

Shared cars, flexible charging: When cost savings meet additional effort

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**OPENing the electricity ecosystem
to multiple actors in order to have a real
decarbonization opportunity**

Background: OPENTUNITY Project

OPENing the electricity ecosystem to multiple actors in order to have a real decarbonization oppor**TUNITY**



Quick Intro: Flexibility in the Electricity System

Volatility is one **big challenge** in decarbonizing the energy system

- The sun does not always shine
- Air does not always move
- Rivers do not always carry the same amount of water
- ...

*This is why some say:
„I TOLD YOU, RENEWABLE ENERGY
DOES NOT WORK!!!!11“*

but

- Hot water does not have to be *this hot* all day long
- Washing machines do not always have to run NOW
- Electric vehicles do not always need to be charged NOW
- ...

*... and this is where Flexibility
joins the table.*



What does it need to make use of Flexibility?

1. A **decent amount of information** about the current state of the electricity grid:
 - I. Transmission System
 - II. Distribution System
 - III. Energy use by users/consumers/prosumers
2. A **meaningful idea** about:
 1. What the system needs
 2. What users/consumers/prosumers can theoretically contribute
3. Users/consumers/prosumers **who actually participate**

Tech- and IT

Tech- and IT

Tech- and IT

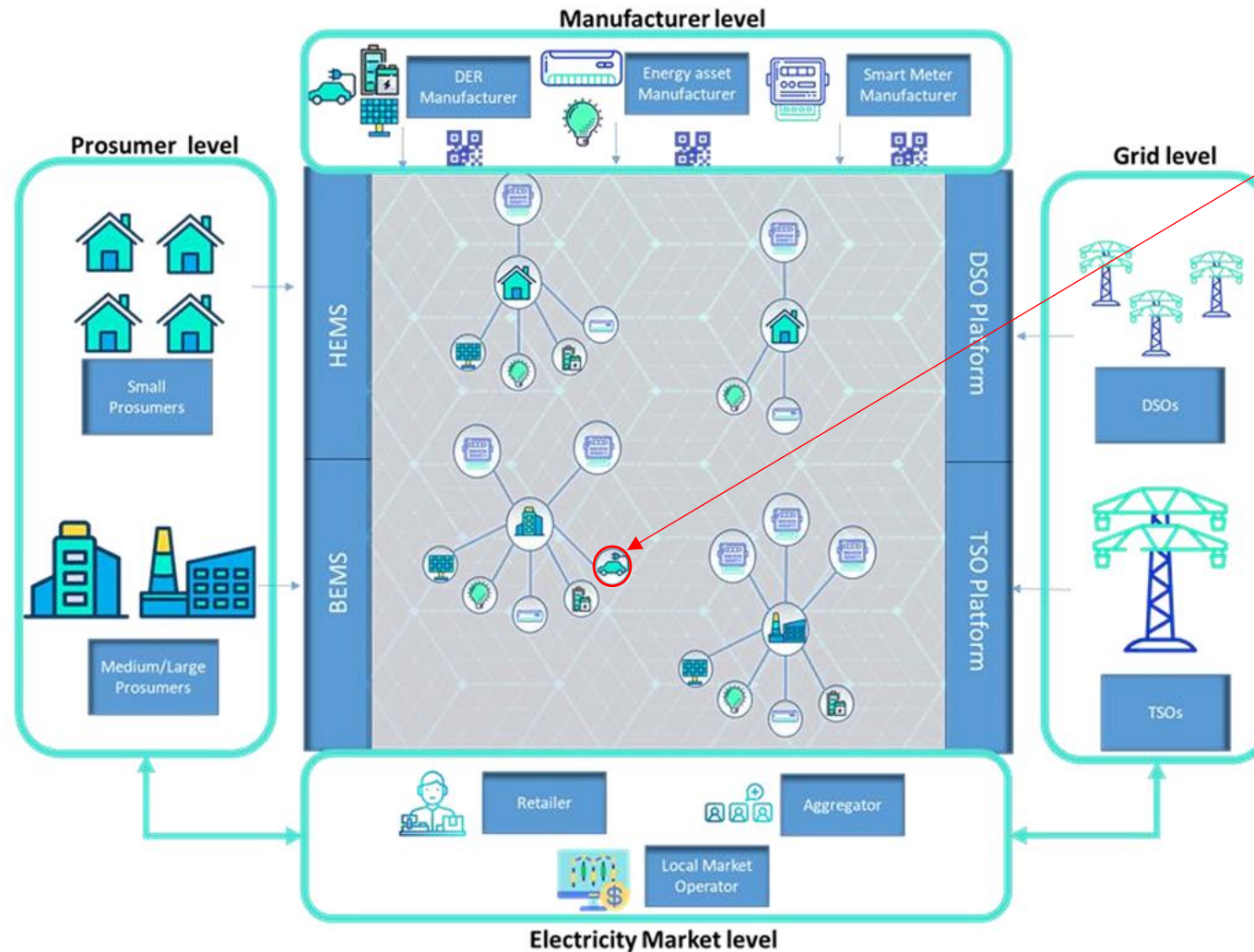
Tech- and IT

Tech- and IT

Social Science



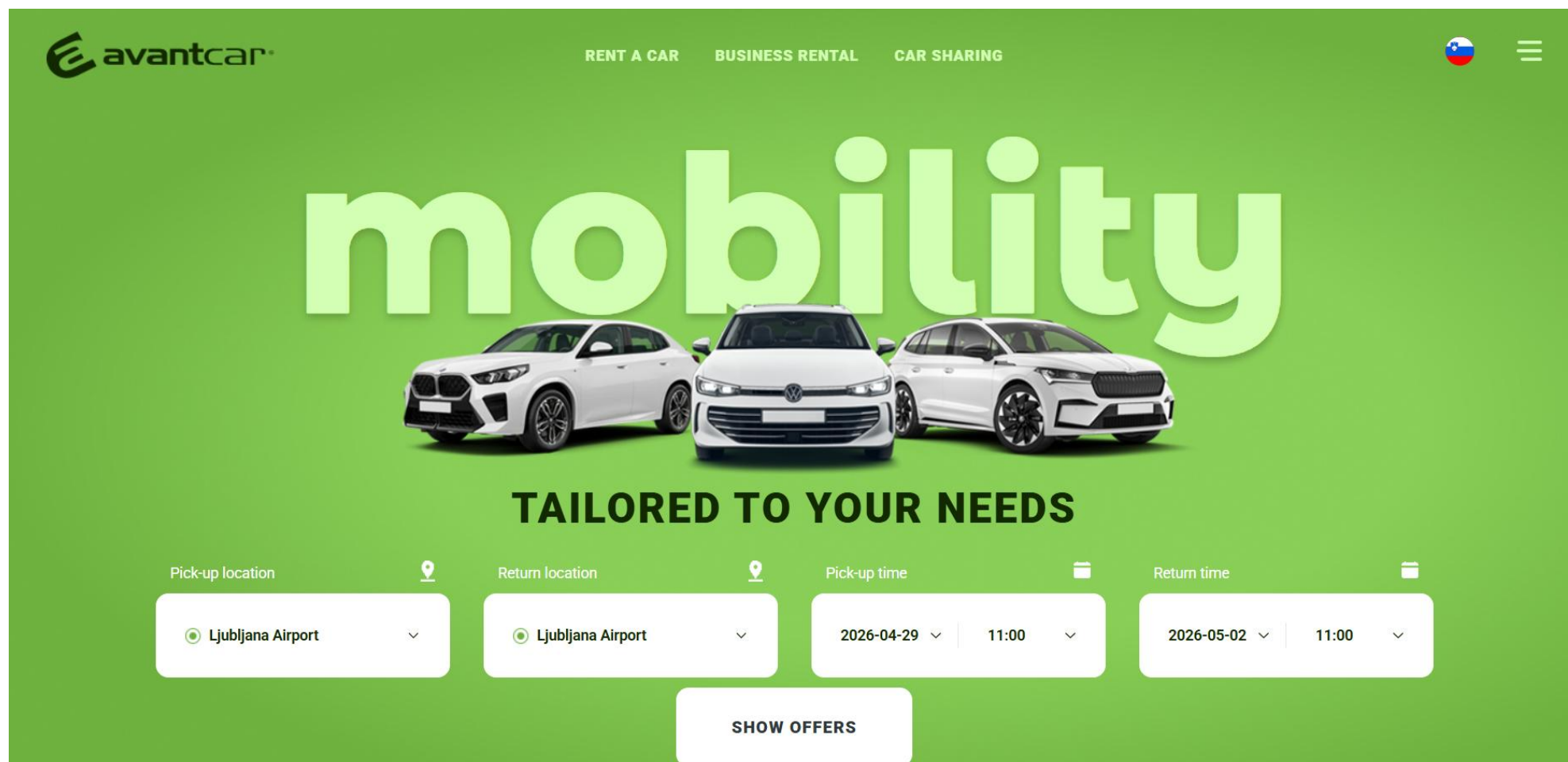
What does it need to make use of Flexibility?



