D4.2– User questionnaire WP4– Strategies for Stakeholders Engagement

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EXECUTIVE SUMMARY

The purpose of this deliverable is to provide a clustering method and a questionnaire given to participants at the beginning of the pilot. The questionnaire responses will allow us to define the pilot participant group for two key purposes.

First, there is a clustering questionnaire to provide participants a relatively fair comparison for their own electricity consumption. Four clustering questions, all relating to *Housing characteristics,* were added to help group the participants in a way to be able to provide them with meaningful comparison with other participants in similar situations.

The second clustering questionnaire covers the characteristics: *Housing characteristics*, *sociodemographic characteristics* and *attitudes and beliefs*. This questionnaire goes deeper into understanding a person's household, lifestyle, attitudes and values. The aim of the questions is to see where she/he places themselves with regards to technology, environmental consciousness and social engagement with the intention to explore whether we can identify key characteristics of engaged participation in the project- and hence receptiveness to similar approaches.

This current deliverable (D4.2) explains how the questionnaire was designed, for what purpose and how it was implemented. The Clustering may feed into WP 10 on Dissemination and Exploitation, in particular for T.10.3 Exploitation, where the plan is to allow for clustered group purchasing.

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List of Abbreviations

Abbreviation	Description
WP	Work Package
Partner Abb.	Description
VUB-IES	Vrije Universiteit Brussel – Institute for European Studies
BLP	Blue Planet AC
UU	Universiteit Utrecht
RES	Resourcefully
SVT	University of Bergen, Centre for the Study of the Sciences and the Humanities
ENR	Enerbyte

1 Introduction

Task 4.2. User Clustering includes two deliverables. D4.2 User questionnaire and D4.3 user analysis report. The task will include a development of a clustering method, a questionnaire given to participants at the beginning of the pilot (D4.2), and an analysis of the groups defined in the pilots (D4.3).

The purpose of this deliverable is to provide a clustering method and a questionnaire given to participants at the beginning of the pilot. The questionnaire responses will allow us to define the pilot participant group for two key purposes. First, as the basis to further develop methods to address groups via gamification strategy (D4.5), mainly for creating comparable clusters on the projects online platform. This grouping will allow us to provide participants with meaningful feedback based on level playing fields. Second, to, at the end of the pilot, compare the actual behaviour of the participants (e.g. level of engagement) during the pilot phase with the various sociodemographic factors, attitude and beliefs in order to analyse whether we can identify common characteristics of the most active participants (and the least active ones). Deliverable 4.3 User analysis report will include the results of our participant questionnaire responses and an analysis whether the information provided by participants correlates with their participation in the project. The User analysis report (D4.3) that will be delivered after the pilots end, will aim to research whether we can find people who share certain characteristics and who also turn out to be highly engaged in the project - and vice versa. If we can identify common characteristics of active pilot participants who to respond to the PARENT project activities, the project (or other similar projects) can in the future focus on reaching people that are likely to be receptive to this type of a project. In short, the questionnaire serves as a basis to understand the different segments of the participant groups and to conduct an analysis of key characteristics at the end of the pilot period- based on their responses and their engagement in the pilots.

This current deliverable (D4.2) explains how the questionnaire was designed, for what purpose and how it was implemented. The clustering may feed into WP 10 on Dissemination and Exploitation, in particular for T.10.3 Exploitation, where the plan is to allow for clustered group purchasing.

2 Clustering methodology

Understanding citizens and consumers is a fundamental aspect when trying to reach them, especially when it comes to behaviour change, adoption of new technologies and active engagement. The goal of strategic communication and marketing is based on targeting a specific group of people in a tailored way that this group of people is likely to respond to. Rather than casting a wide net, hoping to catch whatever fish is around, identifying the most important ones and finding ways to reach them may be the more effective way to make change.

Clustering of households into groups can be done at several different levels. Literature in energy behaviours studies and gamification for energy services has provided several indications. As a first consideration it is worth reporting that most advanced methods for clustering, segmenting users within gamified approaches rely on dynamic methods (Johnson et al. 2017; S3C 2014a, 2014b). That is to say, the system through given criteria and algorithms for machine learning dynamically identifies and groups users based on emerging patterns of use and values. However, such an advanced system does not fall within the scope of PARENT. Therefore, the clustering approach used in this project relies on a set of static information and characteristic of the user sample. Such information shall become available through the administration of the questionnaires developed in this deliverable.

