WHAT ARE THE DRIVERS AND BARRIERS FOR SMART CHARGING ACCEPTANCE AND WILLINGNESS TO PAY IN BELGIUM?

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Vlaanderen is ondernemen

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OBJECTIVES OF THE STUDY

What do existing Belgian EV drivers know about smart charging and what are their attitudes towards the technology?

- Acceptance
- Intention to use
- Willingness-to-pay

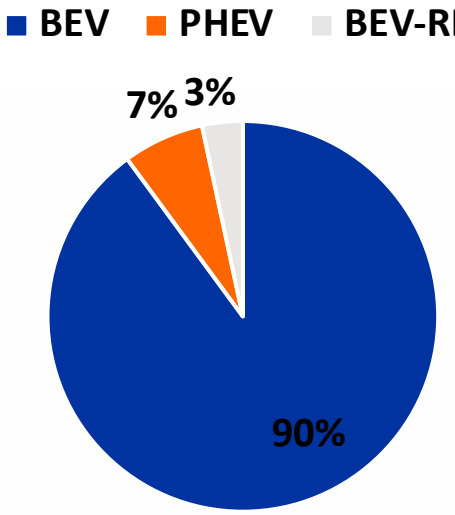
METHODOLOGY

1. Baseline survey drafting through expert guided questionnaire
2. Full survey conducted in October-November of 2020
   - Mobility & Behavior
     - Establishing baseline behavior
   - Attitudes the technology
     - Likert-scaled responses
     - Scenarios for quantitative assessment of flexibility for smart charging
   - Willingness-to-pay
     - Relative price requirements
3. 120 respondents complete and usable for analysis

