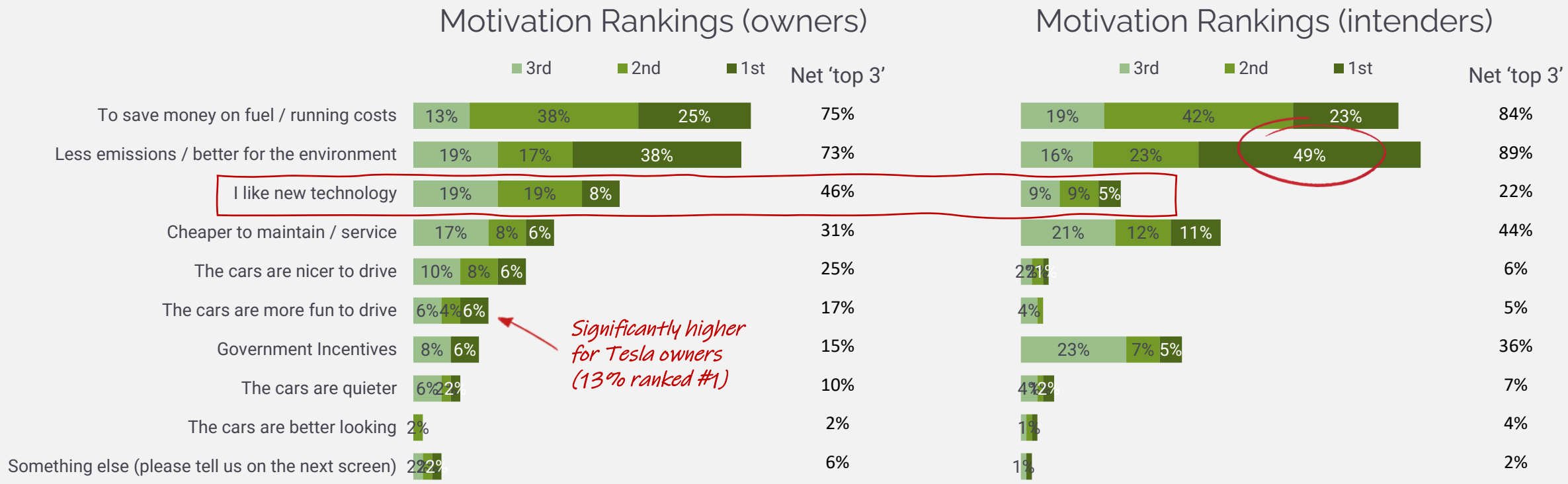


Q1.3: Do you currently have any of the following installed at your home? **Q4.5:** Do you know what size of solar system you have?
Base: All owners (n=48), All intenders (n=81), with solar (n=39 / 31)

THE ROLE OF PRICE & THE COST OF CHARGING

Saving money and the environment are the strongest motivations to purchase an EV

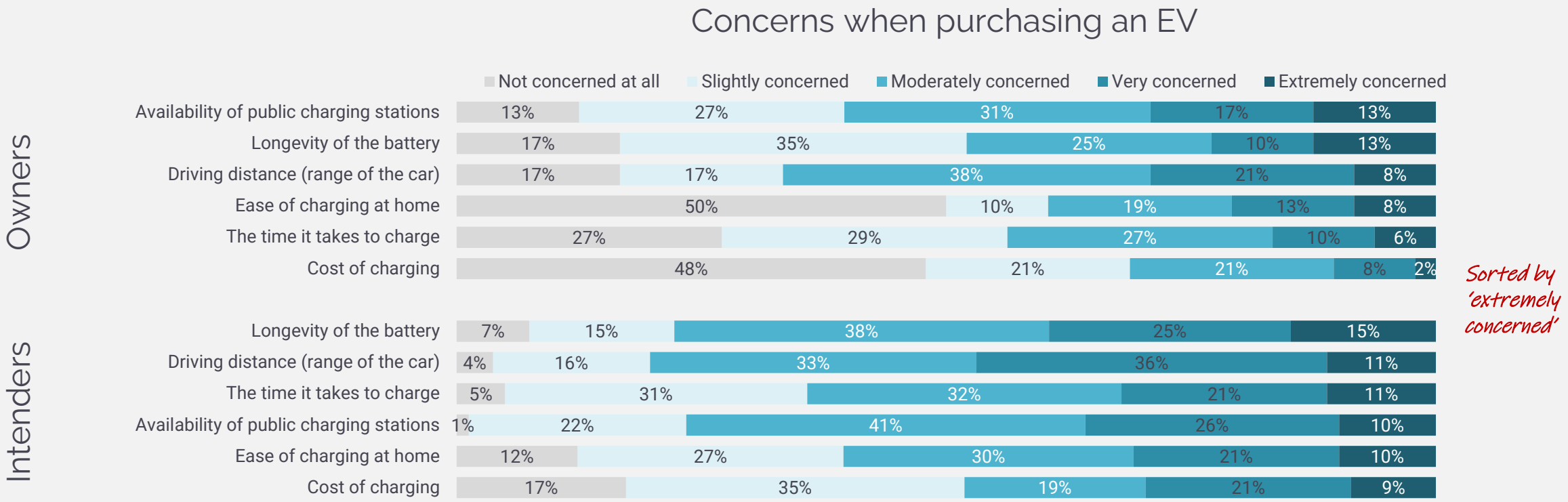
- The environment would appear to be becoming more influential, with half of intenders ranking this #1.
- Fewer are intending to purchase because they like new technology, suggesting EVs are moving on from the 'early adopters'.



Q2.1: What <<were / are>> your main motivations for buying an EV?
Base: All owners (n=48), All intenders (n=81)

While saving money is a strong motivator, there are few concerns about the cost of charging

- Concerns are more focused on the availability of public charging stations and the range of the car.
- This might suggest that encouraging owners to charge off-peak would require more than a monetary incentive.

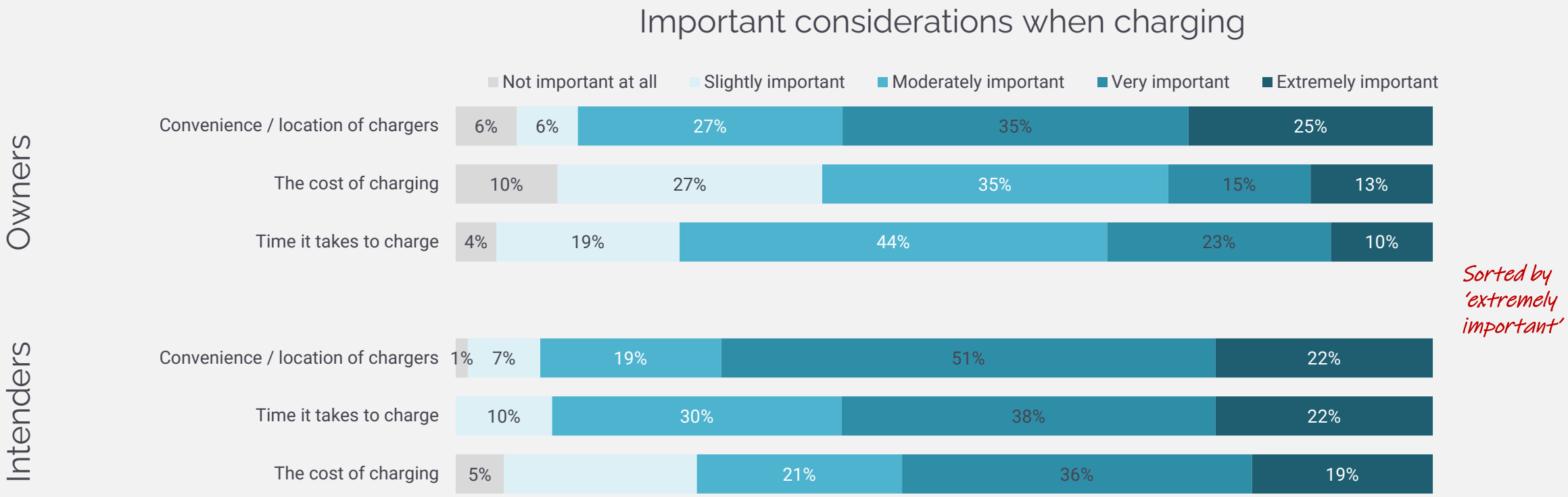


Sorted by 'extremely concerned'

Q2.2: When deciding to buy an EV, to what extent <<were / are>> you concerned about each of the following?
Base: All owners (n=48), All intenders (n=81)

Similarly, the cost of charging is not an important decision factor when deciding where and how to charge

- Again, this might suggest that encouraging owners to charge off-peak would require more than a monetary incentive.

