Questionnaire of a representative empirical survey on the willingness to invest in alternative vehicles

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Remark: The original questionnaire is in German and was translated by the authors.

Questionnaire

1. What sex are you?

- Female
- Male
- Other

2. How old are you?

3. Once you add it all up: What is the net monthly income of your household?
This refers to the amount remaining after deduction of taxes and social security - including pensions, retirement, income from rent, child benefit, housing benefit and other public assistance.

- Up to less than 1,000 €
- 1,000 € to 1,999 €
- 2,000 € to 2,999 €
- 3,000 € to 3,999 €
- 4,000 € to 4,999 €
- 5.000 € or more

4. What is your highest educational level?

- I am still a student
- No schooling or vocational training
- Secondary school leaving certificate (elementary school leaving certificate) or equivalent
- Secondary school leaving certificate (Mittlere Reife) or equivalent
- Advanced technical college entrance qualification
- Abitur/ general or subject-related higher education entrance qualification
- University of Applied Sciences degree
- University degree
- Promotion

5. In which state of Germany do you live?

- Baden-Württemberg
- Lower Saxony
- Bavaria
- North Rhine-Westphalia
- Berlin
- Rhineland-Palatinate
- Brandenburg
- Saarland
- Bremen
- Saxony
- Hamburg

- Saxony-Anhalt
- Hessen
- Schleswig-Holstein
- Mecklenburg-Western Pomerania
- Thuringia

6. How many cars do you own in your entire household?

- 1 car
- 2 cars
- 3 cars
- More than 3 cars
- None
-

7. Into which of the categories do the vehicles fall?

multiple answers possible

- Private property
- Private Leasing
- Company car

8. How many kilometers do you drive with your car in a year?

9. How often do you drive the following distances?

	Every day	Several times per week	Once a week	Several times in a month	Once a month	Several times per year	Less	Never
Less than 10 km	◯	◯	◯	◯	◯	◯	◯	◯
10 km to 19 km	◯	◯	◯	◯	◯	◯	◯	◯
20 km to 49 km	◯	◯	◯	◯	◯	◯	◯	◯
50 km to 99 km	◯	◯	◯	◯	◯	◯	◯	◯
100 km to 249 km	◯	◯	◯	◯	◯	◯	◯	◯
250 km and more	◯	◯	◯	◯	◯	◯	◯	◯

10. How often do you use your car for the following routes?

	Every day	Several times per week	Once a week	Several times in a month	Once a month	Several times per year	Less	Never
Commuting	◯	◯	◯	◯	◯	◯	◯	◯
Shopping	◯	◯	◯	◯	◯	◯	◯	◯
Leisure	◯	◯	◯	◯	◯	◯	◯	◯
Spare time	◯	◯	◯	◯	◯	◯	◯	◯
Holiday	◯	◯	◯	◯	◯	◯	◯	◯

11. What means of transport do you use in your everyday life?

multiple answers possible

- I go by foot
- Bicycle

- E-Bike
- Public transport
- Train
- Private car
- Company car
- Car-Sharing
- Motorcycle
- Scooters

12. Which one do you use most often?

- I go by foot
- Bicycle
- E-Bike
- Public transport
- Train
- Private car
- Company car
- Car-Sharing
- Motorcycle
- Scooters

13. Do you plan to buy a car in the next 5 years?

- Yes
- No

14. Why not?

multiple answers possible

- I will continue to use my previous
- Riding a bike
- Use of public transport
- Use car sharing
- It's too expensive
- Environmental protection
- Climate protection
- Health
- Other
- I do not wish to answer

15. What class of car would be the most likely to have the next car you would buy?

- Mini (e.g. VW up!, Smart Fortwo, Fiat 500)
- Small cars (e.g. Ford Fiesta, VW Polo, Opel Corsa)
- Compact class (e.g. Opel Astra, VW Golf, Škoda Octavia, Toyota RAV4)
- Middle class (e.g. BMW 3 series, VW Passat, Audi A4, BMW X3)
- Upper middle class (e.g. Audi A6, BMW 5 Series, Mercedes-Benz E-Class, Audi Q5)
- Upper class (e.g. Mercedes-Benz S-Class, BMW 7 Series, Audi A8, Porsche Cayenne)

16. How much horsepower should your next car have?

- Less than 85 HP
- 85 to 119 HP

- 120 to 159 HP
- 160 to 199 HP
- 200 to 299 HP
- 300 HP and more
- Doesn't matter to me

In the following we will ask you some questions about cars with alternative drive concepts. Electric cars and hydrogen cars are referred to here as cars with alternative drive systems.