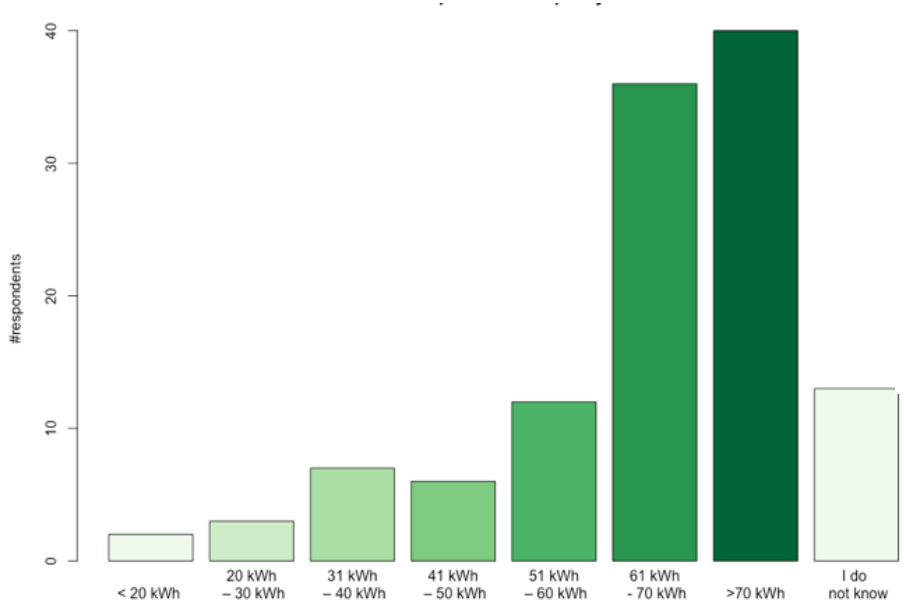
RESULTS

BASELINE CHARGING BEHAVIOR

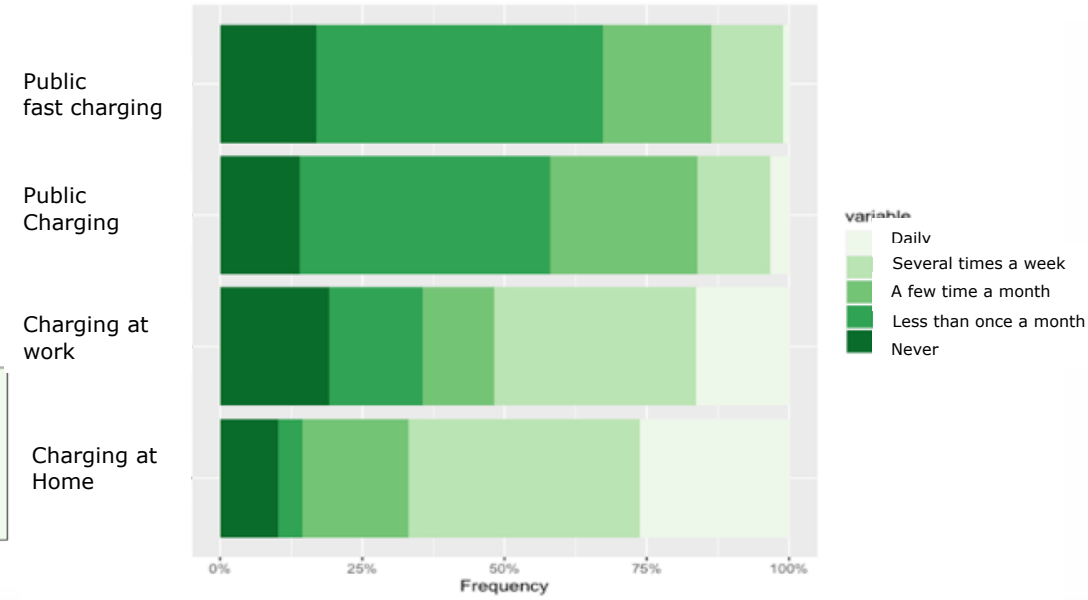
EV Type Distribution



Battery Capacity Distribution



Charging Frequency Per Location



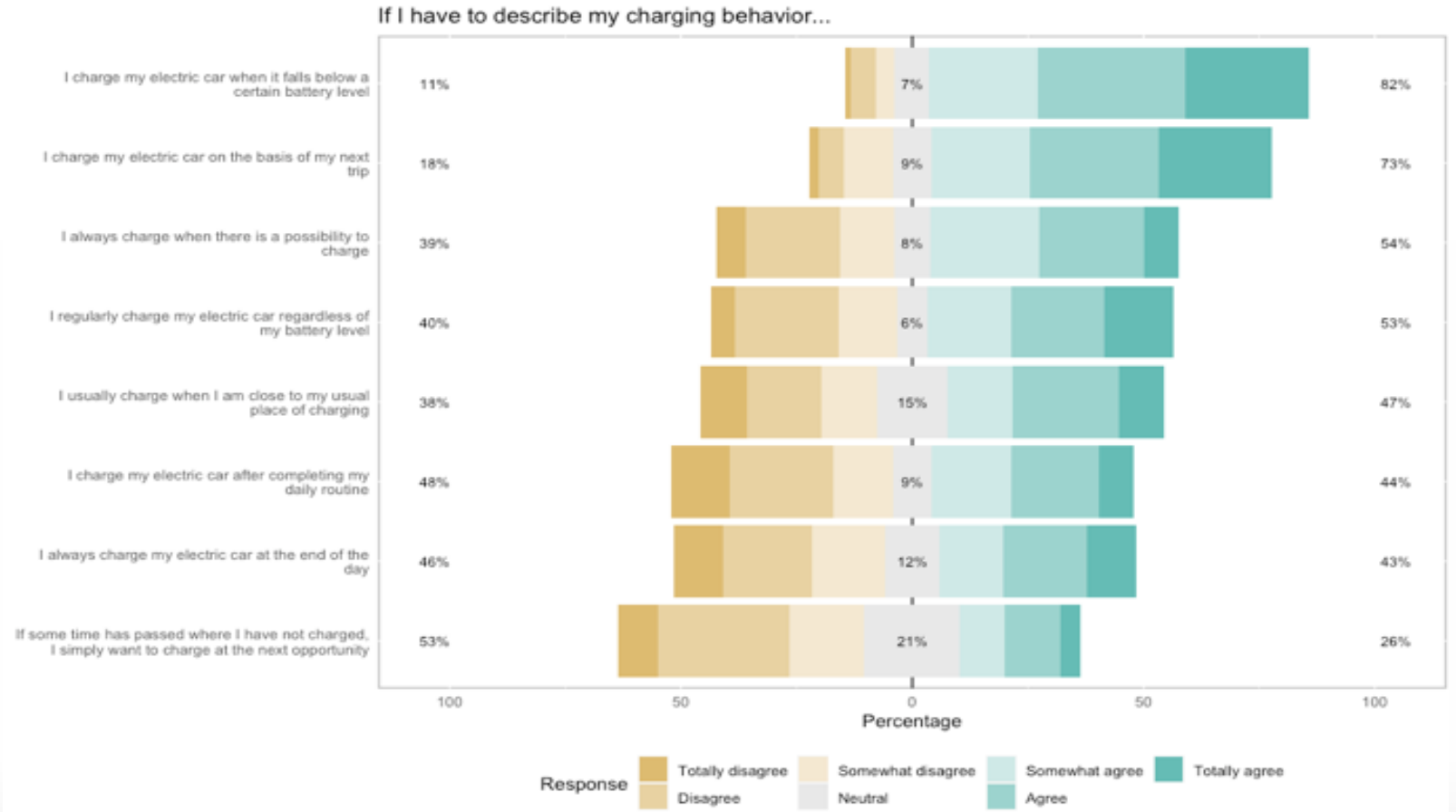
RESULTS

BASELINE CHARGING BEHAVIOR

- Low State-of-Charge (SoC) threshold biggest trigger (82% agreement)

- Charging based on basis of next trip (73% agreement)

- Routine behaviors more divided (around 50-50% split agreement-disagreement)

