

Energy Citizenship and Energy Communities for a Clean-Energy Transition

# D2.3 Energy Citizenship Scale - Validation Study (Final Version)



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Abstract	In this deliverable, we describe the validation process of our newly					
	developed psychological energy citizenship scale. We start by confirming					
	the factor structure of the energy citizenship scale with a confirmatory					
	factor analysis. We then continue with reporting two studies which have					
	been carried out in Austria and in the Netherlands to demonstrate					
	convergent and divergent validity of the energy citizenship scale and last					
	also show criterion validity of the energy citizenship scale.					





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# List of Abbreviations

CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DF	Degrees of Freedom
М	Mean
SD	Standard Deviation
RMSEA	Root Mean Square Error of Approximation
WP	Work Package



### **1** Introduction

This deliverable forms part of WP2 of the Horizon2020 project **Energy Citizenship and Energy Communities for a Clean-Energy Transition** ( $\mathbf{EC}^2$ ). In this work package, we started out with developing a common understanding of energy citizenship which was the basis for our interdisciplinary work. In Deliverable 2.1 we describe how we arrived at an interdisciplinary definition of energy citizenship based on the expert opinions of a legal, economic and psychological team. This interdisciplinary definition served as the foundation for our psychological definition of energy citizenship. To us,

"Energy citizenship from a psychological perspective is people's **belief** that they as **individuals** and as **collectives** have **rights** and **responsibilities** for a **just** and **sustainable energy transition**, and their **motivation to act** upon those rights and responsibilities."

The psychological energy citizenship definition in turn builds the foundation for the energy citizenship scale which we are developing. This scale should measure how energy citizenship manifests within individuals and collectives and is a critical pillar for future work packages and project work. In psychological studies, WP4 aims to gather empirical evidence on barriers and facilitators of energy communities and energy citizenship, as well as on the effectiveness of energy citizenship for broader sustainability goals. For that purpose, longitudinal field studies are carried out to assess people's energy citizenship level, using our newly developed energy citizenship scale. Hence, the energy citizenship scale serves as a basis for studying energy citizenship psychologically.

We documented first steps of the scale development process in Deliverable 2.2. It elaborates on how the scale is connected to our definition of energy citizenship, how the items were selected, it describes the studies and analysis on the items and finishes with an explanation of how we arrived at the current version of the scale (see Appendix for the complete Energy Citizenship Scale).

The present deliverable focuses on the validation<sup>1</sup> of the newly developed energy citizenship scale. In the following, we will discuss different studies which were carried out to test various kinds of validity of the scale. We start out with looking at the factor structure of the scale and carry out Confirmatory Factor Analysis. Then we test for convergent and divergent validity of the scale by looking how our energy citizenship scale relates to other theoretically related and unrelated constructs. We also check for criterion related validity, by testing whether the scale is able to predict community energy behaviour and sustainable energy behaviour. Lastly, we also validate the scale in another EU country.

### 2 Study 1: Confirming the factor structure

The aim of study 1 was to confirm the factor structure of the newly developed scale in a new sample. To do so, we collected data with an online survey, through a survey panel. The sample was representative for the Austrian population and sampled based on the criteria of age, gender and education.

#### 2.1 Participants

1542 people, mainly from Austrian and representative for the Austrian population, participated in this study. The participants were between the ages of 16 and 74 with a mean age of M = 42.78 (SD = 14.78).

<sup>&</sup>lt;sup>1</sup> According to Kelly (1927, p. 14), tests are valid if they measure what they claim to measure.



In the sample, 41% lived in a house and 48% currently lived in an apartment. Out of this, 46% were living for rent and 43% owned the house or apartment they lived in. 49% were living in urban areas whereas the other 51% were living in rural areas. One hundred people (6.5%) indicated that they were part of an energy community or energy initiative.

#### 2.2 Procedure

Participants were invited to take part in the online survey by the panel. The panel sent out the link to our study. The data collection was combined with another study on smart meter use. The survey started with a short introduction to the topic as well as an informed consent. Then a number of different constructs, which were relevant for the other study, were measured with their respective questionnaires. After that, Energy Citizenship was measured using our newly developed energy citizenship scale. The scale consists of two separate energy citizenship scales, assessing the individual level and the collective level of energy citizenship. The two scales consist of nine items each (see Table 1, original items are in German). Both scales have identical items content wise and only differ in referring either to the individual "T" or a specific group. In this study, the group was defined as EU citizens. Participants had to indicate how much they agree with a statement on a 7-point Likert scale ranging from "*Completely agree*". In total, completing the survey took the participants about 20 minutes.

Table 1	1.	Items	of the	Energy	Citizenshi	o Scale
			- <b>J</b>			

	Individual Level						
1.	I consider affordable sustainable energy to be an important right.						
2.	I consider it an important right to be informed about the energy efficiency of various products.						
3.	I consider being able to actively participate in the energy market (e.g., being able to produce / sell / exchange / store energy) to be an important right.						
4.	I see it as my responsibility to help others to participate in the sustainable energy transition (e.g., by sharing my knowledge).						
5.	I see it as my responsibility to contribute towards a sustainable energy transition.						
6.	I see it as my responsibility to actively participate in the energy market (e.g., produce / sell / ex- change / store energy).						
7.	I am willing to play an active role in ensuring that no one is at a disadvantage during the sustainable energy transition.						
8.	Investing time, effort, and money to be able to use more renewable energy is a source of pride for me.						
9.	I am open to helping to influence energy policy and legislation.						
	Collective Level						
1.	We EU citizens consider affordable sustainable energy to be an important right.						
2.	We EU citizens consider it an important right to be informed about the energy efficiency of various products.						
3.	We EU citizens consider being able to actively participate in the energy market (e.g., being able to produce / sell/ exchange / store energy) to be an important right.						
4.	We EU citizens see it as our responsibility to help others to participate in the sustainable energy transition (e.g., by sharing our knowledge).						



- 5. We EU citizens see it as our responsibility to contribute towards a sustainable energy transition.
- 6. We EU citizens see it as our responsibility to actively participate in the energy market (e.g., produce / sell / exchange / store energy).
- 7. We EU citizens are willing to play an active role in ensuring that no one is at a disadvantage during the sustainable energy transition.
- 8. Investing time, effort, and money to be able to use more renewable energy is a source of pride for us EU citizens.
- 9. We EU citizens are open to helping to influence energy policy and legislation.

#### 2.3 Confirmatory factor analysis

We carried out confirmatory factor analyses  $(CFA)^2$  to confirm the factor structure of our energy citizenship scale. A previous study (see Deliverable 2.2) indicated that the concept of energy citizenship could be measured by two separate scales, one individual and collective level energy citizenship scales. Even though, based on our energy citizenship definition, our theoretical understanding would combine both, the individual level and the collective level, into one construct of energy citizenship, we could not find such a latent factor. However, since this is the first study in which participants only received the final 18 items of the Energy Citizenship Scale and the sample was substantially bigger, we tested the following three models using CFA. MODEL1 was a one-factor model of the individual level energy citizenship scale. MODEL2 was a one-factor model of the collective level energy citizenship scale. MODEL3 was a two-factor model combining the two previously described individual level energy citizenship scale and collective level energy citizenship scale. Each of them constituting one factor, respectively and being combined by one latent factor of energy citizenship. Regarding model fit, all three models showed a moderate, but acceptable model fit after small modifications (MODEL1: Chisquare = 330.282, Chi-square/df = 14.360, RMSEA = 0.093, CFI = 0.966; MODEL2: Chi-square = 354.237, Chi-square/df = 13.625, RMSEA = 0.091, CFI = 0.976; MODEL3: Chi-square = 11692.958, Chi-square/df = 13.544, RMSEA = 0.090, CFI = 0.936). As all three tested models show an acceptable model fit, we concluded that the scales could either be used as sperate scales looking at either the individual or the collective level of energy citizenship separately, or they could be used as one combined Energy Citizenship Scale.

			MODEL1	MODEL2	MODEL3	
	M	SD	Factor loading 1	Factor loading 1	Factor load- ing 1	Factor loading 2
IL Item 1	4.42	2.14	0.70	-	0.76	-
IL Item 2	4.34	2.05	0.72	-	0.77	-
IL Item 3	4.07	1.95	0.77	-	0.78	-
IL Item 4	3.86	1.79	0.79	-	0.77	-
IL Item 5	4.12	1.97	0.81	-	0.84	-
IL Item 6	3.72	1.83	0.68	-	0.67	-

#### Table 2. Factor Loadings for Confirmatory Factor Analysis (N = 1542)

<sup>&</sup>lt;sup>2</sup> Confirmatory Factor Analysis can be used to determine if measures of a construct are in accordance with a researcher's understanding of that construct (or factor). Thus, the purpose of confirmatory factor analysis is to determine whether the data are consistent with a hypothesized measurement model (Jöreskog, 1969).



IL Item 7	3.97	1.83	0.82	-	0.80	-
IL Item 8	3.77	1.79	0.70	-	0.69	-
IL Item 9	3.97	1.80	0.76	-	0.74	-
CL Item 1	4.76	2.09	-	0.77	-	0.79
CL Item 2	4.66	2.00	-	0.80	-	0.81
CL Item 3	4.37	1.87	-	0.87	-	0.87
CL Item 4	4.22	1.82	-	0.87	-	0.87
CL Item 5	4.31	1.87	-	0.88	-	0.88
CL Item 6	4.19	1.79	-	0.87	-	0.86
CL Item 7	4.32	1.84	-	0.87	-	0.87
CL Item 8	4.07	1.77	-	0.76	-	0.75
CL Item 9	4.32	1.81	-	0.87	-	0.87
IL Scale	4.03	1.50	-	-	-	-
CL Scale	4.36	1.61	-	-	-	-
Combined	4.19	1.44	-	-	-	-
Scale						

*Note:* IL= Individual Level, CL = Collective Level

#### 2.4 Reliability

We conducted reliability analysis on the scale as a whole as well as on the individual level and the collective level, to get an estimate of the internal consistency among the items. To do so, coefficient  $\alpha$  was calculated. Overall, the coefficient  $\alpha$ s were very good (combined scale: Cronbach's  $\alpha = .96$ ; individual level: Cronbach's  $\alpha = .92$ ; collective level: Cronbach's  $\alpha = .96$ ).

