

Recommendations for improving societal perception of biomethane in 7 target countries

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GREENMEUP 



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Abbreviations

CAPEX	Capital Expenditure
CNG	Compressed Natural Gas
CO ₂	Carbon dioxide
CRES	Center for Renewable Energy Sources and Saving
CZ	Czechia
DE	Germany
EE	Estonia
ES	Spain
EU	European Union
GHG	Greenhouse Gases
GR	Greece
HU	Hungary
IT	Italy
LV	Latvia
MoU	Memorandum of Understanding
NGO	Non-Governmental Organization
PhD	Doctor of Philosophy
PL	Poland
PPC	Public-Private-Community
R&D	Research & Development
RED	Renewable Energy Directive
RES	Renewable Energy Sources
RO	Romania
RS	Serbia
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
WTP	Willingness to Pay

Executive Summary

The GreenMeUp project aims to promote the broader adoption of biomethane in Europe's energy and transportation sectors, particularly targeting countries with slower market development. A key component of the project involves understanding societal perceptions of biomethane across different dimensions—socio-political, community, and market—by engaging stakeholders and society through evidence-based research. To this end, a comprehensive mixed-methods approach was undertaken, including a quantitative citizen survey and qualitative stakeholder interviews in nine European countries (Czechia, Estonia, Greece, Hungary, Latvia, Poland, Romania, Serbia, and Spain).

The citizen survey involved over 2200 respondents, approximately 200 per country, and examined demographics, awareness, perceptions, attitudes, and behaviors toward biomethane. Results revealed generally low self-perceived knowledge, especially regarding biomethane, biogas, and biofuels. While awareness varied, many respondents viewed biomethane positively in terms of environmental and social benefits, such as waste management and emissions reduction, though perceptions of economic benefits were more mixed. Concerns about risks—including environmental, health, and safety issues—were present but generally moderate. Additionally, acceptance levels decreased with increasing proximity to potential facilities, and trust in stakeholders, particularly government and industry, was relatively low, whereas trust in scientists and researchers was higher.

The stakeholder interviews provided nuanced insights into societal needs, policy support, community engagement, perceived risks, and trust. Stakeholders emphasized the importance of transparent communication, early community involvement, addressing concerns about nuisances, and highlighting local benefits—economic, environmental, and social. They recognized existing policy supports like tariffs, subsidies, and regulatory frameworks, but also noted gaps such as regulatory uncertainty, limited community engagement policies, and financial barriers. Stakeholders advocated for building trust through consistent dialogue, demonstrating project benefits, and fostering partnerships among public authorities, private companies, and communities to accelerate market growth.

Based on these findings, the report offers tailored recommendations to improve societal perceptions of biomethane. Efforts should focus on increasing public awareness through targeted education that clarifies misconceptions and highlights environmental and socioeconomic benefits. Building trust requires transparent, early, and ongoing community engagement, involving local stakeholders, authorities, and trusted figures to foster acceptance. Addressing community concerns about safety, environmental impacts, and nuisances with clear information and mitigation measures is essential. Promoting social equity by ensuring benefits are accessible to all, including marginalized groups, and developing fair project siting and operational guidelines will support fairness and acceptance. Strengthening partnerships among public, private, and community organizations, along with continuous dialogue and shared goals, can further facilitate market growth and societal support for biomethane initiatives.

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1 Introduction

The main objective of the GreenMeUp project is to facilitate the wider market uptake of biomethane in the European energy and transport sectors by strengthening the market in countries with slower market development policies. In this respect, one of the specific project objectives is to ensure active engagement of stakeholders and societal acceptance with the involvement of actors representing all stages of the biomethane value chains through science-based evidence and tools. For this purpose, a study of societal perspectives related to biomethane is performed, focusing on different societal dimensions, namely the socio-political, the community, and the market (Figure 1-1).

Having this in mind, a) a quantitative survey involving at least 200 citizens per country was implemented and b) a qualitative study (through an interviews protocol) was carried out focusing on targeted policy (e.g. government representatives, policy & decision-makers) and market (e.g. project developers, distributors) stakeholders, through the Policy and the Market Hubs to address issues affecting socio-political, community and market perspectives of biomethane in all GreenMeUp target countries (Czechia, Estonia, Greece, Hungary, Latvia, Poland, Romania, Serbia, and Spain).

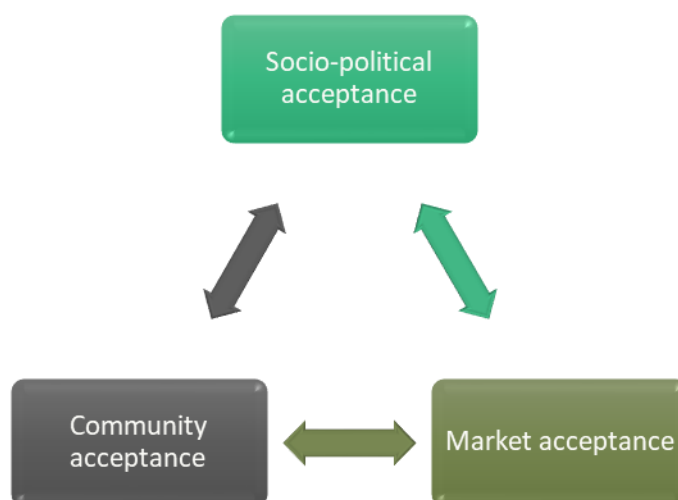


Figure 1-1: Societal dimensions of biomethane perceptions

The 2nd Section of this report presents the methodology and results of the citizen survey; the 3rd Section presents the methodology and results of the stakeholder interviews, while the 4th Section provides recommendations on improving societal perception of biomethane, based on the findings of the quantitative and qualitative studies.

2 Citizen survey: Methodology and results

2.1 Methodology

In order to examine the societal perspectives related to the market and community dimensions of biomethane, a survey focusing on citizens' knowledge, awareness, perceptions, attitudes, and behaviour was planned, organized, and executed. The overall procedure can be outlined in three phases, in particular:

1. Questionnaire and survey organization;
2. Data collection;
3. Data analysis.

The 1st phase (marked in blue color in the figure below), i.e., the questionnaire and survey organization, was the most lengthy, including activities such as a literature review analysis and the development of two theoretical models; the first on the market (see Figure 2-1) and the second on the socio-political and community dimensions of biomethane perceptions (see Figure 2-2). It also included the validation of the final questionnaire (see Annex I) and the translated versions, and the administrative procedures to set up a collaboration with a surveying company (responsible for translations in national languages and data collection). The final version of the questionnaire was prepared based on the feedback received by all partners, including the following segments: A. Socioeconomic characteristics; B. Residence characteristics; C. Knowledge & awareness; D. Information Box; E. Perceptions/ Attitude/ Behaviour; F. Willingness to Pay (WTP); G. Local acceptance.

The 2nd phase (marked in grey color in the figure below) included the data collection performed by the surveying company. The survey was performed in 11 countries (Czechia, Estonia, Germany, Greece, Hungary, Italy, Latvia, Poland, Romania, Serbia, and Spain), i.e., the target and mature (Germany and Italy) market countries of the GreenMeUp project, during December 2024; approximately 200 responses were collected per country, thus leading to an overall sample of over 2200 responses. The collection of the sample by a surveying company (Metron Analysis) ensured the collection of a random and representative sample (in terms of age, gender, and region).

The 3rd phase (marked in green color in the figure below), i.e., data treatment and analysis, was performed by CRES, including descriptive statistics analysis (overall and per country). Statistical analyses were carried out using the SPSS 20 software; Microsoft Excel was used to create bar charts and heat tables. Descriptive statistics were estimated a) per country and b) for the overall sample. The overall results are presented using bar charts, while the results per country are presented using heat tables. Figure 2-3 illustrates each separate step of the three phases presented above in chronological order.

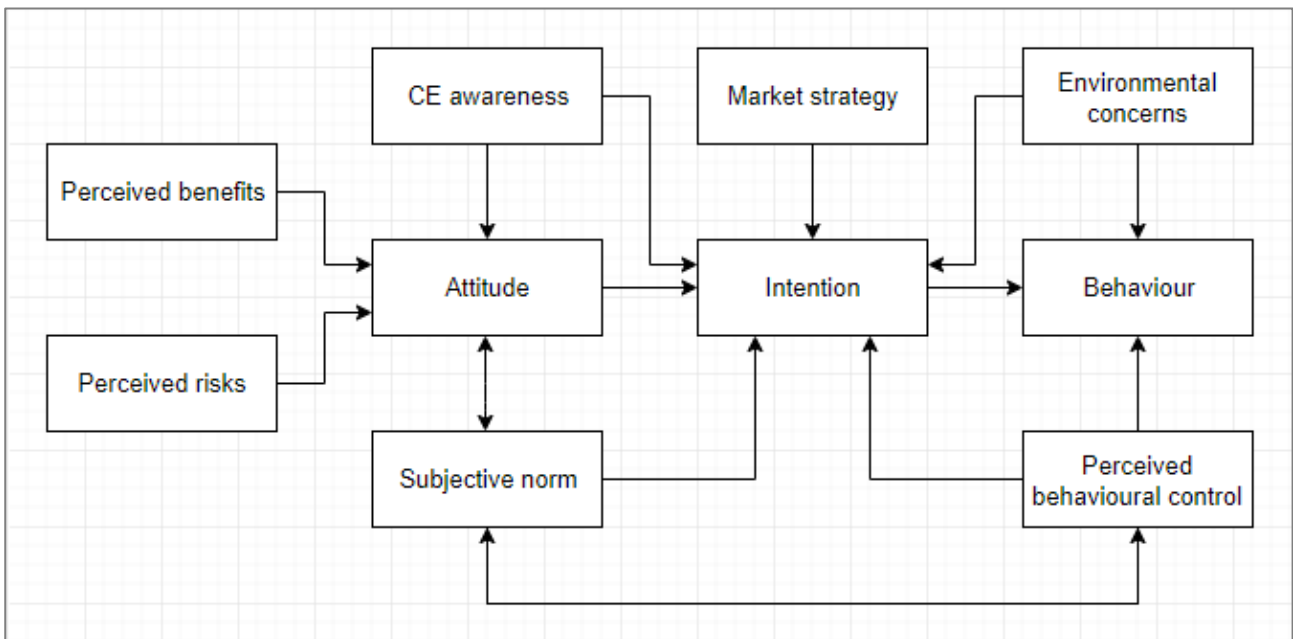


Figure 2-1: Market dimension of biomethane perceptions - Theoretical model

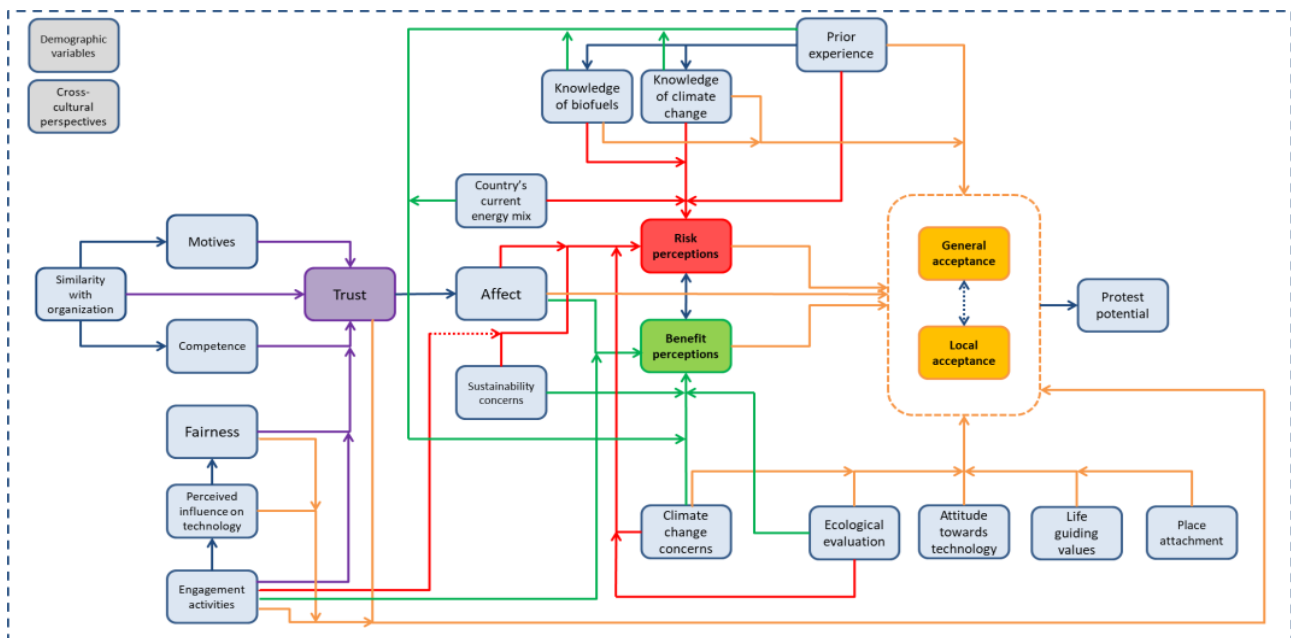


Figure 2-2: Socio-political and community dimensions of biomethane perceptions - Theoretical model