A hydrogen car has (like an electric car) an electric motor. In contrast to the electric car, the energy in a hydrogen car comes from a fuel cell, which converts hydrogen into electricity. This electricity can either be temporarily stored in a battery or consumed directly. The only direct waste product of a hydrogen car is therefore only harmless steam.

17. How well have you informed yourself about alternative drive concepts so far?

Please indicate this on a scale from 1 to 6. 1 means 'not good at all', 6 means 'very good'. With the values in between you can grade your answer.

Not good at all					Very good
1	2	3	4	5	6
○	○	○	○	○	○

18. Have you ever personally driven an electric car?

- Yes
- No

19. Have you ever personally driven a hydrogen car?

- Yes
- No

20. How have you informed yourself so far about alternative drive concepts or would you inform yourself?

multiple answers possible

- Family
- ADAC
- Trade journal
- Television
- Car Dealers
- Internet
- Friends/ acquaintances
- Other:
- Not at all

21. Have you invested in any of the following technologies in recent years?

multiple answers possible

- PV system
- Battery powered electric car
- Hydrogen car
- Hybrid car

- House insulation
- Heat pump
- Solar thermal energy
- PV storage system
- Other
- None of them

We now ask you to evaluate the following statements and answer questions. Electric cars and hydrogen cars are again referred to here as cars with alternative drive systems. For some questions the answers are given separately for electric cars and hydrogen cars. In these cases, please answer the questions for both.

22. Investing in a car with an alternative drive is a possible option for me.

*Please indicate this on a scale from 1 to 6. 1 means **'Not applicable at all'**, 6 means **'Fully applicable'**. With the values in between you can grade your answer.*

	Not applicable at all 1	2	3	4	5	Fully applicable 6
Electric car	◯	◯	◯	◯	◯	◯
Hydrogen car	◯	◯	◯	◯	◯	◯

23. To what extent does the following statement apply to you?

I have decided to invest in a car with an alternative drive over the next few years.

Please indicate this on a scale from 1 to 6. 1 means 'Not applicable at all', 6 means 'Fully applicable'. With the values in between you can grade your answer.

Electric car	◯	◯	◯	◯	◯	◯
Hydrogen car	◯	◯	◯	◯	◯	◯

24. To what extent does the following statement apply to you?

A car with alternative drive gives me a good feeling.

Please indicate this on a scale from 1 to 6. 1 means 'Not applicable at all', 6 means 'Fully applicable'. With the values in between you can grade your answer.

Electric car	◯	◯	◯	◯	◯	◯
Hydrogen car	◯	◯	◯	◯	◯	◯

25. To what extent does the following statement apply to you?

A car with an alternative drive is a sensible decision for me.

Please indicate this on a scale from 1 to 6. 1 means 'Not applicable at all', 6 means 'Fully applicable'. With the values in between you can grade your answer.

Electric car	◯	◯	◯	◯	◯	◯
Hydrogen car	◯	◯	◯	◯	◯	◯

26. Please rate the following statements.

Please indicate this on a scale from 1 to 6. 1 means 'Not applicable at all', 6 means 'Fully applicable'. With the values in between you can grade your answer.

	Does not apply at all 1	2	3	4	5	Fully applicable 6
For people in my situation, it's common to invest into a car with alternative drive.						
A lot of people in my neighborhood think it's good if I invest in a car with alternative drive.						
A lot of people I care about think it's a good idea for me to get a car with alternative drive.						

27. Please estimate: What percentage of the people in your circle of friends and acquaintances have an electric car?

28. Please rate the following statements.

*Please indicate this on a scale from 1 to 6. 1 means 'Does not apply at all', 6 means 'Fully applies'. With the values in between you can grade your answer***.**

	Does not apply at all 1	2	3	4	5	Fully applicable 6
We, the people in our region, can work together to realise mobility transition.						
A car with alternative drive shows that I take over social responsibility.						
A car with an alternative drive allows me to be more independent of oil price development.						
With a car with alternative drive I can safe maintenance costs to a conventional car.						
I see myself as someone who likes to learn about the latest technical developments.						
I feel bad if I do not invest in environmentally friendly mobility.						
With a car with an alternative drive system, I am protecting the environment.						
I see myself as someone who likes technology to be efficient.						
I see myself as someone who likes to own technical novelties.						
With a car with an alternative drive I save natural resources.						
The risk associated with a car with alternative drive is too high.						
If all people in our region participate, we can make use of electric cars to solve environmental problems.						
I feel a moral obligation to make my mobility environmentally friendly, regardless of what others do.						
I do not believe that we will achieve sustainable mobility in long term						

29. How do you rate the comfort of electric cars compared to conventional cars (in terms of interior equipment such as heating and air conditioning)

- o Poorer comfort
- o Same comfort
- o Better comfort

30. How important is it to you, with your mobility…

Please indicate this on a scale from 1 to 6. 1 means 'Not important at all', 6 means 'Very important'. With the values in between you can grade your answer.