#### 2.5 Conclusion study 1

Contrary to the previous study described in the preceding deliverable (D2.2), which indicated that the concept of energy citizenship could only be measured by two separate scales, one individual and collective level energy citizenship scales, we this time found that both levels could be combined into one Energy Citizenship Scale. We should bear in mind that the previous study was done to construct the scale and still included a lot more items which were then cut down based on the results. The present study is in fact the first study in which participants only received the final 18 items of the Energy Citizenship Scale and the sample was substantially bigger. We should therefore acknowledge that the results of the current study are more meaningful for the drawing conclusions on the factor structure of the final scale. Hence, we concluded that the scales could either be used as sperate scales looking at either the individual or the collective level of energy citizenship separately, or they could be used as one combined Energy Citizenship Scale.

#### **3** Study 2: Demonstrating construct validity

To validate the scale, we conducted a second study, in which we had participants complete the Energy Citizenship Scale again, together with other constructs to test for convergent and divergent validity. The idea of convergent validity is to show that a construct assessed with a newly developed scale correlates with theoretically related constructs (Chin & Yao, 2014), whereas divergent validity aims at showing that the measured construct is not related and does not correlate to other, theoretically unrelated constructs. Together, convergent and divergent validity are used to demonstrate construct validity (Campbell & Fiske, 1959). For the current study, we chose to include the constructs of energy attitude, ecological citizenship, environmental awareness, environmental knowledge and values, which will all be defined in the following. In the case of energy citizenship, we would for example expect that the higher a person's environmental awareness, the higher their energy citizenship, but on the other hand, for example the value tradition should not be related to energy citizenship.



Due to the definition of energy citizenship, it is reasonable to expect other energy related, as well es other citizenship related, constructs to be associated. The Energy attitude scale by Piskernik (2008) for instance, measures people's attitudes and willingness to use energy in an efficient and environmentally friendly manner. We expect energy attitudes to correlate with our Energy Citizenship Scale because both constructs deal with the topic of energy and people's willingness to engage in energy proficient ways. Even though the energy attitude scale does not include a citizenship component and is only focused on individual energy behaviours, we still expect a positive correlation with energy citizenship, as past studies have demonstrated a positive relationship between environmental attitudes and citizenship components (Daniel et al., 2022; Steel, 1996).

Ecological citizenship on the other hand explicitly focuses on the citizenship aspect. Ecological citizenship can be seen as a subcategory of global citizenship with the goal of safeguarding or restoring the integrity of the biosphere (Karatekin & Uysal, 2018). Ecological citizens therefore are people who actively protect the environment through individual, collective or political actions. Central aspects for the concept of ecological citizenship are responsibility, sustainability, rights, justice and participation. Responsibility is seen on a global level as well as towards future generations to preserve/restore the integrity of the environment. Sustainability is necessary to fulfil the responsibility towards future generations. The rights dimension includes the right to information, the right to participate in decisionmaking on environmental issues, and the right to behave in ways that protect the environment. Justice means that everyone should be able to exercise these rights equally. Public participation is essential to achieve these goals. Participation can be seen as both, a right and a responsibility. There are large overlaps in the conceptualization of ecological citizenship and energy citizenship. Energy citizenship also focuses on rights and responsibilities of citizens but in relation to the energy transition. Sustainability, justice and participation are also central aspects of energy citizenship. In our Energy Citizenship Scale, participation is conceptualized as action intentions, meaning people's intentions to participate in the energy transition. Furthermore, it was empirically shown that different environmental concepts correlate to energy concepts (Liao et al., 2020; Sapci & Considine, 2014). Because of the high theoretical and conceptual overlap between the concepts of energy citizenship and ecological citizenship and the empirical evidence for the relation between environmental and energy concepts, we expect them to be positively related to each other.

Because the sustainable energy transition is part of a more general environmental sustainability construct, energy citizenship should be related to broader environmental constructs as for example environmental awareness. Environmental awareness can be seen as an attitude concept and can be measured based on the three-component attitude model (Rosenberg & Hovland, 1960; Geiger & Holzhauer, 2020). The three-component model includes cognitive, affective and behavioural components. Environmental awareness concerns attitudes about current environmental issues. It is composed of environmental affect (expressions of affective concern), environmental cognition (rational evaluations), and environmental behaviour (intention-based behaviours. Since our energy citizenship conceptualization and scale also include a cognitive and a behavioural intentions component, there is a large theoretical overlap between the concept of environmental awareness and energy citizenship. Furthermore, empirical research has found positive associations between environmental attitudes and energy-related behaviours (Fornara et al., 2016; Henn et al., 2019; Pothitou et al., 2017). Accordingly, a positive relationship between environmental awareness and energy citizenship is expected.

We also decided to include an environmental knowledge scale in our validation study. On the one hand, we tried to clearly distinguish our energy citizenship scale from energy / environmental literacy or



knowledge, making sure that energy citizenship does not depend on one's knowledge of the energy system and that even someone without energy or environmental knowledge may be an energy citizen if they feel motivated. Therefore, one might expect that energy citizenship may not be related to environmental knowledge. On the other hand, people who are interested in the energy transition and in environmental issues and find these topics important might also know more about these. Indeed, some previous studies have shown small correlations between environmental knowledge and energy related behaviours (Paço & Lavrador, 2017; Pothitou et al., 2016; Dursun et al., 2019). We therefore also expect a small but positive relationship between energy citizenship and environmental knowledge.

Lasty, we included a value scale. Values can be described as desirable and situation independent goals that serve as guiding principles in people's lives (Schwartz, 1992). We had different expectations for how the different values should relate to energy citizenship. Given that values guide the perceived importance of consequences of different energy alternatives, the energy transition and energy citizenship, it follows that people's level of energy citizenship will depend on what consequences, they think, energy citizenship will have for their important values. First, we expect positive relationships between the values universalism (which focus on understanding, appreciation, tolerance, and protection of the welfare of all people and nature), benevolence (which focus on preserving and enhancing the welfare of other people) and biospheric values (which focus on caring about nature and the environment). Energy citizenship is likely to be seen as supporting people's biospheric values, since people with strong biospheric values tend to be more concerned about the environment and put a lot of emphasis on protecting it (De Groot & Steg, 2008). Hence people with strong biospheric values might also score higher on energy citizenship because the goal of energy citizenship is a sustainable energy transition. And indeed, studies have shown, that the stronger people's biospheric values, the more likely they are to favor renewable energy (Perlaviciute & Steg, 2015). The values universalism and benevolence together make up the category of self-transcendent values in Schwartz's (1992) value theory. Self-transcendence values emphasize serving the interests of others. Individuals who attribute high importance to self-transcendence values want to seek social justice and equality for all people and try to be helpful, loyal, and tolerant (Roccas, 2003). This shows one important theoretical overlap to our concept of energy citizenship. Our conceptualization of energy citizenship also empathizes social justice in the energy transition. People who value social justice and show high self-transcended values therefore also likely show higher levels of energy citizenship. Furthermore, studies have shown that environmentally responsible attitudes and behavior can be predicted by self-transcendent values (see for example: Nordlund & Garvill, 2002). More specifically, in the energy domain, people with high self-transcended values were more willing to pay for eco-labeled electricity (Hansla, 2010). Based on these studies and the previously described theoretical overlaps, we expect a positive relationship between energy citizenship and the values universalism, benevolence and biospheric values.

On the other hand, we expect the values power and achievement to be negatively related to energy citizenship. These two values can both be found in the self-enhancement category of Schwartz's (1992) value theory. Generally, highly self-enhancing individuals are less concerned about environmental issues and are less likely to behave in environmentally friendly ways (Kilbourne et al., 1998). As one example of this, Kilbourne et al. (2005) showed that self-enhancing individuals are more materialistic than self-transcendent individuals, and consequently are less concerned about the impact of their consumption on the environmental constructs such as environmental citizenship (e.g., Stern et al., 1999) as well as to different energy related behaviours like adoption of energy-efficient lighting at home or car use (Lee et al., 2013; Lind et al., 2015). Therefore, we also assume a negative relationship between the values power and achievement and energy citizenship. For the value Tradition we expected



that it would not be related to our Energy Citizenship Scale, because we think that people will not perceive the energy system as a tradition. Therefore, energy citizenship should be independent from the value tradition.

Taken together, a positive correlation of energy citizenship with energy attitude, ecological citizenship, environmental awareness, biospheric values and the values universalism and benevolence would indicate convergent validity of our scale. In addition, no or negative relations between energy citizenship and the values tradition, power and achievement would indicate divergent validity of our scale. We pre-registered our expectations in the Open Science Framework.

#### 3.1 Participants

The sample size for the second study was 561 participants, 433 completed the whole survey. From these 433 participants, 33 people had to be excluded because they did not pass the attention checks and 14 more were excluded because they completed the survey too fast, making it unlikely that they read the questions. This left us with a final sample of 386. In the final sample, 34% of the participants were male and 65% female. The age ranged from 18 to 71, with a mean age of M = 28 (SD = 10.69). The vast majority of the participants were highly educated, 96% having completed a high school diploma of at least 12 years. Seventy-four percent were currently students and 72% were living in an apartment for rent.