Typically, the basic level at which clustering is performed, either to support comparative analytics or enable gamification features, is one of sociodemographic characteristics (age, gender, education level, etc.). However, current clustering approaches include a broader set of variables which cover attitudes and social aspects (e.g. motivations, lifestyles, and attitudes on energy and environmental issues) as well as structural and technological ones (e.g. house size, features, and appliances) to make the gamification approach more effective on the medium and long term (Sütterlin, Brunner, and Siegrist 2011; Breukers and Mourik 2013; McKinsey 2013; Dietz 2015).

Sütterlin, Brunner, and Siegrist 2011 have noted that a common image of the energy saving target group is a "young, female, well-educated, and wealthy." However, they conclude that the grouping is not that simple as "The factors and processes underlying energy consumption behaviour are much more complex and far-reaching." Further according to Sütterlin, Brunner, and Siegrist, "generally, two approaches used to profile the pro environmental consumer can be distinguished: profiling methods based on sociodemographic criteria and methods based on

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psychographic and behavioural criteria. Sociodemographic were found to explain only a small part of variance regarding pro environmental behaviour (Diamantopoulos et al., 2003), and also proved to be less suitable in predicting energy-saving behaviour than attitudinal and behavioural variables (Diaz-Rainey and Ashton, 2010; Rowlands et al., 2003)."

It is therefore that we chose to look at a variety of factors including attitudes and behavioural criteria to identify our pilot clusters. For the sake of the PARENT project, we propose clustering based on three categories: *Housing characteristics*, *sociodemographic characteristics* and *attitudes and beliefs*. The clustering will be done in two separate parts: during inscription and through an online survey.

Clustering Question Categories
1. **Housing characteristic: (to be used for primary clustering for participant comparison)**
   1.1. Location
   1.2. Household size
   1.3. Housing type
   1.4. Electric energy system (consumer vs prosumer)
   1.5. Energy efficiency class
   1.6. Energy instalments and demand (thermal/electric/gas)
   1.7. Appliance usage
2. **Sociodemographic characteristics of participant signing their household up:**
   2.1. Age group
   2.2. Gender
   2.3. Education level
   2.4. Employment status
   2.5. ICT usage
3. **Participants' attitudes and beliefs on energy and environment:**
   3.1. *Personal Values*
   3.2. *Views on sustainability*
   3.3. *Attitudes towards energy savings*
   3.4. *Attitudes to community and place*
   3.5. *Societal engagement*

The clustering of participants will serve two main reasons. On the one hand, in clustering part one, we will group participants in clusters for participant peer comparison. This will be important for providing participants meaningful feedback in seeing how they perform in comparison with other peers, or as a group effort (allowing us to display which group shows the highest performance). For the first part of the project pilots, the clustering will be limited to housing characteristics.

Thus, the way for participants to compare with others, is based on location, and similar household structure. They will not be grouped based on their attitudes, beliefs or personal factors or sociodemographic factors for the feedback function (at least not in the first stage of the project). Even if this type of clustering (housing characteristics) explains only to a small degree behaviour, the goal of clustering for peer household comparison is not to understand users but to give them a level playing field within the group (it would not seem fair to compare the energy use or energy savings of a large house with 6 members to a small one-person apartment). This data for the clustering will be collected upon inscription as this information is essential to have from all participants in order to provide them with reasonable comparison data.

For the purpose of our research, and potentially for later stage gamification purposes, the participants will be further clustered in part two, based on a series of questions within all three characteristic categories. Following their registration, participants will be sent an online questionnaire with several questions that will aid in clustering them further along the lines of their values, attitudes, behaviour and sociodemographic characteristics. At the end of the pilots, clustering will be developed based on performance during the pilot.[1] The data could include, for example, those displaying high performance in the following:
- *Highest savings*
- *Highest relative improvement of efficiency*
- *Highest level of participation/engagement*
- Use of online platform
- Response /feedback to mailings
- Participation in pilots and events

Thus, it will be a reversed clustering of sorts. We will search for common characteristics of those responding the best to the different aspects of the PARENT pilot (e.g. online platform, communication, newsletter views, workshop and meeting participation, survey responses) and thereby we may have some hints on what target groups potentially respond to these types of activities (and those who don't and will need to be introduced to a different type of initiative to reach energy efficiency targets).
The goal of the second clustering is to identify issues and opportunities for energy saving using the PARENT method, based on our understanding of each segment's attitudes, barriers, motivations and current behaviours.