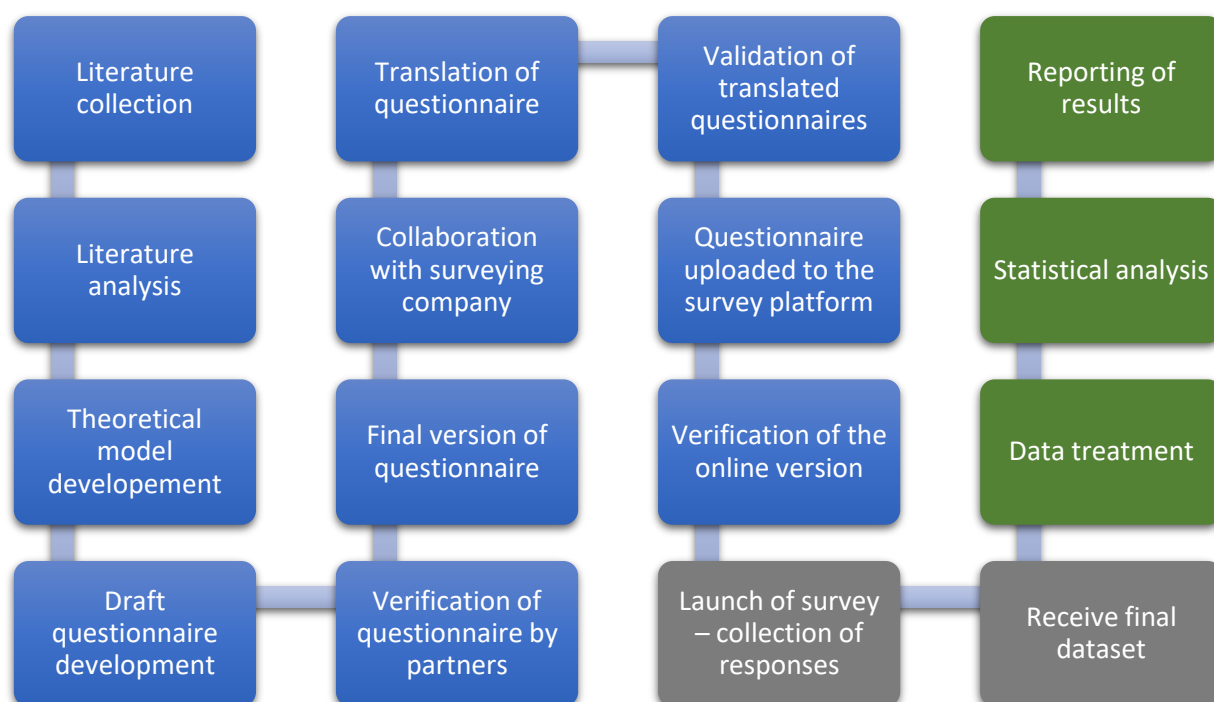


Figure 2-3 Citizen survey: Methodology

2.2 Descriptive statistics

2.2.1 Socioeconomic characteristics

The sociodemographic characteristics (country of origin, area type, gender, age, education, professional association with the environmental or energy sectors, and income satisfaction) of the overall sample and the 11 national samples are presented. First, it should be mentioned that there is an equal representation of the 11 countries, with each comprising approximately 9% of the overall sample (Figure 2-4). The exact sample per country is provided in Table 2-1, indicating that 200 to 205 responses were collected per country. It should be noted that the 11 national-level samples were collected based on region quotas, leading to representative samples in terms of population distribution in different regions.

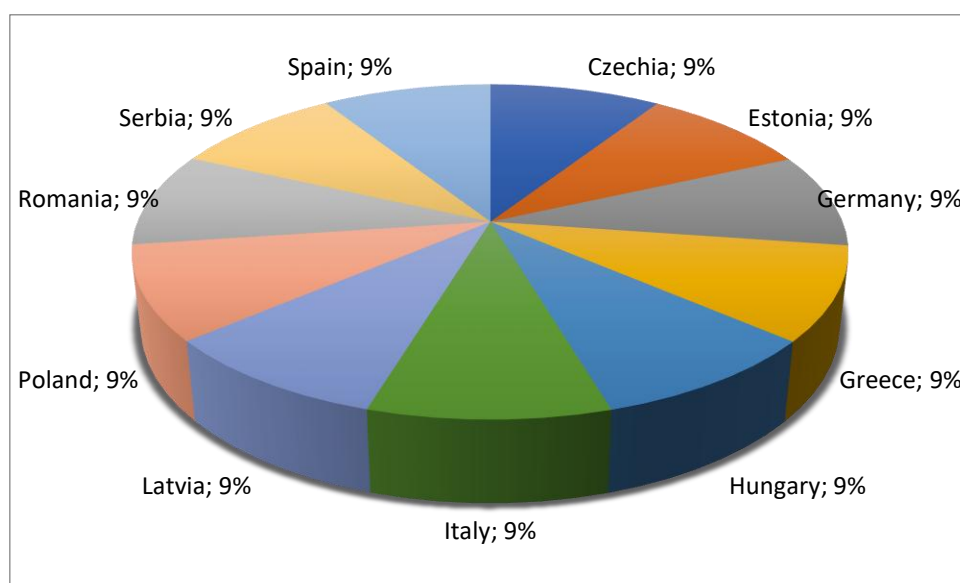


Figure 2-4: Country of origin

Table 2-1: Country of origin

		Please select the country you live in	
		%	sample size
Czechia	CZ	9,2	203
Estonia	EE	9,0	200
Germany	DE	9,0	200
Greece	GR	9,0	200
Hungary	HU	9,1	201
Italy	IT	9,3	205
Latvia	LV	9,0	200
Poland	PL	9,1	201
Romania	RO	9,0	200
Serbia	RS	9,1	201
Spain	ES	9,0	200
Total		100	2211

The majority of the respondents live in urban areas (Figure 2-5). On a country level, we can notice that Germany has the lowest urban population (49%), while Romania (85%) and Greece (83%) have the highest ones (

Table 2-2).

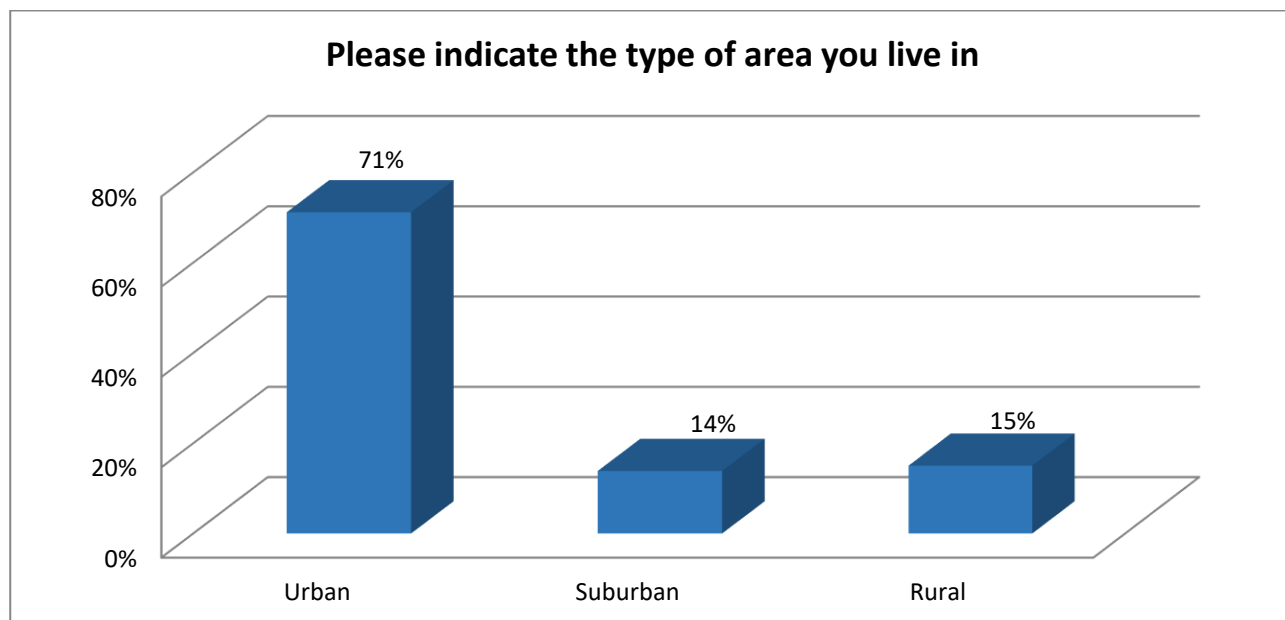


Figure 2-5: Residence area type

Table 2-2: Residence area type per country (%)

	Please indicate the type of area you live in		
	Urban	Suburban	Rural
CZ	64	18	18
EE	64	13	23
DE	49	26	25
GR	83	13	4
HU	72	7	21
IT	66	18	16
LV	75	9	17
PL	77	12	11
RO	85	3	13
RS	75	20	5
ES	75	13	13

The male participants represent 48% of the overall sample, while females represent 52% (Figure 2-6). Concerning national samples, female respondents are represented more in the majority of the countries, with a broader difference –in relation to men- in Latvia and Poland (Table 2-3).

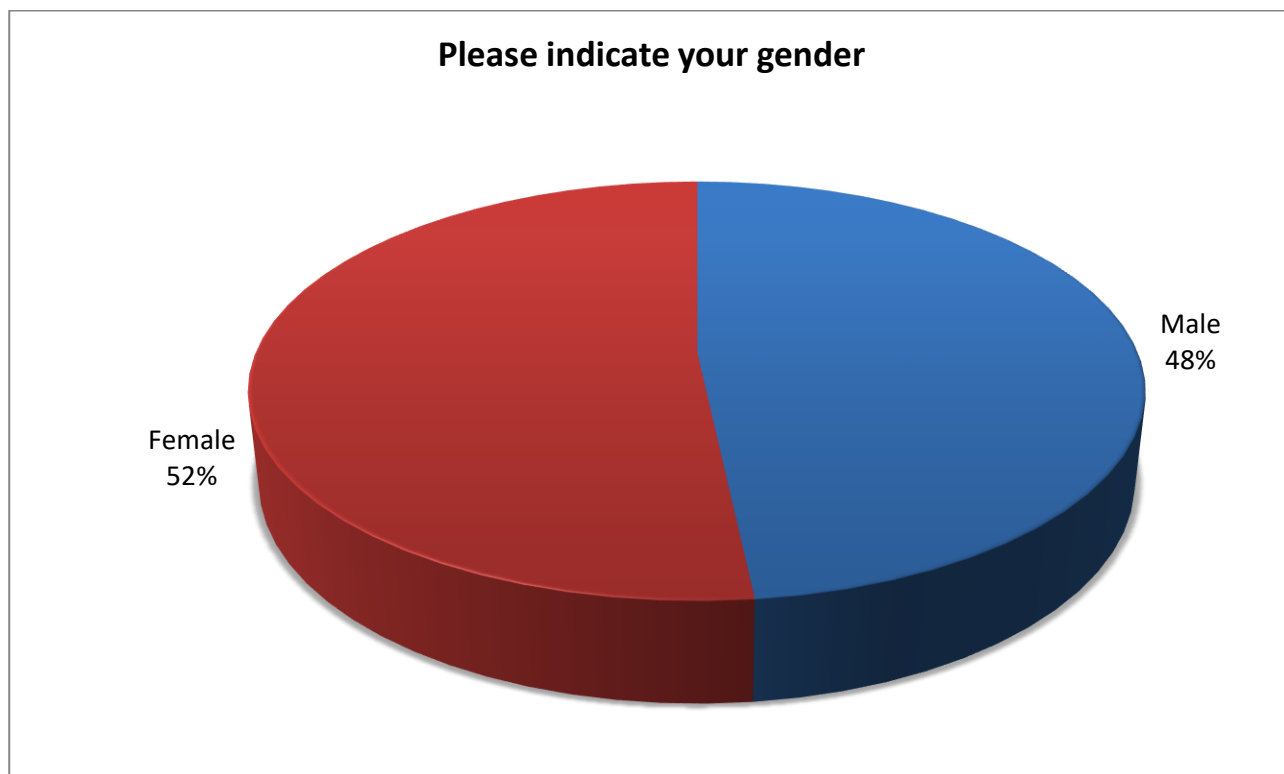


Figure 2-6: Participants' gender

Table 2-3: Participants' gender per country (%)

	Please indicate your gender	
	Male	Female
CZ	50	50
EE	49	52
DE	50	50
GR	48	52
HU	48	52
IT	49	51
LV	46	54
PL	47	53
RO	48	53
RS	49	51
ES	48	52

The mean age of the overall sample is 45,96 years (S.D.: 14,71; Median: 45,00; Range: 18 - 85), while the majority of the respondents belong within the 55+ age group (Figure 2-7: *Participants' age groups*). When referring to the national samples, Romania presents the youngest sample (mean 44,7, median 43), while Latvia presents the oldest one (mean 47,8, median 51) (Table 2-4). In terms of age groups, Italy (45%), Germany (44%), and Latvia (43%) have the highest percentage of respondents in the 55+ age group (Table 2-5).

