# TOOL: COLLECTION OF SURVEY QUESTIONS FOR SMART GRID EVALUATION

## Abstract

This collection of questions can be used by social scientists or marketing employees to help design questionnaires to be used in a smart grid project. The questions can be used in different phases of the projects. Some can be used to get to know your customer's needs better, other questions have a focus on the evaluation of the customers attitudes, behaviour, etc. after the smart grid project. This collection of questions is by no means exhaustive, but shows examples of questions used in a number of smart grid projects.

## What is it?

The evaluation in smart grid projects differs depending on its context, but some parts of the evaluation are similar in all smart grid projects. This is why we collected sets of questions used in projects in our S3C Family of Projects, which are useful for the majority of projects dealing with smart grids and were already used in some of them. The questions do not deal with the general evaluation of the whole project, for this see the guidelines User-centred KPIs for the evaluation of smart grids and KPIs for energy consumption effects, but can be used for gaining insights about the target groups before, during or after the project. The questions in this tool can be compiled for survey dedicated to consumers, citizens and customers. The aim of these questionnaires is to increase the understanding of the participants, their desires, needs, beliefs, or attitudes to different topics, which are relevant to learn about when working in smart grid projects.

The idea behind the offered set of questions is twofold. On the one hand, it is a service offered to you, to easily compile your specific set of questions to gain information about the participants of your smart grid project. On the other hand it aims at a standardization of questions across different smart grid projects in the European Union. This could help to make different projects more comparable. The last seems to be crucial, as our analysis and experiences of S3C projects indicate, that the results of the evaluation of smart grid projects are in general not easily comparable. This makes it difficult to replicate and upscale the results.

The questions offered to you with this tool are based on the analysis of the questionnaires of different smart grid projects in Denmark, Germany, Austria and Belgium. These questions were used and validated in different research projects: at different model regions of the German E-Energy project, at the LINEAR project in Belgium, at the FINESCE trial Site in Horsens in Denmark, and at the HiT project in Austria. Although the questions have been validated in these projects we would like

to stress that these questions have been (quite literally) translated to be understandable for the reader of this guideline, where cultural connotations might have been lost or changed. This is also important to take into account when translating them to your audience's language. Furthermore, the questions included in your survey should fit your project objectives and audience.

## When to use?

The main target group of this tool are social scientists who have just started their research on smart grid projects and have to design a quantitative survey. The questions can be used for different purposes. Understanding your target group and/or the participants of your smart grid project is the most obvious. This can be done before, or in the beginning of the project. Questions concerning attitudes and behaviour can be used in different phases of the project and are therefore usable to measure changes.

The collection of questions is most useful for someone starting with a smart grid evaluation, because you don't have to start at a blank page. The sets of questions can also be used to double-check the questionnaires that you've already devised for the evaluation of your project.

## Do's and don'ts

- **Take care of standards for the construction of surveys.** A trained social scientist should be included for this task. Literature about the compilation, preparation, execution and analysing of surveys can be found in sociology standard reference books on survey design.
- **Be aware, that your survey is not too time consuming**. Very long and broad surveys can lead to a drop out of the participants. Include only the questions which are really relevant and necessary for your specific research question. So always do pre-trials, and see how long it actually takes for someone to fill in the questionnaire before you present it to your target group.
- **Look beyond quantitative survey**. Surveys and questionnaires based on questions proposed in this tool are just one way to get to know your target group and cannot replace qualitative research. For a deeper understanding other methods and tools to assess end user experience are very valuable, for more information on this see the guidelines Using segmentation to better target user groups, Learning about target groups and Co-creation – collaborating to develop smart energy solutions.

## What do you need to do?

We offer the questions that can be compiled in a way that best fits your specific project, although the analysis of the collected data has to be done by you. Depending on your specific smart grid project you can select the questions or set of questions which fit best to understand your target group or to measure attitudes and behaviour.