#### 3.2 Procedure

Potential participants were invited to participate in the online survey using Limesurvey (http://limesurvey.org/). The survey started with a short introduction to the topic as well as an informed consent, in line with the project's ethical requirements. Only if the participants indicated their consent to participate, they were able to start the survey. We started with a number of questions regarding demographic characteristics. Then the different constructs were measured with their respective scales and questionnaires. We measured the variables values, energy citizenship, environmental awareness, environmental knowledge, ecological citizenship and energy attitude. In total, completing the survey took about 20 minutes. Participants had to chance to win 1x 250 Euro and 5x 50 Euro for their participation.

#### 3.3 Materials

In the survey, the variables were assessed in the order as they appear in the following description of the material.

Values were measured using the German version of Schwartz's value scale (Boer, 2014; Schwarz, 1992). The scale consists of short descriptions of ten different values, namely power, achievement, universalism, benevolence, tradition, conformity, security, self-direction, stimulation and hedonism. One item for biospheric values was added to the original scale. One example item would be "Power: Social status and prestige, control or dominance over people and resources". The participants were asked to rate how important the described values are to them on scale ranging from 1"*not important at all*" to 6 "*very important*".

Energy citizenship was measured in the same way as described in study 1, using our newly developed Energy Citizenship Scale. For the collective level, again the group of EU citizens was chosen.



Additionally, we measured energy citizenship with a 1-Item-scale which was developed alongside our other Energy Citizenship Scale and is based on the practical energy citizenship definition which we developed together with practitioners in the course of WP2 (see Deliverable 2.1 & 2.2). First, participants read the practical definition of energy citizenship to become familiar with the construct. The definition reads as follows:

"Energy citizenship describes people's opportunity and willingness for active participation in the energy transition, with the goal of achieving a decentralized, equitable, and regenerative energy system. Energy citizenship is characterized by a co-responsibility between governmental authorities and people. Authorities are responsible for creating structural opportunities and decreasing barriers, particularly for marginalized groups, in order to empower people to become active. People are seen as active agents that create the foundation for, participate in, and sustain a regenerative energy system."

Then they were asked to indicate how much they are willing to participate in the described concept of energy citizenship and to get actively involved within their scope of possibilities, on a 1 to 7 scale from "*not willing at all*" to "*fully willing*".

The variable, environmental awareness was measured using the scale by Geiger and Holzhauer (2020). The scale consists of a cognitive-affective and a behavioural component. The cognitive-affective subscale includes 15 statements like "It worries me to think about the environmental conditions in which future generations will probably have to live", to which the participants have to indicate how much they agree with each of them, on a scale ranging from 1 "*do not agree at all*" to 4 "*fully agree*". The behavioural subscale consists of 8 items. The participants were asked to rate how often they perform specific environmental actions in their daily lives on a 1 to 6 scale from "*never*" to "*always*".

Environmental knowledge was measured using an eight-item scale which consists questions that cover environmental issues (Geiger & Holzhauer, 2020). Each question has four answer options, out of which only one is correct. The items included questions like "What is the main source of groundwater pollution in the EU?".

To measure ecological citizenship, we used a scale developed by Karatekin and Uysal (2018). The scale consists of 24 items describing specific behaviours, to which participants have to indicate how often they perform these behaviours on a 5-point scale ranging from "*almost never*" to "*always*". The scale includes items like "When buying electrical appliances, I pay attention to the energy consumption" or "I take part in protests on environmental issues".

Energy attitude was measured using a scale developed by Piskernik (2008). The scale captures attitudes toward efficient energy use by assessing energy related behaviours. The questionnaire asks respondents to rate how much they agree with different statements. It consists of 9 items which the participants rate on a 1 to 4 scale from "*do not agree at all*" to "*fully agree*". One example item would be "I think it makes sense to always switch off the computer when taking a longer break to save energy.".

#### 3.4 Confirmatory factor analysis

Again, we carried out confirmatory factor analyses in this new dataset, to further confirm the factor structure of our Energy Citizenship Scale. We tested the same models as described in Study 1, namely, MODEL1, a one-factor model of the individual level Energy Citizenship Scale, MODEL2 was a one-factor model of the collective level Energy Citizenship Scale and MODEL3 was a two-factor model



combining the individual level and collective in one latent factor of energy citizenship. Regarding model fit, MODEL1 and MODEL2 showed an acceptable to good model fit after small modifications<sup>3</sup> (MODEL1: Chi-square = 120.736, Chi-square/df = 4.472, RMSEA = 0.095, CFI = 0.925; MODEL2: Chi-square = 148.807, Chi-square/df = 5.511, RMSEA = 0.108, CFI = 0.934). MODEL3, the combined Energy Citizenship Scale, showed a very good model fit (MODEL3: Chi-square = 400,920, Chi-square/df = 3.207, RMSEA = 0.076, CFI = 0.923). We therefore confirmed our previous conclusion, that the scales could either be used as sperate scales looking at either the individual or the collective level of energy citizenship separately, or they could be used as one combined Energy Citizenship Scale.

			MODEL1	DEL1 MODEL2		MODEL3	
	M	SD	Factor	Factor	Factor load-	Factor	
			loading 1	loading 1	ing 1	loading 2	
IL Item 1	6.03	1.23	0.57	-	0.54	-	
IL Item 2	5.65	1.39	0.60	-	0.58	-	
IL Item 3	5.05	1.56	0.60	-	0.59	-	
IL Item 4	4.64	1.74	0.72	-	0.72	-	
IL Item 5	5.37	1.42	0.72	-	0.72	-	
IL Item 6	3.57	1.83	0.61	-	0.62	-	
IL Item 7	4.65	1.63	0.73	-	0.72	-	
IL Item 8	4.45	1.62	0.68	-	0.68	-	
IL Item 9	4.66	1.65	0.64	-	0.64	-	
CL Item 1	5.88	1.23	-	0.56	-	0.56	
CL Item 2	5.73	1.34	-	0.63	-	0.61	
CL Item 3	5.10	1.44	-	0.71	-	0.70	
CL Item 4	5.03	1.49	-	0.84	-	0.84	
CL Item 5	5.27	1.42	-	0.83	-	0.83	
CL Item 6	4.67	1.52	-	0.76	-	0.76	
CL Item 7	4.90	1.50	-	0.77	-	0.77	
CL Item 8	4.72	1.54	-	0.69	-	0.69	
CL Item 9	5.13	1.43	-	0.71	-	0.71	
IL Scale	4.90	1.09	-	-	-	-	
CL Scale	5.16	1.09	-	-	-	-	
Combined	5.03	.96	-	-	-	-	
Scale							

Table 3. Mean, Standard Deviation and Factor Loadings for Confirmatory Factor Analysis (N = 386)

*Note:* IL= Individual Level, CL = Collective Level

#### 3.5 Reliability

For the second study, Cronbach's alphas for the Energy Citizenship Scales were as follows: .92 for the combined scale, .87 for the individual level, and .91 for the collective level, indicating very high levels of reliability.

#### 3.6 Results

We calculated the bivariate Pearson correlations for the Energy Citizenship Scale (individual level, collective level and combined), energy attitudes, ecological citizenship, environmental awareness, values and environmental knowledge. The alpha error was corrected using the Holm-Bonferroni method (Holm, 1979). For energy attitudes, environmental awareness, ecological citizenship, the values universalism, benevolence and biospheric values, the correlations were all positive and statistically

<sup>&</sup>lt;sup>3</sup> Small modifications were done by correlating some error terms of similarly phrased items.



significant and moderate to strong, supporting the construct validity of the Energy Citizenship Scale (see Table 4 for the bivariate Pearson correlations). There was no significant correlation between the Energy Citizenship Scale and environmental knowledge (r = .08, p = .10; see Table 7 for equivalence test).

	Individual Level		Collective Level		Combined Energy Citizenship	
	r	р	r	р	r	р
Energy Attitudes	.449	<.001	.261	<.001	.402	<.001
Ecological Citizenship	.563	<.001	.395	<.001	.543	<.001
Environmental	.522	<.001	.325	<.001	.480	<.001
Awareness						
Environmental	.094	.064	.053	.300	.083	.102
Knowledge						
Biospheric Values	.463	<.001	.232	<.001	.394	<.001
Benevolence	.272	<.001	.238	<.001	.289	<.001
Universalism	.391	<.001	.293	<.001	.387	<.001
Power	016	.381	007	.444	013	.401
Achievement	.111	<.001	.205	<.001	.179	<.001
Tradition	020	.701	.045	.378	.014	.779

#### Table 4. Bivariate Correlations

To show that the value tradition does not correlate with the Energy Citizenship Scale, equivalence tests were calculated. The smallest effect size of interest was set at r = +/-.15. Hence, the lower equivalence limit is defined as r(L) = -.15 and the upper equivalence limit as r(U) = .15. See Table 4 for the results. For all three, the individual level Energy Citizenship Scale, the collective level Energy Citizenship Scale, as well as the combined Energy Citizenship Scale, the correlation with the value tradition was within the equivalence limits and can thus be interpreted as equivalent to 0. There is no correlation between the value tradition and the Energy Citizenship Scale.