Carsharing Use Case



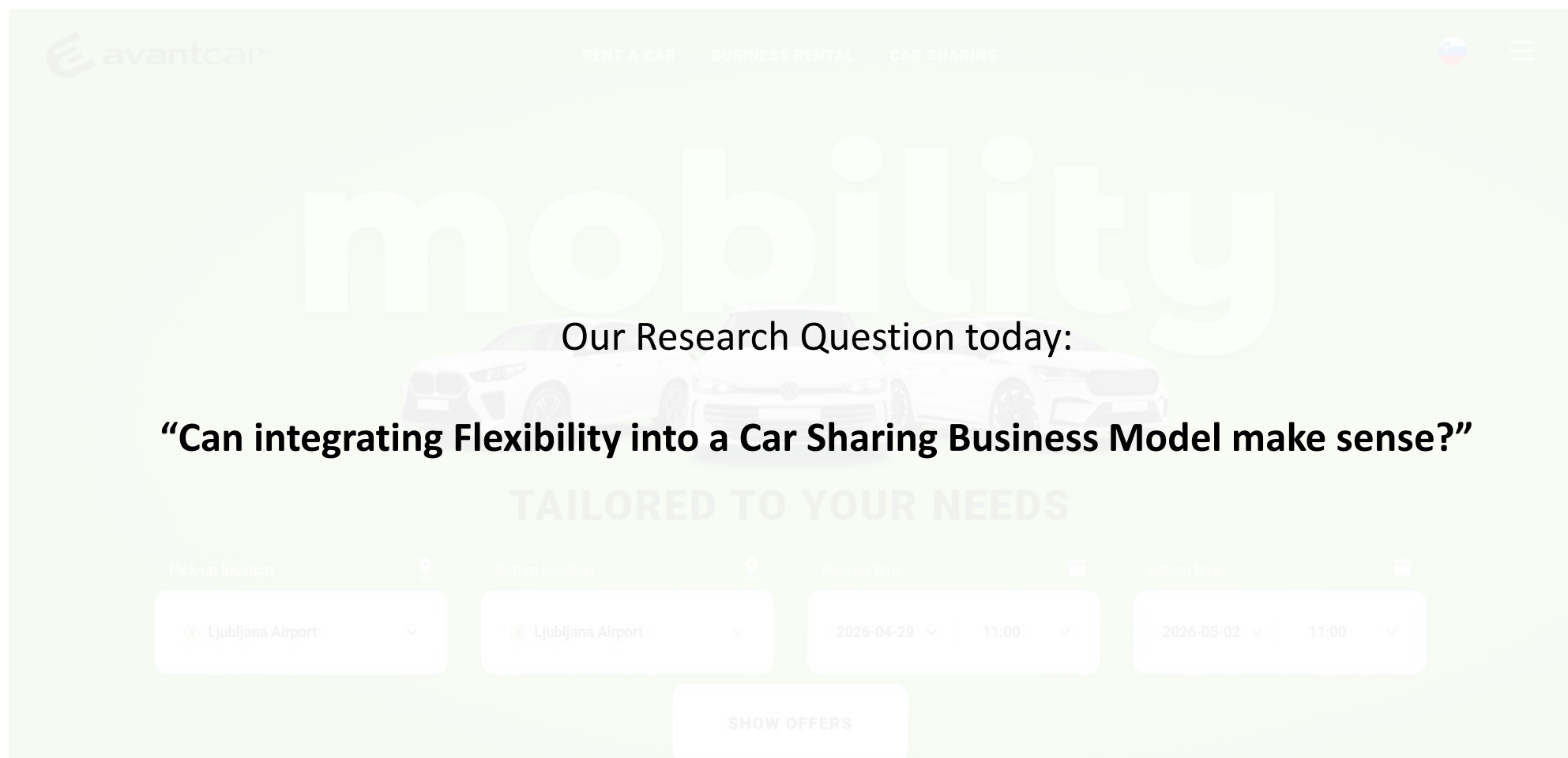
Car Sharing Use Case



The image shows a screenshot of the Avantcar website's car sharing search interface. The background is a vibrant green. At the top left is the Avantcar logo. In the top right, there are navigation links for 'RENT A CAR', 'BUSINESS RENTAL', and 'CAR SHARING', along with a Slovenian flag and a menu icon. The word 'mobility' is written in large, light green lowercase letters across the center. Below it, three white cars are displayed. Underneath the cars, the text 'TAILORED TO YOUR NEEDS' is centered. The search form consists of four main sections: 'Pick-up location' with a dropdown menu set to 'Ljubljana Airport'; 'Return location' with a dropdown menu set to 'Ljubljana Airport'; 'Pick-up time' with two dropdown menus set to '2026-04-29' and '11:00'; and 'Return time' with two dropdown menus set to '2026-05-02' and '11:00'. A white button labeled 'SHOW OFFERS' is positioned below the search form.



Car Sharing Use Case



Integrating Flexibility into a Car Sharing Business Model?