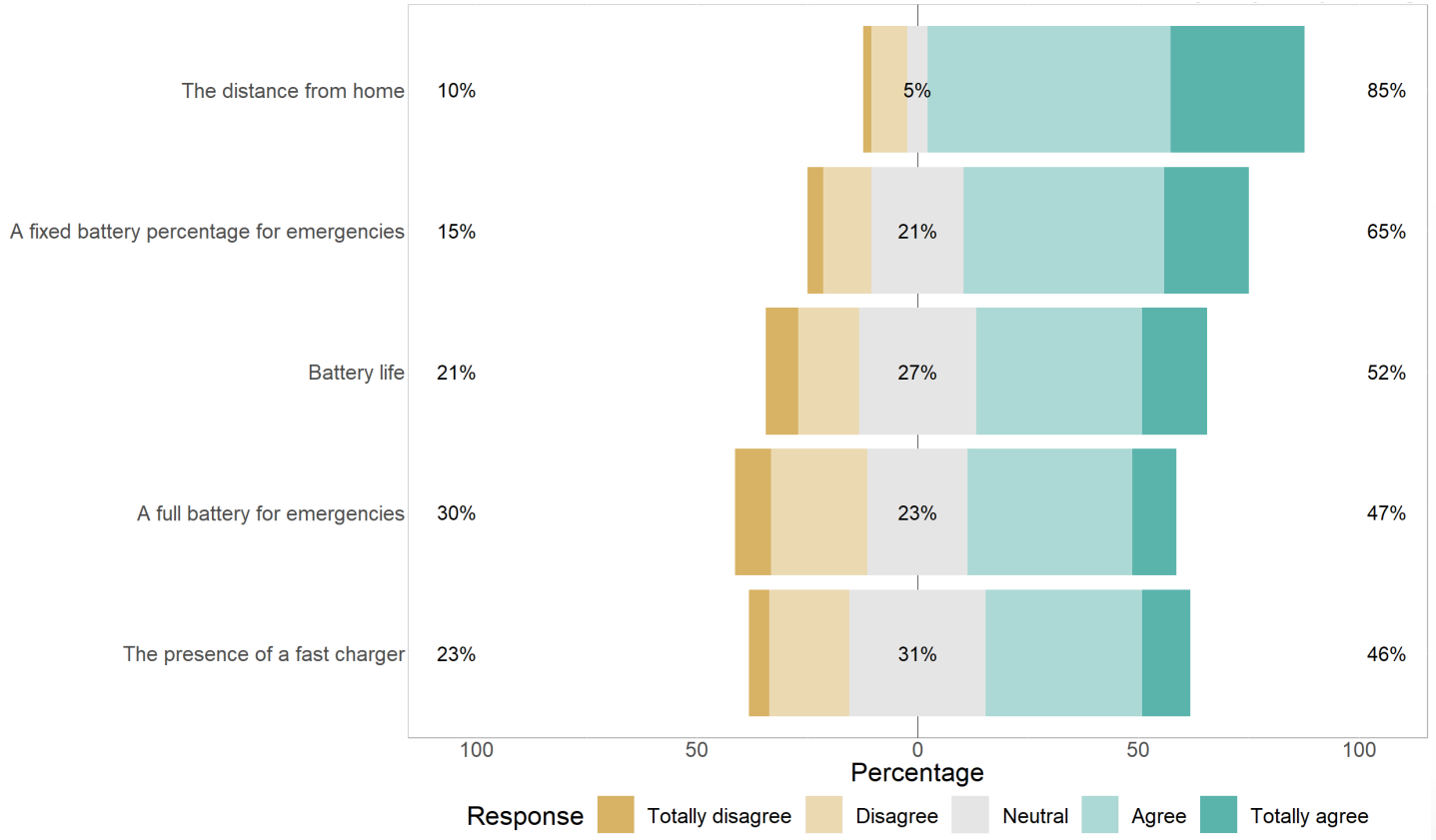


RESULTS - BASELINE CHARGING BEHAVIOR

DESIRED STATE-OF-CHARGE

- "Desired" is to be achieved at end of charging session
- Distance to home and emergencies are most important determinants for desired SoC
- Indication of respondents' consciousness of battery life
- Presence of fast charger is important for about half the respondents

Which factors do you take into account to decide the desired battery state-of-charge…