The following chapters are filled with questions that have been used in other smart grid projects and are therefore elaborated instruments for the measurement of this topics. The questions are grouped so that you can easily compile the topics you'd like to evaluate in your project. Of course the questions have to be adapted to the specific need of your project. Every set of questions starts with a short introduction about when and how to use this set of questions within a smart grid project. We recommend to integrate social scientist for the design and conduction of the survey.

## Set of Questions

# 1 Living situation and building

The questions on this chapter have been used within the HiT project in Austria. The project used the questions for the analysis of the success of the usage of persuasive technologies. The questions in this chapter give an overview of the installed devices that consume electricity, and about the living situation of the participants. These questions should be used for a survey in the beginning of a project.

## 1.1 Electricity

The columns for the average usage hours per day and the energy class enable you to get a very detailed insight into the customer's households. When using this set of questions you should be aware, that a too detailed questionnaire can have negative effects; on the one hand it might cause concerns about privacy issues and on the other hand it can reduce the motivation to answer the questions. The questions are good to get first insights into the energy consumption habits of your customers.

**1. Which electrical appliances do you use in your household?**

| | **Device** | *Usage frequency (average hours per day)* | *Efficiency class (if available)* |
|---|---|---|---|
| ☐ | *Fridge* | *Please choose an element.* | Please fill in here. |
| ☐ | *Freezer* | *Please choose an element.* | Please fill in here. |
| ☐ | *Microwave* | *Please choose an element.* | Please fill in here. |
| ☐ | *Oven* | *Please choose an element.* | Please fill in here. |
| ☐ | *electrical heating* | *Please choose an element.* | Please fill in here. |
| ☐ | *infrared cabin/solarium* | *Please choose an element.* | Please fill in here. |
| ☐ | *aquarium/terrarium* | *Please choose an element.* | Please fill in here. |
| ☐ | *cordless telephone* | *Please choose an element.* | Please fill in here. |
| ☐ | *air conditioning* | *Please choose an element.* | Please fill in here. |
| ☐ | *Sauna* | *Please choose an element.* | Please fill in here. |
| ☐ | *Waterbed* | *Please choose an element.* | Please fill in here. |
| ☐ | *DSL-router with WiFi* | *Please choose an element.* | Please fill in here. |
| ☐ | *Dishwasher* | *Please choose an element.* | Please fill in here. |
| ☐ | *washing machine* | *Please choose an element.* | Please fill in here. |
| ☐ | *Television* | *Please choose an element.* | Please fill in here. |
| ☐ | *Computer* | *Please choose an element.* | Please fill in here. |
| ☐ | *other appliances with high energy consumption or constant stand-by mode* | *Please choose an element.* | Please fill in here. |
| ☐ | Please fill in here. | *Please choose an element.* | Please fill in here. |
| ☐ | Please fill in here. | *Please choose an element.* | Please fill in here. |
| ☐ | Please fill in here. | *Please choose an element.* | Please fill in here. |
| ☐ | Please fill in here. | *Please choose an element.* | Please fill in here. |

## 1.2 Heating

**2. Do you heat your bedrooms more, the same or less than your living space (living-room, workroom, and kitchen)?**

☐ *more*
☐ *the same*
☐ *less*

**3. How often do you reduce the room temperature in your accommodation during the night manually? (if you have a system with automatic night temperature reduction and you use this option, please choose "always")**

☐ *never*
☐ *rarely*
☐ *sometimes*
☐ *often*
☐ *always*

**4. If you reduce the room temperature at night: At what temperature do you set the heating system at night?**

Please choose an element.°C

**5. How and how often do you generally air in your household during the heating period?**

***in your living space:***

| | |
|---|---|
| *allow ventilation (tilted window):* | Please choose an element. *minutes per day* |
| *open windows* | Please choose an element. *minutes per day* |
| *electric ventilation system (like for example in passive houses)* | yes☐ |
| | no☐ |

***in your bedrooms:***

| | |
|---|---|
| *allow ventilation (tilted window)* | Please choose an element. *minutes per day* |
| *open windows* | Please choose an element. *minutes per day* |
| *electric ventilation system (like for example in passive houses)* | yes☐ |
| | no☐ |

## 1.3 Domestic hot water

The following questions can be used to get more detailed information about the usage of domestic hot water. You should be aware the usage of domestic hot water

is connected to the topic of hygiene, which is a personal topic that people could refuse to answer out of privacy issues.