Table	5.	Equival	ence	test	for	the	value	tradition
		1						

		r	р	90% CI
Individual Level	upper	020	<.001	.064
Energy Citizenship	lower		.005	103
Collective Level	upper	.045	.019	.128
Energy Citizenship	lower		<.001	039
Combined	upper	.041	.004	.098
Energy Citizenship	lower		<.001	070

To check whether the values power and achievement correlate negatively with the Energy Citizenship Scale, bivariate correlations were calculated (see Table 4 for results). The correlation between the value power and the Energy Citizenship Scales is non-significant. We therefore calculated another equivalence test for the correlations between energy citizenship and power. The smallest effect size of interest was again set at r = +/-.15. See Table 6 for the results. For all three, the individual level Energy Citizenship Scale, the collective level Energy Citizenship Scale, as well as the combined Energy Citizenship Scale, the correlation with the value power was within the equivalence limits and can thus be interpreted as equivalent to 0. Unexpectedly, the correlation between the value achievement and the Energy Citizenship Scale is positive and significant. The correlation however, is weak (r = .18, p < .01),



especially when considering the previously defined limits of the equivalence test that set the smallest effect size of interest to +/- .15.

#### Table 6. Equivalence test for the value power

		r	90% CI
Combined	upper	013	.071
Energy Citizenship	lower		097
Individual Level	upper	016	.068
Energy Citizenship	lower		100
Collective Level	upper	007	.077
Energy Citizenship	lower		091

#### Table 7. Equivalence test for environmental knowledge

		r	90% CI
Combined	upper	.083	.166
Energy Citizenship	lower		001
Individual Level	upper	.094	.177
Energy Citizenship	lower		.010
Collective Level	upper	.053	.136
Energy Citizenship	lower		031

#### **3.7 Discussion study 2**

The current study provided first empirical evidence for the validity of our newly developed Energy Citizenship Scale. As expected, the scale showed a substantial correlation

with ecological citizenship, environmental awareness and energy awareness, indicating high convergent validity as these concepts all share considerable theoretical overlap. At the same time, also according to our expectations, our Energy Citizenship Scale showed no correlations to the value tradition indicating discriminant validity. Contrary to expectations, we could not find any significant correlations to environmental knowledge and the value power.



Figure 1. Correlations between the combined Energy Citizenship Scale and other constructs, ordered by effect strength



In the current study we were also able to demonstrate how the strength of the correlation of different related constructs and our combined Energy Citizenship Scale varies (see Figure 1). Ecological citizenship for one, showed the highest correlation to our Energy Citizenship Scale. This indicates that there seems to be a high theoretical overlap between the two concepts, which indeed is the citizenship component related to environmental issues. Next, we have the concepts of environmental awareness and energy attitudes. These two concepts also showed high correlations to our Energy Citizenship Scale. Both of these concepts were conceptualized as attitude constructs, including affects, behaviours and cognitions. Since our Energy Citizenship Scale also includes a cognitive and a behavioural intentions component, there is a large theoretical overlap between these concepts and energy citizenship, even more so because they also focus on attitudes related to energy use and general environmental related issues. Then we have the values, first biospheric values with the strongest correlation to energy citizenship, followed by universalism and benevolence. They do share some important overlap to energy citizenship as people who endorse biospheric or other self- transcendent values generally highly care about others or nature. Individuals who attribute high importance to these values seek social justice and equality for all people. These aspects can also be found in our Energy Citizenship Scale in relation to the energy transition. But since these values do not explicitly focus on the energy transition or citizenship components, one would expect that the strength of the correlations should only be medium and that these values correlate less to energy citizenship than the afore mentioned constructs.

Even though the order if these correlations does not fully resemble our preregistered expectations (see preregistration), overall, they do not contradict our understanding. Importantly, the more pronounced differences between correlations were statistically confirmed as expected. To do so, we performed z-tests. The results are shown in Table 8. It can be seen that energy attitude is more strongly correlated with Energy Citizenship than the value achievement. Furthermore, energy attitude correlates more strongly with energy citizenship than environmental knowledge. Lastly, ecological citizenship correlates more strongly with energy citizenship than the value power.

					95 %	6 CI
		r difference	z	р	lower	upper
Combined	EA - Achievement	.223	3.373	<.001	.102	.369
Energy Citizenship	EA - EK	.319	5.181	<.001	.210	.440
	EcoC - Power	.556	8.054	<.001	.438	.648
Individual Level	EA -Achievement	.338	5.107	<.001	.225	.474
Energy Citizenship	EA - EK	.355	5.845	<.001	.253	.477
	EcoC - Power	.579	8.450	<.001	.463	.667
Collective Level	EA - Achievement	.056	.824	.205	082	.198
Energy Citizenship	EA - EK	.208	3.284	<.001	.086	.329
	EcoC - Power	.402	5.581	<.001	.269	.518



Note: EA= Energy Attitudes, EK= Environmental Knowledge, EcoC = Ecological Citizenship

It is a great sign of convergent validity, that we were able to demonstrate the different strength of relationships between our Energy Citizenship Scale and the other constructs. Ecological citizenship shares a large theoretical overlap to energy citizenship and also correlated the strongest to energy citizenship. The values achievement and power share a smaller theoretical or no overlap and resultingly they also correlated less to energy citizenship.



Interestingly, the value achievement positively correlated to our Energy Citizenship Scale. Especially the collective level Energy Citizenship Scale correlated more strongly to the value achievement (r = .21, p < .01) compared to the individual level Energy Citizenship Scale which just very weakly correlated to achievement (r = .11, p < .01). The value achievement is defined as "personal success through demonstrating competence according to social standards" (Schwartz, 1992). It might be that the value achievement is especially important on the collective level in this case, because there might be a higher efficiency belief on a collective level than on the individual level. People might feel like they have higher chances of achieving change in the energy transition as part of a collective than as an individual. Indeed, previous studies have shown that collective efficacy could increase pro environmental behaviour intentions (Jugert, et al., 2016). Therefore, people who value achievement might also score higher on the collective level Energy Citizenship Scale.

In the case of environmental knowledge, we expected a small positive correlation to our Energy Citizenship Scale but the correlation was not significant. However, equivalence testing did also not support the interpretation of nor relationship (at least for combined and individual energy citizenship). We had expected a positive correlation because people who feel responsible for a sustainable energy transition and are motivated to actively participate in it, might also educate themselves about environmental issues and accumulate knowledge. In our scale we still tried to disentangle energy knowledge and energy citizenship as much as possible and tried to measure energy citizenship without a knowledge component, because we believe that even someone who is not an expert on energy issues may be an energy citizen. Energy citizenship is based on one's beliefs and motivations, not on one's comprehension of the energy transition and energy-related topics, we wanted to focuses how much importance they place on having energy-related rights, and whether they feel responsible for the energy transition. It seems like we have succeeded in developing a measure that is mostly independent of knowledge, since we did not find a significant positive correlation between environmental knowledge and energy citizenship in the current study.

Lastly, no correlation was found between the values tradition and power and our Energy Citizenship Scale. For the value tradition, we did not expect a relationship since the energy system cannot be classified as a tradition. Therefore, the two ideas of energy citizenship and the value tradition are unrelated ideas which is also what our data shows. For the value power however, we expected a negative relationship to our Energy Citizenship Scale because previous research has often showed a negative correlation between power and different environmental topics like environmental citizenship (e.g., Stern et al., 1999; Steg et al., 2014). As mentioned before, value orientations are assumed to make individuals focus on information and threats that are congruent with their value orientation (Stern et al., 1995). Thus, a person who strongly endorses power values, would be aware of and focus on those objects or situations that are threatening to their wealth, power, or authority. It therefore makes sense that power would negatively correlate to other environmental topics as acting pro-environmentally is often also linked to higher costs or more restrictions which would pose a threat to power values. Energy citizenship however, does not necessarily imply more restrictions, in contrast it might even give more opportunities and power to the people in the energy transition by letting them actively participate in the energy market and influencing energy policies and legislation. It therefore does not necessarily pose a threat to power value orientations. In hindsight, it seems explainable why energy citizenship does not pose a threat to people's power value considerations and we expect to replicate this result in further studies.



#### 3.8 One-Item Energy Citizenship Scale

In the current study we also tested our one-item Energy Citizenship Scale exploratively. For two reasons a one-item Energy Citizenship Scale might be of interest. First, the constantly very high reliabilities of the 18-item scale, might indicate over-identification of the construct by the use of multiple items (Postmes et al., 2013). Second, in many research situations the length of a survey is of crucial importance, because filling out long surveys is cumbersome and raises the risks of drop-outs. The one-item Energy Citizenship Scale which we used for this purpose is based on our practical Energy Citizenship Scale which we developed in WP2 of the project (see Deliverable 2.1 & Deliverable 2.2). Participants were instructed to read the practical definition of energy citizenship and were asked to indicate how much they are willing to get actively involved as an energy citizen, within their means.

We calculated the bivariate Pearson correlations for the one-item Energy Citizenship Scale and the other included constructs. The correlations between the two different Energy Citizenship Scales, the one-item scale and the combined Energy Citizenship Scale (18-items), was around .52, indicating a strong but not perfect relationship between the two. The correlation was a little stronger for the individual level than for the collective level energy citizenship (both 9 items; see Table 9). It seems that the one-item and the 18-item Energy Citizenship Scales do not measure exactly the same. One large difference between the two Energy Citizenship Scales might be that the one-item scale is more directly focused on active involvement. The one-item scale only asks the question whether people are willing to get actively involved as an energy citizen, within their means. The 18-item Energy Citizenship Scale is much more discriminatory and complex. Even though active involvement is also a part of the longer Energy Citizenship Scale, it is only one sub facet and even people who do not have specific action intentions might score high on the cognitive aspects of energy citizenship.