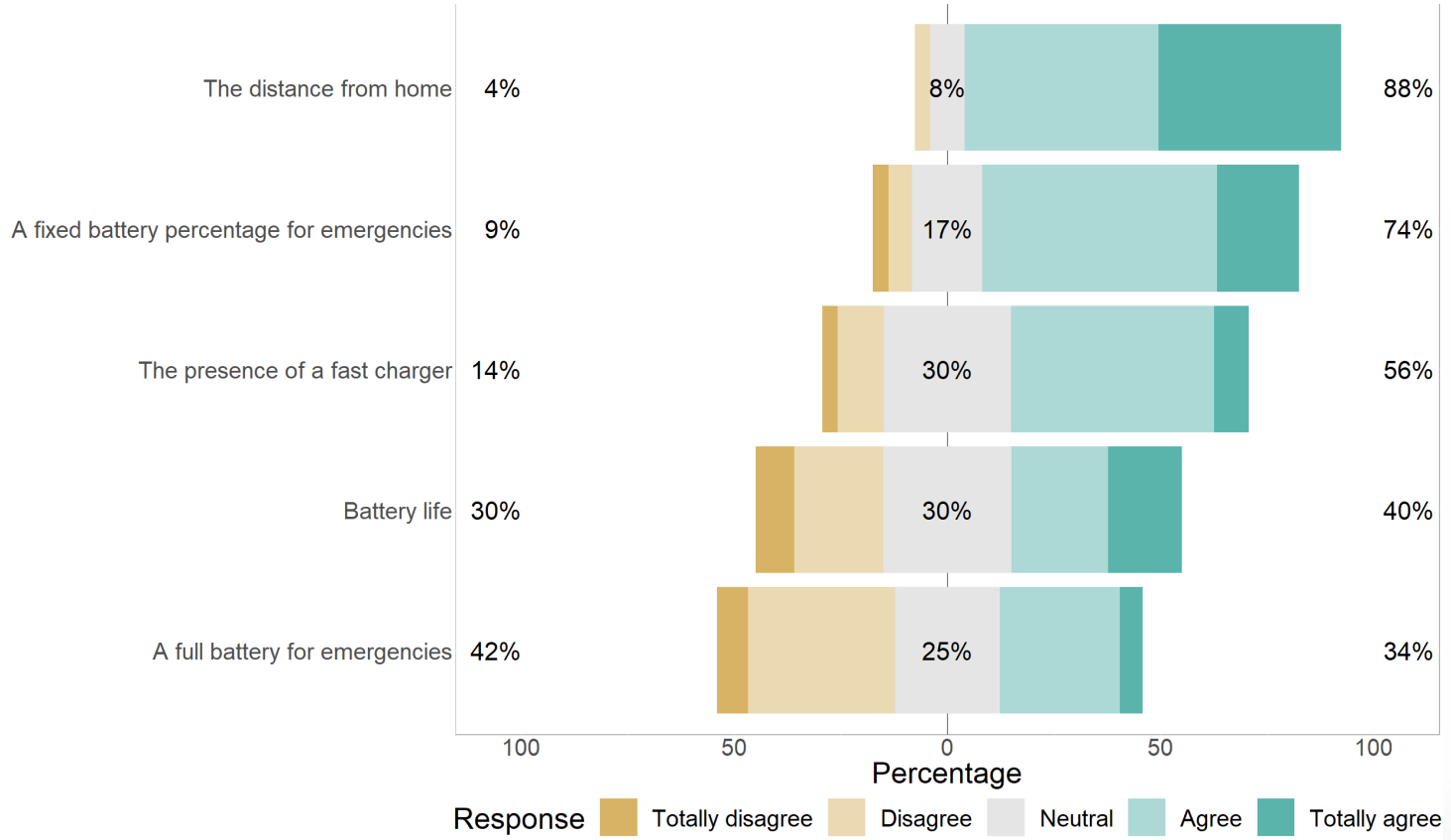


RESULTS - BASELINE CHARGING BEHAVIOR

MINIMUM STATE-OF-CHARGE

- "Minimum" SoC is to be achieved as soon as possible
- Very similar values to the "desired" SoC
- Slightly higher values for the presence of fast charger and lower values for full battery indicate slight openness to flexible charging

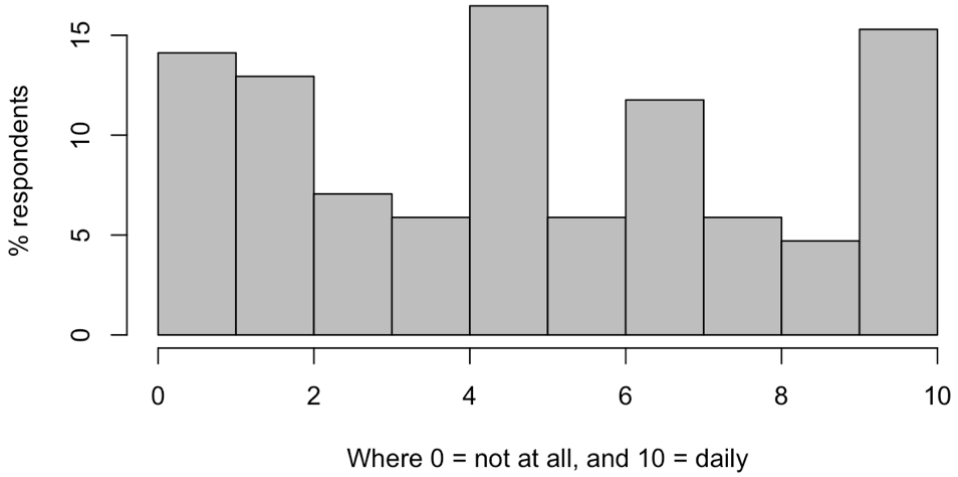
Which factors do you take into account to decide the minimum battery state-of-charge?