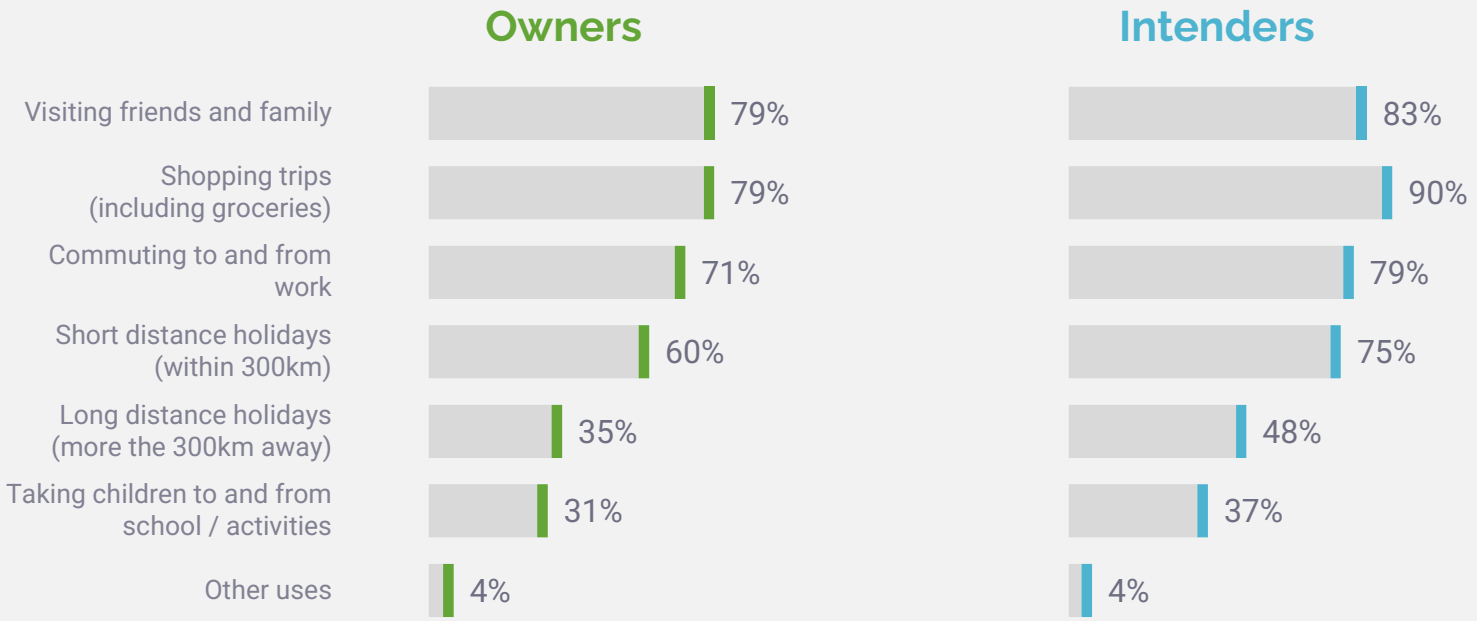


Q3.0: How important are each of the following to you when deciding where and how to charge your EV
Base: All owners (n=48), All intenders (n=81)

EV USE & CHARGING BEHAVIOUR

EVs are primarily being used for social visits, shopping trips and commuting

- Indicatively, those intending to purchase an EV are more likely to use the car for a wider range of uses, including short and long distance holidays. This may be reflective of their earlier life stage.
- Just over half of EV owners (54%) stated that they had access to another (non-EV) car.



NB/ Intenders use, was based upon their expectations and/or their current use of the vehicle that the EV would replace.

Q2.5a: For which of the following would your EV be used for? **Q2.6:** Do you have access to any other cars that you can use?
Base: All owners (n=48), All intenders (n=81)

On average EVs are being used once a day (return trip), with a weekly distance of just over 200km

- This would potentially suggest that the EVs only need to be charged once per week, as most have a range in excess of 200km.
- Interestingly, those intending to purchase an EV, would expect to make slightly more trips, but cover less distance.

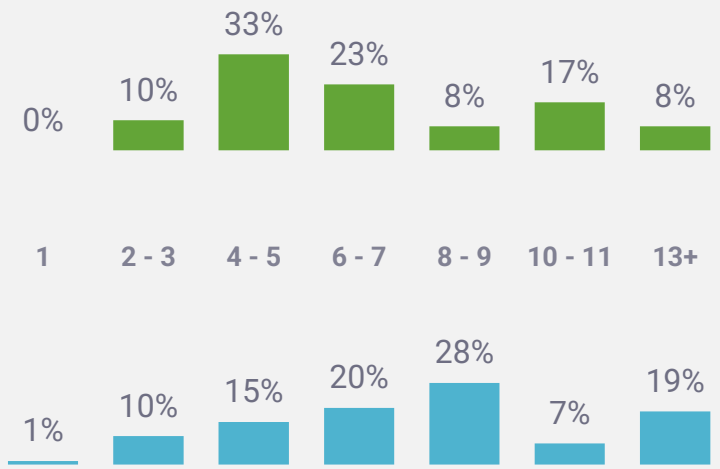
Owners

Av trips: 7
Av Kms: 230

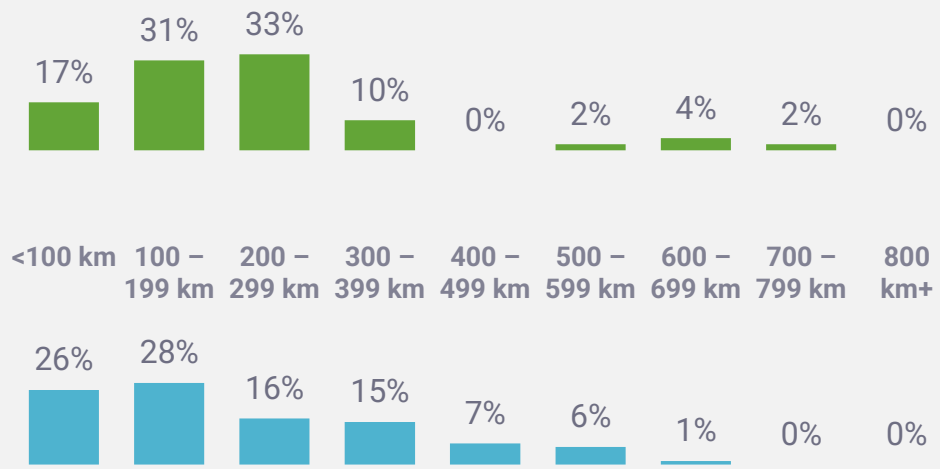
Intenders

Av trips: 8
Av Kms: 223

Return trips in EV *pw*



Kilometres in EV *pw*

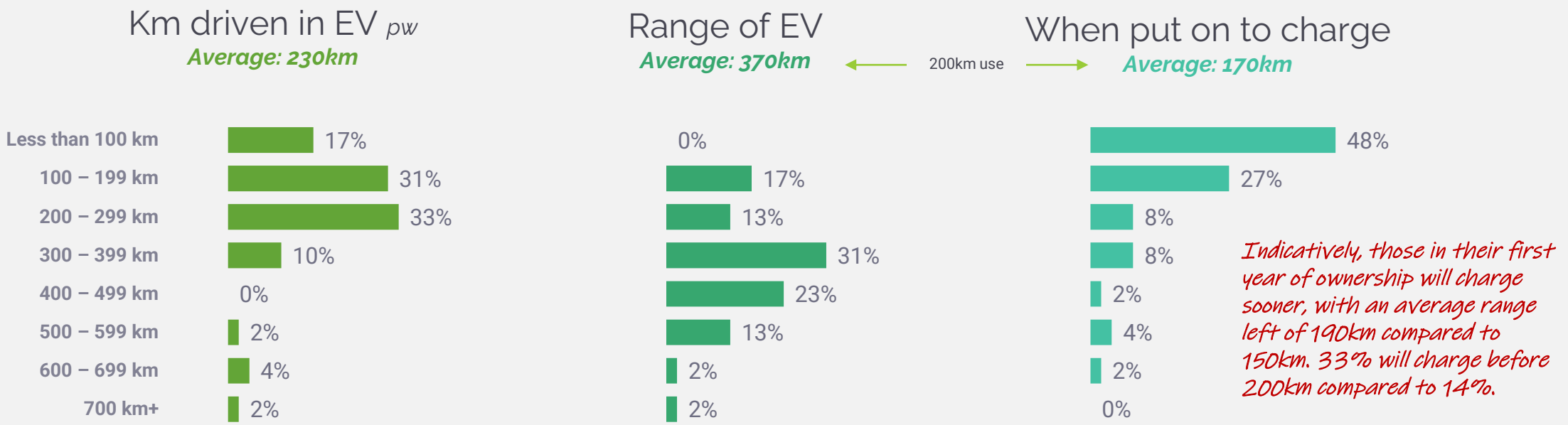


Q2.4: How many trips would your EV be used for in a typical week? **Q2.5b:** How many km would you typically drive in your EV in a normal week?
Base: All owners (n=48), All intenders (n=81)

The range of EVs, and when users feel the need to charge, also suggests they only need to be charged once per week

- Owners are wanting to charge once their range reduces to 170km, which with a range of 370km, affords them 200km use.

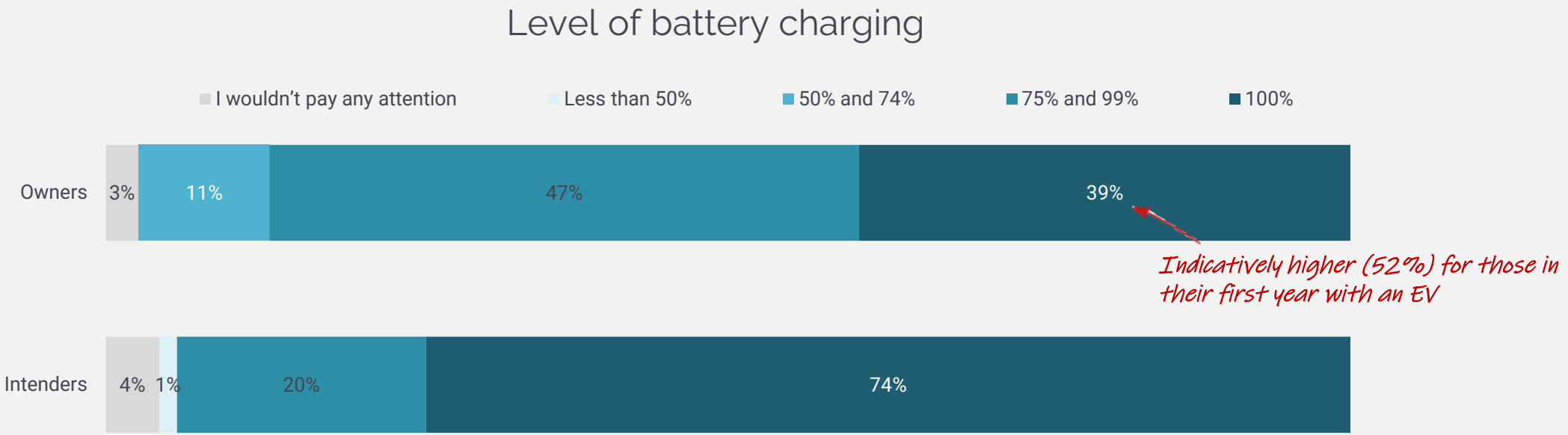
Owners



Q2.4: How many trips would your EV be used for in a typical week? **Q3.1a:** What is the range of the battery in your EV? **Q3.1b:** And at what point do generally you feel the need to put the EV on to charge?
Base: All owners (n=48)

However, the majority are not charging their batteries to capacity, so the starting range would be lower

- This would indicate a need to charge more frequently than once per week.
- Those intending to purchase an EV (and those in their first year with an EV) are more likely to state they would charge to 100%, which is possibly indicative of their knowledge and not yet being advised against this.