**6. How long do your or other member of your household generally shower? Please estimate the average time of all household members per day**

☐ *less than 5 minutes*
☐ *between 5 and 10 minutes*
☐ *between 10 and 15 minutes*
☐ *more than 15 minutes*
☐ *don`t know*

**7. How often do all members of the household generally shower in one week in total?**

Please choose an element. *times*

**8. Is there a bathtub in your household?**

☐ *yes* — *If "Yes": How many baths are taken in your household from all the household members in a month on average?* Please choose an element. *times*
☐ *no*

## 1.4 Mobility

The following questions will give some insights in the car usage of your customer. You can of course replace the car by other mobility options like motor(-bikes), electric vehicles etc.

**9. Is there a car available for you?**

☐ *yes, i own a car*
☐ *yes, i can borrow a car from friends or family*
☐ *yes, i use car sharing*
☐ *No* — *If "no": Would you consider to use car sharing?* ☐ *yes* ☐ *no*

**10. How often do you use the car?**

☐ *never*
☐ *rarely (several times per month)*
☐ *often (several times per week)*
☐ *daily*

**11. How many kilometres do you drive with your car per year?**

Please fill in here. *km*

# 2 Attitude towards energy saving

The questions in this chapter are based on the elaborated evaluation concept of the HiT project in Austria. The questions should be asked in the beginning of the project to get an overview of the attitudes of your participants. Additionally they can be asked at the end of the project to measure a possible change of the attitude of your participants. You should be aware, that there always is a big gap between the attitudes and the concrete actions of people. The self-evaluation of actions can be much more positive than the actions really are. Another challenge for the assessment of attitudes you should be aware of is the social response effect; People avoid to rate themselves negatively in front of others. One possible solution for this problem is a private environment for the answering of the questionnaire to avoid interviewee effects.

## 2.1 Environmental domestic routine behaviour

The following questions can give you general insights into the environmental behavioural of your customers.

*The following questions are supposed to find out your opinion about energy-saving*
*Please indicate how often you generally carry out the following activities.*
*Please answer on a scale of 1=never, 2=rarely, 3=sometimes, 4=often and 5=always.*

| | | *1 never* | *2 rarely* | *3 sometimes* | *4 often* | *5 always* |
|---|---|---|---|---|---|---|
| **12.** | **Using pots with lids for heating water and food.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **13.** | **Using the standby mode for often used appliances.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **14.** | **Starting the washing machine with only a half full load.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **15.** | **Leaving warm water running while brushing teeth.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **16.** | **Closing the door between heated and not heated rooms.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **17.** | **Showering for more than 10 minutes.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **18.** | **Leaving the window tilted at night during winter.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **19.** | **Switching off lights when leaving the room for half an hour.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **20.** | **Putting on warmer clothes before turning up the heating if it gets cold in a room.** | ☐ | ☐ | ☐ | ☐ | ☐ |

## 2.2 Intention

The following questions can give you an insights on the intention of different energy related actions. The questions are indicators that could be aggregated to a total score for every customer for the behavioural intentions on energy. The questions partly relate to load shifting actions for private households and are partly related to general energy saving actions. You should be aware that you'll be faced with social response effects in a very strong manner when asking these questions. Because environmental friendly behaviour is more socially accepted and desired, people are keen on rating themselves more positively when they are not alone or not anonymous.

| | | 1 never | 2 rarely | 3 sometimes | 4 often | 5 always |
|---|---|---|---|---|---|---|
| **21.** | **I try to wash my clothes at times of lower price (i.e. at night).** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **22.** | **I try to switch off my computer when it`s no longer used.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **23.** | **I try to switch off the light when leaving the room.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **24.** | **I try to use a switchable power socket and switch it off when not using any appliances.** | ☐ | ☐ | ☐ | ☐ | ☐ |

## 2.3 Personal norms and attitudes

The following questions, which have been used in the HiT project, will give you insights into the norms, attitudes and knowledge about energy consumption that customers have. This can be a valuable input for the collection of information material for your customer. You can learn about knowledge gaps from your participants.