However, we found similar correlation patterns to the other constructs as with our 18-item Energy Citizenship Scale (see Table 9) and the one-item scale performed comparably well to the 18-item scale in convergent validity and discriminant validity. The one-item Energy Citizenship Scale strongly correlated to the constructs of ecological citizenship, environmental awareness, energy attitudes, biospheric values and the values universalism and benevolence, demonstrating convergent validity. No significant correlations could be found to the values power and tradition which can be seen as a sign of divergent validity. Contrary to our long Energy Citizenship Scale, a small correlation could be found between environmental knowledge and the one-item Energy Citizenship Scale.

Furthermore, we asked the participants how comprehensible they found the practical energy citizenship definition which the one-item Energy Citizenship Scale was based on. The answer format was from 1 (*very incomprehensible*) to 7 (*very comprehensible*). The results show, that generally, people found the definition rather comprehensible (M=4.75, SD=1.59, see Figure 2).

Overall, the findings provide first evidence that energy citizenship can be effectively assessed with a one-item scale. Yet, future studies are needed to further improve the one-item measure, to make it even more understandable and to really capture all aspects of energy citizenship, including the cognitive aspects.



Table 9.	Bivariate	<b>Correlations</b>	between the	<b>One-Item</b>	Energy	Citizenship	Scale and	other constructs
						r		

	<i>r</i> One-Item Energy Citizen- ship Scale	р
Combined Energy Citizenship Scale	.516**	<.001
Individual Level Energy Citizenship	.572**	<.001
Scale		
Collective Level Energy Citizenship	.338**	<.001
Scale		
Energy Attitudes	.353**	<.001
Ecological Citizenship	.471**	<.001
Environmental Awareness	.484**	<.001
Environmental Knowledge	.139**	.006
Biospheric Values	.380**	<.001
Benevolence	.290**	<.001
Universalism	.323**	<.001
Power	034	.508
Achievement	.132**	.010
Tradition	007	.892

Note: \*\*=p<.01, \*=p<.05



Figure 2. Comprehensibility of the one-item Energy Citizenship Scale (1=very incomprehensible, 7= very comprehensible)



### 4 Study 3: Validation in the Netherlands

As a last step, we wanted to validate the scale in another European country. We therefore conducted a third study in the Netherlands. For that purpose, the 18-item Energy Citizenship Scale was translated from German to Dutch. The data collection was combined with the data collection for the first wave of the psychological longitudinal studies of WP4. To examine convergent and divergent validity of our Energy Citizenship Scale in the Dutch sample, we again looked at how our Energy Citizenship Scale relates to different values. In this case we explored biospheric values, altruistic values, hedonic values and egoistic values. In addition, we assessed criterion validity, by testing whether the scale is able to predict community energy behaviour and personal energy behaviour.

Biospheric values as well as altruistic values can both be classified as part of Schwartz's (1992) selftranscendent value category (e.g., De Groot & Steg, 2007). Biospheric values are concerned with the quality of nature and the environment without explicitly connecting them to the wellbeing of other human beings. In the current study, biospheric values were conceptualized as respecting the earth, unity with nature, protecting the environment and preventing pollution. Contrastingly, altruistic values mainly focus on the welfare of other human beings. In the current study, altruistic values were made up of the sub categories: equality, a world at peace, social justice and helpfulness. Previous studies have found both of these values to be positively related to pro environmental beliefs, attitudes and behaviours, biospheric values however were generally stronger related to these environmental topics (e.g., De Groot & Steg, 2008). Based on these studies and based on the results of our previous study (Study 2), we expected a positive correlation between biospheric, altruistic values and energy citizenship.

In contrast to that, stand self-enhancement values. Environmental studies have usually conceptualized them as egoistic values, focused on the costs and benefits of choices influencing the resources people have, such as wealth, power, and achievements (e.g., De Groot & Steg, 2008). The category of egoistic values is made up of the values social power, wealth, authority, influence and ambition. Since our previous study has found a small positive correlation between the egoistic value achievement and energy citizenship, we therefore also expect a positive correlation between egoistic values and energy citizenship in the current study. The last category is made up of hedonic values which are mainly focused on improving one's feelings and reducing effort. Hedonic values include: pleasure, enjoying life and self- indulgence. Hedonic values have previously been shown to be linked with higher energy consumption, as people with strong hedonic values were less likely to reduce their comfort or pleasure in order to reduce their energy consumption (Steg et al., 2014). At the same time however, we do not expect hedonic values to be related to energy citizenship as in study 2 we did not find a relationship between energy citizenship and the value hedonism when looking at the correlation between the two concepts exploratorily (see Appendix). We therefore think that the idea of energy citizenship is irrelevant for hedonic value considerations, and does not interfere with people's pleasure, gratification or life enjoyment.

Concerning criterion validity, we exploratively looked at the relationship between energy citizenship and both personal energy behaviour and community energy behaviour. We did however expect, that energy citizenship would be able to explain variance in the variables personal and community energy behaviour above and beyond the demographic variables and values.



#### 4.1 Participants

The sample for the current study were Buurkracht App users. Buurkracht is a Dutch neighbourhood initiative whose initial aim was to support people in saving energy and making their homes more sustainable, but it has now evolved to not only focus on sustainability, but also on other themes such as mobility, quality of life, and citizen participation. The sample size was 696 participants, out of which 327 completed the whole survey. In the final sample, 71% of the participants were male and 28% female. The age ranged from 23 to 88 (M=62.33, SD=12.18). The vast majority of the participants were highly educated, 71% having completed higher education programs. Most of the participants owned their apartment or house (88%), while 11% were currently living for rent. In the sample, 49 people were active members of the Buurkracht initiative.

#### 4.2 Procedure

Potential participants were invited to participate in the online survey using the Buurkracht App. The survey started with a short introduction to the topic as well as an informed consent, in line with the project's ethical requirements. Only if the participants indicated their consent to participate, they were able to start the survey. Then a number of different constructs, which are relevant for WP4, were measured with their respective scales. The important constructs for the current study were values, energy citizenship, personal energy behaviour and community energy behaviour. The survey ended with a number of questions regarding demographic characteristics. In total, completing the survey took about 60 minutes.

#### 4.3 Materials

As in study 1 and study 2, energy citizenship was measured with our newly developed Energy Citizenship Scale (see Table 10 for descriptives). However, in this study, the collective level did not refer to EU citizens, but for the 49 active members to the Buurkracht initiative and for the non-members to their neighbourhood.

Values were measured using an adapted version of Schwartz's value scale (1992) by De Groot and Steg (2008) with three added hedonic value items proposed by Schwartz (1992). The complete scale was tested in previous research by Steg et al. (2014). In our sample the reliability of the scale was high (altruistic values Cronbach's  $\alpha = .73$ ; biospheric values Cronbach's  $\alpha = .87$ ; egoistic values Cronbach's  $\alpha = .75$ ; hedonic values Cronbach's  $\alpha = .81$ ; complete scale Cronbach's  $\alpha = .81$ ).

Personal energy behaviour was measured with 8 items asking about different energy related behaviours and the extent to which people have implemented these behaviours in the last 6 months. One example item would be "In the past 6 months, to what extent have you ridden a bicycle or took public transportation to close by destinations (up to 5 km)?". The answer options ranged from 1 "*Not at all*" to 7 "*Very much*". Community energy behaviour was measured in a similar format with 7 items like for example "In the past 6 months, to what extent have you participated in a protest for a just and sustainable energy transition?".

	М	SD
IL Item 1	6.02	.95
IL Item 2	6.03	.94
IL Item 3	5.19	1.34



IL Item 4	5.17	1.35
IL Item 5	4.83	1.21
IL Item 6	4.76	1.52
IL Item 7	4.62	1.50
IL Item 8	4.81	1.55
IL Item 9	4.90	1.44
CL Item 1	4.87	1.33
CL Item 2	5.17	1.27
CL Item 3	4.49	1.33
CL Item 4	4.38	1.27
CL Item 5	4.52	1.28
CL Item 6	4.08	1.35
CL Item 7	4.17	1.34
CL Item 8	3.95	1.32
CL Item 9	4.00	1.28
IL Scale	5.26	.89
CL Scale	4.54	1.08
Combined Scale	4.90	.86

*Note:* IL= Individual Level, CL = Collective Level

#### 4.4 Reliability

Cronbach's alphas for the Energy Citizenship Scales were as follows: .92 for the combined scale, .85 for the individual level, and .94 for the collective level, indicating very high levels of reliability.

#### 4.5 Convergent and divergent validity

We calculated the bivariate Pearson correlations for the Energy Citizenship Scale, biospheric values, altruistic values, egoistic values and hedonic values. For biospheric values and altruistic values, the correlations were positive, statistically significant and moderately strong, supporting the construct validity of the Energy Citizenship Scale (see Table 11 for the bivariate Pearson correlations). The correlation between the Energy Citizenship Scale and egoistic values was also positive and significant, it was weak, however (r = .11, p = .05). No correlation could be found between our Energy Citizenship Scale and hedonic values.

		Combined	Individual Level	Collective Level
		Energy Citizen-		
		ship		
<b>Biospheric Values</b>	r	.35**	.40**	.21**
	р	<.001	<.001	<.001
Altruistic Values	r	.26**	.33**	.14*
	р	<.001	<.001	.013
Hedonic Values	r	.01	.01	.01
	р	.833	.842	.938
Egoistic Values	r	.15**	.13*	.11*
	p	.008	.013	.045

#### Table 11. Bivariate Correlations

*Note:* \*\*=*p*<.01, \*=*p*<.05



The positive correlation between biospheric values, altruistic values and energy citizenship can be seen as a sign of convergent validity. Both of these values share some important overlap to energy citizenship as people who endorse biospheric or other self- transcendent values generally highly care about others or nature. On a theoretical level, biospheric values should correlate strongest to energy citizenship as biospheric values are concerned with the quality of nature and the environment, which energy consumption and the energy transition would have a direct effect on. Indeed, this is also what we found in our data. Biospheric values and altruistic values both positively correlate to energy citizenship, but biospheric values correlate the strongest (see Table 12 for Z-Tests).