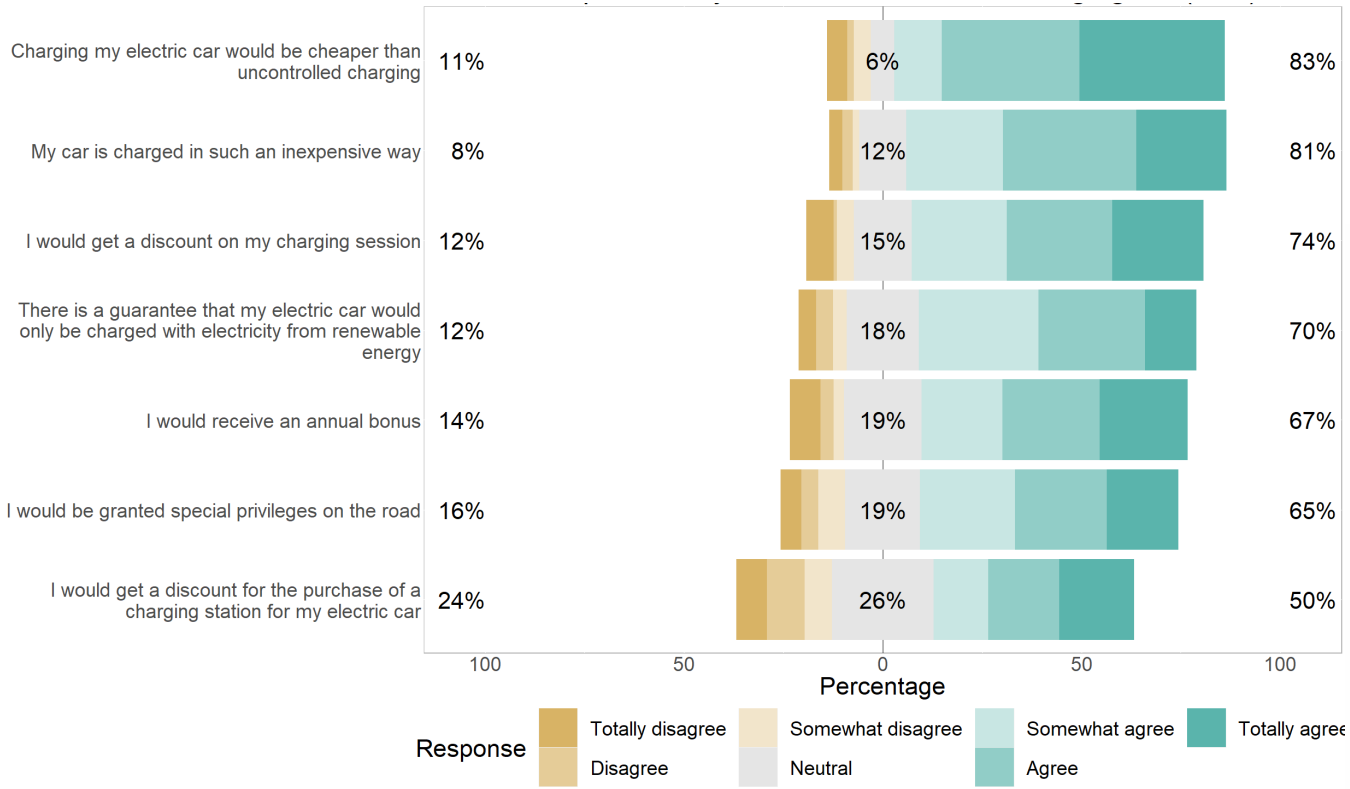
RESULTS

ATTITUDES & DRIVERS FOR SMART CHARGING

Intention to use smart charging in the next two years:



I would provide my electric car for smart charging if …

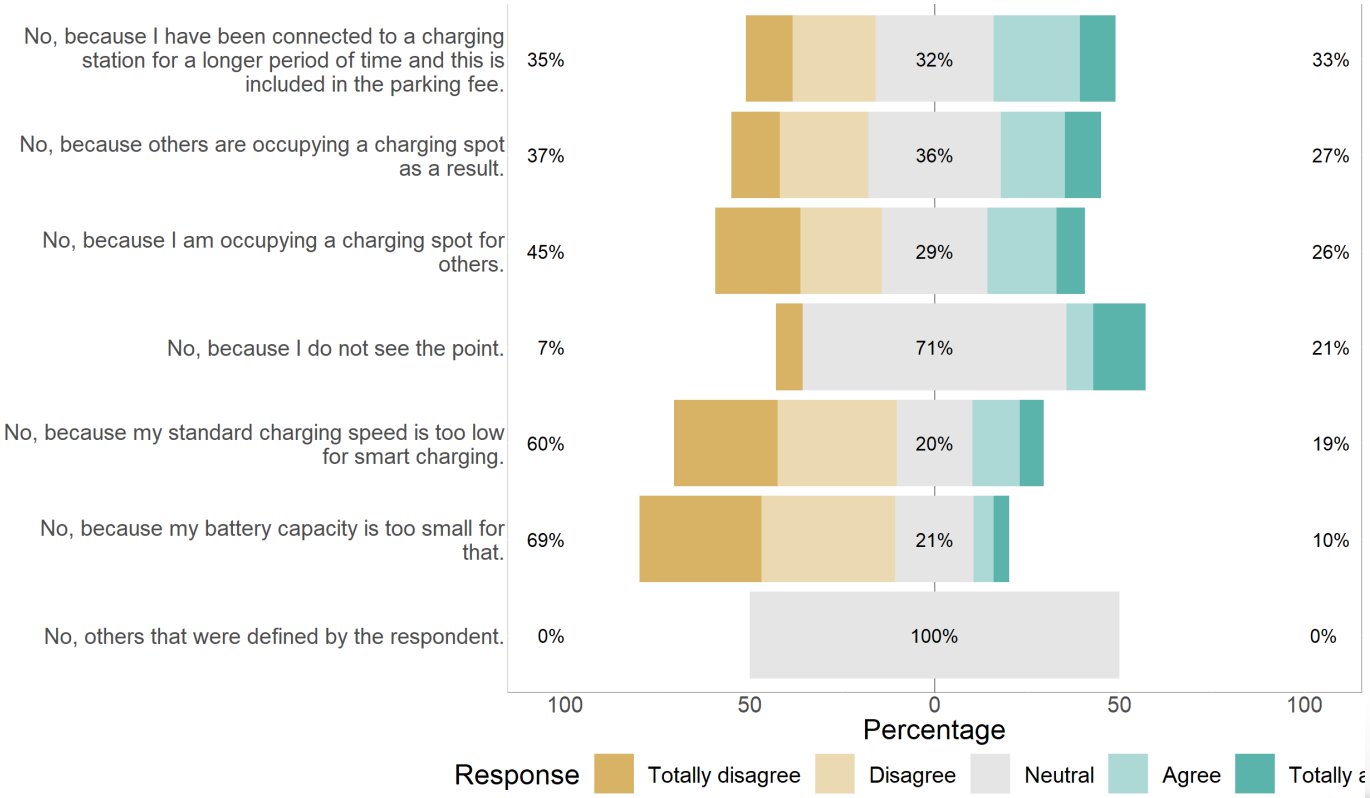


Highest level of agreement with financial incentives for smart charging

RESULTS

ATTITUDES AND BARRIERS FOR SMART CHARGING

Would you be prepared to use a station with smart-charging technology in the future?



- Overall attitudes skewed towards openness to smart-charging
- Link with parking management divides responses