*Select one level of agreement for each statement to indicate how you feel.*
*1=fully applies to me to 5=does not apply to me at all.*

| | | *1 fully applies* | | | | *5 does not apply* |
|---|---|---|---|---|---|---|
| **25.** | **I think it is commendable if other people save energy in their household.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **26.** | **I think it is important that possible energy saving potentials through insulation and insulating glazing are realized.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **27.** | **In my judgement it is cheaper to constantly have the window tilted in winter than opening the window entirely for a short time.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **28.** | **In my opinion it is not reasonable to expect people to check their electricity or gas consumption on a regular basis in order to save energy.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **29.** | **To save energy I use energy efficient devices and/or energy-saving lamps** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **30.** | **I seal joints around window and door frames.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **31.** | **I wash normally soiled laundry only with at 60 degrees Celsius.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **32.** | **Energy efficiency has a high priority when purchasing new household equipment.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **33.** | **I avoid to heat my home to the point where I need to open the windows or remove layers of clothing.** | ☐ | ☐ | ☐ | ☐ | ☐ |

## 2.4 Habits

These questions used at the FINESCE trial site in Horsens (DK) should be asked in the beginning of a project to get an overview over the energy related habits of your participants.

**34. How many hours do you spend on the following activities during a normal week?**

| | *No time* | *Less than one hour a week* | *1 – 3 hours* | *3 – 5 hours* | *5 – 7 hours* | *More than 7 hours* |
|---|---|---|---|---|---|---|
| ***a. listen to music or the radio,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***b. watch TV,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***c. playing computer or video games*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***d. watch the news,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***e. spend time with family and friends,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***f. read books, newspapers or magazines,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***g. cook,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***h. tidy up and clean in my home (e.g. laundry and dishwashing),*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***i. exercise,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***j. shop food and other purchases for you, your family and your home,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***k. do work from home (paid employment or self-employment work),*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***i. transport (travel time),*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***m. spend time in the garden,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***n. make a large or small home improvement,*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***o. take a shower*** | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| ***r.*** Please fill in here. | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

## 3 Attitude towards nature

The answers to those questions can be a good starting point for the design of your marketing campaign or additional incentives for the customers. If your customers consider themselves green (environmentally friendly) you should emphasize environmental factors much more. The questions were used by the Austrian HiT project to determine attitudes towards nature. These questions should be asked in the beginning of the project to get an overview about the attitude towards nature of your participants. Additionally they can be asked at the end of the project to measure a possible change of the attitude of your participants.

*Select one level of agreement for each statement to indicate how you feel.*
*1= I completely agree to 5= I don't agree with this at all.*

| | | *1 I agree* | | | | *5 I don't agree* |
|---|---|---|---|---|---|---|
| **35.** | **We as human beings have to live in harmony with nature if we want to survive.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **36.** | **We have to conserve natural resources for future generations.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **37.** | **Climate change will never stop if we carry on as before.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **38.** | **If we carry on as before, energy will become increasingly scarce.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **39.** | **For every kind of problem-solving, we always have to consider the consequences for the environment first.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **40.** | **We should be careful not to disturb the balance of nature.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **41.** | **Society should promote environmental protection.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **42.** | **Environmental issues should have precedence in all government decisions.** | ☐ | ☐ | ☐ | ☐ | ☐ |

## 4 Motives for participating

It can be useful to ask for the actual reasons for their participation. This can help you to assess the success of your recruiting campaign. And it can help you to use the information to create incentives and develop your products based on the needs of your customers. The following questions are mainly based on the evaluation concept of the HiT project. These questions should be asked in the beginning of the project to learn about the motivation of your participants.