	Does not apply at all 1	2	3	4	5	Fully applicable 6
... that you can actively promote energy system transformation?						
...that it's comfortable?						
... that it's reasonably priced?						
... that it is safe for you and your fellow man?						
...that this is as environmentally friendly as possible?						
... that air pollution is kept to a minimum?						

31. How willing are you to take financial risks for technical innovations?

Please indicate this on a scale from 1 to 6. 1 means 'Not willing at all', 6 means 'Very willing'. With the values in between you can grade your answer.

Not at all willing 1	2	3	4	5	Very willing 6
◯	◯	◯	◯	◯	◯

32. How important is it to you that the technology you could invest in is mature?

Please indicate this on a scale from 1 to 6. 1 means 'Not important at all', 6 means 'Very important'. With the values in between you can grade your answer.

33. What do you think makes more sense: that the state promotes "public" transport (rail, car sharing, cycle paths ...) or subsidize "individual" means of transport (e.g. electric car, hydrogen car)?

- o Promotion of public transport
- o Subsidy for individual means of transport
- o No opinion

34. Would a leasing model for the battery of an electric car be more interesting for you than buying a battery?

- o Yes
- o No
- o Maybe

- o I don't know.

35. My willingness to buy an electric/hydrogen car would increase if ...

multiple answers possible

- o ... I would have a wider range of vehicle models
- o ... the motor vehicle tax would turn out in favour of alternative drive systems
- o ... I could park for free
- o ... I am no longer allowed to drive into the inner cities with conventional cars (driving bans)
- o ... alternative propulsion systems would receive more financial support from the state
- o ... I would prefer to park...
- o ... I could use the bus lane
- o None of these measures would increase my willingness to buy

36. Please assume that you would own an electric car (if you do not already own one).
The battery of an electric car can be used to store electricity from renewable energies, for example to stabilize the power grid.
Would you allow your battery to be used externally to balance power generation and consumption?

- o Yes, definitely.
- o Yes, under certain conditions (e.g. adequate remuneration)
- o Only if there are no restrictions on my planned trips
- o Maybe
- o No
- o I don't know.

37. Which billing method do you prefer when charging an electric car at a public charging station?

- o Flat rate
- o After loading time
- o According to charging capacity
- o According to the amount of energy purchased
- o Anyway
- o I don't know.

The following part is very important for our study and works slightly differently than before. Please take your time to look at the three options and choose the one that suits you best. This part is a bit more strenuous, as a slightly higher concentration is required than before. Nevertheless, the test persons so far found this part interesting.

In the following experiment you will be shown six properties each of an electric car, a hydrogen car and a conventional car, here named as a combustion engine. These properties will take different forms.

Some of the specifications may seem somewhat unrealistic to you at this stage, as future technical progress was also taken into account for our study. Therefore, please simply choose the model that suits you best.

The properties mean the following:

Vehicle type:	Electric car, hydrogen car, internal combustion engine (diesel or petrol)
Purchase price:	Acquisition cost of the car in question
Fuel costs [€/100	The cost of refuelling for each 100 km travelled.

km]:	In the case of an electric car, this means the cost of the electricity used for the tank, in the case of a hydrogen car the price of hydrogen, and in the case of a combustion engine the average price of petrol and diesel.
Maximum range [km]:	Maximum distance that is possible with one tank load under ideal conditions.
Expansion of the charging infrastructure:	**Refuelling/charging possible without restrictions:** Corresponds roughly to the filling station system for internal combustion engines - very well developed infrastructure with a high density of filling stations. **Refuelling/charging possible with restrictions:** Charging infrastructure is already in place, it may not always be easily accessible and it may not be developed in high density. **Refuelling/charging possible with severe restrictions:** There are occasional opportunities to refuel/charge.
W2W CO_2 emissions:	Calculation of CO_2 emissions according to the W2W = well-to-wheel ("from the oil source to the tank") method. All CO_2 emissions that occur during the production and use of the fuel are included. As a result, electric cars are considered to have an electricity mix with high and low shares of renewable energies. This can also cause CO_2 emissions in hydrogen cars if the hydrogen is generated by electricity.
Additional CO2 tax on petrol and diesel:	In addition to the general operating costs, there is a CO_2 tax for refuelling petrol and diesel.