We could not find a relationship between energy citizenship and hedonic values. In the current study, hedonic values were conceptualized by the three values pleasure, enjoying life and gratification for oneself. It seems that the idea of energy citizenship is irrelevant for these value considerations, and does not interfere with, nor foster, people's pleasure, gratification or life enjoyment.

Lastly, we again found a small positive relationship between egoistic values and energy citizenship. In this study, the category of egoistic values was composed of the values social power, wealth, authority, influence and ambition. When looking at each of these value subcategories separately, it becomes clear that only the values influence and ambition positively correlate to energy citizenship (r= .14, p=.01 & r= .12, p=.04). This actually seems coherent with the idea of energy citizenship since energy citizenship would result in more rights and more influence for the citizens.

		Z	р
Combined	<b>Biospheric - Egoistic</b>	2.772	.003
Energy Citizenship	<b>Biospheric - Altruistic</b>	1.804	.036
	Biospheric – Hedonic	4.869	<.001
Individual Level	<b>Biospheric - Egoistic</b>	3.799	<.001
Energy Citizenship	<b>Biospheric - Altruistic</b>	1.518	.064
	Biospheric – Hedonic	5.859	<.001
Collective Level	<b>Biospheric - Egoistic</b>	1.324	.093
Energy Citizenship	<b>Biospheric - Altruistic</b>	1.398	.081
	Biospheric – Hedonic	2.932	.002

Table 12. Z-Tests

#### 4.6 Criterion Validity

To examine criterion validity of our Energy Citizenship Scale we started out with looking at the bivariate correlations between energy citizenship and personal energy behaviour and community energy behaviour, respectively (see Table 13). All correlations are positive and significant. Interestingly though, when looking at active Buurkracht members and non-members separately, we can find large differences in the strength of the correlation to the different energy behaviours. Keep in mind that collective level energy citizenship was measured slightly differently in these two groups. For active members the collective was referring to the initiative, but for non-members, to their neighbourhood. For active members of the initiative, the correlation to personal energy behaviour is much stronger than for non-members (r=.46, p<.001 vs r=.31, p<.001). For community energy behaviour we can spot an even larger difference, here the effect size is almost doubled compared to non-members (r=.63, p<.001 vs r=.33, p<.001). It seems that energy citizenship is especially related to energy behaviours in samples that belong to communities or initiatives and are already active in the energy transition. Furthermore, the difference in correlations between the individual level and collective level is lower for members. It



appears that for people who are actively involved in a community (and probably identify more strongly with that community), the distinction between individual level and collective level is less pronounced.

		Com- bined EC	Com- bined EC "Mem- bers"	Com- bined EC "non- mem- bers"	Individ- ual Level	Collec- tive Level	Collective Level "Mem- bers"	Collec- tive Level "non- mem- bers"
Personal Energy	r	.34**	.46**	.31**	.37**	.23**	.32*	.20**
Behaviour	р	<.001	.001	<.001	<.001	<.001	.023	.001
Commu- nity En-	r	.42**	.63**	.33**	.44**	.30**	.57**	.19**
ergy Be- haviour	р	<.001	<.001	<.001	<.001	<.001	<.001	.002

#### Table 13. Bivariate Correlations

*Note:* \*\*=*p*<.01, \*=*p*<.05

We continued with conducting a hierarchical multiple regression to see whether our Energy Citizenship Scale is able to predict personal energy behaviour and community energy behaviour above and beyond demographic variables and values.

We started out with a three-stage hierarchical multiple regression with community energy behaviour as the dependent variable. The demographic variables age, gender and household income were entered at stage one of the regression. The self-transcendent values (biospheric and altruistic) as well as egoistic values, were entered at stage two and lastly, energy citizenship at stage three. The hierarchical multiple regression revealed that at Stage one, the demographic variables did not explain a significant amount of variation in community energy behaviour (F(3,316) = .99, p = .39). Introducing the values however, contributed significantly to the regression model (F(3,314) = 5.72, p < .001). They accounted for 8.9% of the variation in the behaviour. Finally, the addition of energy citizenship to the regression model explained an additional 12.2% of the variation in community energy behaviour and this change in explained variance was also significant (F(1,313) = 12.65, p < .001). Together, the six independent variables accounted for 22.1% of the variance in community energy behaviour. Energy citizenship, however, was the most important predictor of community energy behaviour which uniquely explained 12% of the variation in community energy behaviour which uniquely explained 12% of the variation in community energy behaviour for community energy behaviour which uniquely explained 12% of the variation in community energy behaviour which uniquely explained 12% of the variation in community energy behaviour which uniquely explained 12% of the variation in community energy behaviour. Energy citizenship, however, was the most important predictor of community energy behaviour which uniquely explained 12% of the variation in community energy behaviour. Energy Citizenship Scale (see Appendix for regression Tabels).

We then calculated the same three-stage hierarchical multiple regression again, but this time with personal energy behaviour as the dependent variable. The demographic variables age, gender and household income were entered at stage one of the regression and again did not significantly contribute to the regression model (F(3,315) = 2.46, p = .06). Similar to before, at stage two, the values (biospheric, altruistic and egoistic) contributed significantly to the regression model, (F(3,313) = 13.84, p < .001) and accounted for 18.7% of the variation in personal energy behaviour. Lastly, the addition of energy citizenship to the regression model explained an additional 5.6% of the variation in personal energy behaviour and the change in explained variance was also significant (F(1,312) = 16.10, p < .001). Taken together, the six independent variables accounted for 26.6% of the variance in personal energy behaviour. In this case the self-transcendent values were the most important predictor, uniquely explaining 19% of the variation in personal energy behaviour. But even at the last stage of the model, energy citizenship could still significantly contribute to uniquely explaining some variance of personal energy behaviour, further confirming criterion validity of our Energy Citizenship Scale.



Lastly, we wanted to explore whether individual level energy citizenship would be more predictive for personal energy behaviour than collective level energy citizenship and whether the collective level would be more predictive of community energy behaviour than the individual level. To do so, we ran similar hierarchical regressions as before, but at stage three entered either only the individual or only the collective level instead of the combined Energy Citizenship Scale.

For personal energy behaviour, the addition of individual level energy citizenship to the regression model at stage three explained an additional 5.7% of the variation in the behaviour (F(1,322) = 16.18, p < .001). However, including collective level energy citizenship to the regression model explained only an additional 3.1% of the variation in personal energy behaviour ( $F(1,311) = 14.09 \ p < .001$ ). Thus, individual level energy citizenship seems to be more predictive for personal energy behaviour than collective level energy citizenship.

Looking at community energy behaviour, we see a similar pattern. The addition of individual level energy citizenship to the regression model explained an additional 13.1% of the variation in community energy behaviour (F(1,322) = 13.10, p < .001), but the addition of collective level energy citizenship explained an additional 6.6% (F(1,312) = 8,80 p < .001).

To explore whether individual level energy citizenship explains energy behaviour beyond and above collective level energy citizenship, we ran two final hierarchical regressions and entered at stage three collective level energy citizenship and at stage four individual level energy citizenship. These regressions revealed that for personal energy behaviour, the individual level explained an additional 3.1% of the variation (F (1,310) = 14.49, p < .001) in the final step of the regression model. For community energy behaviour, the individual level explained an additional 7.1% of the variation (F (1,311) = 12.01, p < .001) in the final step of the regression model.

#### 4.7 Conclusion study 3

In study 3 we were able to validate the Energy Citizenship Scale in another EU country, namely the Netherlands. The scale has thus already proven its validity in two different cultures and languages. Furthermore, this was the first study in which we investigated a different collective level, in study 1 and 2 we used the collective level of EU citizens, whereas in this sample the collective level was set to either active members of the Buurkracht initiative or for the non-members to their neighbourhood. We also provided first evidence for criterion validity of the scale by showing that energy citizenship was able to predict personal and community energy behaviour and explain variance in these variables, even above and beyond demographics and values. Interestingly, when looking at the individual level and the collective level Energy Citizenship Scales separately, the individual level was always able to explain more variance in both, personal and community energy behaviour.

#### 5 Conclusions and outlook

This deliverable, aimed at validating our newly developed Energy Citizenship Scale. We started out by confirming the factor structure of the Energy Citizenship Scale by conducting confirmatory factor analyses in two different samples. We then checked for convergent and divergent validity of the scale by seeing how it relates to other theoretically related and unrelated constructs, first in an Austrian sample and then in a Dutch sample. Lastly, we tested for criterion validity of the scale by checking whether it is able to predict energy behaviour.



Indeed, we were able to support the validity of our Energy Citizenship Scale. The conducted studies confirmed the factor structure of the scale, two studies indicated convergent and divergent validity of the scale and lastly, one study also demonstrated criterion validity of the scale. Even though we sometimes had slightly different expectations of how some constructs would relate to energy citizenship, ultimately, there were no relationships which went against the idea of energy citizenship. In hindsight, a small positive relationship between energy citizenship and egoistic values like achievement and influence does not speak against the validity of the scale but highlights the difference between the concept energy citizenship and other concepts like environmental awareness or energy attitudes. Furthermore, these initially unexpected relationships were replicated in a second study (Study 3). In the end, energy citizenship is a rather new construct and we still have to learn more about all the aspects it entails and further explore and adjust our expectations on energy citizenship.