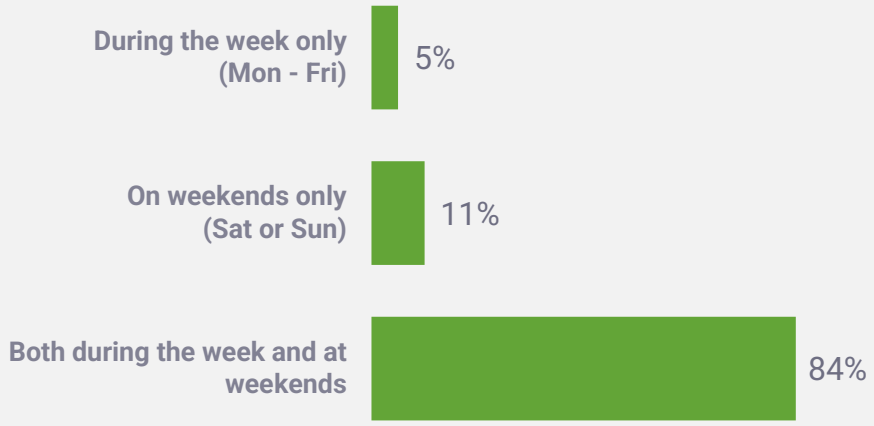
Q3.8: How full <<do / would>> you allow the battery in your EV to charge?
Base: Owners charging at home (n=38), Intenders charging at home (n=70)

Indeed, on average EV owners are charging their cars 3 or 4 times a week across both weekdays and weekends

- Almost 1 in 5 (18%) are charging their EV almost every day at home (6 or 7 days a week).

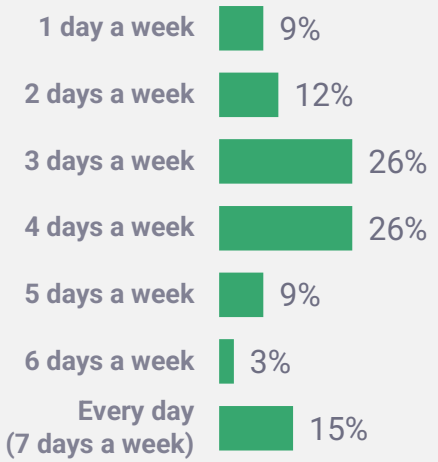
Owners

When charge



Number of days charge

Average: 3.8



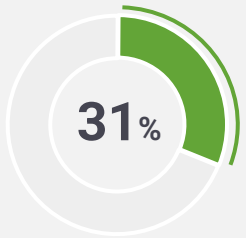
Q3.5a: Do you charge your EV at home during the week, at weekends or both? **Q3.5b:** How many days in a typical week do you have your EV plugged in to charge at home?
Base: Owners charging at home (n=38)

There is a strong preference to charge at home, particularly amongst those who have invested in a fast charger

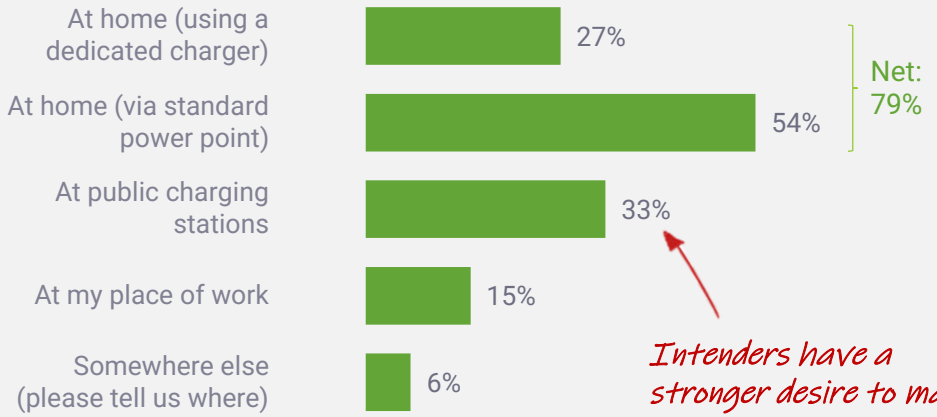
- While those intending to purchase an EV have a stronger desire to make use of public charging stations, this is not as their main charging location.

Owners

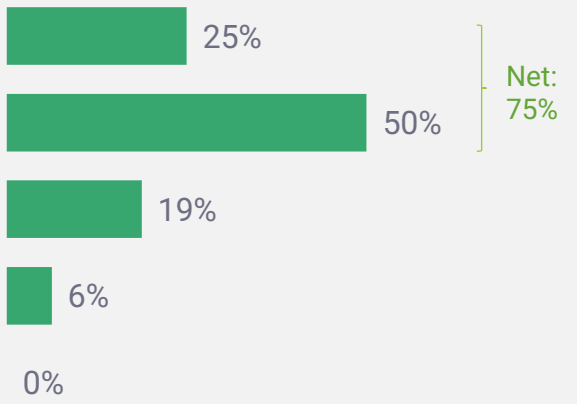
Have a fast charger



Where charge



Main charging location

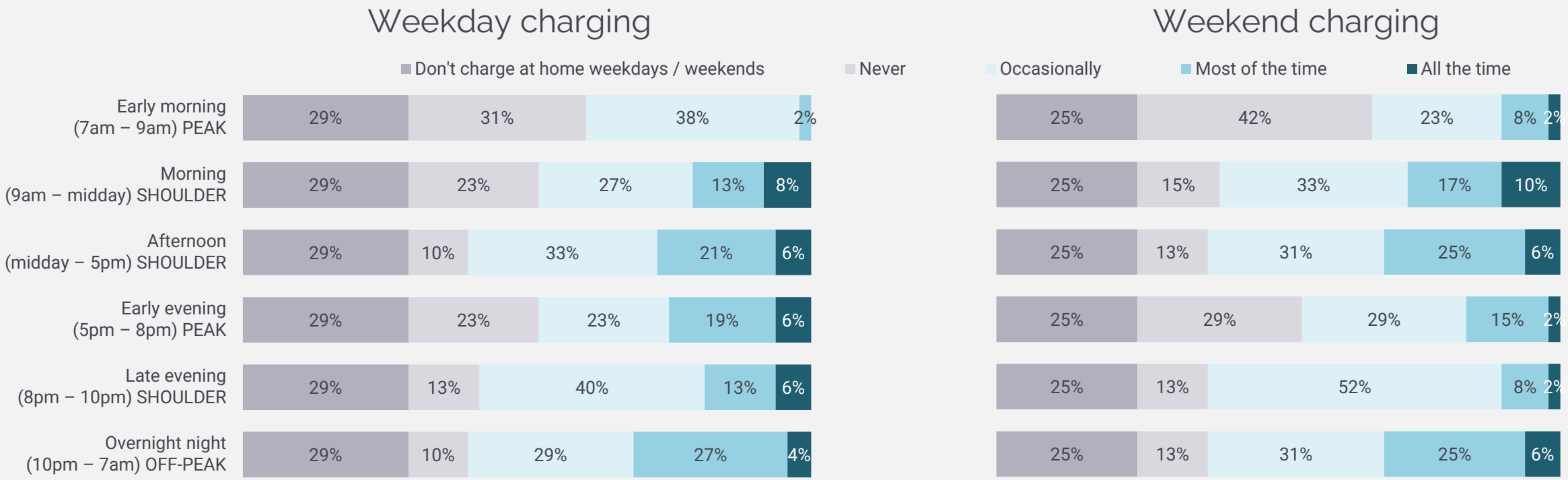


Q3.2: Do you currently have or intend to install a wall mounted dedicated fast charger for your EV at home? **Q3.3:** Where <<do / would>> you charge your EV? **Q3.4:** Where <<do / would>> you most often charge your EV during the course of a typical week?
Base: All owners (n=48), All intenders (n=81)

While EV owners are avoiding the early morning peak time, charging is fairly evenly spread across the rest of the day

- This may indicate that charging is done for convenience rather than with consideration to the cost of charging.