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[1] Our ability to cluster will depend on our access to reliable data

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2.1   Clustering for peer comparison

When a participant agrees to participate in the PARENT project pilot, they have to
fill out, amongst other, a registration form. On that registration form we added four
clustering questions (in addition to other registration questions such as name,
email, phone number, language and Smappee code).
These four clustering questions, all relating to *Housing characteristics,* were added
to help group the participants in a way to be able to provide them with meaningful
comparison with other participants in similar situations.

Clustering Questions Part One

1. What is your City and postal code? (drop down list)
2. How many people live regularly in this household (at least half of the time)? _____
        a.   Of these how many are adults (over 18) _____
        b.   Of these how many live there all of the time? _____
3. What type of building do you live in? (Only one answer)
    [ ] A house
    [ ] An apartment in an apartment building
    [ ] A floor/apartment in a multilevel house
    [ ] Shared apartment/Collective
    [ ] Houseboat
    [ ] Other _____
4. (What is the approximate area, in square meters, of your household. Excluding
    external spaces (e.g. garden, terraces) or detached (e.g. cellars, garages)?
    [ ] Less than 45sqm
    [ ] 45 - 70sqm
    [ ] 71 - 100mq
    [ ] 101 - 130mq
    [ ] More than 130mq

The peer clustering is a key element on the PARENT online platform. Participants can there
view their own electricity consumption and then compare with others with similar
characteristics. In practice, the type of housing was not used for displaying comparison, but
we used city (commune for Brussels – as there are two), household size (number of people
in household) and household size (square meters of home). Additionally, a comparison
between all participants was added to show participants their performance when
comparing to a larger more diverse sample size. The following images show how the
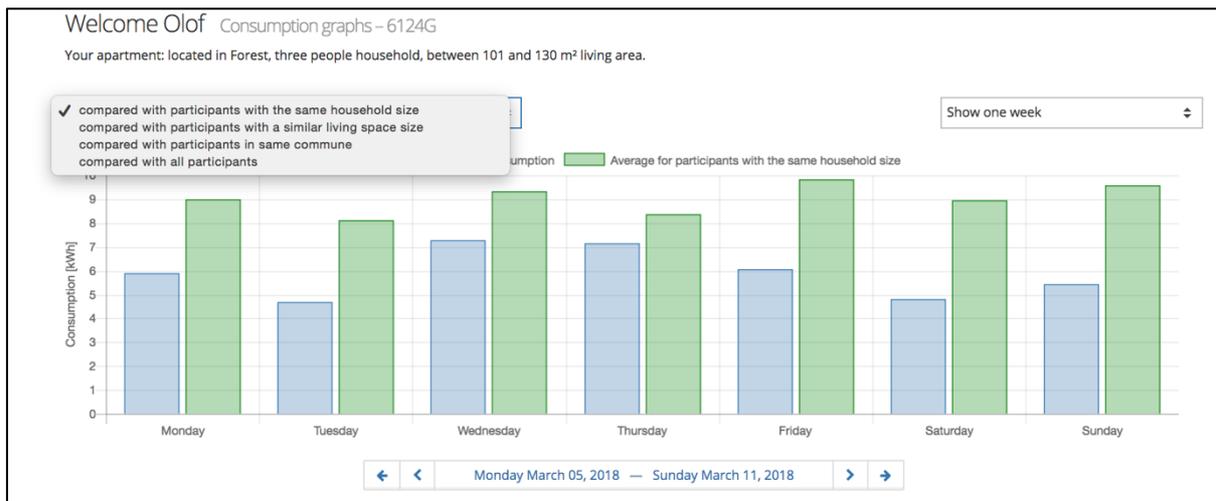

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clustering works in practice as a tool for participants to compare and add more meaning to their own consumption data.[2]