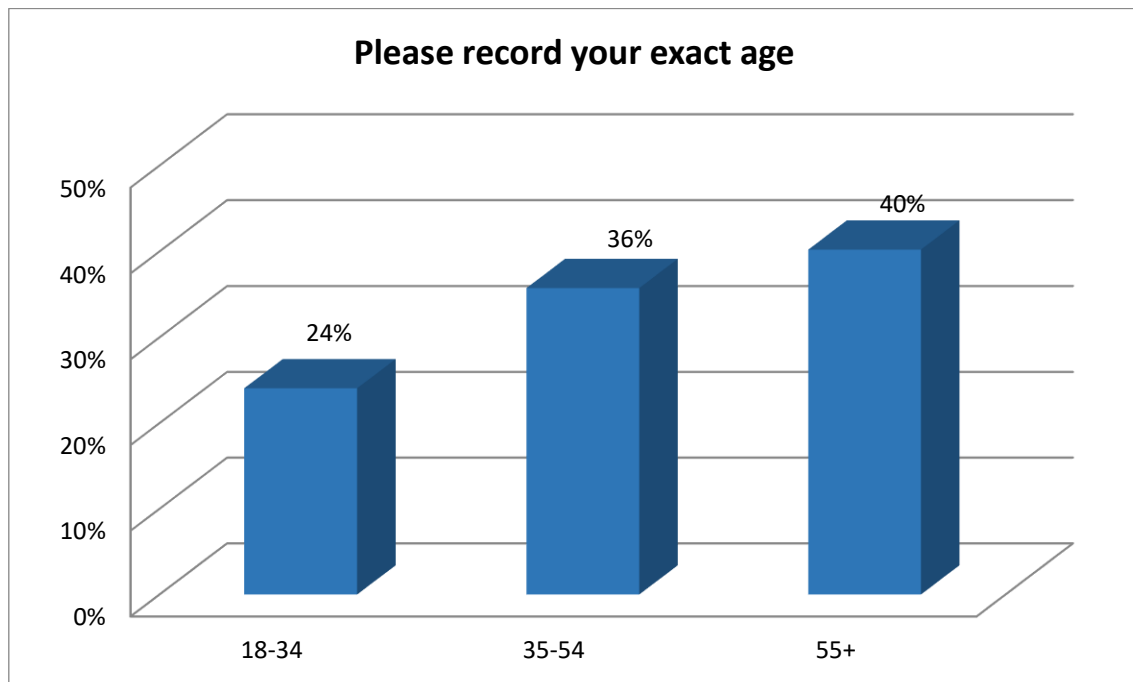


Figure 2-7: Participants' age groups

Table 2-4: Participants' age per country

	Mean	Median	Std. Dev.	Minimum	Maximum
CZ	45,2	44	15,7	18	85
EE	46,2	45	14,5	18	73
DE	47,6	47	16,0	18	75
GR	45,2	44	14,4	18	72
HU	45,1	43	15,1	19	74
IT	46,9	49	14,4	18	75
LV	47,8	51	14,6	19	75
PL	45,1	44	14,8	18	71
RO	44,7	43	14,0	18	70
RS	46,2	46	14,4	18	70
ES	45,5	44,5	14,0	18	71

Table 2-5: Participants' age groups per country (%)

	Please indicate your age		
	18-34	35-54	55+
CZ	24	38	38
EE	25	36	39
DE	23	34	44
GR	23	36	41
HU	26	38	36
IT	23	32	45
LV	23	34	43
PL	26	36	38
RO	24	38	39
RS	24	34	41
ES	24	38	39

Referring to the educational level, in the overall sample, high school graduates (32%), university/ university college degree (25%), and vocational training degree (24%) were the responses with the highest percentages. A significant percentage of respondents (13%) stated that they have a Master's degree, while only 3% have a PhD degree (Figure 2-8).

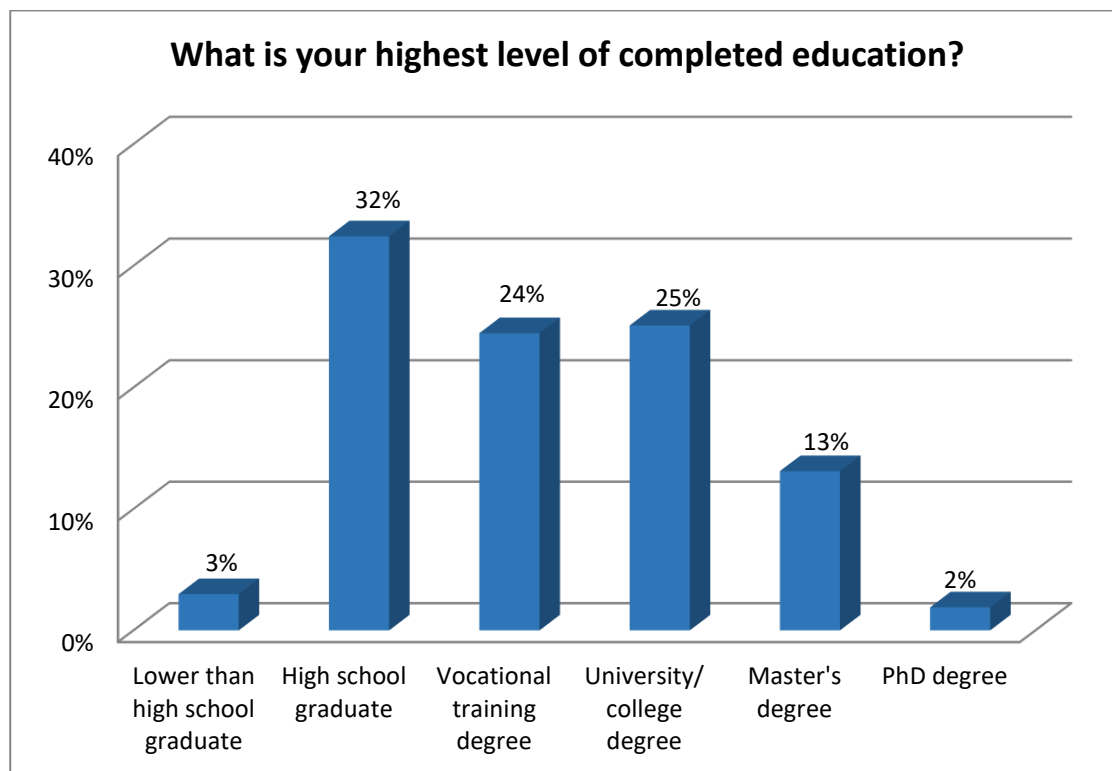


Figure 2-8 Educational level

When examining the national samples, having a University degree is the most common answer in Greece and Serbia, having a vocational training degree is the most common answer in Czechia, Germany, Latvia, and Spain, while the most common answer in Estonia, Hungary, Italy, Poland, and Romania is being a high school graduate (Table 2-6).

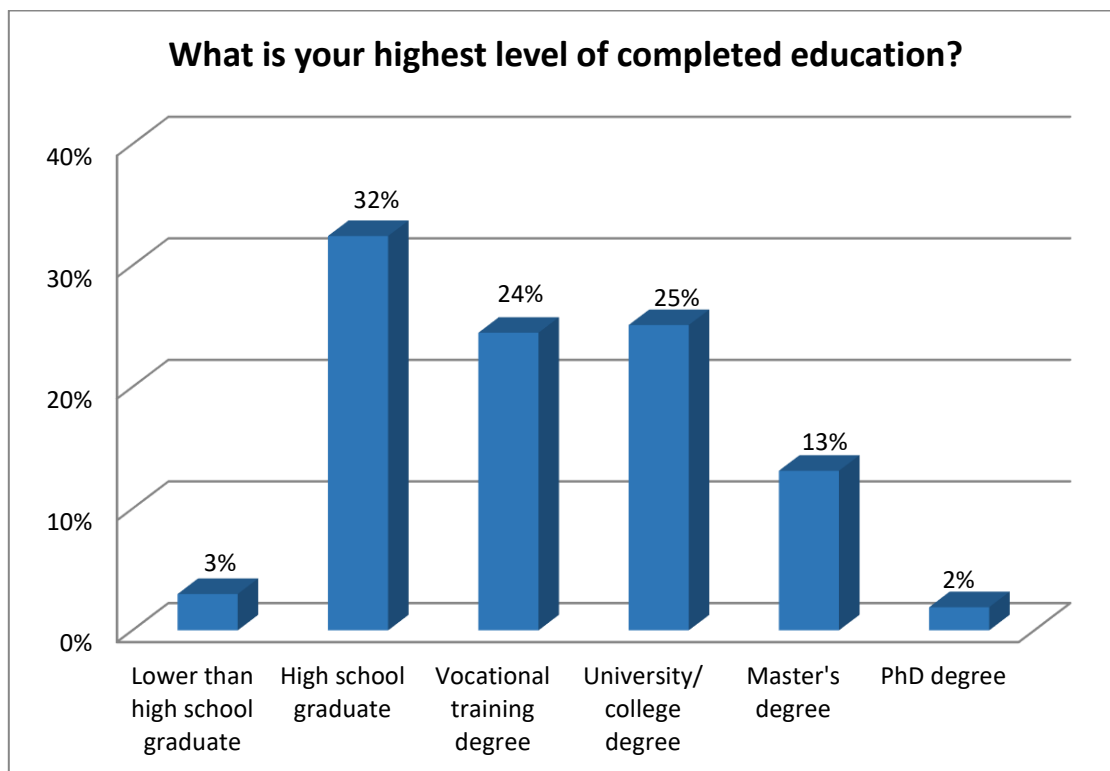


Figure 2-9: Educational level

Table 2-6: Educational level per country (%)

	What is your highest level of completed education?					
	None of the above	High school graduate	Vocational training degree	University/ University college degree	Master's degree	PhD degree
CZ	2%	26%	45%	14%	11%	2%
EE	3%	34%	18%	31%	15%	1%
DE	5%	19%	51%	12%	14%	1%
GR	1%	23%	15%	43%	15%	4%
HU	12%	37%	29%	16%	6%	0%
IT	4%	52%	10%	19%	14%	1%
LV	3%	21%	37%	24%	16%	1%
PL	1%	44%	13%	16%	23%	3%
RO	1%	42%	12%	32%	13%	2%
RS	0%	38%	11%	42%	7%	1%
ES	2%	22%	30%	29%	12%	5%

The respondents were questioned about their professional experience in the environmental or energy sectors, with the majority of the respondents (81%) stating that they have no previous or current experience in these sectors (Figure 2-10). Serbia (14%) has the lowest percentage of respondents related to these sectors, while Czechia has the highest one (26%) (Table 2-7).

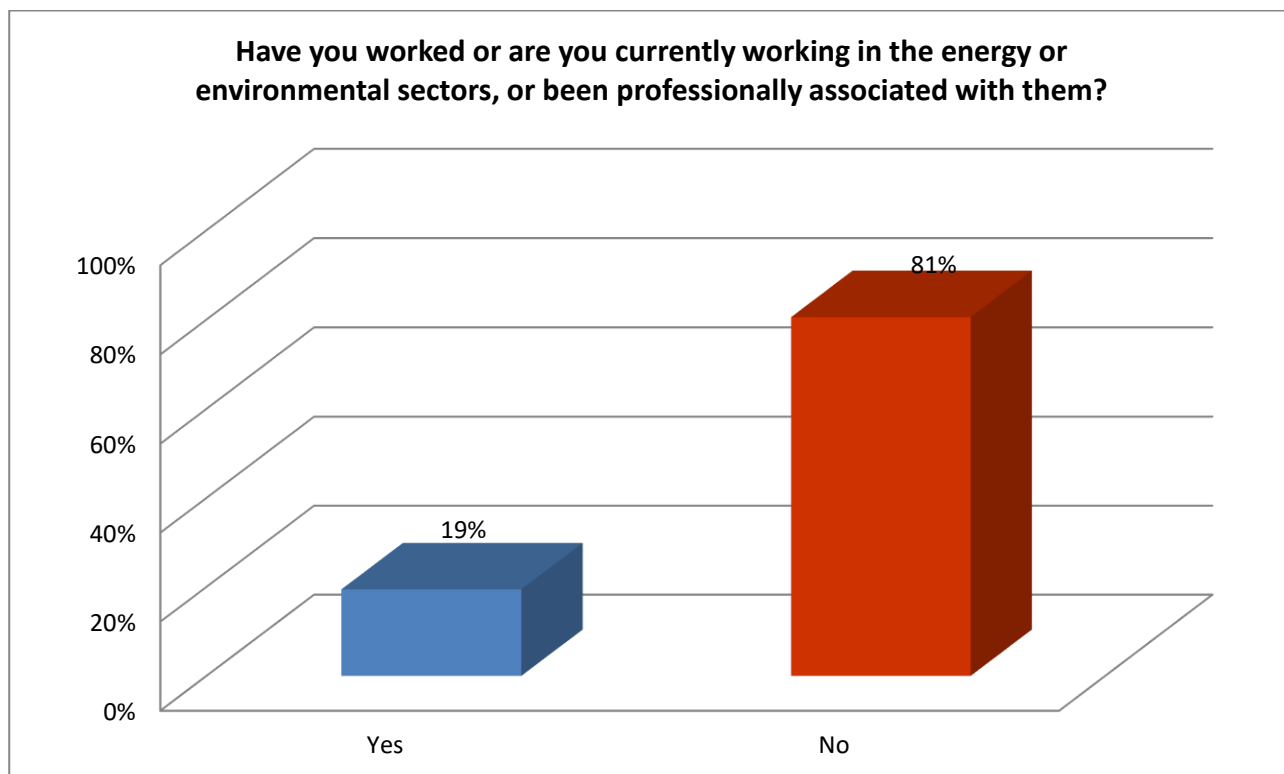


Figure 2-10: Prior professional experience in the energy or the environmental sector

Table 2-7: Prior professional experience in the environmental or energy sectors per country (%)

	Have you worked or are you currently working in the energy or environmental sectors, or been professionally associated with them?	
	Yes	No
CZ	26%	74%
EE	17%	83%
DE	18%	83%
GR	18%	82%
HU	18%	82%
IT	17%	83%
LV	22%	79%
PL	22%	78%
RO	23%	77%
RS	14%	86%
ES	21%	80%

Respondents were asked about their level of satisfaction with their household income; in the overall sample, “Agree” (21%) and “Slightly Agree” (24%) were the answers with the highest percentages (Figure 2-11). This was also true for all participating countries, apart from Estonia, Greece, and Latvia (Table 2-8).