*I participate in this project … (1=not correct at all to 5=fully applies)*

| | | *1 not correct at all* | | | | *5 fully correct* |
|---|---|---|---|---|---|---|
| **43.** | **…to see exactly when I consume how much electricity.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **44.** | **…to recognize if there are any devices that consume electricity without my notice (“vampire power”).** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **45.** | **…to find out what I can actually do to save energy.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **46.** | **…to check and compare my consumption data with the billing of my utility.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **47.** | **…to save money by consuming less energy.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **48.** | **…to protect the environment by consuming less energy.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **49.** | **…because I receive a tablet for taking part in this project.** | ☐ | ☐ | ☐ | ☐ | ☐ |
| **50.** | **Do you have any other reasons for taking part in this project?** | Please fill in here. | | | | |

# 5 Smart grid technologies, products and services

The questions in this chapter were used and elaborated within the LINEAR-project in Belgium and the German E-Energy project. These questions should be asked at the end of the project to measure the acceptance and usage of the used smart grid technologies, products and services.

## 5.1 Usage of variable tariffs

These questions can be good to evaluate the drivers and barriers of load balancing in households. Be aware that open questions need more post processing than closed questions.

**51. What were the main reasons for adjusting your behaviour to the variable rates**

1. Please fill in here.
2. Please fill in here.
3. Please fill in here.

**52. What were the main reasons for not adjusting your behaviour to the variable rates?**

1. Please fill in here.
2. Please fill in here.
3. Please fill in here.

## 5.2 Usage of devices

The following questions used in the Belgian LINEAR project are strongly related the usage of the (pre-set) flexibility options of different devices.

**53. The devices at your disposal during the field test had the ability to program a certain degree of flexibility when using your (smart) appliances. By "setting flexibility" we mean the ability to time delay the start of your devices.**
**What did you take into account when setting the flexibility?**

Please fill in here.

**54. Were there certain household routines or habits that affected the setting of the flexibility? Household routines are for example: specific days on which the (washing) machine is used.**

☐ *yes*

☐ *no*

If you selected “no”, please skip the next section

**55.** **Can you give some examples of such routines?**
Please fill in here.

**56.** **To what extent did you find it easy to setup the flexibility on the following devices?**

| | *certainly not easy* | *not difficult and not easy* | *easy* | *not applicable* |
|---|---|---|---|---|
| ***washing machine*** | ☐ | ☐ | ☐ | ☐ |
| ***dishwasher*** | ☐ | ☐ | ☐ | ☐ |
| ***dryer*** | ☐ | ☐ | ☐ | ☐ |
| ***other device*** Please fill in here. | ☐ | ☐ | ☐ | ☐ |
| ***other device*** Please fill in here. | ☐ | ☐ | ☐ | ☐ |

**57.** **What would you consider an improvement when programing the flexibility for these devices?**
Please fill in here.

**58.** **Which devices were the easiest to program for you (regarding the flexibility)? In other words, for which devices did it not matter at what time they started?**

| | |
|---|---|
| ☐ | *washing machine* |
| ☐ | *dish washer* |
| ☐ | *dryer* |
| ☐ | *other device* Please fill in here. |
| ☐ | *other device* Please fill in here. |

## 5.3 Behaviour

These two questions show insights on the intention to continue the changed (flexible) energy behaviour and its reasons. The questions in this subchapter were used and elaborated within the LINEAR-project.

**59.** **Would you continue your behaviour and habits from the field test if you had the ability to use the flexibility of your appliances after the field test?**

☐ *definitely not*
☐ *I think not*
☐ *maybe*
☐ *I think so*
☐ *certainly*

**60. Which factors would play a role in continuing your behaviour from the field test?**

| | Definitely not | I think not | Neutral | I think so | certainly |
|---|---|---|---|---|---|
| *financial factor* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *ecological factor* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *habits, routines* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *other, which?* Please fill in here. | ☐ | ☐ | ☐ | ☐ | ☐ |
| *other, which?* Please fill in here. | ☐ | ☐ | ☐ | ☐ | ☐ |

## 5.4 Usage and evaluation of given digital information

These questions will provide you an initial insight into the success of the digital information you deliver to your customer. Remember to change the mentioned devices in this questionnaire into the devices that have been used in your project. The questions in this subchapter were used and elaborated within the LINEAR-project.