Owners



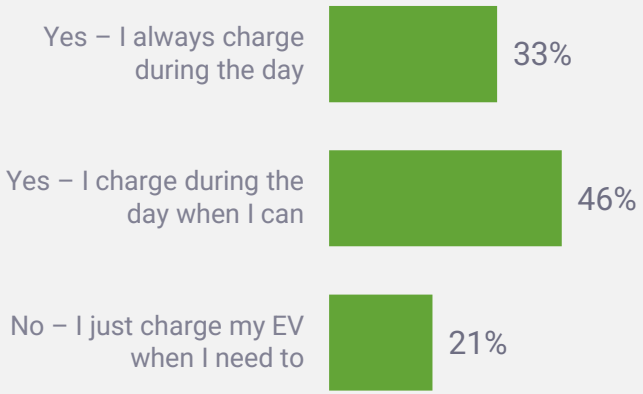
Q3.6a: Thinking about charging your EV during the week (Mon-Fri). How often do you charge your EV at home during the following times?
Q3.6b: Thinking about charging your EV at weekends (Sat or Sun).. How often do you charge your EV at home during the following times?
Base: All owners (n=48)

EV Charging would appear to be strongly influenced by the use of solar

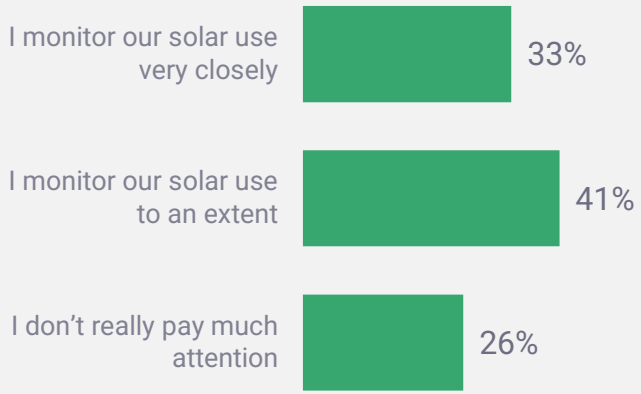
- Four fifths of those who have solar state that they charge during the day when they can, with a third always charging during the day.
- A similar proportion monitor their use very closely and know exactly how much solar saves them.

Owners

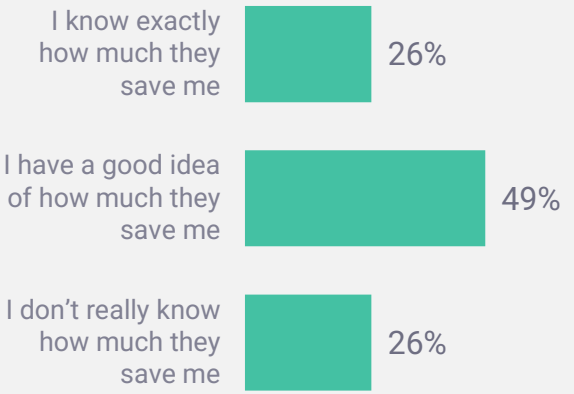
Impact how charge



Monitor use



Aware of savings



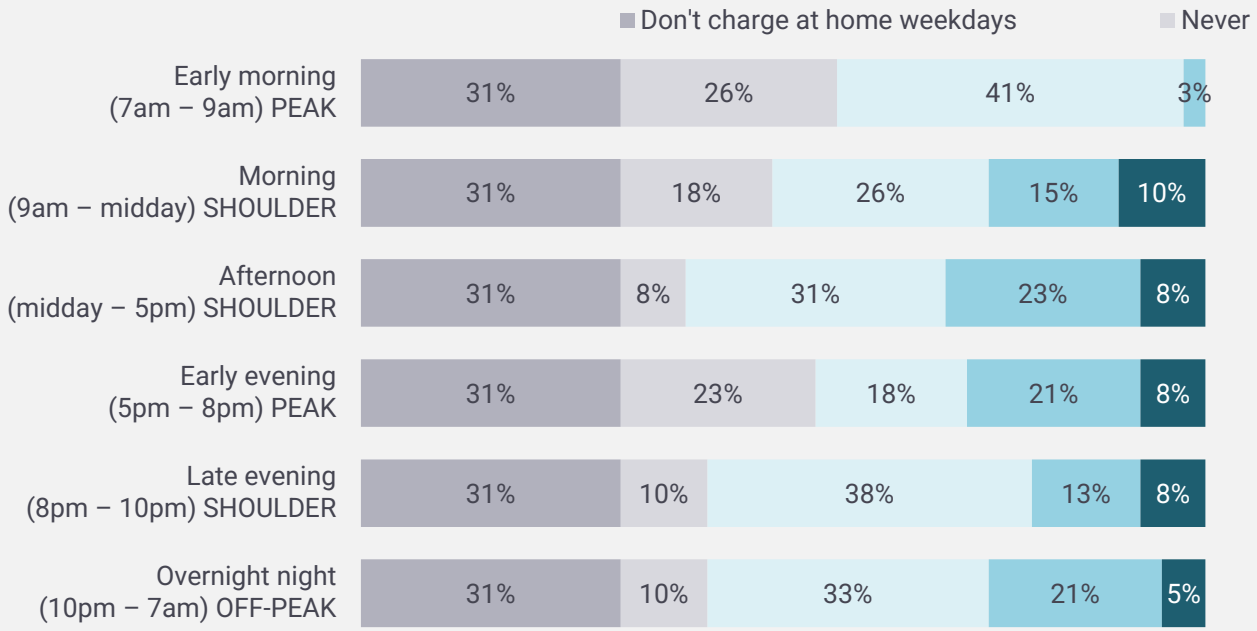
Q4.6: Does having solar influence how you charge your EV? **Q4.8:** How closely do you monitor and manage your use of the solar panels and appliances to maximise the savings? **Q4.7:** To what extent are you aware of how much your solar panels save you on your electricity bill?
Base: All owners with solar (n=39)

While indicative, there is evidence that non-solar users are more inclined to make use of the overnight off-peak period

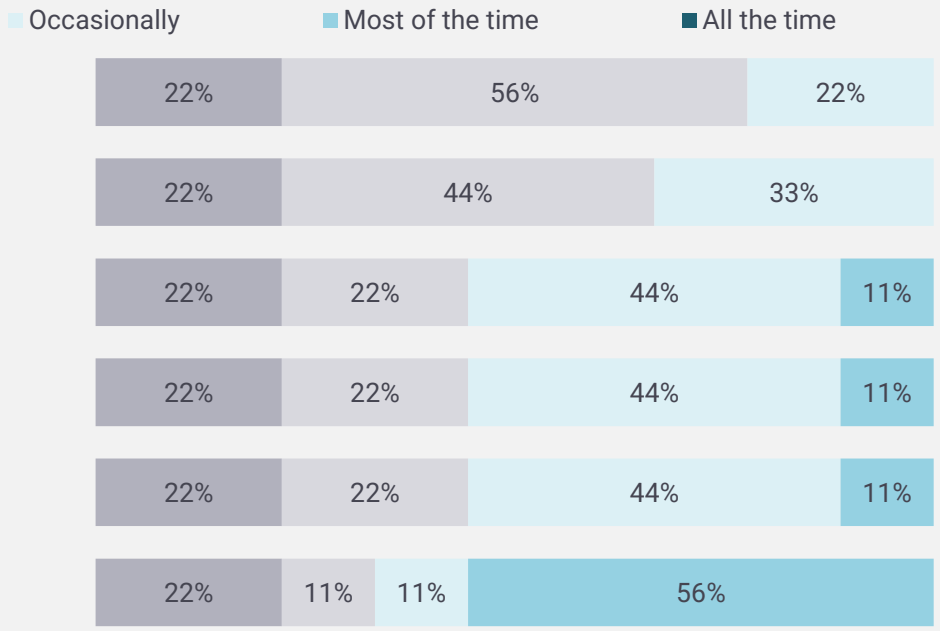
- However, they are not able to completely avoid the afternoon shoulder and peak periods.

Owners

Weekday charging (with solar)



Weekday charging (w/o solar*)



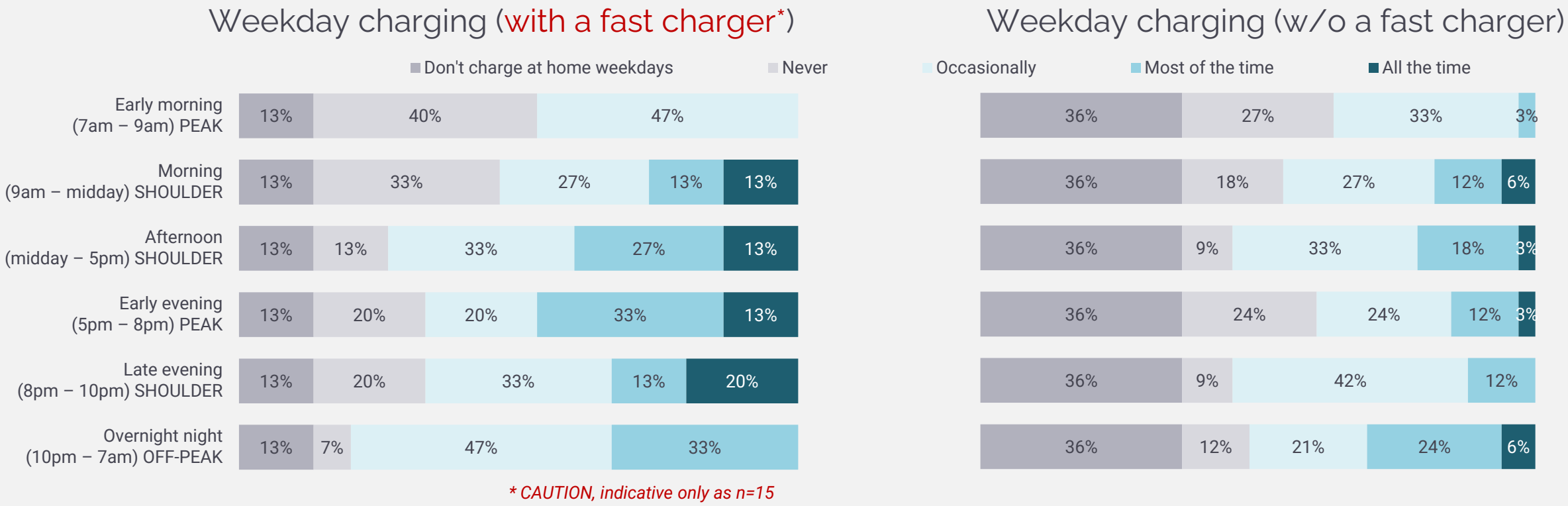
** CAUTION, indicative only as n=9*

Q1.3: Do you currently have any of the following installed at your home?
Q3.6a: Thinking about charging your EV during the week (Mon-Fri). How often do you charge your EV at home during the following times?
Base: All owners with solar (n=39); without solar (n=9)

Indicatively, those with a fast charger are more likely to charge during the day at home, particularly late evening

- Overall, they are more likely to be charging at home during on weekdays, just 13% avoiding weekdays at home, comparted to 36%.