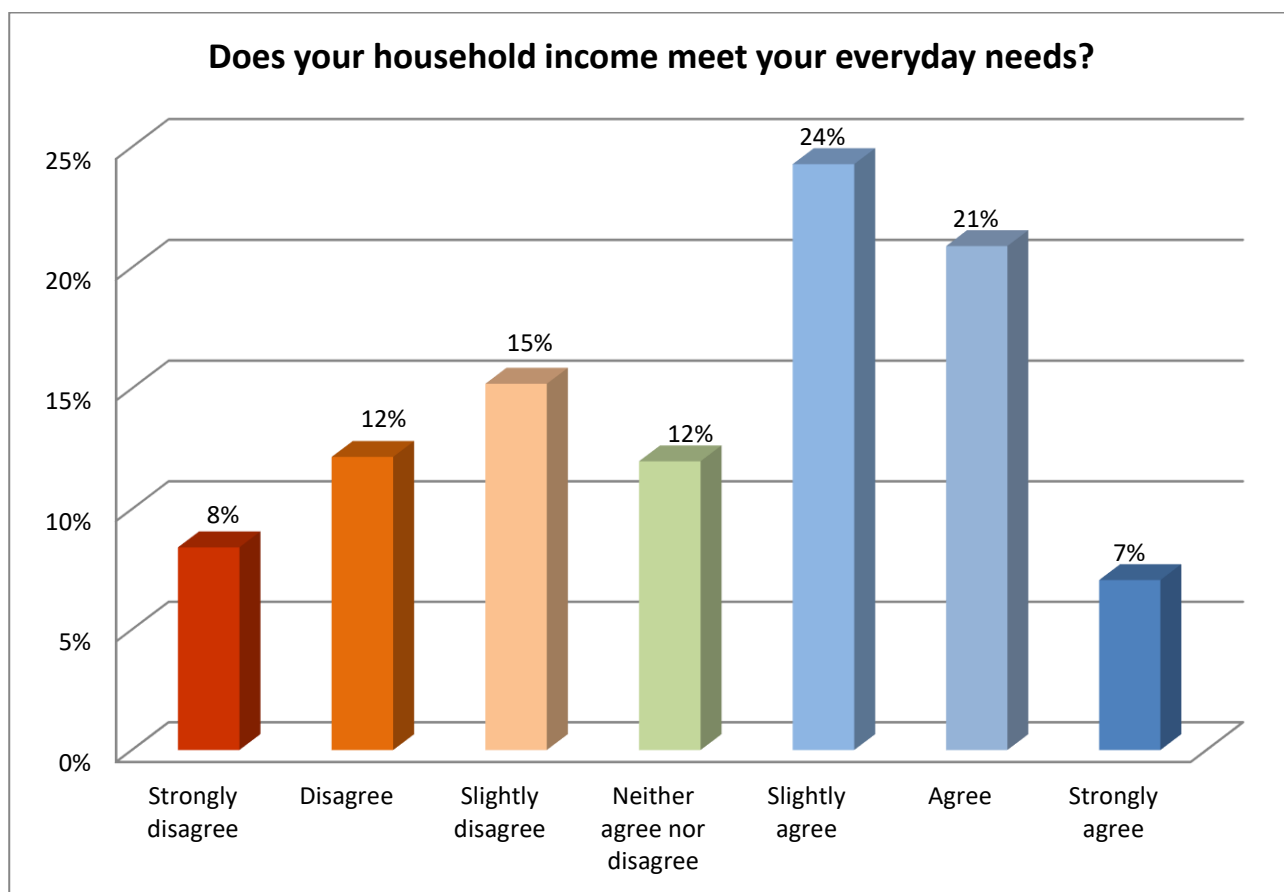


Figure 2-11: Satisfaction with household income

Table 2-8: Satisfaction with household income per country (%)

	Please indicate the extent to which you agree or disagree with the statement: "My household income meets my everyday needs"						
	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
CZ	8%	10%	14%	13%	34%	15%	5%
EE	15%	15%	26%	9%	18%	15%	3%
DE	7%	7%	14%	8%	26%	23%	16%
GR	6%	13%	15%	27%	22%	16%	3%
H U	7%	11%	18%	5%	28%	20%	10%
IT	6%	14%	14%	12%	23%	30%	2%
LV	17%	22%	20%	12%	12%	17%	2%
PL	7%	6%	10%	11%	35%	19%	9%
RO	6%	10%	10%	13%	23%	31%	9%
RS	8%	19%	15%	13%	24%	15%	5%
ES	6%	8%	13%	10%	22%	29%	13%

2.2.2 Residence characteristics

In terms of type of residence, the most common response was living in an apartment (58%), followed by living in a detached house (36%) (Figure 2-12). On a country level, this is the case for all countries, apart from Hungary (60%) and Serbia (47%), where the most common housing type is detached houses (Table 2-9).

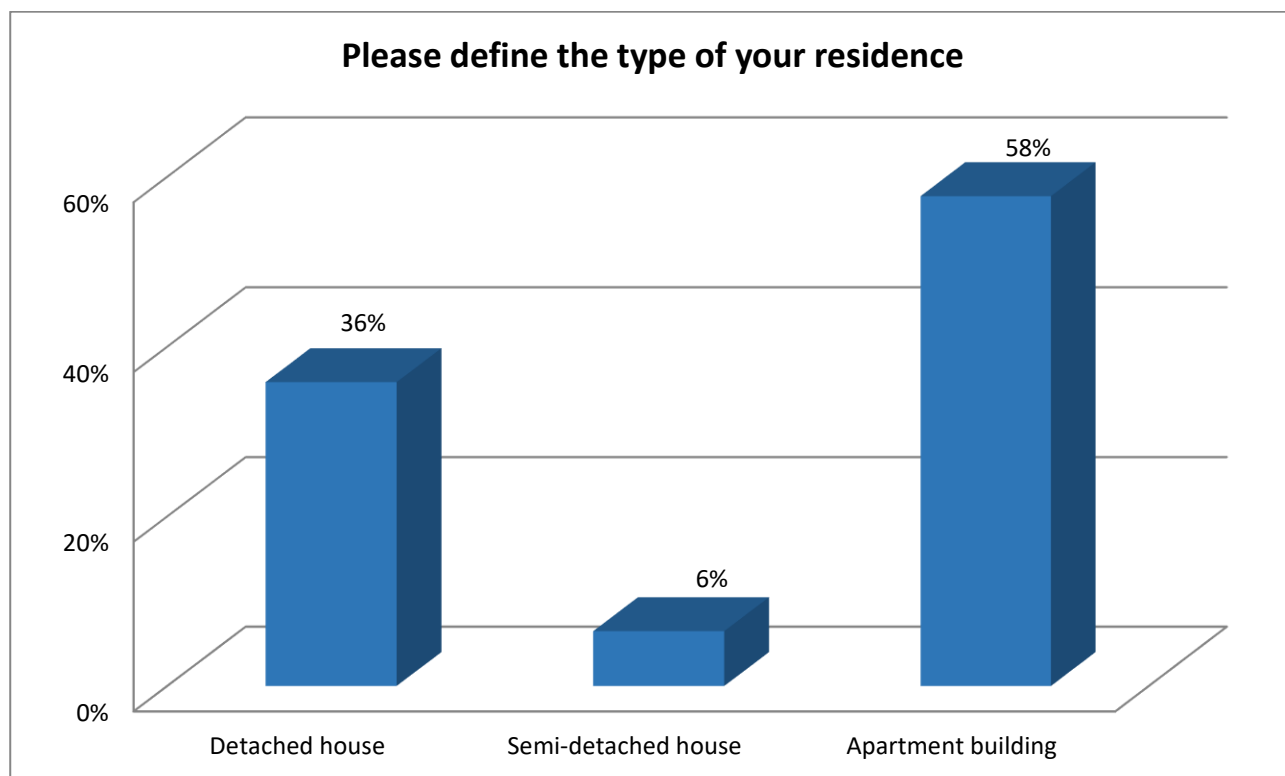


Figure 2-12: Residence type

Table 2-9: Residence type per country (%)

	Please define the type of your residence		
	Detached house	Semi-detached house	Apartment building
CZ	41%	2%	56%
EE	31%	7%	63%
DE	34%	9%	58%
GR	28%	6%	66%
HU	60%	2%	38%
IT	19%	11%	70%
LV	32%	3%	65%
PL	36%	3%	61%
RO	36%	5%	60%
RS	47%	12%	40%
ES	30%	12%	59%

Regarding residence ownership, the majority of the participants in the overall sample stated that they privately own the residence where they live (72%) (Figure 2-13). On the national level, most countries have a higher proportion of privately owned residences, except for Germany, where 61% of the respondents stated that they live in a rented residence (Table 2-10).

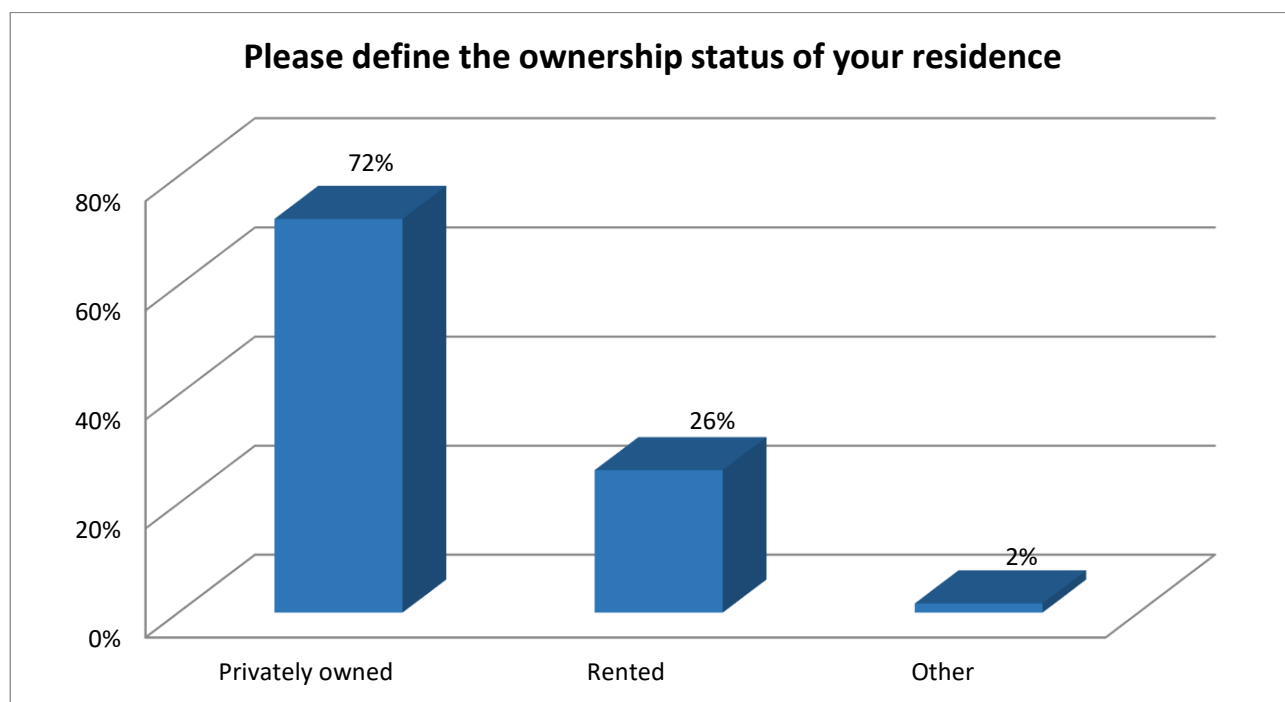


Figure 2-13: Residence ownership status

Table 2-10: Residence ownership status per country (%)

	Please define the ownership status of your residence		
	Privately owned	Rented	Other
CZ	59%	37%	3%
EE	74%	25%	2%
DE	39%	61%	0%
GR	70%	29%	2%
HU	79%	19%	1%
IT	74%	24%	2%
LV	69%	28%	4%
PL	83%	16%	1%
RO	84%	14%	3%
RS	90%	9%	0%
ES	75%	25%	1%

The participants were asked about the construction year of their residence. In the overall sample, the most common answer was that the residence was constructed between 1961 and 1980 (26%), followed by 1981 and 1990 (18%) (Figure 2-14). On a country level, this was the case in most countries, except for Spain, where

residents reported that their residence was constructed more recently, with the highest proportion being between 2001-2010 (21%), followed by the period 1991-2000 (19%) (Table 2-11).