Flexible Charging on-the-go



Illustrative Image, made with Google Gemini Pro

Flexible Charging at home

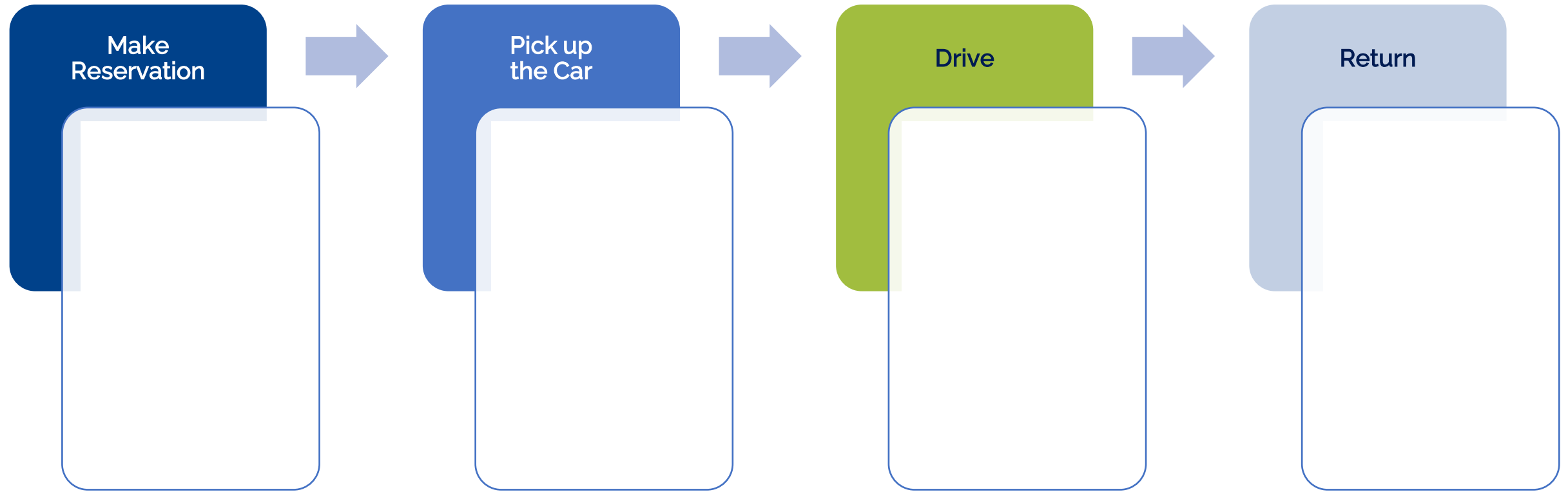


Illustrative Image, made with Google Gemini Pro



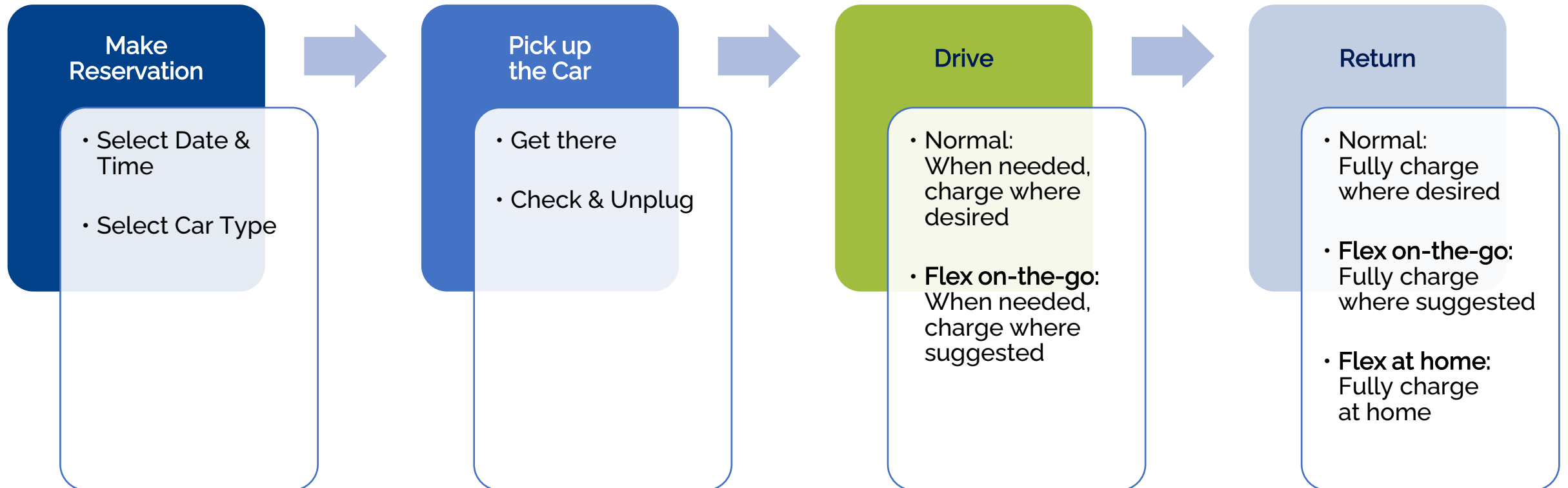


Car Sharing User Journey





Car Sharing User Journey



Survey Details

Target: A convenience-sample of Avantcar customers
 Distribution: E-Mail with link to survey

Survey design: joint effort of JR and Avantcar
 Technical implementation: Avantcar

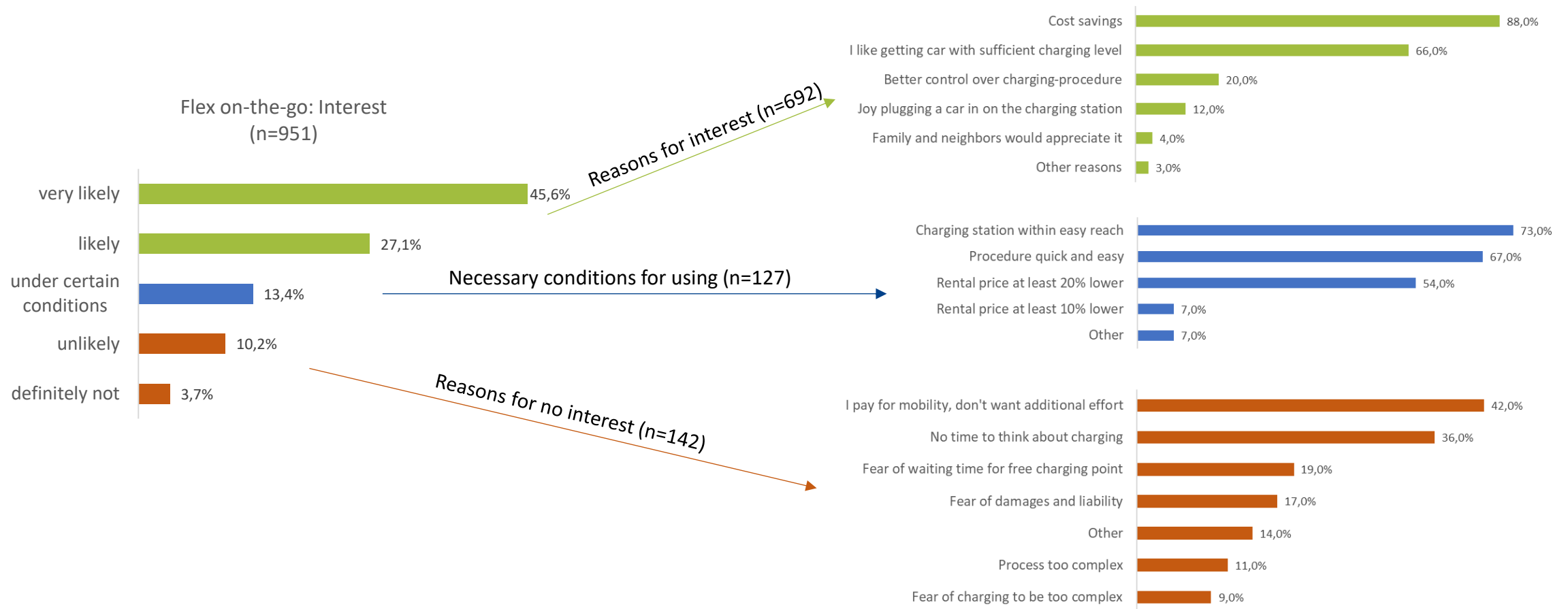
Invites sent: 18.954
 Full responses: 951

The image displays six screenshots of survey questions, organized into two rows and three columns. Each screenshot shows a specific question and a list of possible answers.