Figure 1 Platform comparison
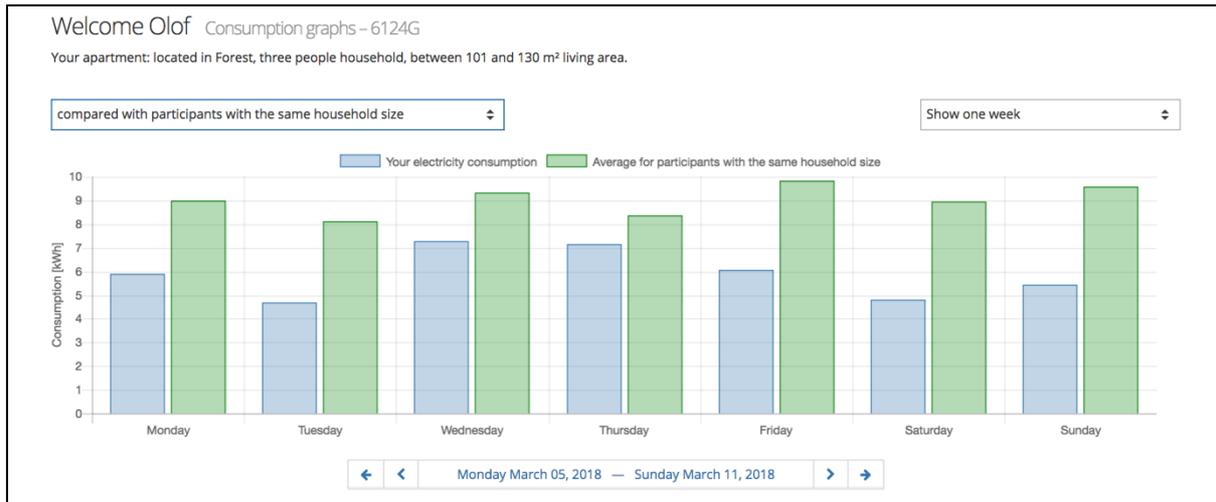
When clicking on the drop down in the upper left field, a participant can choose what cluster she/he wants to compare with.

Figure 2 cluster comparison types

For further visualisation of the clustering, the platform also displays a ranking, so a participant can in one image see how she/he is doing compared to others with similar household characteristics.

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[2] The images are from a participant who is also a member of the PARENT project consortium who knowingly shares these images

Figure 3 Smileys for cluster visualisation

Finally, a smaller condensed version of the same information, a graph image for a specific week is sent via the PARENT newsletter to all participants who have installed their energy monitor.

Figure 4 Newsletter comparison graph
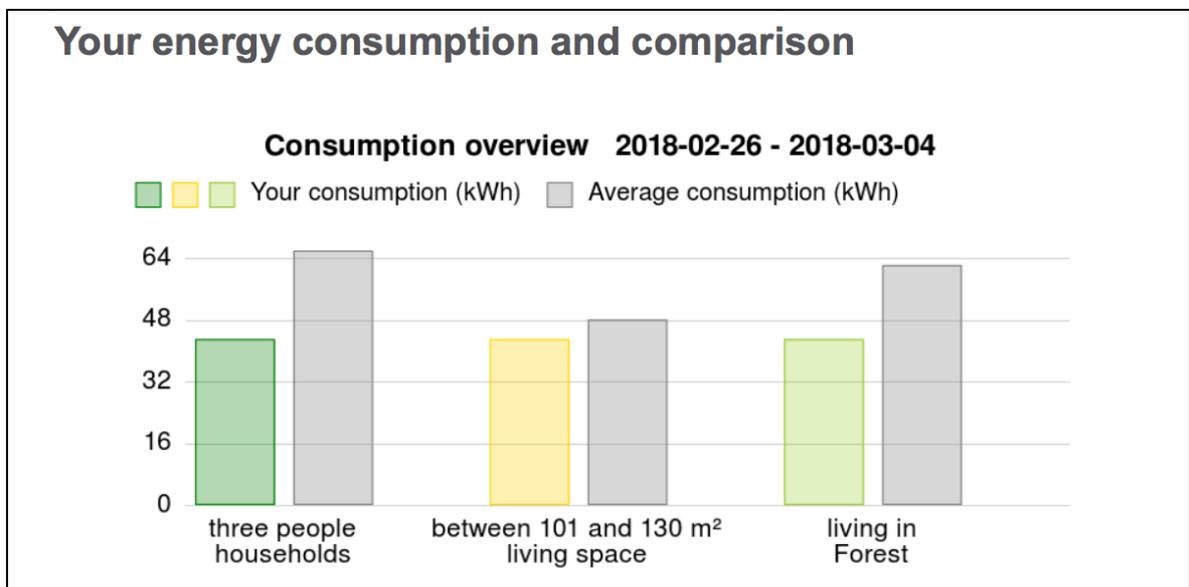
The clustering for peer comparison is a basic and practical way to allow the pilot participants to look at their own consumption and to compare with other participants in similar living conditions. Location, household size and size of home were considered the key characteristics in the variation of electricity consumption. For instance, the Norwegian figures are considerably higher than the Belgian ones as in Norway most people heat with electricity and the winters are colder. More people in a household will in most cases lead to higher electricity use for heating water, more laundry, more electronics to plug in etc. And a larger living space