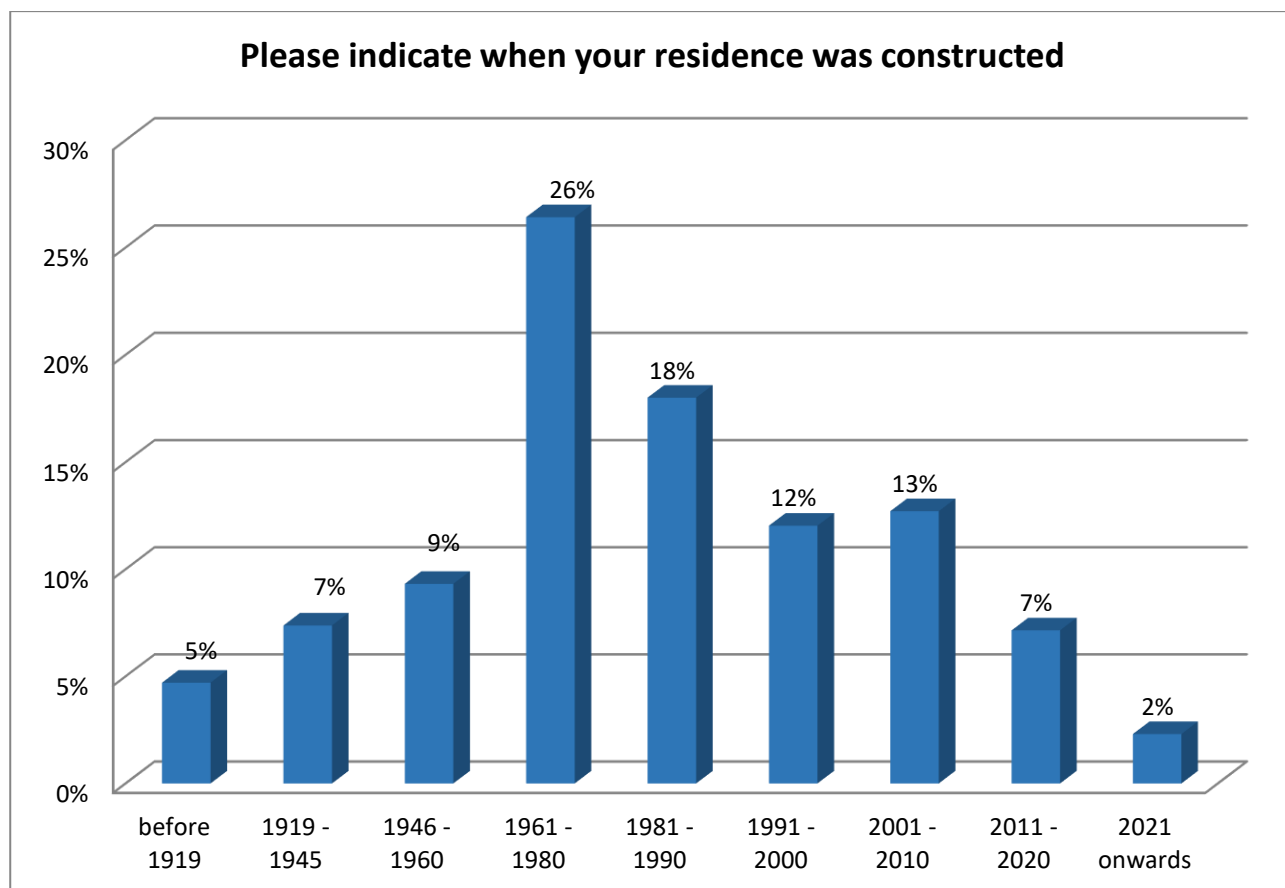


Figure 2-14: Year of construction of residence

Table 2-11: Residence year of construction per country (%)

	Please indicate when your residence was constructed								
	before 1919	1919 - 1945	1946 - 1960	1961 - 1980	1981 - 1990	1991 - 2000	2001 - 2010	2011 - 2020	2021 onwards
CZ	11	13	8	19	18	9	8	9	5
EE	6	9	8	31	16	9	13	8	2
DE	6	10	12	29	13	12	10	7	3
GR	1	2	4	28	23	17	23	3	1
HU	5	8	9	33	17	11	10	3	2
IT	4	6	13	24	18	13	15	6	0
LV	9	13	14	33	16	7	5	5	1
PL	4	10	8	17	20	13	13	11	2
RO	1	4	7	29	25	8	13	10	4
RS	3	4	10	32	17	15	9	4	4
ES	3	2	9	17	16	19	21	13	2

The participants were also asked about the size of their residences. In the overall sample, the most common residence size is between 50 m² and 100 m² (47%), followed by 100 m² to 150 m² (21%) (Figure 2-15). When referring to the national samples, the most common answer in all countries is living in a residence between 50 m² to 100 m². It could be noted that in Estonia, Hungary, Latvia, Poland, and Romania, the second highest category is 0 to 50m² (Table 2-12).

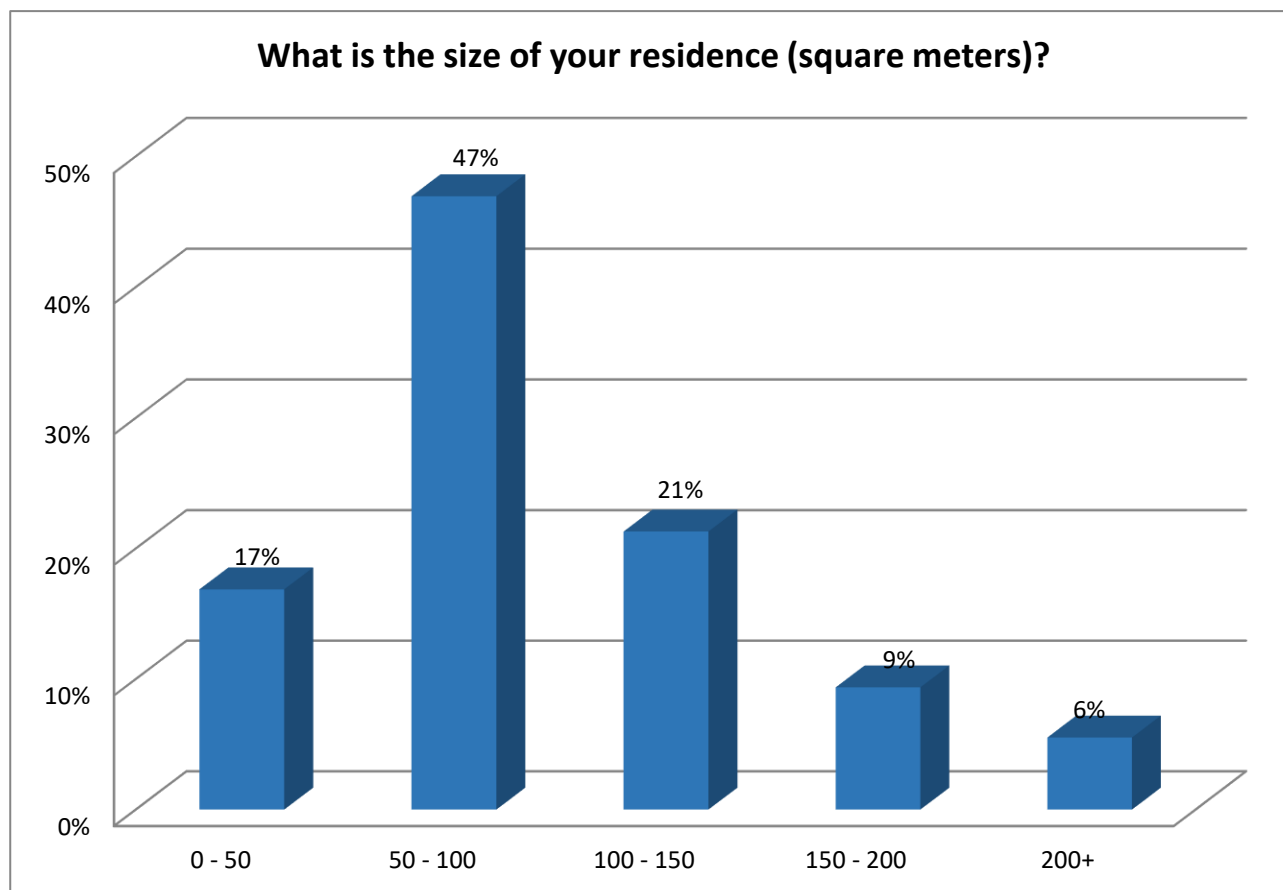


Figure 2-15: Residence size

Table 2-12: Residence size per country (%)

	What is the size of your residence (square meters)?				
	0 - 50	50 - 100	100 - 150	150 - 200	200+
CZ	13	40	21	17	8
EE	30	34	28	5	4
DE	15	43	28	10	5
GR	11	59	24	4	3
HU	21	55	16	7	1
IT	6	46	31	11	6
LV	30	47	12	7	5
PL	21	44	16	12	7
RO	18	49	17	12	6
RS	17	46	20	11	5
ES	6	55	23	7	10

Regarding the main heating system in the respondents' residence, in the overall sample, the most common responses are natural gas boiler (27%), district heating system (21%) and wood-burning or pellet stove (14%) (Figure 2-16). At the county level, natural gas boiler is the most common answer in Romania (61%), Italy (59%), Spain (33%), Germany (29%), Czechia (28%) and Hungary (26%); district heating system is the most common in Latvia (50%), Poland (37%) and Estonia (35%); heating oil boiler is the most common in Greece (36%) and wood-burning or pellet stove the most common in Serbia (31%) (Table 2-13).

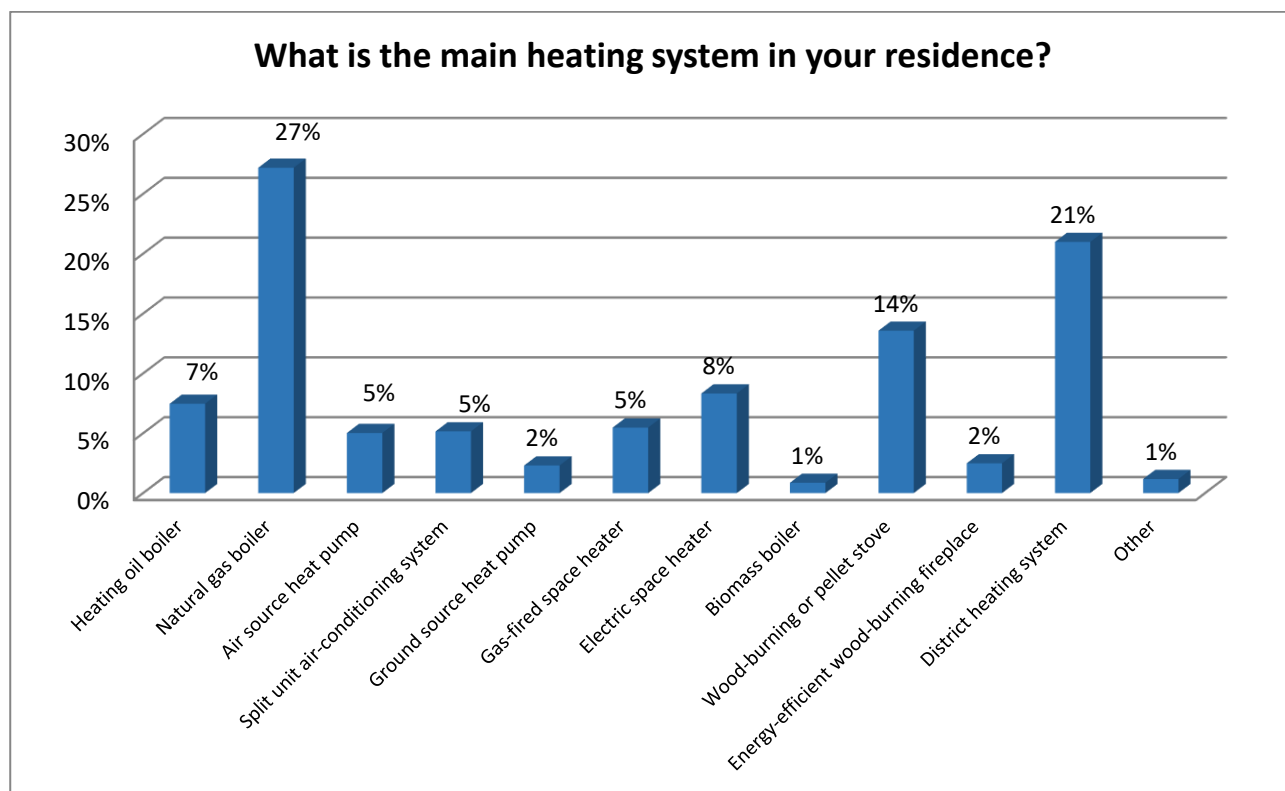


Figure 2-16: Main heating system of the residence

Table 2-13: Main heating system of the residence per country (%)

	What is the main heating system in your residence?											
	Heating oil boiler	Natural gas boiler	Air source heat pump	Split unit air-conditioning system	Ground source heat pump	Gas-fired space heater	Electric space heater	Biomass boiler	Wood-burning or pellet stove	Energy-efficient wood-burning fireplace	District heating system	Other
CZ	1	28	10	1	5	5	9	1	8	4	27	1
EE	3	6	13	2	5	5	11	1	18	4	35	0
DE	22	29	5	1	4	6	7	1	2	3	21	2
GR	36	21	3	18	0	2	9	1	6	2	3	2
HU	1	26	1	3	1	19	9	0	17	3	14	1
IT	7	59	4	4	2	5	4	1	4	2	4	2
LV	1	5	2	0	2	3	3	0	35	1	50	1
PL	1	15	8	1	4	5	7	2	14	2	37	0
RO	3	61	3	3	1	1	4	1	12	3	11	0
RS	0	15	2	13	1	0	8	0	31	3	24	1
ES	7	33	5	11	1	10	21	2	3	1	6	3

Regarding the energy source for cooking in the respondents' residence, in the overall sample, the most common response is electricity (59%), followed by gas (38%) (Figure 2-17). At the county level, the results concerning the most common cooking energy source are split among the countries; electricity is more popular in Greece (92%), Germany (88%), Serbia (83%), Estonia (81%), Spain (73%) and Czechia (62%), while gas is more common in Romania (76%), Italy (70%), Hungary (60%), Latvia (56%) and Poland (50%) (Table 2-14).