Owners



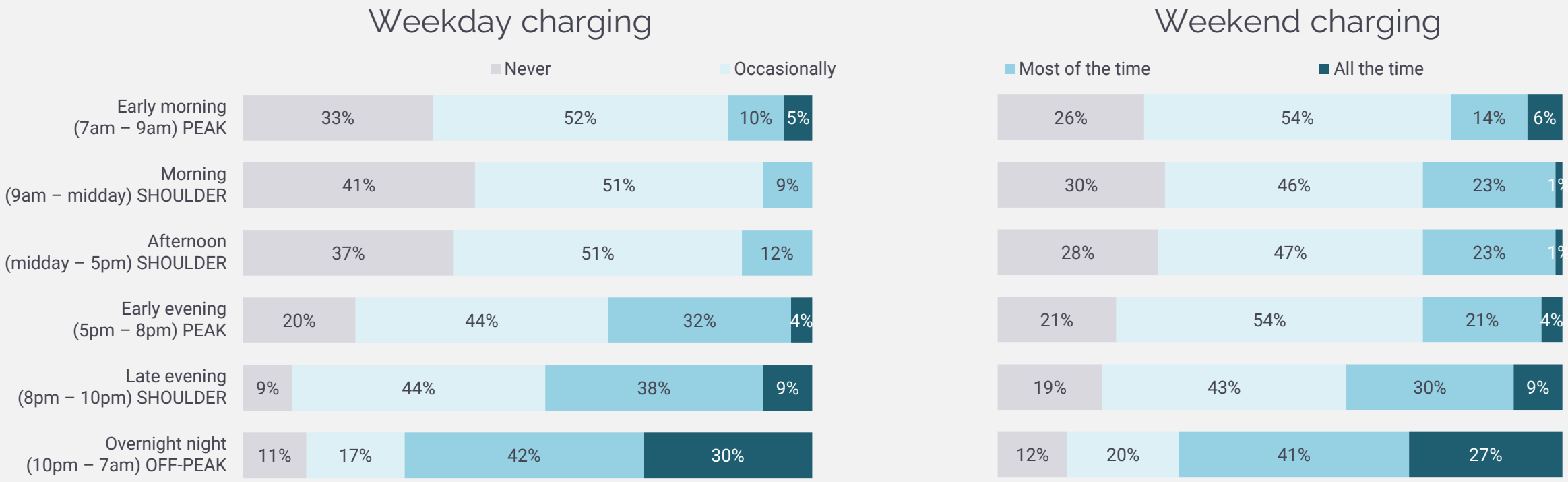
** CAUTION, indicative only as n=15*

Q3.2: Do you currently have or intend to install a wall mounted dedicated fast charger for your EV at home?
Q3.6a: Thinking about charging your EV during the week (Mon-Fri). How often do you charge your EV at home during the following times?
Base: All owners with a fast charger (n=15); no fast charger (n=33)

Those intending to purchase an EV are also more inclined to favour the overnight off-peak period

- This may reflet the fact that fewer of this cohort currently have solar.
- Their actual charging may be subject to change if they followed through with their intent to also purchase a solar system.

Intenders

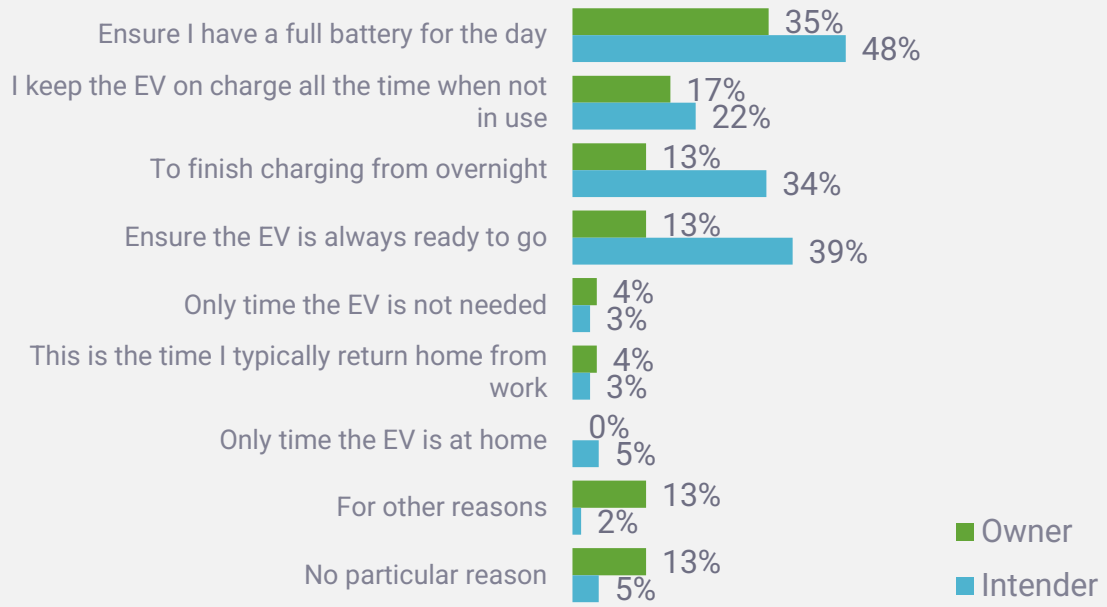


Q3.6a: Thinking about charging your EV during the week (Mon-Fri). How often do you charge your EV at home during the following times?
Q3.6b: Thinking about charging your EV at weekends (Sat or Sun).. How often do you charge your EV at home during the following times?
Base: All intenders (n=81)

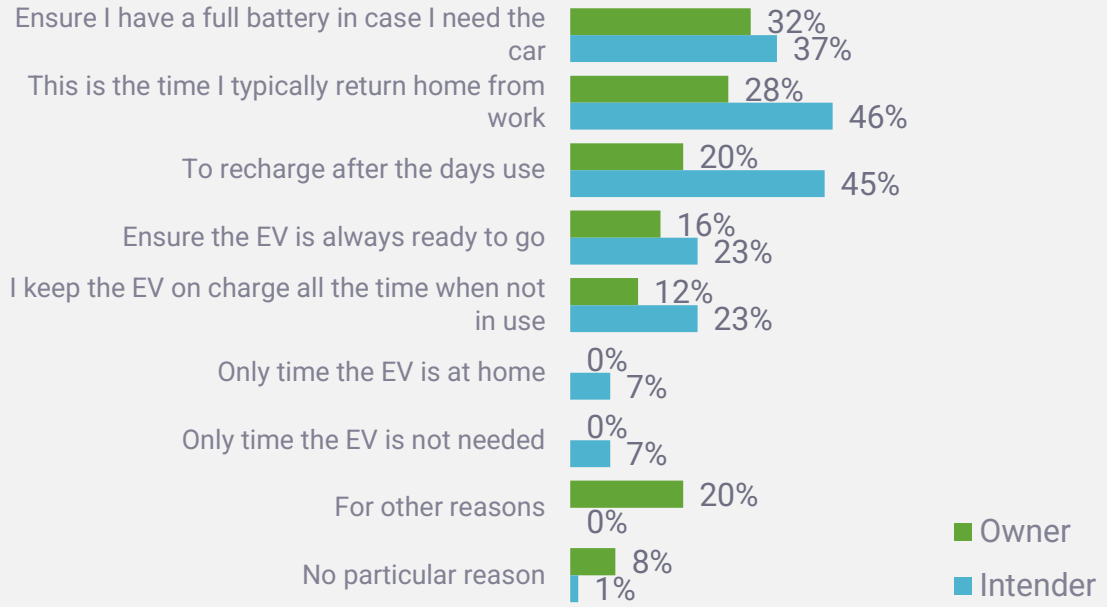
Reasons given for charging during peak periods would appear more for convenience than necessity

- Owners charge in the early evening, because that is when they return home, and want the car to be ready in case they need it.
- This would suggest there is some flexibility in when EV are charged.

Early morning (7am – 9am) PEAK



Early evening (5pm – 8pm) PEAK

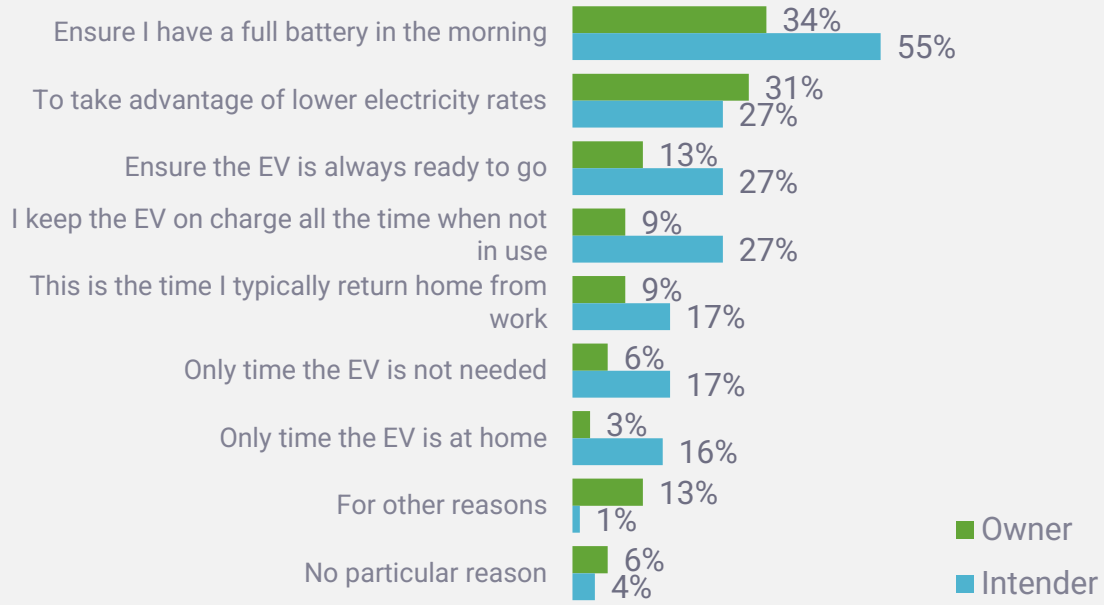


Q3.7a: Why <<do / would>> you choose to charge your EV in the early morning (7am-9am)? **Q3.7b:** Why <<do / would>> you choose to charge your EV in the early evening (5pm-8pm)?
Base: Those charging early morning (n=23 / 65), Those charging early evening (n=25 / 71)