often means more lighting, more equipment and more space to fill and heat. Of course, these are general assumptions. One element we discovered after the clustering had been conducted is that some homes in Belgium are heated with electricity and others with gas. This has a major impact on the electricity consumption. This variable is not covered with our clustering.

2.2 Clustering for understanding behaviour

The second part of the clustering contains a longer questionnaire that covers the three characteristics: *Housing characteristics*, *sociodemographic characteristics* and *attitudes and beliefs.* It was sent to all registered partners in the form of an online survey. The questions go deeper into understanding a person's household, lifestyle, attitudes and values. The aim of the questions is to see where she/he places themselves with regards to technology, environmental consciousness and social engagement. The questions are in line with several other behavioural surveys such as Defra's 2009 Public attitudes and behaviours towards the environment, Sütterlin, Brunner, and Siegrist's 2011 "Who Puts the Most Energy into Energy Conservation? A Segmentation of Energy Consumers Based on Energy-Related Behavioural Characteristics" and other research project surveys such as the FP7 CIVIS project (2013-2016).

The online survey is not mandatory (or at least not in an enforceable manner), and at the time of writing, around half of the participants have filled it out. The questionnaire includes 18 questions of different lengths. It includes an introductory text as well as explanatory text for each question.

Clustering Questions Part Two

Dear PARENT project participant

We are very happy that you have joined our project and hope that you are excited about installing your Smappee, and to get started with saving energy and developing solutions with us - working towards a more sustainable future together.

Before we go further, we would like to ask you a few questions regarding your household, your lifestyle and your attitudes and values. The questionnaire will be used for the PARENT project research and policy advise purposes only. The data will be kept safe and will not be used by third party or for any sort of commercial activity.

The reason for this questionnaire is to help us better to understand motivations and barriers for sustainable energy behaviour, and to identify factors that may be linked with individuals' interest and ability to act towards energy saving. We will be using this information to create clusters, and we will link these anonymised clusters with the participation and level of engagement of participants at the end of the year. The result of this research will be anonymous.

The questionnaire consists of 18 sections and should take around 15 minutes to complete. It is a very important part of the PARENT project and towards sustainable behaviour research, so we ask you please to complete the whole questionnaire.

General Questions

1. What is your housing situation?
(This question will help in explaining potential limitations and possibilities for energy saving action based on whether a person is a homeowner or renter)
[ ] Owner
[ ] Tenant
[ ] Other _____

2. Does your home have an energy class certification?
(This question helps to establish what the starting point is- which both explains level of current engagement and also potential for further energy savings)
[ ] Yes, class A +
[ ] Yes, class A
[ ] Yes, class B
[ ] Yes, class C
[ ] Yes, class D
[ ] Yes, class E
[ ] Yes, class F
[ ] Yes, class G
[ ] Yes, but I do not remember what class
[ ] No / I don't know

3.   Indicate the type of heating system in your home:
(The different types of heating systems require very different amounts of energy and are an important factor in energy usage that is not linked with changing behaviour)
[ ] District heating
[ ] Gas heating
[ ] Wood/Fire-based heating
[ ] Electric heating
[ ] I do not have a heating system
[ ] I don't know
[ ] Other (specify) _____

4.   Do you know how much electricity you consumed last year?
(This answer may help us in defining a baseline to compare this year's consumption and changes between years)
[ ] Yes
[ ]No
          4.1.1.   If yes- How much? _____ kwh
          4.1.2.   please indicate the period from _____ to _____.