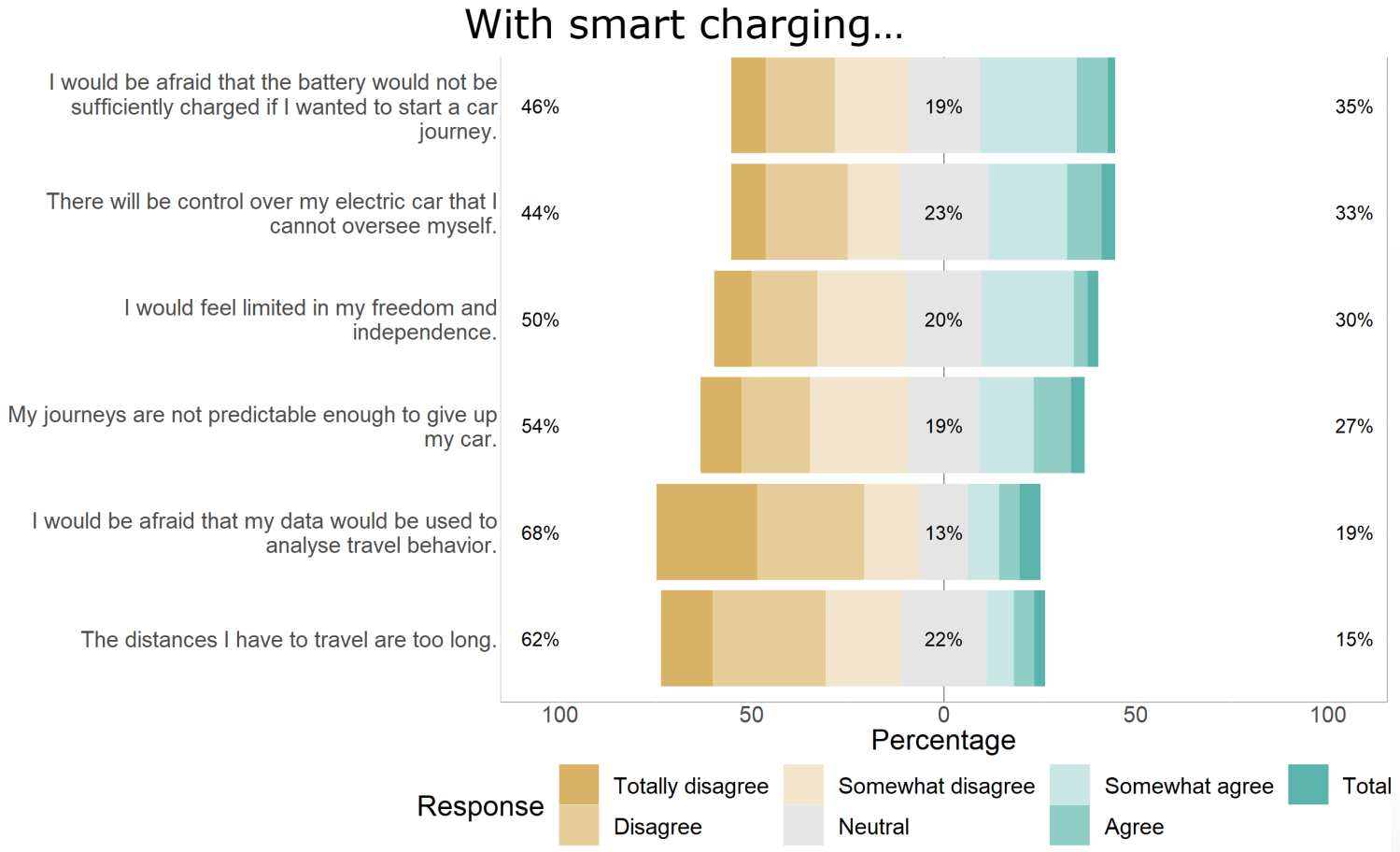
RESULTS

ATTITUDES AND BARRIERS FOR SMART CHARGING

- Most of the respondents seem confident they will not be negatively impacted by smart charging.

- About 1/3 of the respondents would be afraid that the battery will not be sufficiently charged after a smart charging

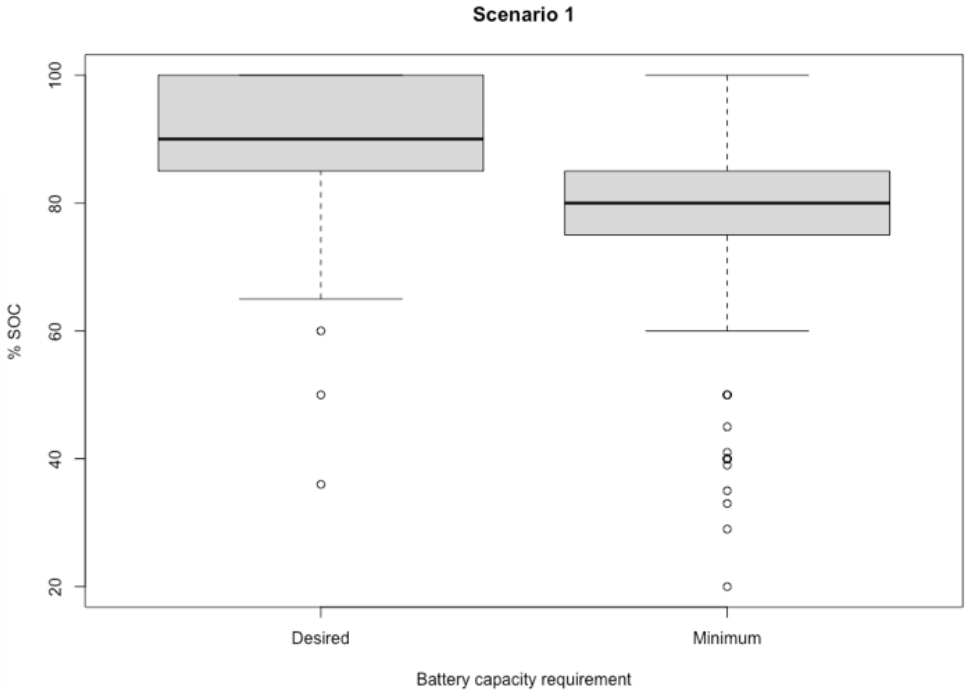
- Potential negative impacts smart charging highly correlated with intention to use.



RESULTS

SCENARIOS FOR QUANTIFYING FLEXIBILITY

- Average minimum SoC is around 80% and average desired SoC around 90%. This leaves little room for flexible charging
- The results show very similar preferences across scenarios
- Further study needed to single out determinants