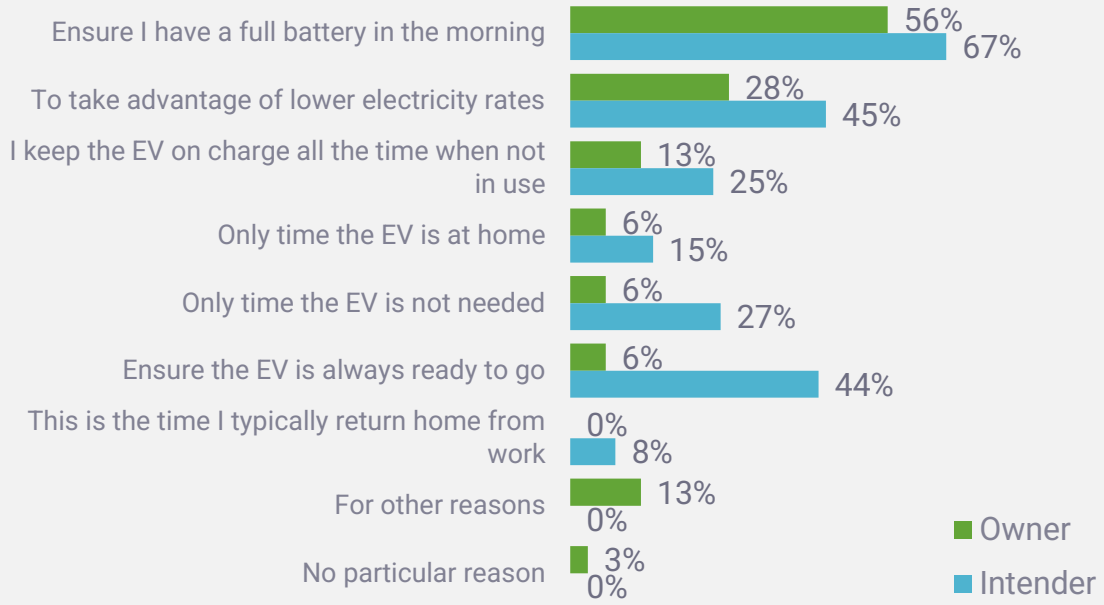
Charging in the late evening and overnight is as much about being ready for tomorrow, as the cost savings

- Indeed, the desire to have a full battery in the morning is the strongest driver for choosing to charge during the overnight off-peak period, twice a high as taking advantage of lower electricity rates.

Late evening (8pm – 10pm) SHOULDER



Overnight (10pm – 7am) OFF-PEAK

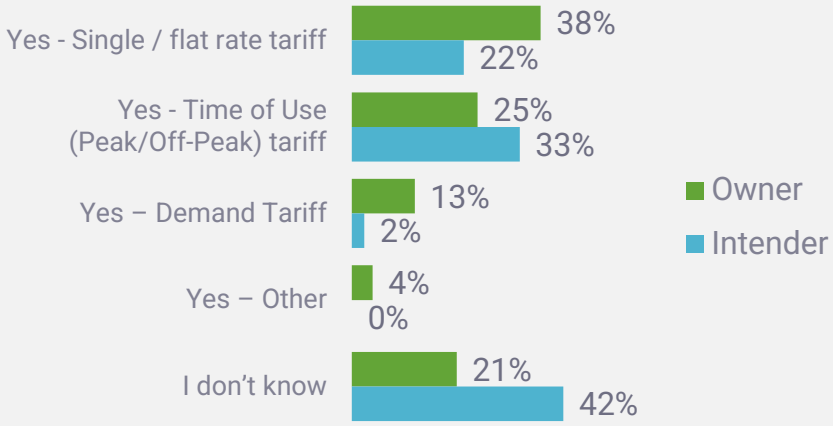


Q3.7c: Why <<do / would>> you choose to charge your EV in the late evening (8pm-10pm)? **Q3.7d:** Why <<do / would>> you choose to charge your EV in the overnight (10pm-7am)?
Base: Those charging late evening (n=32 / 75), Those charging overnight (n=32 / 75)

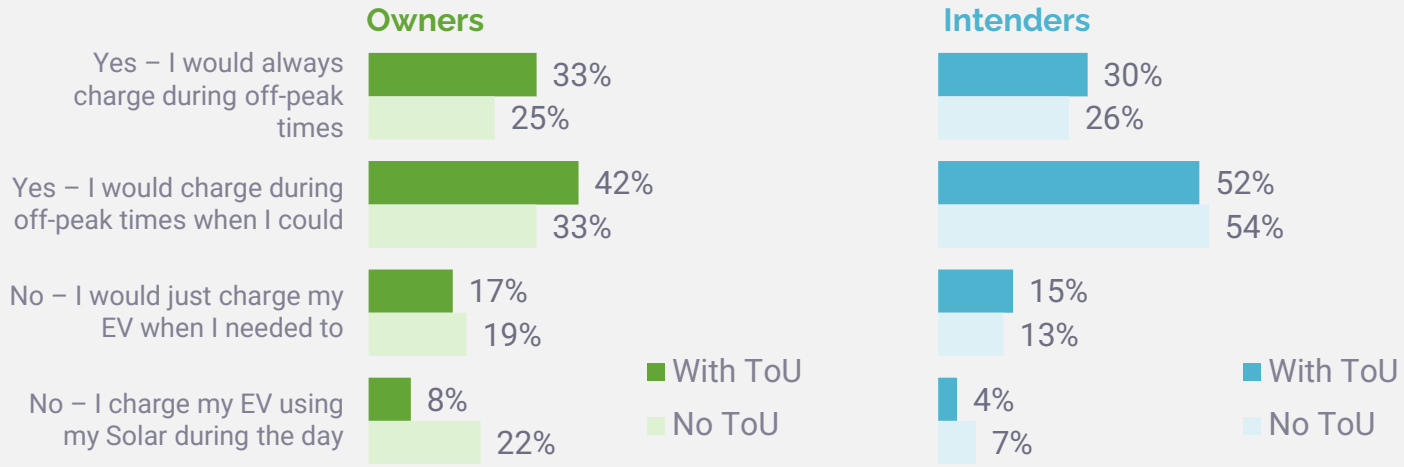
For many owners, there will be no perceived benefit in the cost to charge their EV during off-peak times

- Just a quarter of EV owners are currently on a ToU tariff, with almost two fifths on a single flat rate, while many are simply unaware.
- However, if they are on a ToU tariff, they do state that this would influence when they charged their EV.

Tariff Awareness



ToU Tariff Change behaviour

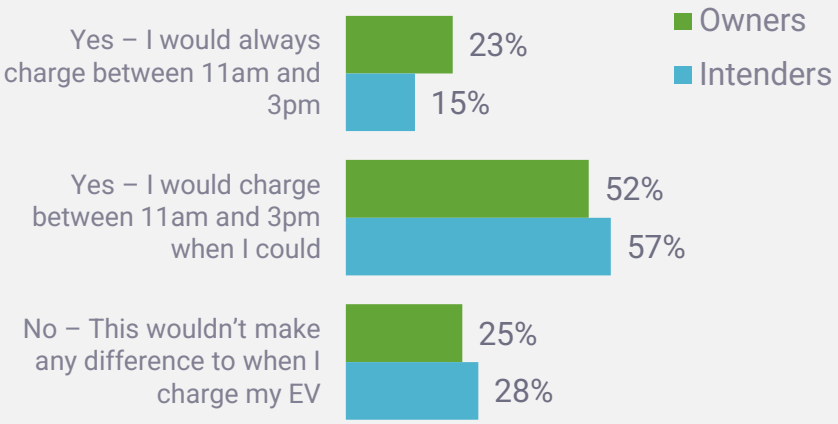


Q3.14: Are you aware of the type of tariff your home is on? **Q3.15:** Does or would having a tariff, where you pay a lower rate during off peak times, influence when you charged your EV?
Base: All owners (n=48), All intenders (n=81), those with a ToU tariff (n=12 / 27); those not on a ToU tariff (n=36 / 54)

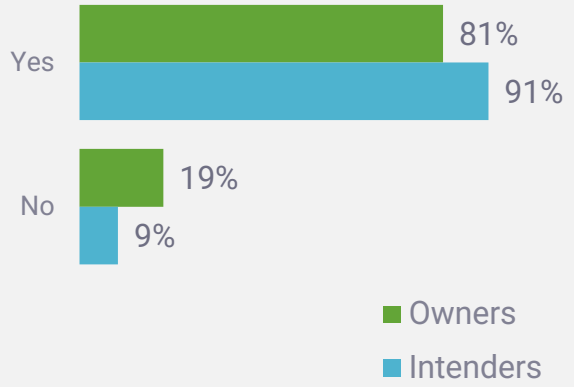
Other concepts also show a desire amongst EV owners to adjust their behaviour to reduce the cost of charging

- Similar to the ToU tariff, many state they would adjust their behaviour if there was a low off-peak period between 11am-3pm.
- There is strong appeal in the ability to reduce the cost to charge by trickle charging overnight.