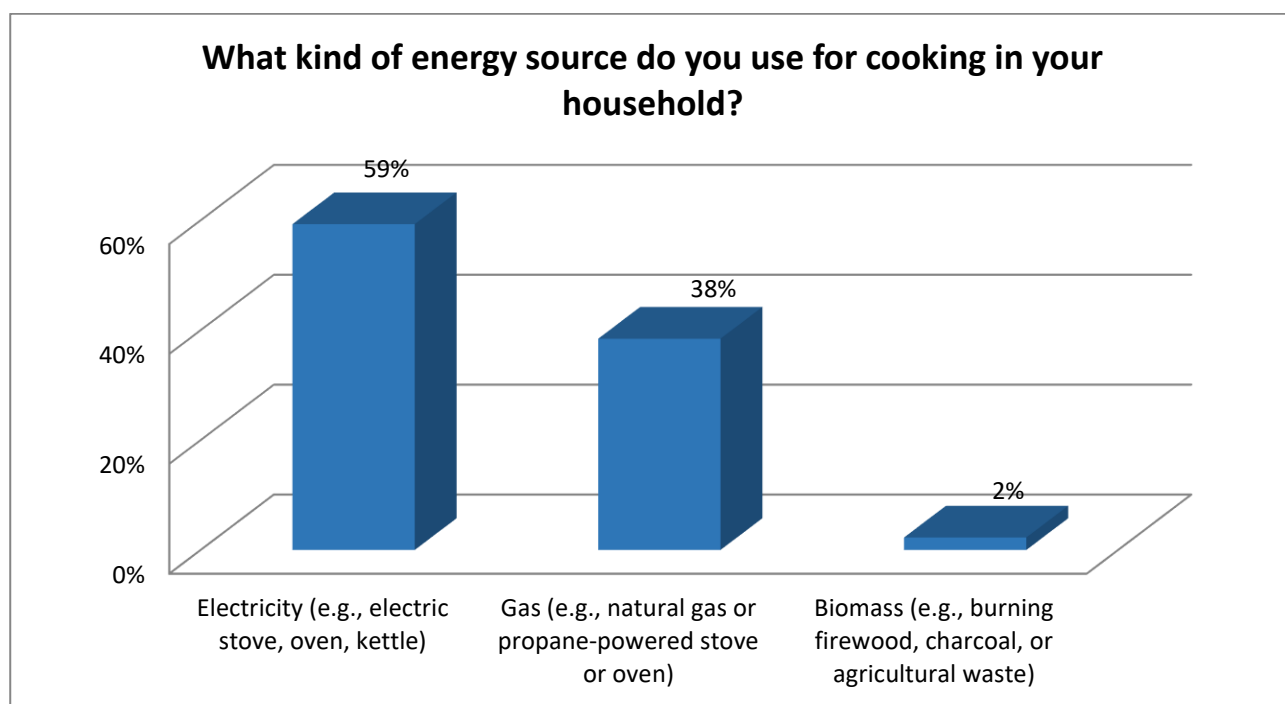


Figure 2-17: Energy source for cooking in the residence

Table 2-14: Energy source for cooking in the residence per country (%)

	What kind of energy source do you use for cooking in your household?		
	Electricity (e.g., electric stove, oven, kettle)	Gas (e.g., natural gas or propane-powered stove or oven)	Biomass (e.g., burning firewood, charcoal, or agricultural waste)
CZ	62	37	1
EE	81	15	4
DE	88	10	2
GR	92	8	1
HU	38	60	2
IT	29	70	0
LV	41	56	3
PL	47	50	3
RO	20	76	4
RS	83	15	2
ES	73	26	2

The survey participants were asked whether or not they drive a car; in the overall sample, 81% responded positively (Figure 2-18). The same applies for the country level, with the country with the highest positive percentage being Italy (93%), and the country with the lowest being Hungary (73%) (Table 2-15).

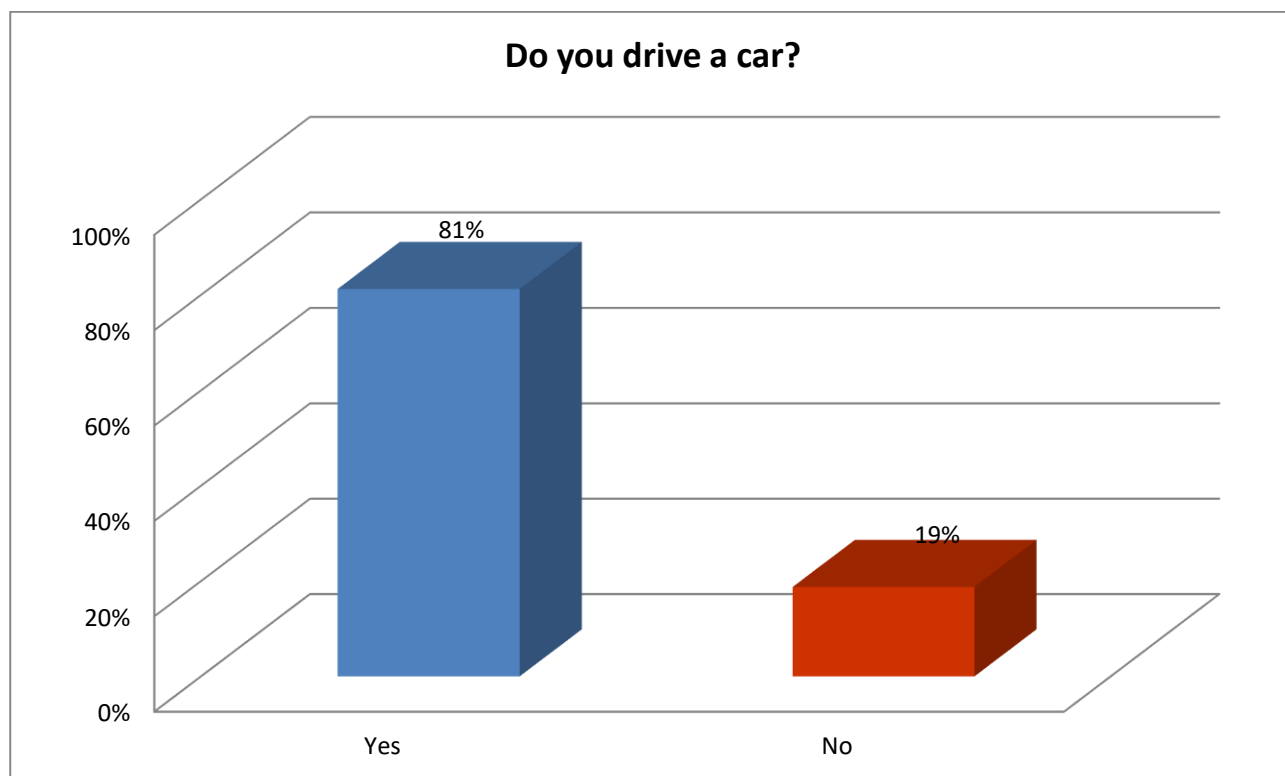


Figure 2-18: Car driving status

Table 2-15: Car driving status per country (%)

	Do you drive a car?	
	Yes	No
CZ	80	20
EE	76	25
DE	85	15
GR	85	16
HU	73	27
IT	93	7
LV	76	24
PL	88	12
RO	79	21
RS	75	25
ES	85	15

Following, the participants were asked about the type of fuel/s their car runs on (multiple responses were allowed). The most common answers in the overall sample were gasoline (petrol) (48%) and diesel (30%) (Figure 2-19). At the county level, the most common response is gasoline in Greece (68%), Poland (59%), Czechia (57%), Hungary (54%), Germany (53%), Italy (45%), Spain (42%), Serbia (40%) and Estonia (39%),

while diesel is the most common fuel in Latvia (45%) and Romania (35%). Other results that stand out are the use of hybrid cars (gasoline and electricity) in Italy (15%), the use of LPG in Poland (9%), and the use of electric cars in Germany (8%) (Table 2-16). It should be noted that the percentages per country sum up to over 100%, as multiple responses were allowed.

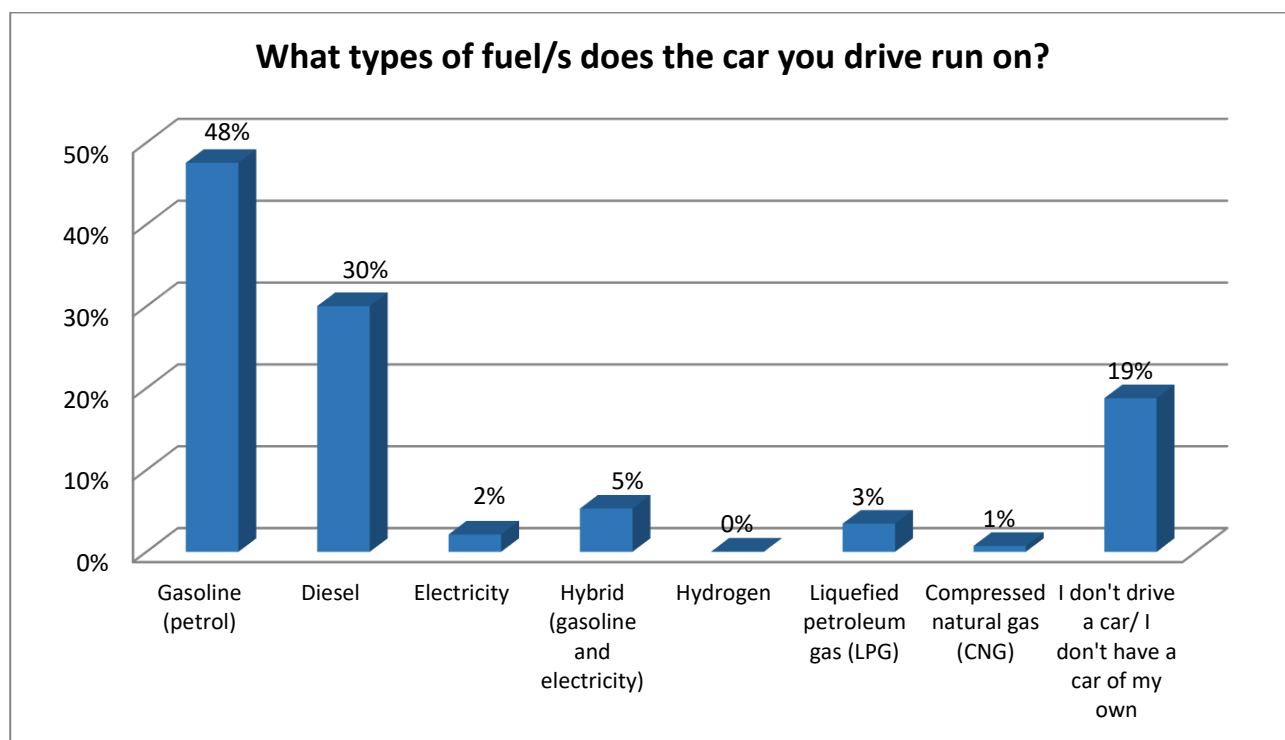


Figure 2-19: Types of fuel/s cars run on

Table 2-16: Types of fuel/s cars run on per country (%)

	What types of fuel/s does the car you drive run on?							
	Gasoline (petrol)	Diesel	Electricity	Hybrid (gasoline and electricity)	Hydrogen	Liquefied petroleum gas (LPG)	Compressed natural gas (CNG)	I don't drive a car/ I don't have a car of my own
CZ	57	24	3	2	0	1	0	20
EE	39	34	2	6	0	1	1	25
DE	53	27	8	5	0	3	1	15
GR	68	15	0	4	0	4	1	16
HU	54	21	1	3	0	1	0	27
IT	45	33	2	15	0	6	2	7
LV	31	45	1	2	0	2	2	24
PL	59	21	2	7	0	9	0	12
RO	36	38	2	4	1	5	1	21
RS	40	36	0	2	0	4	1	25
ES	42	39	1	8	0	2	0	15

2.2.3 Knowledge and awareness

In the overall sample, most respondents reported low levels of self-perceived knowledge of biofuels (Figure 2-20), biogas (Figure 2-21), and biomethane (Figure 2-22); the sums of the below-average responses (1 to 3, in the 7-point scale) were respectively 55%, 57% and 68%. This result indicated a similar level of knowledge of biofuels and biogas, and a rather lower level of biomethane. Regarding the national samples, Romania (40%), Estonia (35%), Spain (34%) and Italy (33%) show the highest self-perceived knowledge of biofuels, while Latvia (21%), Serbia (22%), Czechia (23%) and Germany (23%) the lowest [estimated as the sum of the above-average responses (5 to 7, in the 7-point scale)] (Table 2-17). Accordingly, Romania (39%), Poland (30%), Italy (29%) and Estonia (27%) show the highest self-perceived knowledge of biogas, while Serbia (16%), Hungary (19%), Czechia (20%) and Latvia (20%) the lowest (Table 2-18). Similarly, Italy (31%) and Romania (29%) are the countries with the countries with the highest level of self-perceived knowledge of biomethane, while Latvia (10%) and Serbia (11%) are those with the lowest (Table 2-19).

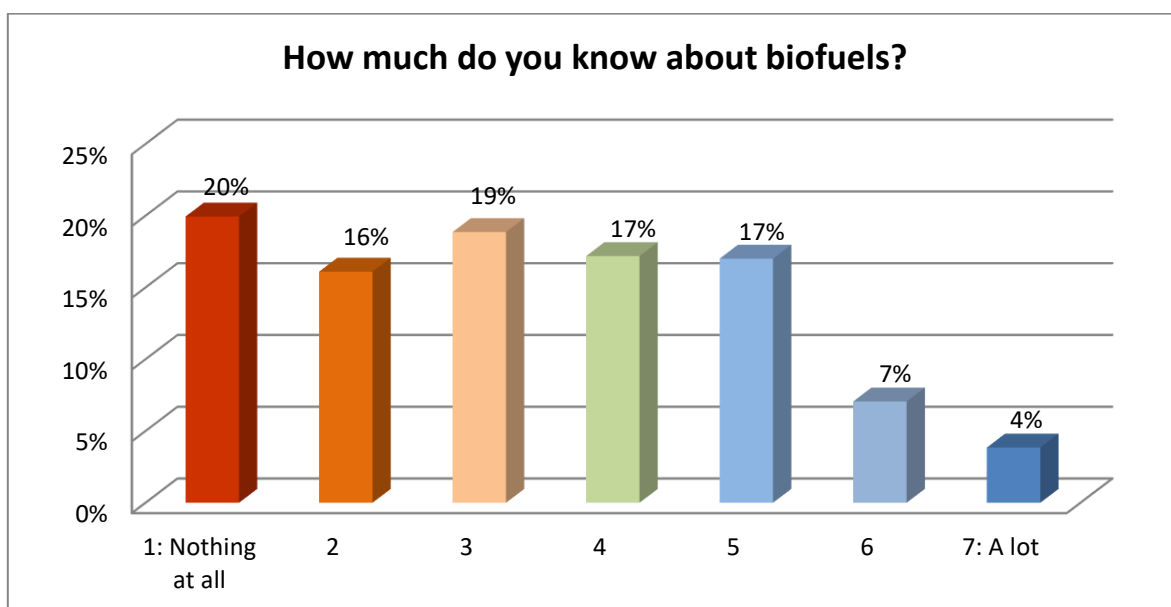


Figure 2-20: Self-perceived knowledge of biofuels

Table 2-17: Self-perceived knowledge of biofuels (%)