- Top Row, Left:** "Survey with Avant car" - General considerations and a list of survey questions.
- Top Row, Middle:** "Use Case 1: Avant2Go private customer and business customer charging the Avant2Go car during EV at home" - A question about private parking space availability.
- Top Row, Right:** "Use Case 2: Avant2Go customers independently playing in the Avant2Go car at the Avant2Go dedicated charging station location" - A question about a new service for dedicated charging.
- Middle Row, Left:** "Use Case 1: Avant2Go customers independently playing in the Avant2Go car at the Avant2Go dedicated charging station location" - A question about a new service for dedicated charging.
- Middle Row, Middle:** "Use Case 2: Business customer charging their EV at the company's site" - A question about a new service for business charging.
- Middle Row, Right:** "Use Case 3: Private EV customer charging their EV at their home" - A question about a new service for private home charging.
- Bottom Row, Left:** "Use Case 1: Avant2Go customers independently playing in the Avant2Go car at the Avant2Go dedicated charging station location" - A question about a new service for dedicated charging.
- Bottom Row, Middle:** "Use Case 2: Business customer charging their EV at the company's site" - A question about a new service for business charging.
- Bottom Row, Right:** "Use Case 3: Private EV customer charging their EV at their home" - A question about a new service for private home charging.

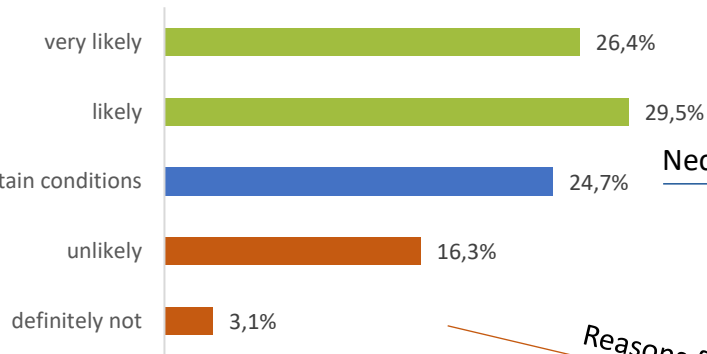


Flex on-the-go

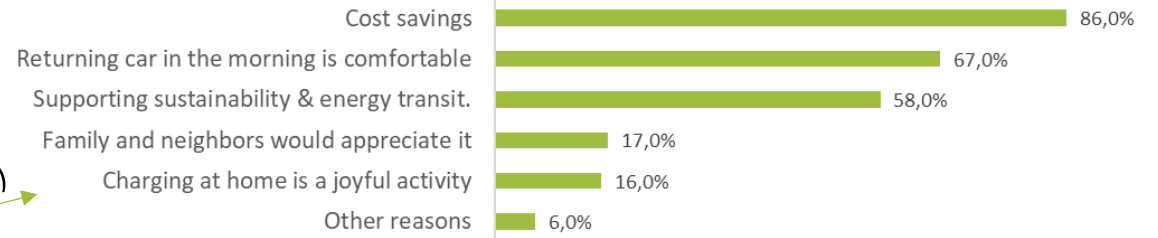


Flex at home

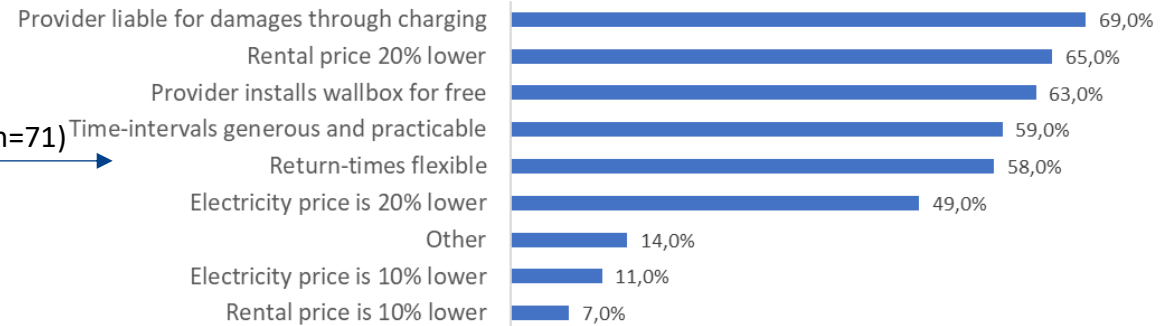
Flex at home: Interest (n=288)