Low-off peak price (11am-3pm)



Overnight trickle charge



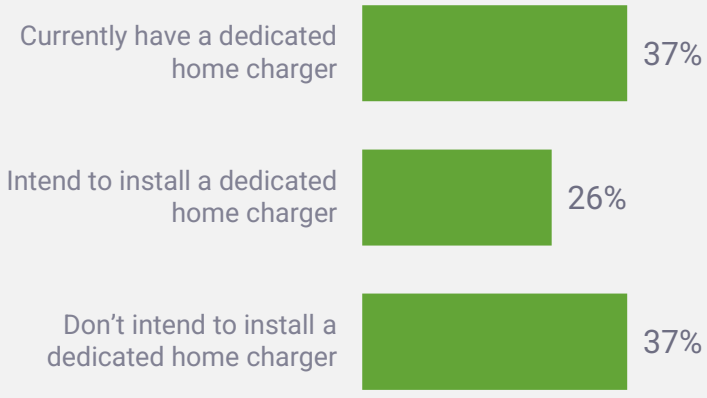
Q3.16: Does or would having a tariff with an extremely low off-peak price between 11am and 3pm influence when you charged your EV?
Q3.15: If you could reduce the cost to charge your EV each night by trickle charging slowly overnight, would you trickle charge?
Base: All owners (n=48), All intenders (n=81)

However many owners are not taking advantage of technology to help them manage the cost of charging

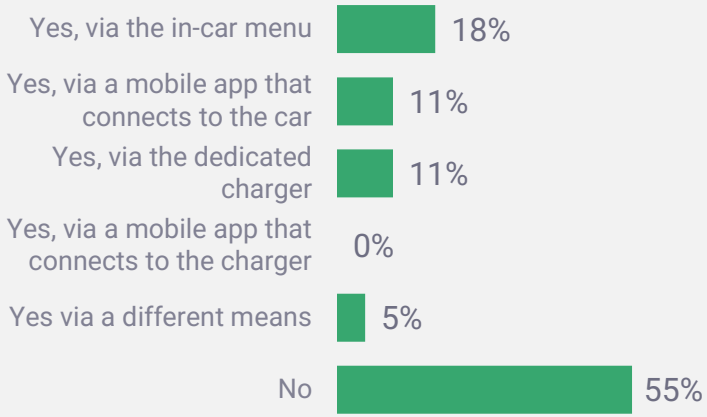
- Less than half have a currently use some for of auto scheduling, while only slightly more are using an energy monitoring device.

Owners

Fast charger



Auto scheduling



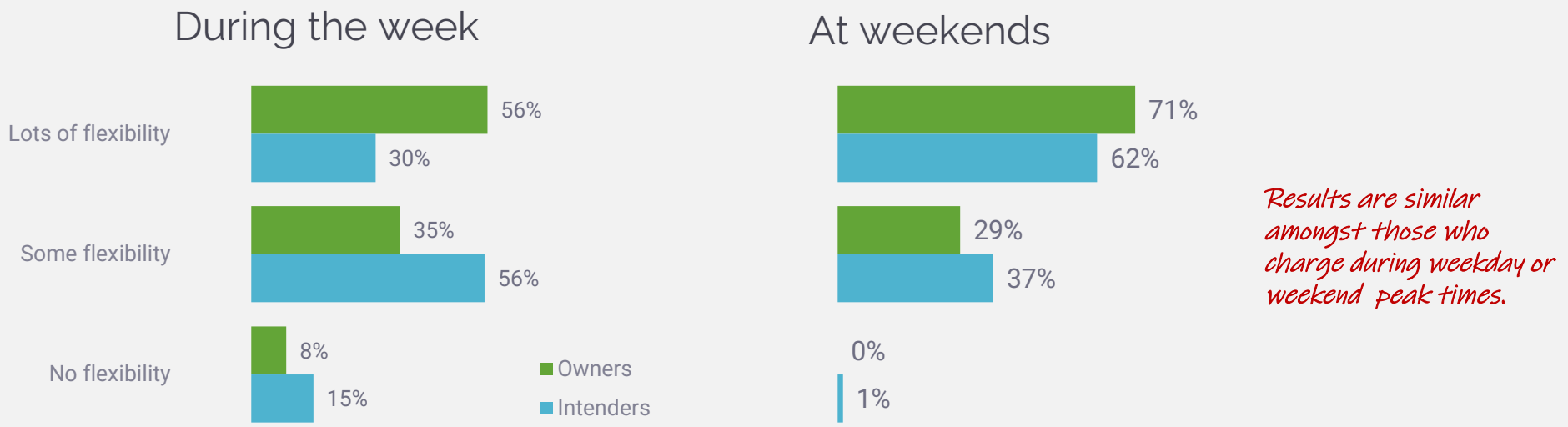
Energy monitoring

Q3.2: Do you currently have or intend to install a wall mounted dedicated fast charger for your EV at home? **Q3.10:** Do you set up an automatic schedule for your car to charge on certain days or at certain times?
Q3.11: Do you have an energy monitoring device to see how much electricity your EV uses when charging at home?
Base: Owners charging at home (n=38)

WILLINGNESS TO ADAPT

There is a opportunity to change charging behaviour, with many having lots of flexibility to do so

- Less then 1 in 10 owners state they have no flexibility in when they charge their EV during the week, with everyone have some degree of flexibility at the weekends.

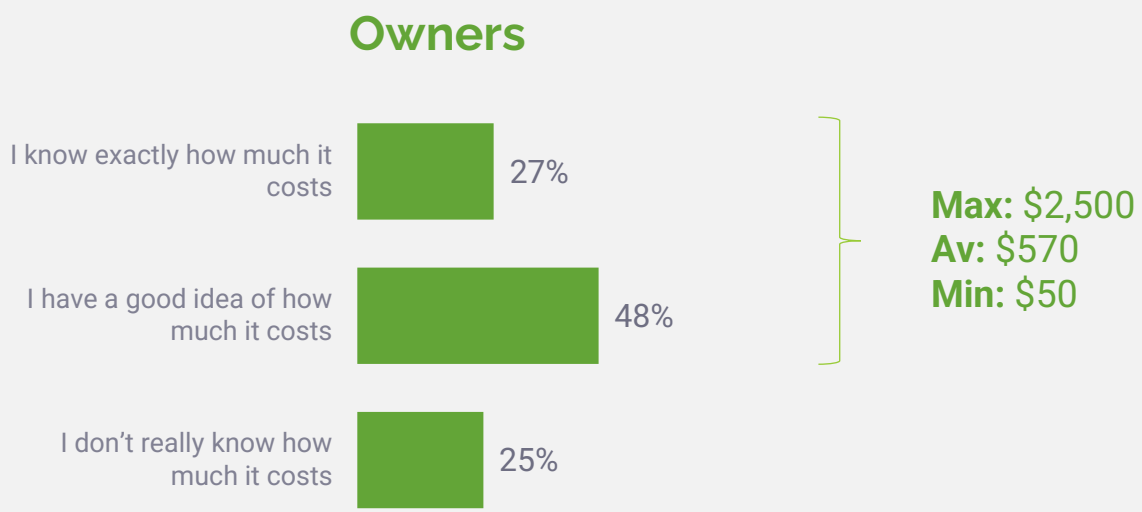


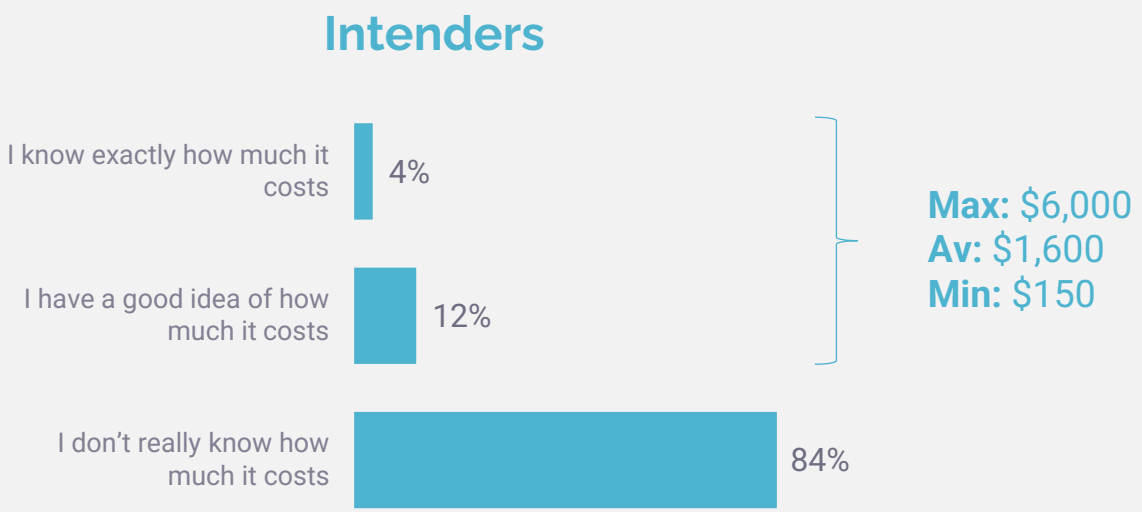
Results are similar amongst those who charge during weekday or weekend peak times.

Q4.0: How much flexibility <<do / would>> you have in choosing the time of day you charge your EV at home:
Base: All owners (n=48), All intenders (n=81)

Three quarters of EV owners understand how much they pay to charge their EV

- Compared to those looking to purchase an EV, where there is still little knowledge.





Q3.12: To what extent are you aware of how much it <<costs / might cost>> to charge your EV at home?
Base: All owners (n=48), All intenders (n=81)

When asked directly EV owners stated they would need to save $160 (29%) off the cost of charging to change their behaviour

- Interestingly, while indicative only, this was slightly lower (23%) amongst wealthier group of Tesla owners.

How much would you need to save? ***spontaneous***

Results are similar for those currently on a ToU tariff.