	How much do you know about biofuels?						
	1: Nothing at all	2	3	4	5	6	7: A lot
CZ	23	16	21	18	12	8	3
EE	18	15	15	19	23	7	5
DE	24	22	19	13	14	6	3
GR	21	14	21	21	14	8	3
HU	25	17	20	12	15	7	2
IT	19	17	15	17	20	9	4
LV	21	17	21	22	15	4	2
PL	13	16	18	22	19	5	6
RO	21	11	16	14	20	11	9
RS	17	18	26	16	16	3	3
ES	18	16	17	17	20	11	3

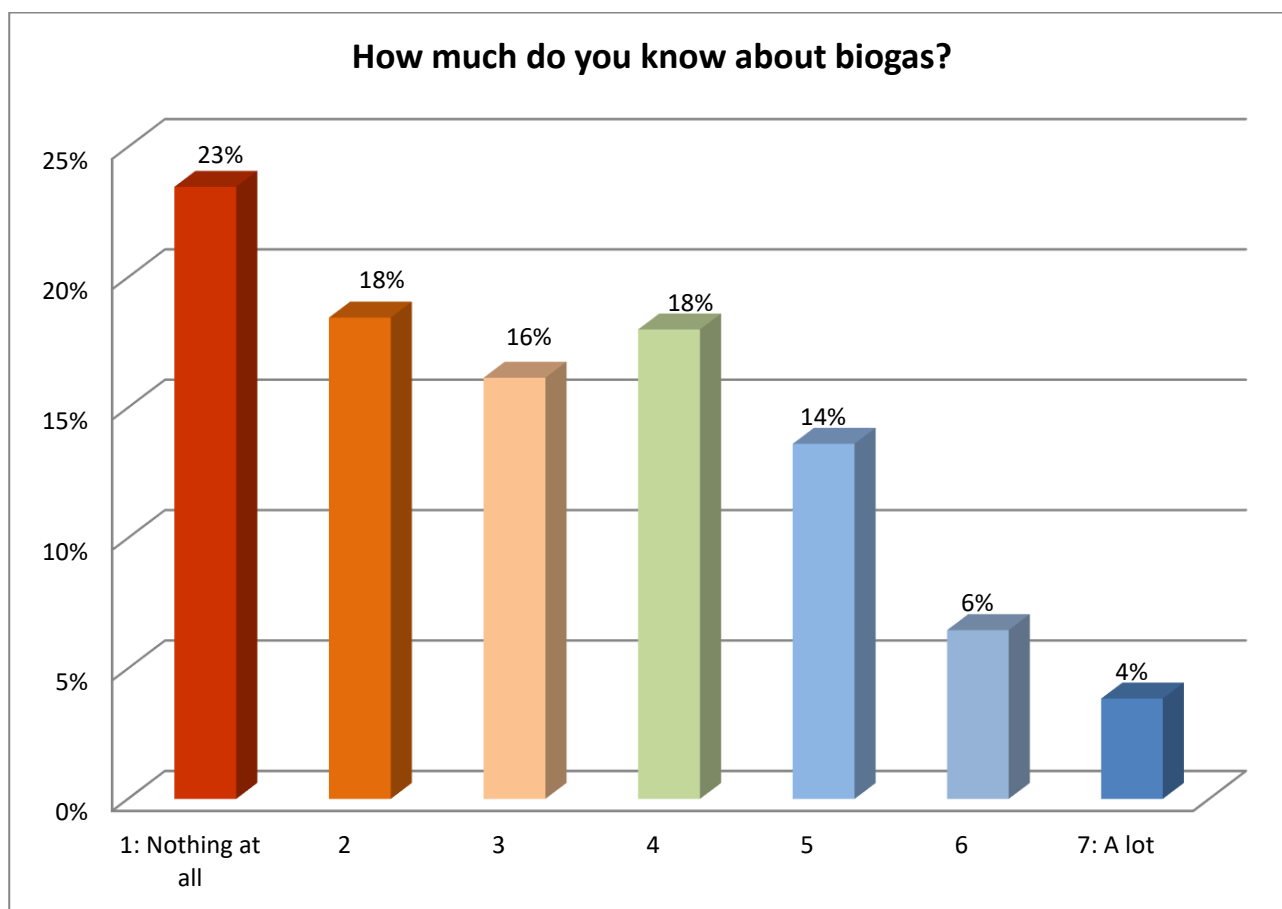


Figure 2-21: Self-perceived knowledge of biogas

Table 2-18: Self-perceived knowledge of biogas per country (%)

	How much do you know about biogas?						
	1: Nothing at all	2	3	4	5	6	7: A lot
CZ	23	22	14	21	12	5	3
EE	21	18	18	18	18	5	4
DE	27	23	16	15	10	6	5
GR	34	19	12	16	13	6	2
HU	29	17	18	16	11	5	3
IT	17	20	14	20	14	10	5
LV	24	19	20	20	13	4	3
PL	16	15	13	24	17	6	7
RO	22	14	12	16	19	13	7
RS	21	20	24	17	11	3	2
ES	26	17	18	16	13	8	3

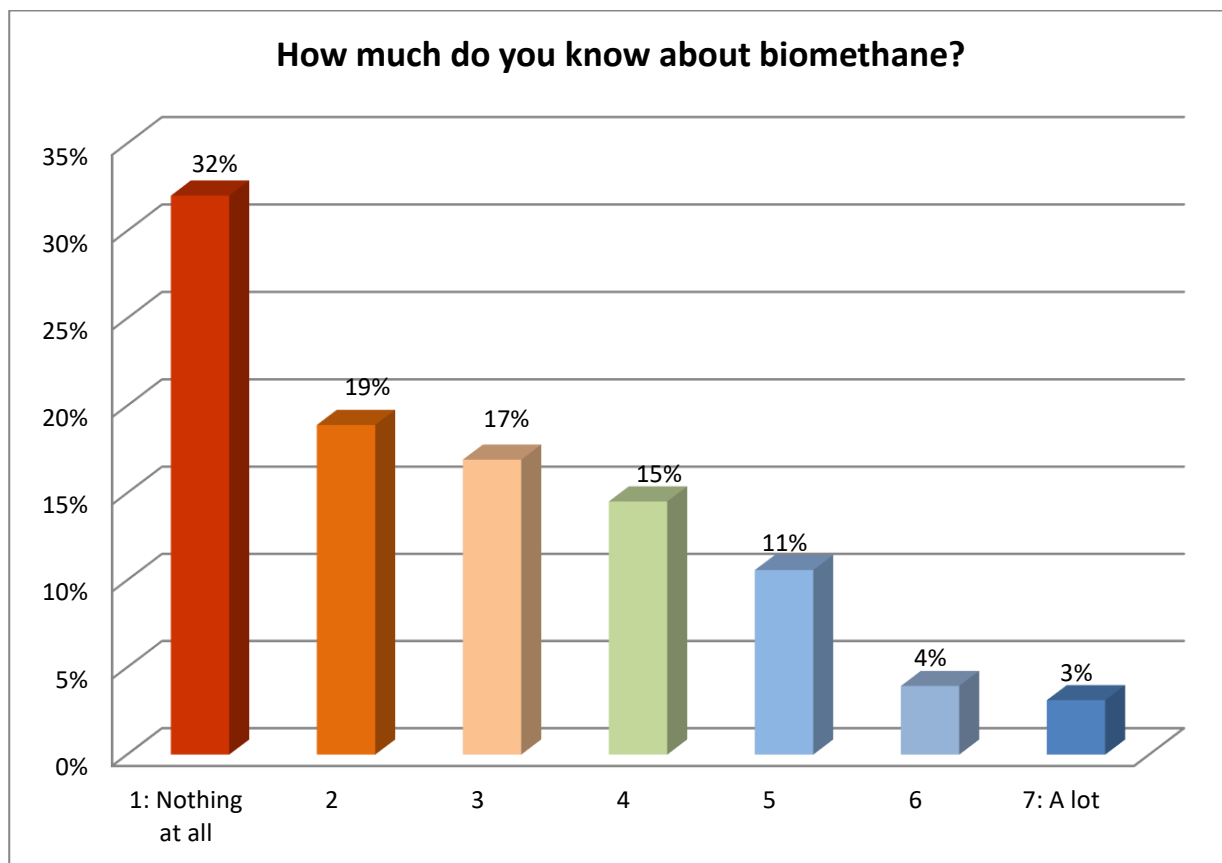


Figure 2-22: Self-perceived knowledge of biomethane

Table 2-19: Self-perceived knowledge of biomethane per country (%)

	How much do you know about biomethane?						
	1: Nothing at all	2	3	4	5	6	7: A lot
CZ	31	17	23	14	9	4	2
EE	31	18	19	15	14	4	2
DE	38	24	15	11	8	3	3
GR	39	18	18	13	8	4	1
HU	35	21	15	12	7	4	4
IT	18	17	16	19	17	9	5
LV	37	22	19	14	5	2	3
PL	29	21	12	14	14	3	5
RO	30	11	13	18	15	6	8
RS	33	21	21	12	10	0	1
ES	32	18	17	19	9	5	2

Following, in order to examine possible misconceptions concerning biogas and biomethane, six statements were provided to the respondents, who were prompted to select all options that apply. Two statements were accurate (“Biomethane is the purified version of biogas” and “Biomethane is produced from the breakdown of organic matter”), and four statements were inaccurate (“Biogas is the purified version of biomethane”, “Biomethane and biogas are the same”, “Biomethane is produced from the breakdown of inorganic matter” and “Biomethane is considered to be a fossil fuel”). In addition, the “None of the above” option was available,

in case the respondent evaluated that none of the six statements applied. It should be noted that the percentages per country sum up to over 100%, as multiple responses were allowed.

In the overall sample, the most common answers were the two correct ones: “Biomethane is produced from the breakdown of organic matter” (38%) and “Biomethane is the purified version of biogas” (23%), while the responses of the inaccurate statements ranged from 10% to 19% (Figure 2-23). On a country level, the accurate statement “Biomethane is produced from the breakdown of organic matter” was the statement most commonly selected in all countries, with the percentages ranging from 31% (Hungary) to 51% (Estonia). The accurate statement “Biomethane is the purified version of biogas” was the second most selected option in the majority of the countries (apart from Germany, Greece, Latvia, and Spain), with its responses ranging from 19% (Germany and Spain) to 29% (Serbia) (Table 2-20).

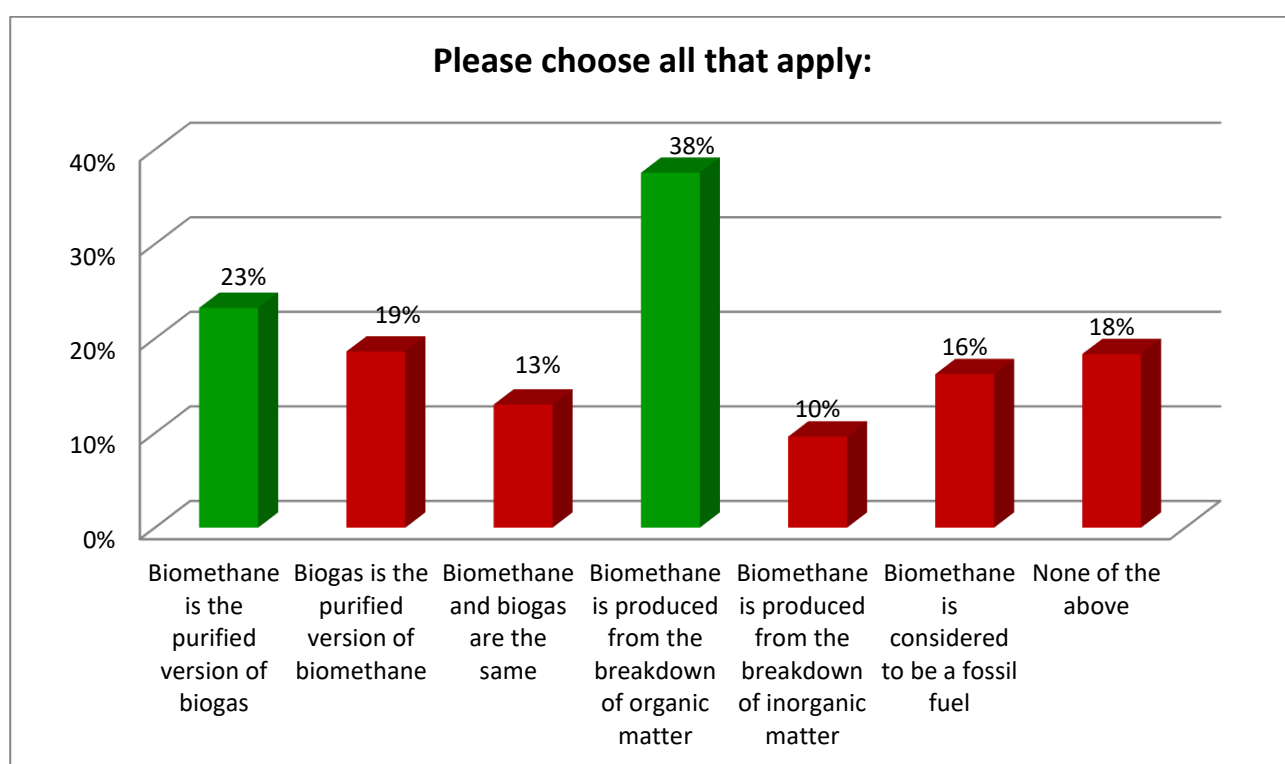


Figure 2-23: Misconceptions about biogas and biomethane (accurate statements marked with green color; inaccurate with red)

Table 2-20: Misconceptions about biogas and biomethane per country (%) (accurate statements marked with bold font)

	Please choose all that apply:						
	Biomethane is the purified version of biogas	Biogas is the purified version of biomethane	Biomethane and biogas are the same	Biomethane is produced from the breakdown of organic matter	Biomethane is produced from the breakdown of inorganic matter	Biomethane is considered to be a fossil fuel	None of the above
CZ	23%	18%	16%	37%	9%	15%	18%
EE	23%	20%	16%	51%	12%	15%	15%
DE	19%	21%	7%	34%	8%	20%	23%

GR	20%	19%	11%	38%	9%	12%	25%
HU	24%	23%	10%	31%	14%	24%	11%
IT	23%	17%	13%	40%	8%	8%	17%
LV	24%	14%	17%	31%	8%	12%	27%
PL	26%	17%	13%	34%	11%	14%	20%
RO	26%	21%	18%	33%	11%	20%	11%
RS	29%	17%	14%	40%	7%	17%	15%
ES	19%	19%	11%	45%	9%	22%	21%

2.2.4 Market acceptance of biomethane-based fuels: Benefit perceptions

The participants were questioned about their perceptions toward the economic, environmental and social benefits of biomethane-based fuels. In the overall sample, all benefits were rated positively, with environmental and social benefits reaching the highest positive (i.e., the sum of the “Slightly agree”, “Agree”, and “Strongly agree”) percentages. Referring to economic benefits, a set of four statements was given to the participants. The positive impact on the economy and the reduction of energy dependence were rated positive (positive responses sum up to 59% and 64%, respectively), while the responses concerning cost and energy efficiency compared to conventional fuels were more balanced between the negative, neutral and positive perceptions (positive responses sum up to 43% and 44%, respectively) (Figure 2-24). The majority of the countries rated the four statements positively; exceptions were Czechia perceiving the 1st statement negatively and the 2nd neutrally (followed by negative perceptions); Estonia rating the 1st and the 2nd statements negatively (with the latter being tied with positive responses); and Latvia perceiving all four statements neutrally (with the 1st and 3rd being followed by negative perceptions, and the 4th being tied with positive ones) (Table 2-21).