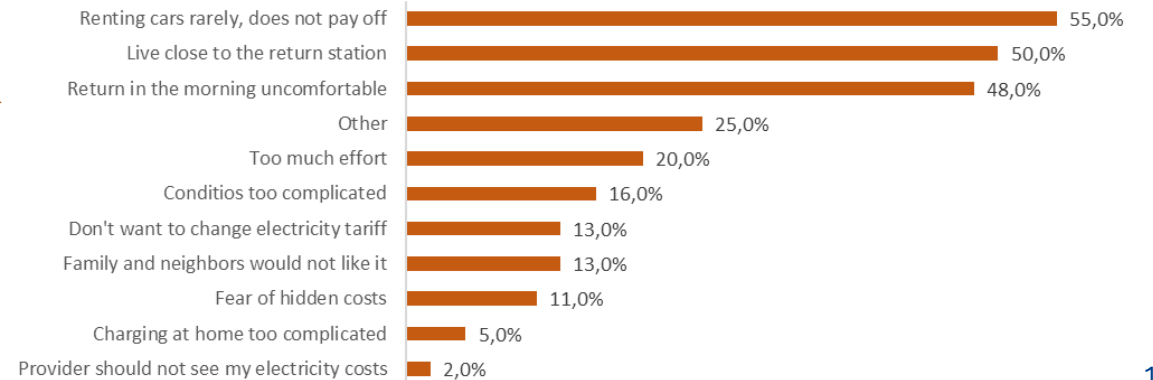
Reasons for interest (n=161)



Necessary conditions for using (n=71)

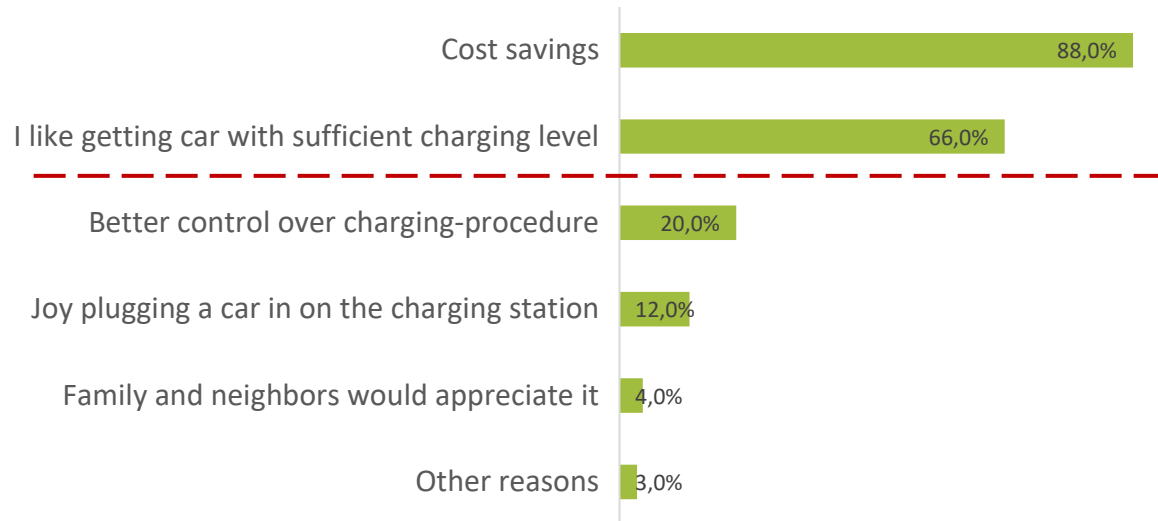


Reasons for no interest (n=56)

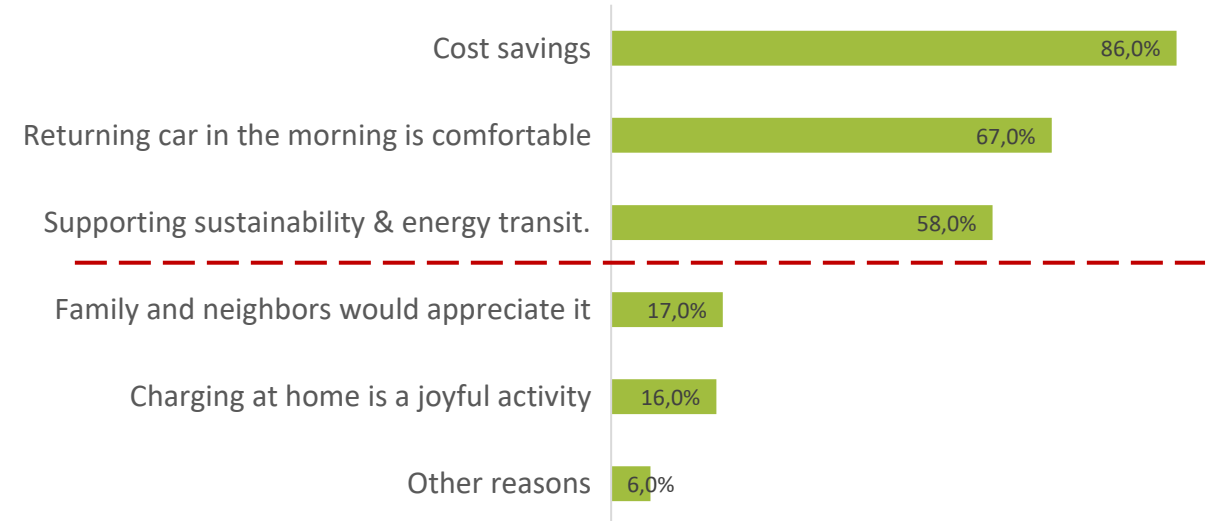


Reasons for interest

Flex **on-the-go** (n=692)