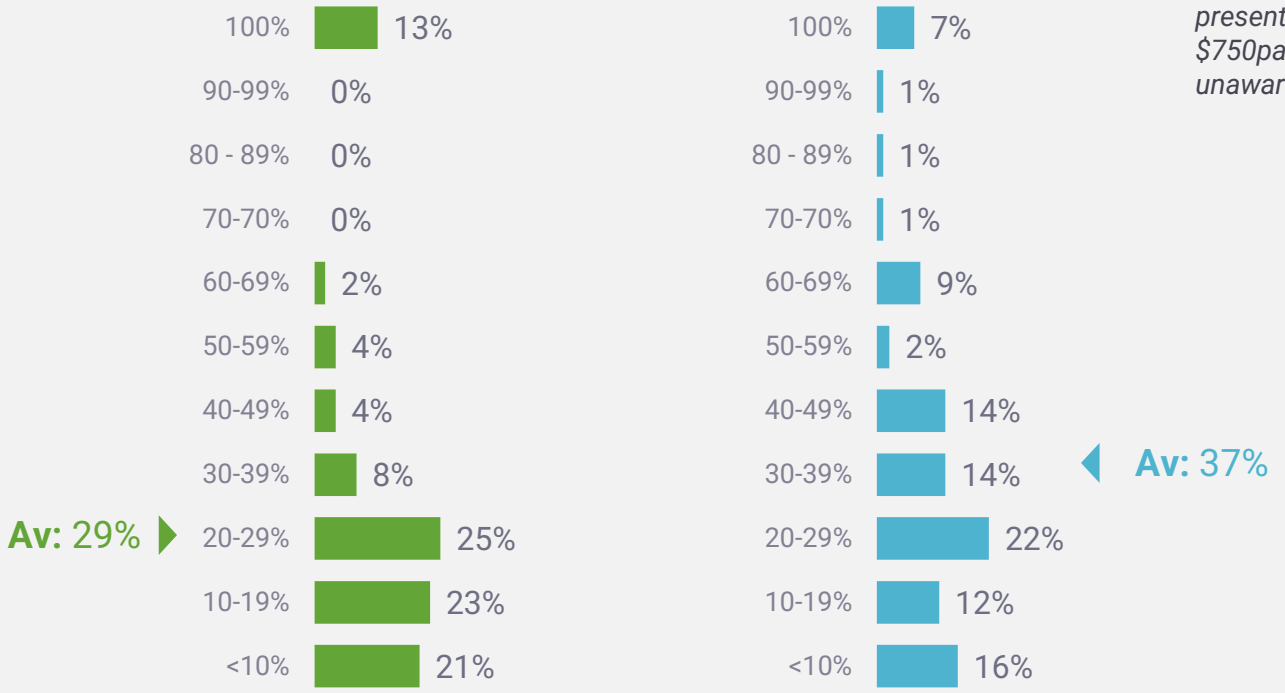
Owners

Max: $750
Av: $160
Min: $1

Intenders

Max: $2,000
Av: $290
Min: $1

As a % of total cost of charging*

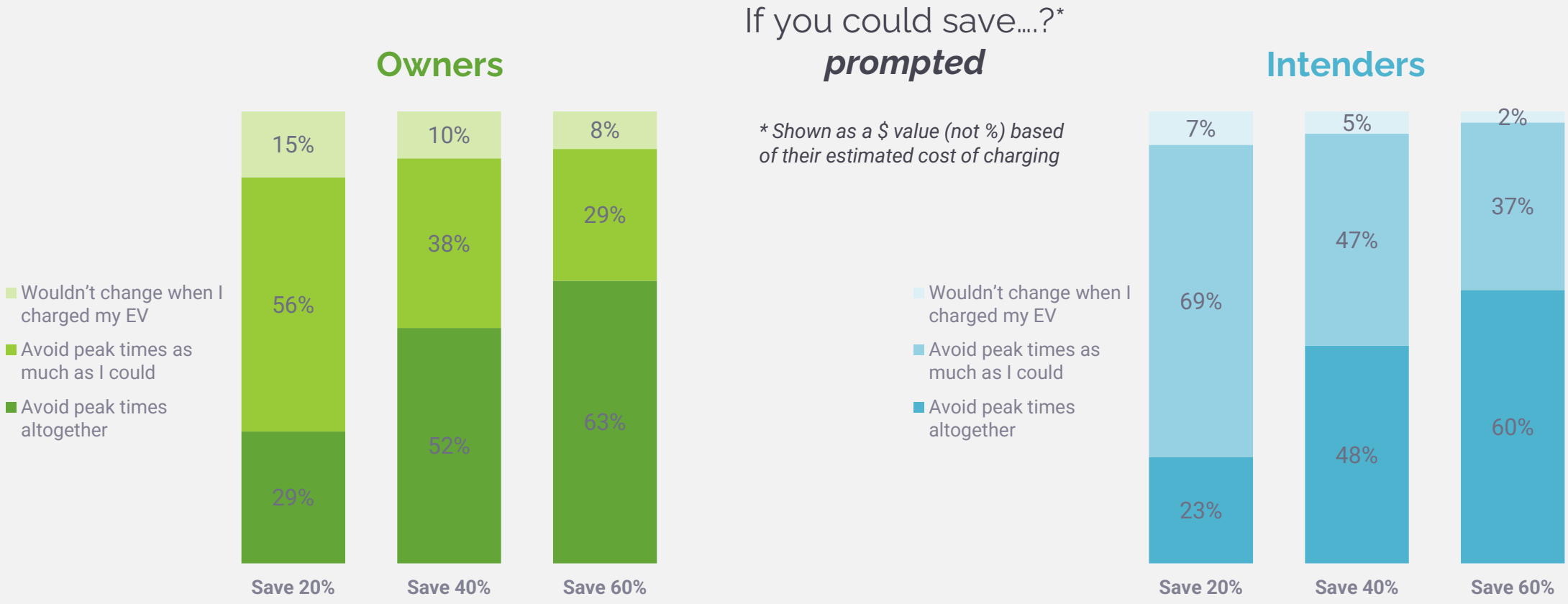


** Cost of charging was presented as $750pa for those unaware*

Q4.1: How much would you need to be able to save off this amount in order to avoid charging at peak times (7am-9am in the morning and 5pm-8pm in the evening) as much as possible?
Base: All owners (n=48), All intenders (n=81)

When prompted, we again seen that the optimal point to influence behaviour would be between 20-40%

- At 40%, 9 in 10 would at least try and avoid peak times, with half stating they would altogether.
- There is limited improvement when the saving increase to 60%.



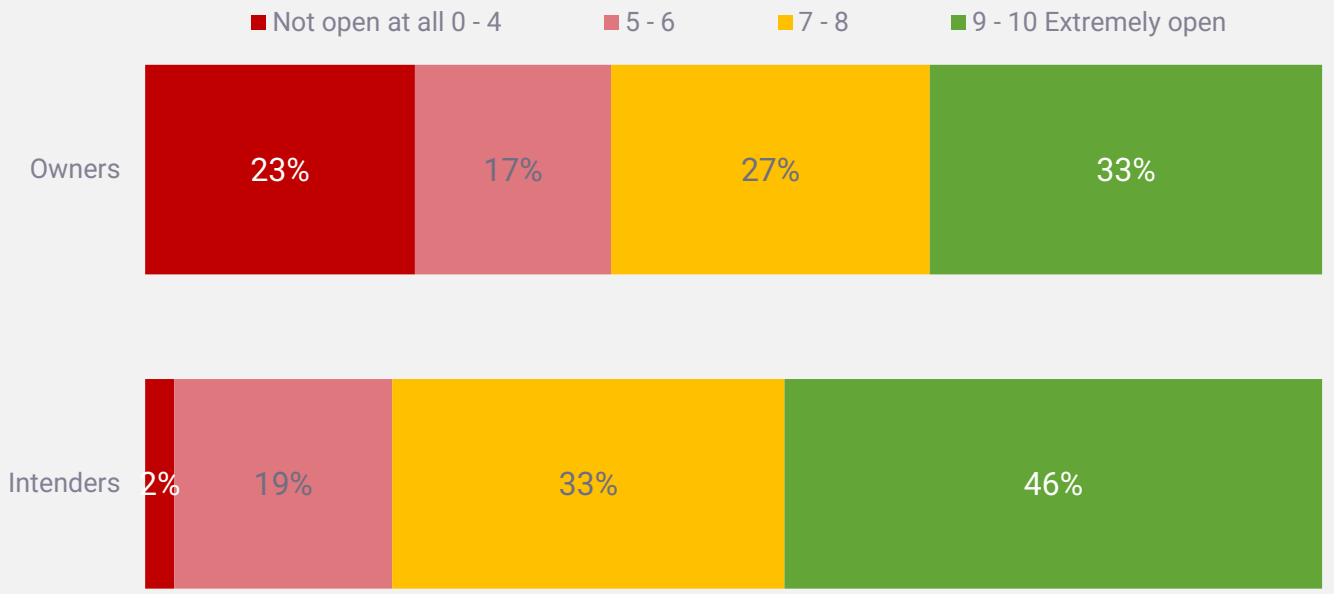
Q4.2: If you could save 20% / 40% / 60% off the annual cost of charging your EV, to what extent would you avoid charging at peak times (7am-9am in the morning and 5pm-8pm in the evening)?
Base: All owners (n=48), All intenders (n=81)

A third of EV owners were extremely open to the concept of a third party taking control of their charging

- While a quarter were not open at all, this still represents a strong result to a concept that would typically generate a negative reaction.

Indicatively, Tesla owners are more open to the concept (42% 9 -10)

For EV users who have smart chargers installed, there may be a future option that customers with EV's and smart chargers may choose which allows electricity distributors (such as Evoenergy) or retailers to remotely control the EV charging to help minimise the cost by ensuring the EV charges quickly when prices are low, and slows down or stops when prices are high. This would result in lower electricity bills for the customer.



Q4.9: How open would you be to this concept?
Base: All owners (n=48), All intenders (n=81)

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