**61. During the field test you had a *tablet* at your disposal. Was the information you received on the *tablet* about your energy consumption satisfactory?**

☐ *yes*
☐ *no*

**62. According to you, which information lacked?**

Please fill in here.

**63. Was the information you received on the display of the devices satisfactory?**

☐ *yes*
☐ *no*

**64. According to you, which information lacked?**

Please fill in here.

## 5.5 Privacy issues

Those two questions can offer you a glance on the privacy issues the users did have in the project. The questions in this subchapter were used and elaborated within the LINEAR-project.

**65. Were you concerned about your privacy when using the devices?**

☐ *not at all*
☐ *not really*
☐ *neutral*
☐ *yes, it was*
☐ *definitely*

**66. Did this concern influence the use of the devices?**

☐ *not at all*
☐ *not really*
☐ *neutral*
☐ *yes, it was*
☐ *definitely*

## 5.6 Comfort

Here the comfort losses that could occur are asked. These answers can provide valuable advice on the impact of your project to the daily lives of participants. It can be insightful to ask these questions more than once; as to see how people adapt to the project features. It also gives you moments to adjust elements that really need to be improved.

**67. Did you experience a decrease of comfort when participating in the smart grid project?**

☐ *not at all*
☐ *not really*
☐ *neutral*
☐ *yes, it was*
☐ *definitely*

**68. Can you point out the decrease of comfort?**

1. Please fill in here.
2. Please fill in here.
3. Please fill in here.

**69. Was there anything that bothered you while participating in the smart grid project?**

☐ *yes*
☐ *no*

**70. If "Yes", what bothered you?**

Please fill in here.

## 5.7 Electric mobility

If electric vehicles have been a part of your project you can use those questions to analyse their acceptance, usage and impact.

**71. Did the use of the electric vehicle, which was part of the project, have an impact on your travel behaviour?**

☐ *yes*
☐ *no*

**72. If "Yes", can you give some examples on how an electric vehicle has affected your travel behaviour?**

1.Please fill in here.
2.Please fill in here.
3.Please fill in here.

**73. How would you describe your experience with charging the electric vehicle?**

| | disagree | tend to disagree | neither disagree nor agree | tend to agree | totally agree |
|---|---|---|---|---|---|
| *A routine has been developed for charging the vehicle* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *There were plenty of charging points available* | ☐ | ☐ | ☐ | ☐ | ☐ |

**74. To what extent would you consider buying an electric vehicle**

| | |
|---|---|
| ☐ | I certainly would not buy an electric vehicle. |
| ☐ | I do not think I would buy an electric vehicle. |
| ☐ | Chances are that I will buy an electric vehicle. |
| ☐ | I'm going to buy an electric vehicle. |
| ☐ | I prefer to wait, maybe later. |

## 5.8 Use of smart appliances

The questions in this chapter give you insights into the participant's attitudes on usage experience of smart appliances. The battery of questions can be statistically evaluated. You can adapt these questions to the specific devices used in your project.

The following questions include some general statements about the use of smart appliances. Indicate to what extent you agree with these statements.

**75. To what extent do you agree with the following statements:**

| | *disagree* | *tend to disagree* | *neither disagree nor agree* | *tend to agree* | *totally agree* |
|---|---|---|---|---|---|
| *The use of smart appliances seem to have no positive contribution* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *Smart appliances are easy to work with* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *The use of smart appliances makes me work more efficiently* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *Learning to work with smart appliances was clear to me and easy to understand* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *The use of smart appliances increases my productivity* | ☐ | ☐ | ☐ | ☐ | ☐ |

**76. To what extent do you agree with the following statements:**

| | *disagree* | *tend to disagree* | *neither disagree nor agree* | *tend to agree* | *totally agree* |
|---|---|---|---|---|---|
| *I use the different features of smart appliances* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *It's easy to get a smart appliance to do what I want* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I use my smart appliances* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *The use of smart appliances allows me to live more economically* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *Working with smart appliances requires not a lot of thinking for me* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *The use of smart appliances has many advantages* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *Smart appliances are useful for me* | ☐ | ☐ | ☐ | ☐ | ☐ |