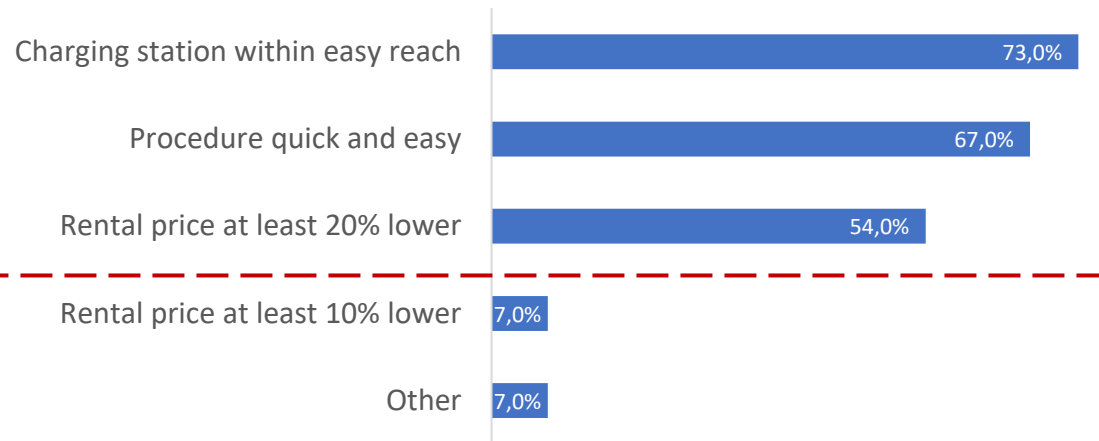


Flex **at home** (n=161)

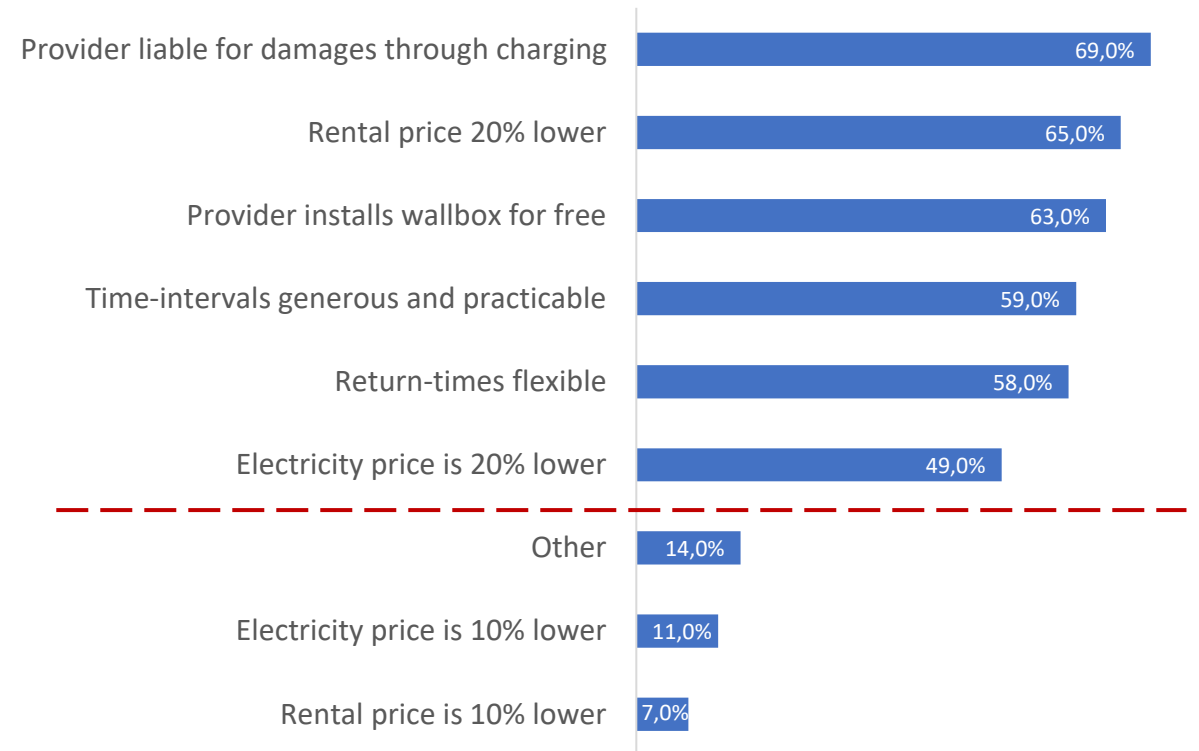


Necessary conditions for usage

Flex **on-the-go** (n=127)