Sociodemographic characteristics of primary household participant
(These answers help us to verify based on previous assumptions about age, gender and education linked with pro environmental behaviour. These factors are being challenged as being indicators and we want to follow up on that research)

5.   Age
[ ] Under 25
[ ] 26-35
[ ] 36-45
[ ] 46-55
[ ] 56-65
[ ] Over 65

6.   Gender
[ ] Male
[ ] Female
[ ] Other

7.   Education
[ ] Primary
[ ] Secondary
[ ] Vocational
[ ] Bachelor
[ ] Master
[ ] Doctorate
[ ] Other

Sociodemographic characteristics of entire household

8. Employment
(This will also explain high or low level of energy use (number of people in the house more often or less often depending on where they spend their days)
Of the adult household members (over 18yo), how many work
[ ] Full time from home (including stay at home parent/home maker)
[ ] Part time out of home
[ ] Full time out of home
[ ] Student
[ ] Unemployed or retired
[ ] Other _____

9. ICT Usage
(This question aims to see if there is a link between high level of ICT appliance use /high level of tech savviness and participation in the PARENT platform and use of the Smappee application)

> *9.1.1. Which of the following ICT appliances are present in your household? (tick all boxes that apply)*
> *[ ] Personal Computer/Laptop*
> *[ ] Tablet*
> *[ ] Smartphone*
> *[ ] Game Console*
> *[ ] Television*
> *[ ] Other (specify)_____*
> *[ ] Other (specify) _____*
> *[ ] There are no appliances in my household*

> *9.1.2. If you consider the ICT appliance that you use the most in your home, what is an approximate average use per adult in household for the week? (Only one answer)*
> *[ ] Several hours (> 5h) every day*
> *[ ] A few hours (<5h) every day*
> *[ ] At least once every two days*
> *[ ] At least once a week*
> *[ ] Less than once a week*

Attitudes and beliefs on Energy and Environment

Personal Values and views on sustainability
(This series of questions (10-18) help us in understanding general attitudes and values towards the environment, responsibility sharing, barriers and motivators.

It also helps us in understanding general attitudes and activities towards energy saving and towards community engagement. It will help us in developing solutions and advise on how to reach out to and assist the different types of people, or how to provide customised support for people who have diverse views and face different barriers towards acting more sustainably

We might for example discover that for some clusters of people economic incentives might motivate them whereas other cluster might respond more to community-based actions)

10. Ecological world view

Please respond to these statements (Strongly agree, tend to agree, neither agree nor disagree, tend to disagree, strongly disagree, don't know)

[ ] Global warming is a serious problem for our society
[ ] The effects of climate change are too far in the future to really worry me
[ ] The so-called 'environmental crisis' facing humanity has been greatly exaggerated
[ ] Climate change is beyond control – it's too late to do anything about it
[ ] The increasing energy demand is a serious problem for our society
[ ] The increasing shortage of energy sources is a serious problem for our society

11. Attitude, barriers and motivations

Please respond to the statements (Strongly agree, tend to agree, neither agree nor disagree, tend to disagree, strongly disagree, don't know)

[ ] The many small efforts I make to conserve energy add up to and can make a difference with regard to general energy consumption.
[ ] Being green is an alternative lifestyle; it's not for the majority
[ ] I sometimes feel guilty about doing things that harm the environment
[ ] I need more information on what I could do to be more environmentally friendly
[ ] If government did more to tackle climate change, I'd do more too
[ ] If business did more to tackle climate change, I would too
[ ] I find it hard to change my habits to be more environmentally friendly
[ ] It's not worth me doing things to help the environment if others don't do the same

Current behaviour and efficacy

12. Which of the following statements describes how you feel about your lifestyle and the environment? (Only one answer)

[ ] I'm happy with what I do at the moment
[ ] I would like to do a little more to support the environment provided that it does not require major changes in my lifestyle
[ ] I would like to do much more to support the environment even if it requires big changes in my lifestyle
[ ] I don't know

13. Which of these would you say best describes your current lifestyle?
[ ] I am actively trying to improve my current lifestyle for environmental reasons
[ ] I don't really do anything that is environmentally friendly
[ ] I do one or two things that are environmentally friendly
[ ] I do quite a few things that are environmentally friendly
[ ] I'm environmentally-friendly in most things or everything I do
[ ] I Don't know