At the same time, there are still a few things that need to be considered and further explored in future studies. For one, there is a possibility that the very high reliabilities which we consistently found in our studies for the Energy Citizenship Scale could be indicative of over-identification of the construct by the use of multiple items, and that it may be possible to assess the construct with fewer items (Postmes et al., 2013). In future studies, it might therefore be a good idea to see whether the scale can be shortened any further and whether some items can still be deleted. However, because in the current 18-item version each item directly translates to one crucial aspect of our theoretical definition of energy citizenship (see D 2.2), deleting items might endanger construct validity. One also has to keep in mind that so far, our samples mostly constitute of the general population. We still need to study how the scale perform in a sample of people who are more strongly involved in the energy transitions or are experts in this field. Nevertheless, in study 2, we showed first evidence that it is indeed possible to also effectively assess energy citizenship with a one-item scale. However, this item was not one out the 18 of the long scale, but it included our practical definition of energy citizenship (see D 2.1) to address the complexity of the construct energy citizenship. Even though the results were promising, future studies are needed to further improve the one-item measure.

Furthermore, it might also be advisable to further think about the collective level Energy Citizenship Scale as still some participants indicate that they do not know how to answer these items when they do not know what others in their group think. This might be especially problematic if the collective level is referring to a rather large and broad group like EU citizens. Lastly, we need some more theoretical discussions about when and under which circumstances it makes sense to use the combined Energy Citizenship Scale or when it is sufficient to only use either the individual or collective level scale.

In conclusion it can be said that we have succeeded in developing a functioning and valid Energy Citizenship Scale which can be used to capture the manifestation of energy citizenship in individuals and different collectives. The Energy Citizenship Scale is crucial for following work packages and project work. In WP4 it is used to study individual and collective predictors of energy citizenship, and active engagement in the energy transition and to examine what facilitates and strengthen energy citizenship on the one hand, and provide insights into what may hinder the emergence of energy citizenship on the other hand. But even beyond the scope of the project, the scale can be used in future studies to explore the concept of energy citizenship even further. It lays the basis for studying energy citizenship empirically.



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# 7 Appendix

# 7.1 Energy Citizenship Scale English

Please indicate the extent to which you agree with	h the followin	g staten	<i>ients</i> .		
	Comple- tely disag- ree				Comple- tely ag- ree
1. I consider affordable sustainable energy to be an important right.					
2. I consider it an important right to be in- formed about the energy efficiency of vari- ous products.					
3. I consider being able to actively participate in the energy market (e.g., being able to pro- duce/sell/exchange/store energy) to be an important right.					
4. I see it as my responsibility to help others to participate in the sustainable energy transition (e.g., by sharing my knowledge).					
5. I see it as my responsibility to contribute to- wards a sustainable energy transition.					
6. I see it as my responsibility to actively par- ticipate in the energy market (e.g., pro- duce/sell/exchange/store energy).					
7. I am willing to play an active role in ensur- ing that no one is at a disadvantage during the sustainable energy transition.					
8. Investing time, effort, and money to be able to use more renewable energy is a source of pride for me.					
9. I am open to helping to influence energy policy and legislation.					
People are members of different social groups. The as a <u>member of the group of EU citizens</u> . Please of the EU, agree with the following statements.	he following s indicate the e	tatemer extent to	nts con which	cern yo 1 you, a	ur opinion s a citizen
	Comple- tely disag- ree				Comple- tely ag- ree



10. We EU citizens consider affordable sustain- able energy to be an important right.			
11. We EU citizens consider it an important right to be informed about the energy effi- ciency of various products.			
12. We EU citizens consider being able to ac- tively participate in the energy market (e.g., being able to produce/sell/exchange/store energy) to be an important right.			
13. We EU citizens see it as our responsibility to help others to participate in the sustaina- ble energy transition (e.g., by sharing our knowledge).			
14. We EU citizens see it as our responsibility to contribute towards a sustainable energy transition.			
15. We EU citizens see it as our responsibility to actively participate in the energy market (e.g., produce/sell/exchange/store energy).			
16. We EU citizens are willing to play an active role in ensuring that no one is at a disad-vantage during the sustainable energy transition.			
17. Investing time, effort, and money to be able to use more renewable energy is a source of pride for us EU citizens.			
18. We EU citizens are open to helping to influ- ence energy policy and legislation.			

# 7.2 Energy Citizenship Scale German

Bitte geben Sie an, wie sehr Sie den folgenden Aussagen zustimmen.											
	Stimme überhaupt nicht zu						Stimme voll und ganz zu				
19. Bezahlbare nachhaltige Energie ist für mich ein wichtiges Recht.											



20. Es ist für mich ein wichtiges Recht, über die Energieeffizienz verschiedener Produkte in- formiert zu werden.							
21. Ich halte die Möglichkeit, aktiv am Energie- markt teilnehmen zu können (z. B. Energie produzieren / verkaufen / tauschen / spei- chern), für ein wichtiges Recht.							
22. Ich fühle mich dafür verantwortlich, andere zu unterstützen an der nachhaltigen Energie- wende teilzunehmen (z.B. in dem ich mein Wissen weitergebe).							
23. Ich fühle mich dafür verantwortlich, selbst etwas zu einer nachhaltigen Energiewende beizutragen.							
24. Ich fühle mich dafür verantwortlich, aktiv am Energiemarkt teilzunehmen (z. B. Ener- gie produzieren / verkaufen / tauschen / speichern).							
25. Ich bin bereit, mich aktiv dafür einzusetzen, dass in der nachhaltigen Energiewende nie- mand benachteiligt wird.							
26. Zeit, Mühe und Geld zu investieren, um mehr erneuerbare Energie nutzen zu kön- nen, erfüllt mich mit Stolz.							
27. Ich bin dafür offen, Energiepolitik und -ge- setze mitzugestalten.							
Menschen sind Mitglieder verschiedener sozialer Meinung als Mitglied der <mark>Gruppe der EU- Bürge</mark> der Gruppe der EU-Bürger/innen den folgenden A	Gruppen. Im <u>r/innen</u> . Wie Aussagen zu?	folg sehr	ende stin	n Te ımen	il ge Sie	ht es als N	um Ihre Aitglied
	Stimme überhaupt nicht zu						Stimme voll und ganz zu
28. Für uns EU- Bürger/innen ist bezahlbare nachhaltige Energie ein wichtiges Recht.							
29. Es ist für uns EU- Bürger/innen ein wichti- ges Recht, über die Energieeffizienz ver- schiedener Produkte informiert zu werden.							



	1	 	 1
30. Für uns EU- Bürger/innen ist es ein wichti- ges Recht, aktiv am Energiemarkt teilneh- men zu können (z.B. Energie produzieren / verkaufen / tauschen/ speichern).			
31. Wir EU- Bürger/innen fühlen uns dafür ver- antwortlich, andere zu unterstützen an der nachhaltigen Energiewende teilzunehmen (z.B. in dem wir unser Wissen weitergeben).			
32. Wir EU- Bürger/innen fühlen uns dafür ver- antwortlich, zu einer nachhaltigen Energie- wende beizutragen.			
33. Wir EU- Bürger/innen fühlen uns dafür ver- antwortlich, aktiv am Energiemarkt teilzu- nehmen (z. B. Energie produzieren / verkau- fen / tauschen / speichern).			
34. Wir EU- Bürger/innen sind bereit, uns aktiv dafür einzusetzen, dass in der nachhaltigen Energiewende niemand benachteiligt wird.			
35. Zeit, Mühe und Geld zu investieren, um mehr erneuerbare Energie nutzen zu kön- nen, erfüllt uns EU- Bürger/innen mit Stolz.			
36. Wir EU- Bürger/innen sind dafür offen, Energiepolitik und -gesetze mitzugestalten.			

#### 7.3 Energy Citizenship Scale Dutch

De volgende stellingen gaan over een rechtvaardige en duurzame energietransitie. In hoeverre bent u het eens met onderstaande stellingen?

	Gaat in			Uiterst
	tegen			belan-
	mijn			grijk
	principes			•••
1. Ik beschouw betaalbare duurzame ener-				
gie als een belangrijk recht.				
2. Ik beschouw het als een belangrijk recht				
om geïnformeerd te worden over de				
energie-efficiëntie van verschillende				
producten.				



3.	Ik beschouw het actief kunnen deelne-							
	men aan de energiemarkt (bijv. het kun-							
	nen produceren/verkopen/ruilen/opsiaan							
	van energie) als een belangrijk recht.							
4.	Ik zie het als mijn verantwoordelijkheid							
	om anderen te helpen deelnemen in de							
	duurzame energietransitie (bijv. door							
	mijn kennis te delen).							
	<b>TI ' I , I ''</b> , I I''I I 'I							
5.	Ik zie het als mijn verantwoordelijkheid							
	om bij te dragen aan een duurzame ener-							
	gietransitie.							
6	Ik zie het als mijn verantwoordelijkheid							
0.	om actiof dool to nomon can do onorgio							
	on actier deer te nemen aan de energie-							
	markt (bijv. energie produceren/verko-							
	pen/runen/opsiaan).							
7.	Ik ben bereid een actieve rol te spelen							
	om ervoor te zorgen dat niemand wordt							
	benadeeld tijdens de duurzame energie-							
	transitie.							
8.	Tijd, moeite en geld investeren om meer							
	hernieuwbare energie te kunnen gebrui-							
	ken, is voor mij een bron van trots.							
	-							
9.	Ik sta ervoor open het energiebeleid en							
	de wetgeving te helpen beïnvloeden.							
Mense	n zijn onderdeel van verschillende sociale g	groepen. De v	olge	nde	stell	inger	n gad	n over uw
menin	g als lid van de groep bewoners van uw bui	ırt. Geef alstı	ıbliej	ft aa	n in	hoev	erre	u, als een
bewon	er van uw buurt, het eens bent met de volge	ende stellinge	n?	-	-	-		
		Gaat in						Uiterst
		tegen						belan-
		mijn						grijk
		principes						
10	. Wij, bewoners van onze buurt, beschou-	<b>_</b>						
	wen betaalbare duurzame energie als een							
	belangrijk recht.							
11	. Wij, bewoners van onze buurt, beschou-							
	wen het als een belangrijk recht om							
	geïnformeerd te worden over de energie-							
	efficiëntie van verschillende producten.							
12	. Wij, bewoners van onze buurt, beschou-							
	wen het actiet kunnen deelnemen aan							