**77. To what extent do you agree with the following statements:**

| | *disagree* | *tend to disagree* | *neither disagree nor agree* | *tend to agree* | *totally agree* |
|---|---|---|---|---|---|
| *The use of smart appliances is a good idea* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I use the smart devices in the extent to which it is possible is* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I wonder about the security of smart devices (e.g. fire hazard)* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I think these technologies (smart appliances) are still in their infancy* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *According to me, smart appliances leave little control to the user* | ☐ | ☐ | ☐ | ☐ | ☐ |

**78. To what extent do you agree with the following statements:**

| | *disagree* | *tend to disagree* | *neither disagree nor agree* | *tend to agree* | *totally agree* |
|---|---|---|---|---|---|
| *I think these smart devices will be much more expensive than current appliances* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I doubt that these smart devices will be truly more environmentally friendly (than the current ones)* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I find that the use of these devices mess with my rhythm of life* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I think that smart appliances represent an violation of my privacy* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I think I am sacrificing comfort when using these appliances* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *I turn off such devices when I'm asleep or not at home* | ☐ | ☐ | ☐ | ☐ | ☐ |

**79. Which factors are important to you when making a decision on buying smart appliances or an energy management system?**

| | *definitely not* | *probably not* | *neutral* | *probably* | *certainly* |
|---|---|---|---|---|---|
| *ecological factor* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *payback time* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *financial benefits* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *subsidies/grants* | ☐ | ☐ | ☐ | ☐ | ☐ |
| *other, which?* Please fill in here. | ☐ | ☐ | ☐ | ☐ | ☐ |

# 6 Standard demographic questions

Within every questionnaire the so called standard demographic questions are the most important part. Segmentation is a very broad term, but actually it starts with the first division of your basic population. The information about age, gender, income, education and occupation are the most basic information about the end user. Be aware, that some people won't answer some questions out of privacy reasons. For those questions it is therefore helpful to offer a selection of pre-categorized questions. These questions are usually placed at the end of surveys, because they can cause a high dropout rate when placed directly at the beginning. These questions should be asked in the beginning of the project to get an overview of the basic characteristics your participants.

**80. How old are you?**

☐ *0 – 14*
☐ *15 – 24*
☐ *25 – 49*
☐ *50 – 64*
☐ *65 – 79*
☐ *80 +*

*or specify:* Please choose an element.

**81. What gender are you?**

☐ *female*
☐ *male*

**82. What level of education have you attained?**

Annotation: Please adapt these education levels to the specific levels of your country, based on the ISCED[1]

☐ *primary school*
☐ *lower secondary school*
☐ *vocational extension school*
☐ *specialised vocational school*
☐ *upper secondary school*
☐ *vocational academy*
☐ *university studies*
☐ *doctoral studies*

*or specify:* Please fill in here.

[1] http://www.uis.unesco.org/Education/ISCEDMappings/Pages/default.aspx

**83. What occupational status do you currently have?**

☐ *student*
☐ *community or military service*
☐ *employed/apprenticeship (full-time)*
☐ *employed/apprenticeship (part-time)*
☐ *housekeeping*
☐ *on parental leave*
☐ *unemployed*
☐ *pensioner*
☐ *permanently incapacitated for work*
☐ *other:*
Please fill in here..

**84. What is the monthly average net income in your household in total? Please also consider leasing, rent, alimonies as well as government aid such as child support, the 13th/14th monthly salary and additional income such as unemployment insurance or other grants!**

☐ *< 1000€*
☐ *1001-2000€*
☐ *2001-3000€*
☐ *3001-4000€*
☐ *4001-5000€*
☐ *> 5001€*
☐ *n/a*

*or specify*: Please fill in here.

## 6.1 Household

The household as the centre of an energy research project is very common, because of the fact that meters are installed for each household and not for each person. The first question enables you to easily calculate for example the consumption per person. The latter two questions give you an indication about the usage of the flat within the usual working hours.

**85. How many people – adults as well as children – are constantly living in your household, including you?**

Please choose an element.