Examples of environmentally friendly activities: buy regularly organic food, buy locally produced products, avoid food waste, buy regularly second-hand products, borrow instead of buying, buy energy efficient products, pay attention to turning off lights and electrical appliances, recycle, compost, use non-toxic cleaning products, use public transport/bike/walk

Attitudes towards energy savings

14. What are your energy concerns?
Please respond to the statements (Strongly agree, tend to agree, neither agree nor disagree, tend to disagree, strongly disagree, don't know)
[ ] I am interested in reducing the cost of energy bills
[ ] I am interested in reducing the environmental impact of the energy we use
[   ] I would be interested in participating in renewable energy projects/schemes, owned either privately or collectively
[ ] I would be interested in receiving energy from renewable sources
[ ] I am interested in owning less electrical appliances
[ ] When buying new appliances, I look for energy efficiency
[ ] I know the areas of my household with the highest energy saving potential and, accordingly, I can/could optimize my consumption without any problems
[   ] I consider myself an energy aware person and I already try to minimise my household consumption

15. Energy Efficiency
In your home, has any of the following energy efficiency intervention planned or been made?

	I do not know	No, and it is not planned for the future	No, but it is planned for the future	Yes, already done
Installation of high-efficiency water boiler (e.g. condensation based)	[ ]	[ ]	[ ]	[ ]
Installation of thermostatic valves	[ ]	[ ]	[ ]	[ ]
Installation of high efficiency windows	[ ]	[ ]	[ ]	[ ]
Roof insulation	[ ]	[ ]	[ ]	[ ]
Wall insulation	[ ]	[ ]	[ ]	[ ]
Replacing old light bulb lamps with LED	[ ]	[ ]	[ ]	[ ]
Replacement of old appliances with high-efficiency ones (A+)	[ ]	[ ]	[ ]	[ ]
Solar panels installed				
Green electricity provider/contract				
Other (specify): _____	[ ]	[ ]	[ ]	[ ]

Attitudes to community and place

16. Community attitude

Please respond to the statements (Strongly agree, tend to agree, neither agree nor disagree, tend to disagree, strongly disagree, don't know)

[ ] I feel like I belong to this neighbourhood
[ ] If I were to move I would like to live in a similar place to where I live now
[ ] I read local news and am aware what is going on in my local area

Societal engagement

17. Are you any involved in local citizen group (taking part in, organising, giving time to)? Tick those that apply

[ ] Climate group
[ ] Food group (CSA, local food production, vegetarian/vegan, organic…)
[ ] Energy action group
[ ] Local political group
[ ] Family/youth/children group
[ ] Faith based group
[ ] Minority support group
[ ] Human rights group
[ ] Animal rights group
[ ] Local projects/events/festivals
[ ] Hobby group
[ ] Sport group
[ ] Art group
[ ] Study/education group
[ ] other _____

18. Are you currently part of at least one association, group, or non-governmental organization that operate in the energy and environmental sector at national or international level?

[ ] Yes, I pay a subscription fee or support them otherwise economically
[ ] Yes, I provide my support in form of volunteer work
[ ] Yes, I am co-organiser/ active member in meetings, activities, events
[ ] Yes, all of the above
[ ] No, I am not part of any national or international energy or environmental organization
[ ] Other: _____

Once the pilot has run its course, we will look at the survey results and compare with the participants' level of engagement in the project. The aim is to explore whether there are characteristics that those who are highly engaged share. Our sample data is relatively small, or under 200, and there is a relatively large number of questions and opportunities for variations in responses. This means that our

outcomes will not be statistically significant, and we will not be able to prove correlation. But we can get an idea, look at linkages and hypothesise. The outcome of the questionnaire will be the subject of D4.3 User Analysis report.

3 Conclusion

This deliverable explains how the user clustering and the clustering questionnaire have been implemented in the PARENT project. There are two types of clustering exercises being conducted. On the one hand we look to provide practical clustering for participants benefit, so that they can compare their electricity consumption with other participants with similar housing characteristics. On the other hand, we created a more in depth personal questionnaire that looks at participants' attitudes, values and lifestyles. This questionnaire serves as the input for D4.3 the User analysis and aims to give us insight into whether there are certain personal characteristics that makes a person more likely to become actively engaged in a project such as the PARENT project.

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