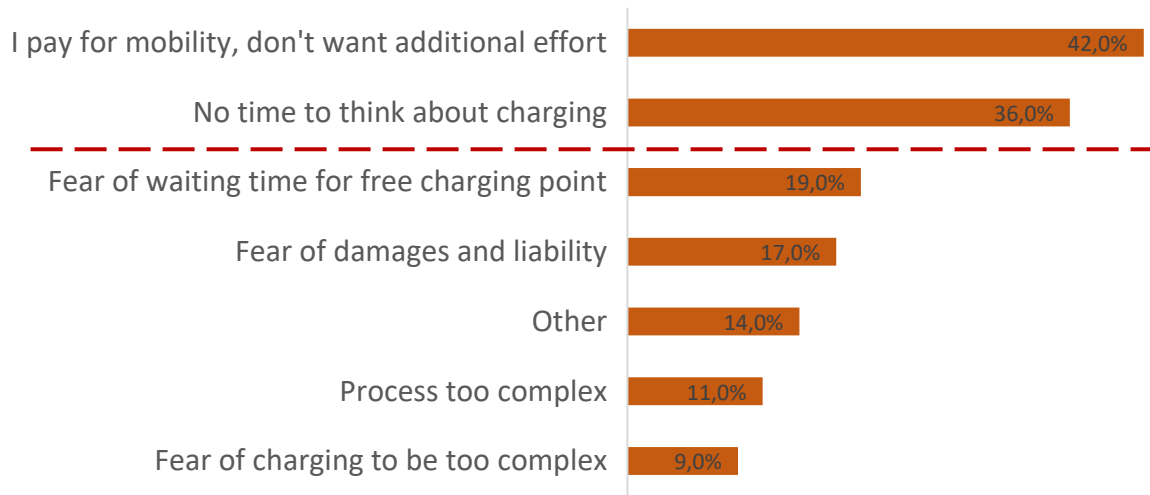


Flex **at home** (n=71)

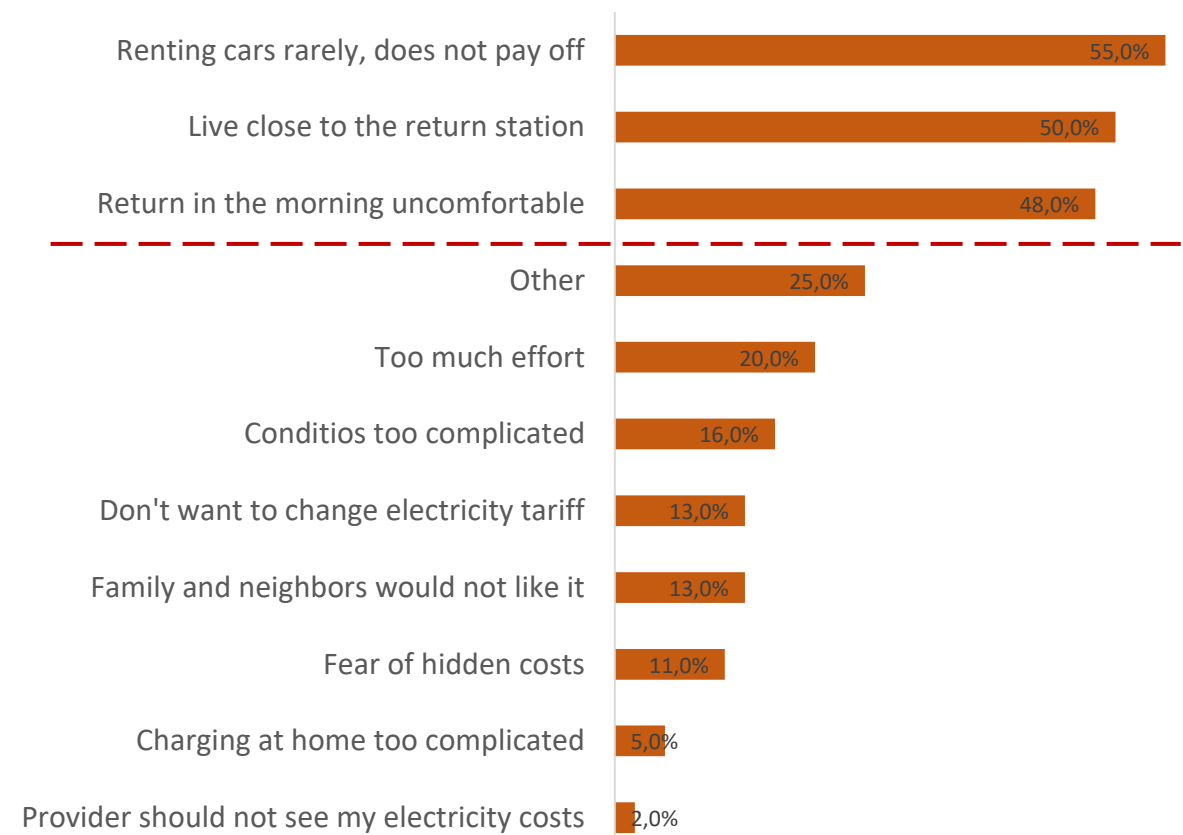


Reasons for no interest

Flex **on-the-go** (n=142)



Flex **at home** (n=56)



A quick glance at target groups

Are there **separate target groups** for **flex on-the-go** and **flex at home**?

Empirically:

Yes, because **flex at home** is only applicable for users with a parking space at home, where a charging point can be installed.

Statistically:

Yes, because the interest in **flex on-the-go** is also not independent from suitable parking space at home. (χ^2 -Test: Value = 11.0, df = 4, p = 0.026)

But:

From a practical point of view, the differences are rather small. One could go

Interest in trying **flex on-the-go**
(n=947)



Takeaways for our research question

“Can integrating Flexibility into a Car Sharing Business Model make sense?”

There is no quick win, but it might be considered if

1. cost savings are high enough and economically viable,
and
2. additional effort and risk for users is kept at a minimum.



Illustrative Image, made with Google Gemini Pro



Takeaways from STS point of view

Pros:

- Business-model innovations reflected in the survey would have been theory-based without partnership
- Field-access would not have been possible without partnership
- Sampling-Bias reduced (no student- or paid panel population)

Cons:

- Limits in terms of length, logic-design, and privacy => limited options for multivariate analysis





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