**86. How many people in your household are employed?**

*employed/apprenticeship (full-time)* *Please choose an element.*

*employed/apprenticeship (part-time)* *Please choose an element.*

**87. Are you or any other person in your household working from home?**

☐ *yes* *If so: how many hours per week?*
*Please fill in here.*

☐ *no*

## Further reading


- Karg, L., Kleine-Hegermann, K., Wedler, M. & Jahn, C. (2014). *E-Energy Abschlussbericht. Ergebnisse und Erkenntnisse aus der Evaluation der sechs Leuchtturmprojekte.* München, Berlin: B.A.U.M. Consult GmbH [URL: http://www.e-energy.de/images/ERGEBNISBERICHT.pdf].
- Mills, L. A., Knezek, G. A. & Wakefield, J. S. (2013). *Learning with Social Media: Measurement Tools for Understanding Information Behavior in Technology Pervasive Environments of the 21st Century*. iConference 2013 Proceedings, 593-600.
- Pacific Northwest national laboratory (2011). *APEC-Pacific Economic cooperation. Using smart grids to enhance use of energy-efficiency and renewable-energy technologies* [URL: http://www.pnl.gov/main/publications/external/technical_reports/pnnl-20389.pdf]
- Mcknight, D., & Carter, M. (2011). *Trust in a specific technology: An investigation of its components and measures.* ACM Transactions on …, 2(2). doi:10.1145/1985347.1985353
- Petkov, P., Goswami, S., Köbler, F. & Kremar, H. (2012). *Personalised Eco-Feedback as A Design Technique for Motivating Energy Saving Behaviour at Home.* ACM NordiCHI ’12 Proceedings.
- Siegel, G., Röderer, K., Prost, S. & Mattheiss E. (2015). *SGMS-HiT Begleitforschung.* Deliverable 4.1.Evaluierungskonzept Rosa-Hofmann-Straße
- Verplanken, B. & Orbell, S. (2003). *Reflections on Past Behavior: A Self-Report Index of Habit Strength.* Journal of Applied Social Psychology, 33 (6), 1313-1330.
- Wiedmann, K.-P., Hennigs, N., Varelmann, D., & Reeh, M.-O. (2010). *Determinants of Consumers’ Perceived Trust in IT-Ecosystems*. Journal of

Theoretical and Applied Electronic Commerce Research, 5(2). doi:10.4067/S0718-18762010000200009

- Worsley, A. & Skrzypiec, G. (1998). *Environmental attitudes of senior secondary school students in South Australia*. Global Environmental Change, 8 (3), 209-225.

This tool was developed in the S3C project, and is freely available from www.smartgrid-engagement-toolkit.eu.

S3C paves the way for successful long-term end user engagement, by acknowledging that the "one" smart consumer does not exist and uniform solutions are not applicable when human nature is involved. Beyond acting as a passive consumer of energy, end users can take on different positions with respective responsibilities and opportunities. In order to promote cooperation between end users and the energy utility of the future, S3C addresses the end user on three roles. The *smart consumer* is mostly interested in lowering his/her energy bill, having stable or predictable energy bills over time and keeping comfort levels of energy services on an equal level. The *smart customer* takes up a more active role in future smart grid functioning, e.g. by becoming a producer of energy or a provider of energy services. The *smart citizen* values the development of smart grids as an opportunity to realise "we-centred" needs or motivations, e.g. affiliation, self-acceptance or community.

S3C performed an extensive literature review and in-depth case study research in smart grid trials, resulting in the identification of best practices, success factors and pitfalls for end user engagement in smart energy ventures. The analysis of collected data and experiences led to the development of a new, optimised set of tools and guidelines to be used for the successful engagement of either Smart Consumers, Smart Customers or Smart Citizens. The S3C guidelines and tools aim to provide support to utilities in the design of an engagement strategy for both household consumers and SMEs. The collection of guidelines and tools describe the various aspects that should be taken into account when engaging with consumers, customers and citizens. More information about S3C, as well as all project deliverables, can be found at www.s3c-project.eu.