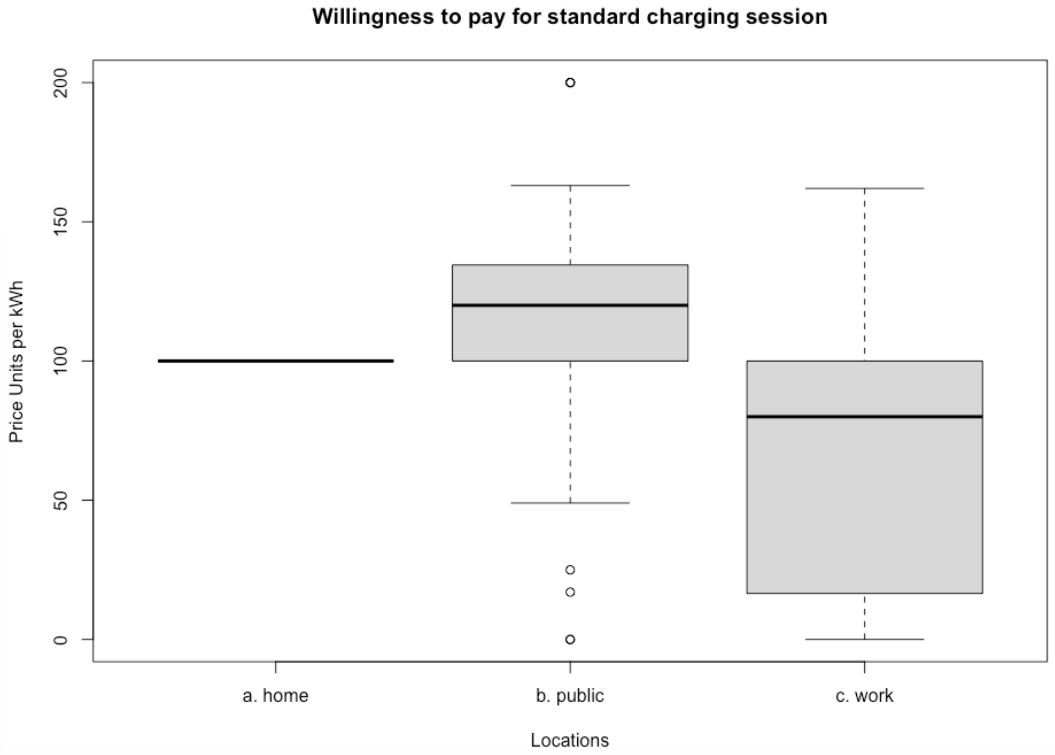
Scenario 1 semi-flexible charging:

You arrive at your **work place** and your electric car still has **20% battery capacity**. You have to leave **8 hours** later for an appointment where you need **75% battery capacity**. During this period, you can fully charge your car and the ***desired battery capacity*** is **guaranteed**. You also have the possibility to charge at your destination. The charging moment is done in a **semi-flexible way**.

RESULTS

WILLINGNESS-TO-PAY

- Definition of a unit price per kWh with baseline of 100 units/kWh set to Home charging
- Respondents accept slightly higher price for public charger (15% on average, 20 % median)
- Respondents expect lower price for charging at work (average 36%, median 20%)



RESULTS

WILLINGNESS-TO-PAY SMART CHARGING

- Overall, the respondents expect to pay less for flexible charging
  - 32% less for flexible charging at work
  - 19% less for a flexible charging at home
  - 4% less for flexible charging on public infrastructure
- Differentiation per group:
  - Absence of home charger affects WTP for public flexible charging (-11%)
  - (No) Interest in smart charging affects WTP.

Respondent profiles	Home		Public		Work	
	Mean	Sd.	Mean	Sd.	Mean	Sd.
All respondents (n = 93)	-19%*	20%	-4%	27%	-32%*	34%
Company car (n = 66)	-21%*	21%	-5%	26%	-33%*	32%
Private car (n = 19)	-15%*	15%	-1%	30%	-29%*	40%
Home charger (n = 59)	-16%*	17%	0%	26%	-30%*	31%
No home charger (n = 17)	-26%*	26%	-11%	30%	-36%*	41%
Interest smart charging (n = 67)	-19%*	18%	-4%	27%	-33%*	34%
No interest smart charging (n = 11)	-27%*	34%	-7%	31%	-41%*	31%
More intention to use smart charging (n = 47)	-17%*	17%	-3%	28%	-28%*	34%
Less intention to use smart charging (n = 30)	-19%*	19%	-6%	28%	-35%*	29%

CONCLUSIONS

ATTITUDES

- **3/4**of the respondents are **interested in smart charging**, but the intention to use smart charging within two years varies.

- **Financial incentives** are the **most important driver** for using **smart charging**

- Most respondents do not think they will be negatively impacted by smart charging but barriers linked to **range anxiety** (mainly for flexibility reasons) have a significant **negative correlation** with **the intention to use**.

- The study limits itself at this point to the **attitudes prior to exposure** to smart charging and should **validate** or observe changes in attitudes in **real-life smart charging**

- **Contextual changes** since the conduction of the survey (increasing EV penetration, increase in public infrastructure, volatile and rising energy prices, increasing battery capacities of EVs) could **affect attitudes**

CONCLUSIONS

WILLINGNESS-TO-PAY

- The average respondent **expects to pay less for smart charging** compared to the baseline price of standard (uncontrolled) charging at home but **deviation differs per driver group**

- The **objective of smart charging** important in drivers attitude towards smart charging but **little to no influence on the price expectancy**

- Respondents demonstrate quite **conservative behaviour** (minimum SoC close to the desired SoC) with only **limited part of the battery capacity available for flexible charging**

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