de energiemarkt (bijv. het kunnen pro- duceren/verkopen/ruilen/opslaan van energie) als een belangrijk recht.				
13. Wij, bewoners van onze buurt, zien het als onze verantwoordelijkheid om ande- ren te helpen deelnemen in de duurzame energietransitie (bijv. door mijn kennis te delen).				
14. Wij, bewoners van onze buurt, zien het als onze verantwoordelijkheid om bij te dragen aan een duurzame energietransi- tie.				
15. Wij, bewoners van onze buurt, zien het als onze verantwoordelijkheid om actief deel te nemen aan de energiemarkt (bijv. energie produceren/verkopen/ruilen/ops- laan)				
16. Wij, bewoners van onze buurt, zijn ber- eid een actieve rol te spelen om ervoor te zorgen dat niemand wordt benadeeld tijdens de duurzame energietransitie.				
17. Tijd, moeite en geld investeren om meer hernieuwbare energie te kunnen gebrui- ken, is voor ons, bewoners van onze buurt, een bron van trots.				
18. Wij, bewoners van onze buurt, staan er- voor open te helpen het energiebeleid en de wetgeving te beïnvloeden.				

# 7.4 Bivariate Correlations of all constructs in study 2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Energy Citizenship	1																	
combined																		
(1)																		
Individual	.88**	1																
Level (2)																		
Collective	.88**	.56**	1															
Level (3)																		
Energy At-	.40**	.45**	.26**	1														
titudes (4)																		



																Þ		
Ecological Citizenship	.54**	.56**	.40**	.43**	1													
(5)																		
Environ-	.48**	.52**	.33**	.57**	.61**	1												
mental																		
Awareness (6)																		
Environ-	.08	.09	.05	.20**	.10	.21**	1											
mental																		
Knowledge																		
(7) Biographoria	30**	46**	73**	38**	30**	57**	11*	1										
Values (8)		.40	.23		.59	.52**	.11	1										
Power (9)	01	02	01	12*	07	- .23**	11*	12*	1									
Achieve-	.18**	.11**	.21**	.04	.05	.04	08	.01	.40**	1								
ment (10)																		
Hedonism (11)	.09	.09**	.07	01	.04	.04	.03	.10*	.14**	.07	1							
Stimula- tion (12)	.24**	.24**	.18**	.13*	.16**	.14**	.00	.23**	.09	.18**	.26**	1						
Self-Direc- tion (13)	.23**	.24**	.17**	.22**	.12*	.16**	.10	.20**	08	.05	.21**	.32**	1					
Universal- ism (14)	.39**	.39**	.29**	.30**	.39**	.45**	.03	.49**	- .17**	.05	.13*	.17**	.26**	1				
Benevo-	.29**	.27**	.24**	.27**	.25**	.33**	.08	.33**	-	.05	.10	.28**	.32**	.33**	1			
lence (15)									.15**									
Tradition	.01	02	.05	13*	.05	- 14**	- 1 <i>4</i> **	.04	.29**	.19**	.00	01	03	.04	06	1		
(16) Conform	21**	17**	01**	00	15**	.14**	.14***	15**	00	1.4**	02	02	10*	10**	12*	15**	1	
ity (17)	.21***	.17***	•21***	.09	.13***	.15***	05	.13***	.09	•14***	02	02	.10**	.19***	$.12^{n}$	.15	1	
Security (18)	.20**	.08	.27**	.05	.12*	.16**	08	.07	.04	.14**	.02	02	.16**	.18**	.19**	.08	.22**	1

Note: \*\*=p<.01, \*=p<.05

#### 7.5 Bivariate Correlations in study 3

	Com- bined EC	Combined EC "Mem- bers"	Combined EC "non- members"	Individ- ual Level	Collec- tive Level	Collective Level "Mem- bers"	Collective Level "non- members"
Biospheric Values	.35**	.28*	.37**	.40**	.21**	.18	.23**
Altruistic Values	.26**	.39**	.27**	.33**	.14*	.22	.16**
Hedonic Val- ues	.01	.05	01	.01	.01	.03	01
Egoistic Val- ues	.15**	.42**	.11	.13*	.11*	.35*	.08

Note: \*\*=p<.01, \*=p<.05

#### **Regression Tables study 3** 7.6

Hierarchical Regression with Community Energy Behaviour as the Dependent Variable

Predictor	В	SE B	β	t	р
Step 1					
Age	.000	.000	.057	1.018	.309
Income	.066	.052	.071	1.256	.210
Gender	.127	.151	.047	.842	.400



Step 2					
Age	.000	.000	.047	.875	.382
Income	.057	.051	.061	1.123	.262
Gender	.153	.146	.057	1.048	.296
Biospheric	.335	.071	.318	4.728	.000
Altruistic	037	.083	031	453	.651
Egoistic	023	.058	022	398	.691
Step 3					
Age	.000	.000	.046	.915	.361
Income	.047	.047	.051	.994	.321
Gender	.267	.137	.099	1.956	.051
Biospheric	.209	.068	.198	3.054	.002
Altruistic	057	.077	047	739	.461
Egoistic	069	.054	066	-1.279	.202
Combined	.585	.084	.381	6.999	.000
Energy					
Citizenship					

Hierarchical Regression with Personal Energy Behaviour as the Dependent Variable

Predictor	В	SE B	β	t	р
Step 1					
Age	.000	.000	.104	1.859	.064
Income	008	.035	012	222	.824
Gender	.191	.101	.105	1.885	.060
Step 2					
Age	.000	.000	.079	1.561	.120
Income	008	.032	013	253	.801
Gender	.204	.092	.112	2.210	.028
Biospheric	.281	.045	.396	6.269	.000
Altruistic	.044	.052	.053	.834	.405
Egoistic	092	.037	131	-2.530	.012
Step 3					
Age	.000	.000	.079	1.603	.110
Income	013	.031	021	425	.671
Gender	.255	.090	.140	2.840	.005
Biospheric	.223	.045	.314	4.969	.000
Altruistic	.035	.050	.043	.698	.486
Egoistic	113	.036	160	-3.172	.002
Combined	.267	.055	.257	4.859	.000
Energy					
Citizenship					

Hierarchical Regression with Community Energy Behaviour as the Dependent Variable

Predictor	B	SE B	β	t	р
Step 1					
Age	.000	.000	.057	1.018	.309
Income	.066	.052	.071	1.256	.210
Gender	.127	.151	.047	.842	.400



Step 2					
Age	.000	.000	.047	.875	.382
Income	.057	.051	.061	1.123	.262
Gender	.153	.146	.057	1.048	.296
Biospheric	.335	.071	.318	4.728	.000
Altruistic	037	.083	031	453	.651
Egoistic	023	.058	022	398	.691
Step 3					
Age	.000	.000	.046	.871	.384
Income	.061	.049	.065	1.241	.215
Gender	.226	.141	.084	1.601	.110
Biospheric	.276	.069	.263	3.988	.000
Altruistic	036	.080	029	448	.654
Egoistic	052	.056	049	921	.358
Collective	.323	.065	.266	4.969	.000
Energy					
Citizenship					
Step 4		-			
Age	.000	.000	.047	.945	.345
Income	.036	.047	.039	.766	.444
Gender	.269	.136	.100	1.985	.048
Biospheric	.183	.069	.174	2.672	.008
Altruistic	072	.077	059	941	.347
Egoistic	071	.054	068	,325	.186
Collective	.154	.070	.127	2.201	.028
Energy					
Citizenship					
Individual	.495	.092	.336	5.382	.000
Energy					
Citizenship					

Hierarchical Regression with Personal Energy Behaviour as the Dependent Variable

Predictor	В	SE B	β	t	р
Step 1					
Age	.000	.000	.104	1.859	.064
Income	008	.035	012	222	.824
Gender	.191	.101	.105	.,885	.060
Step 2					
Age	.000	.000	.079	1.561	.120
Income	008	.032	013	253	.801
Gender	.204	.092	.112	2.210	.028
Biospheric	.281	.045	.396	6.269	.000
Altruistic	.044	.052	.053	.834	.405
Egoistic	092	.037	131	-2.530	.012
Step 3					
Age	.000	.000	.078	1.567	.118
Income	007	.031	011	216	.829
Gender	.236	.091	.130	2.596	.010
Biospheric	.253	.045	.357	5.678	.000
Altruistic	.045	.051	.055	.874	.383



Egoistic	105	.036	149	-2.908	.004
Collective	.149	.042	.181	3.541	.000
Energy					
Citizenship					
Step 4					
Age	.000	.000	.079	1.621	.106
Income	018	.031	028	572	.568
Gender	.256	.089	.141	2.859	.005
Biospheric	.212	.045	.299	4.686	.000
Altruistic	.029	.051	.035	.564	.573
Egoistic	114	.035	161	-3.208	.001
Collective	.073	.046	.089	1.582	.115
Energy					
Citizenship					
Individual	.221	.061	.222	3.649	.000
Energy					
Citizenship					