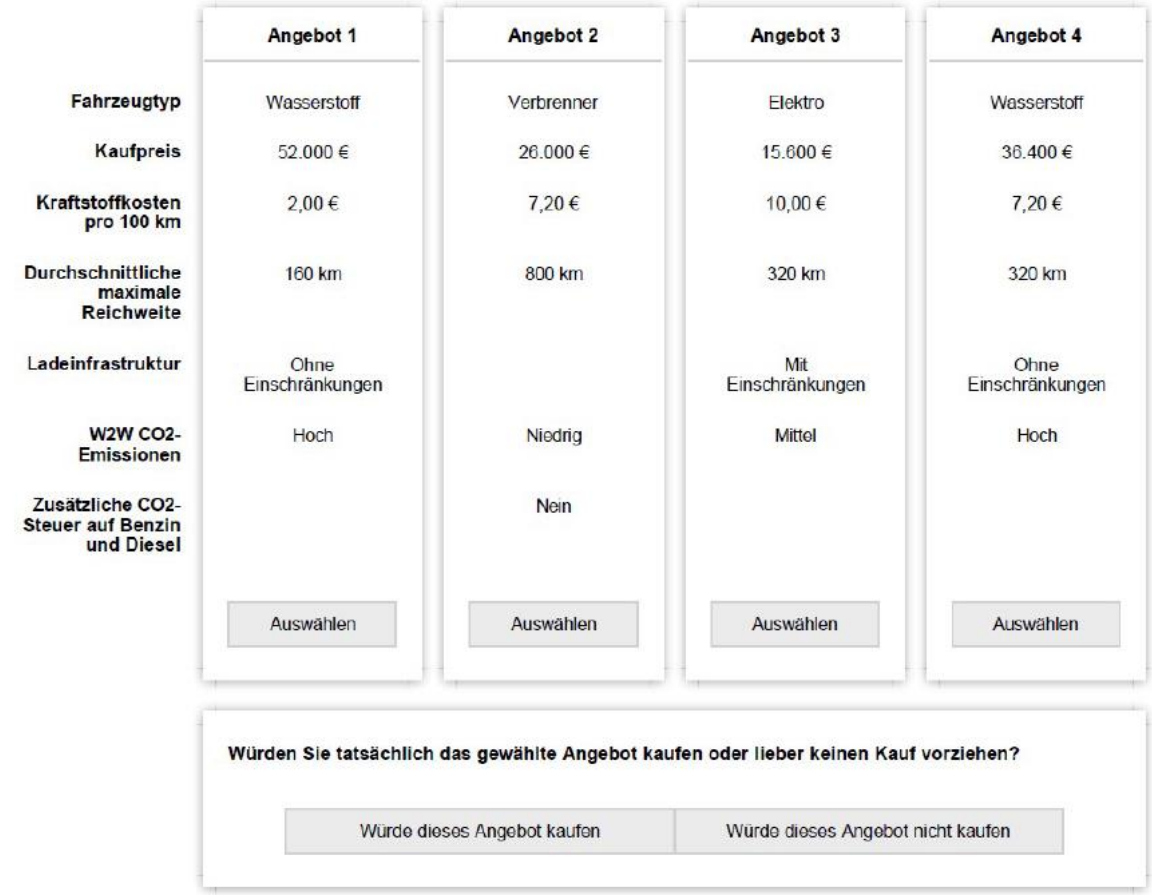

Fig.1: Example for Decision-Task

K1. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (1 of 10)

K2. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (2 of 10)

K3. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (3 out of 10)

K4. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (4 out of 10)

K5. Assuming you could choose between the following offers for a new compact car, which one would you choose? (5 out of 10)

K6. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (6 out of 10)

K7. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (7 out of 10)

K8. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (8 out of 10)

K1.9 Assuming you could choose between the following offers for a new compact class car, which one would you choose? (9 out of 10)

K1.10. Assuming you could choose between the following offers for a new compact class car, which one would you choose? (10 of 10)

38. If you were to buy a (new) car, would you rather choose a new car or a used car?

- New car
- Used cars
- I don't know.
- I Definitely doesn't want a car

39. Should our towns and cities be transformed so that individuals hardly need a car anymore?

- Yes
- More likely yes
- Rather no
- No

40. Would you accept a smaller vehicle class if the car had an alternative drive (electric car/hydrogen car)?

- Yes
- No
- Maybe
- I don't know.

41. Are you a member of an environmental organisation (Greenpeace, BUND etc.)?

- Yes
- No

42. Please enter the first two digits of your postcode.

43. How many people live in your household (including yourself)?

44. Is there anything else you'd like to tell us?