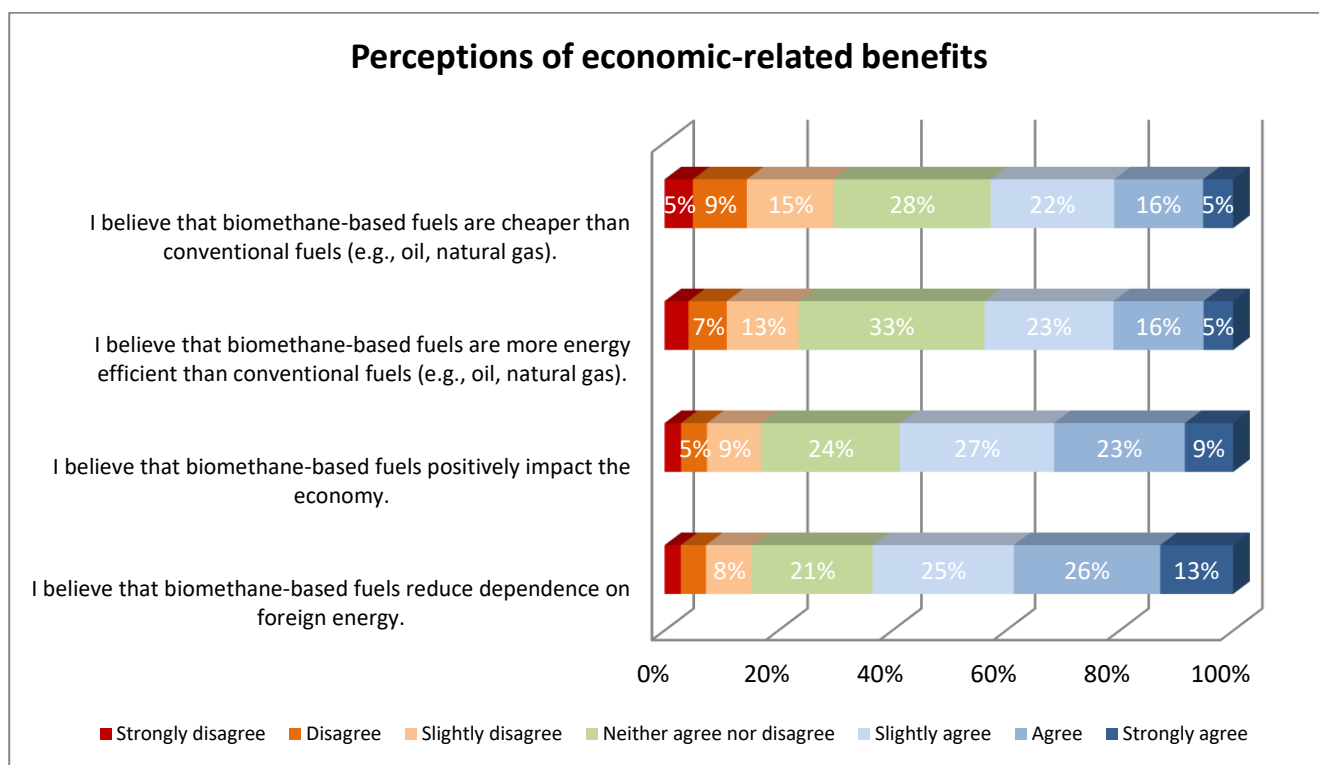


Figure 2-24: Perceptions of economic benefits

Table 2-21: Perceptions of economic benefits per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I believe that biomethane-based fuels are cheaper than conventional fuels (e.g., oil, natural gas)	CZ	6	12	20	33	16	11	2
	EE	6	15	20	24	25	9	2
	DE	7	14	14	27	24	11	6
	GR	2	3	12	29	35	17	3
	HU	9	11	14	17	28	12	7
	IT	4	10	17	25	16	26	2
	LV	6	18	15	41	9	10	2
	PL	5	3	13	34	27	10	7
	RO	4	7	12	23	14	29	12
	RS	1	6	19	24	21	22	6
	ES	5	7	12	29	25	15	8
I believe that biomethane-based fuels are more energy efficient than conventional fuels (e.g., oil, natural gas)	CZ	5	9	22	39	15	8	1
	EE	4	15	18	28	23	12	2
	DE	7	7	11	37	21	12	7
	GR	2	2	11	40	32	12	3
	HU	5	9	12	26	30	14	4
	IT	3	5	12	30	23	21	6
	LV	8	12	13	46	10	10	2
	PL	4	2	9	25	31	18	10
	RO	3	5	8	33	19	25	8
	RS	2	4	16	24	25	20	8
	ES	3	5	7	34	22	24	8
I believe that biomethane-based fuels positively impact the economy	CZ	3	8	12	30	30	11	5
	EE	3	7	11	22	32	24	3
	DE	6	5	9	27	31	17	8
	GR	1	2	6	29	39	18	7
	HU	4	6	12	19	32	16	10
	IT	2	2	8	18	22	38	9
	LV	7	10	15	40	14	13	2
	PL	3	2	8	23	33	19	12
	RO	3	2	8	18	17	41	13
	RS	1	2	9	20	25	30	11
	ES	0	5	7	25	24	26	15
I believe that biomethane-based fuels reduce dependence on foreign energy	CZ	6	6	11	25	25	19	8
	EE	3	6	10	16	26	34	8
	DE	6	5	5	21	32	20	14
	GR	1	1	6	23	35	25	10
	HU	4	4	8	20	29	18	15
	IT	1	2	8	20	16	36	16
	LV	4	9	10	40	13	21	5
	PL	2	5	5	20	31	20	15
	RO	3	2	7	20	17	34	19
	RS	0	2	9	15	27	29	16
	ES	1	7	9	16	23	29	16

Referring to environmental benefits, a set of four statements was given to the participants as well. All four statements were positively perceived, with positive responses (i.e., the sum of the “Slightly agree”, “Agree”, and “Strongly agree” percentages) ranging from 58 to 66% (Figure 2-25). Independently, in all countries, the majority of the respondents perceived positively the four statements, with positive responses ranging from

51 to 74%. The exception was Latvia, with positive responses being 40, 32, 45 and 42% respectively for the four statements; in any case, the positive perceptions were still the most common response in Latvia (although not being the majority), except for the 2nd statement, with the neutral perception being the most common one (41%) (Table 2-22).

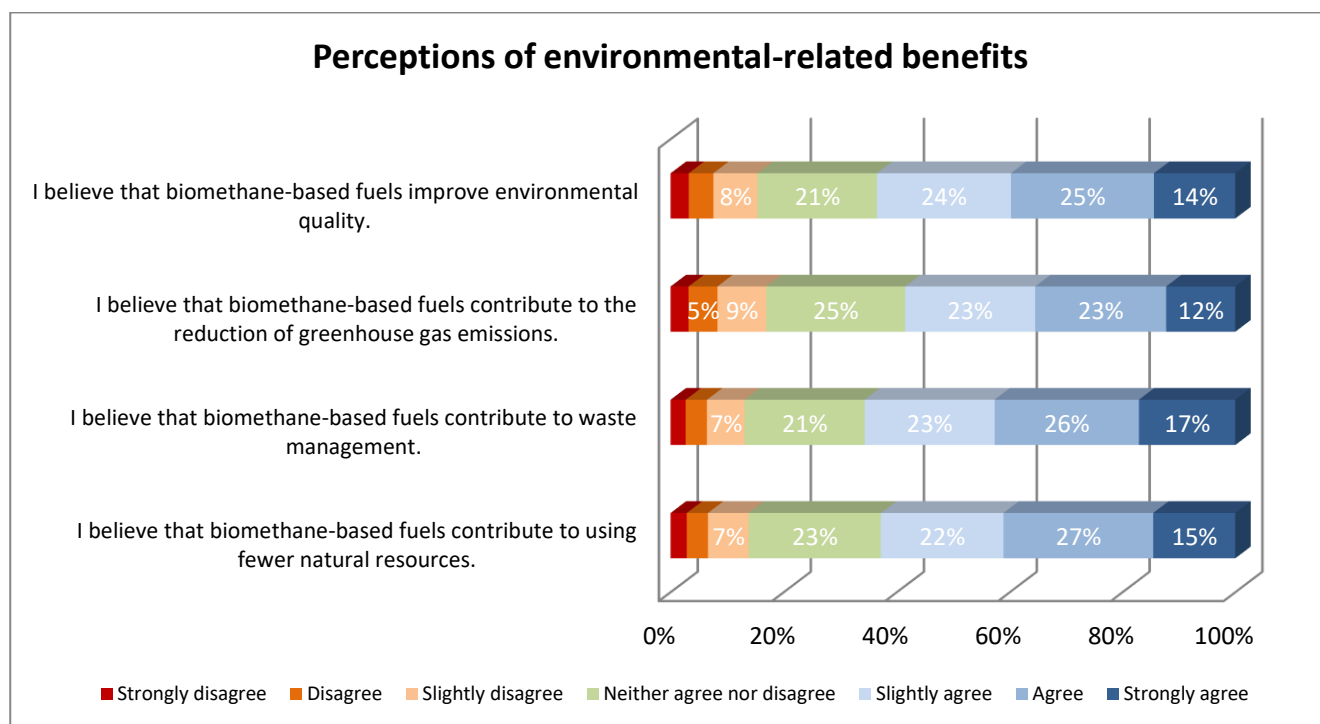


Figure 2-25: Perceptions of environmental benefits

Table 2-22: Perceptions of environmental benefits per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I believe that biomethane-based fuels improve environmental quality	CZ	4	9	8	23	23	21	11
	EE	3	6	8	16	31	29	8
	DE	6	4	9	27	23	20	13
	GR	1	2	6	20	33	24	16
	HU	4	4	11	17	31	18	13
	IT	2	3	7	15	18	36	20
	LV	6	7	10	38	18	16	6
	PL	2	3	6	19	30	21	16
	RO	3	4	7	18	16	35	19
	RS	2	1	10	17	20	32	17
	ES	2	5	6	23	18	27	21
I believe that biomethane-based fuels contribute to the reduction of greenhouse gas emissions	CZ	4	7	10	28	19	21	11
	EE	3	8	10	21	29	23	7
	DE	5	7	9	27	28	16	10
	GR	1	1	8	28	30	22	11

	HU	4	4	10	19	30	20	11
	IT	1	4	7	19	17	35	18
	LV	6	13	10	41	11	18	3
	PL	4	2	6	25	32	14	14
	RO	3	3	8	19	16	36	18
	RS	2	1	10	20	20	30	15
	ES	1	6	7	25	23	22	18
	CZ	4	8	6	23	25	19	14
I believe that biomethane-based fuels contribute to waste management	EE	4	4	7	17	25	34	11
	DE	5	3	7	22	34	17	14
	GR	1	2	7	22	26	27	17
	HU	4	4	5	16	32	20	18
	IT	1	2	5	18	21	35	19
	LV	4	7	10	35	12	24	9
	PL	2	4	4	24	28	16	20
	RO	3	2	6	18	13	31	28
	RS	2	1	8	17	21	28	21
	ES	1	4	7	22	17	33	18
I believe that biomethane-based fuels contribute to using fewer natural resources	CZ	2	8	9	29	22	21	9
	EE	3	5	7	23	19	36	9
	DE	6	3	5	28	27	20	12
	GR	1	1	6	25	29	27	14
	HU	3	3	8	17	31	22	15
	IT	3	1	5	20	14	38	18
	LV	5	10	10	35	13	20	9
	PL	4	2	8	19	28	18	19
	RO	3	2	6	18	14	35	22
	RS	1	1	9	21	24	26	16
	ES	1	5	7	23	19	29	18

Moreover, participants were questioned about their perceptions of the social benefits of biomethane-based fuels, based on one statement. The overall sample perceived social benefits positively (64%) (Figure 2-26).

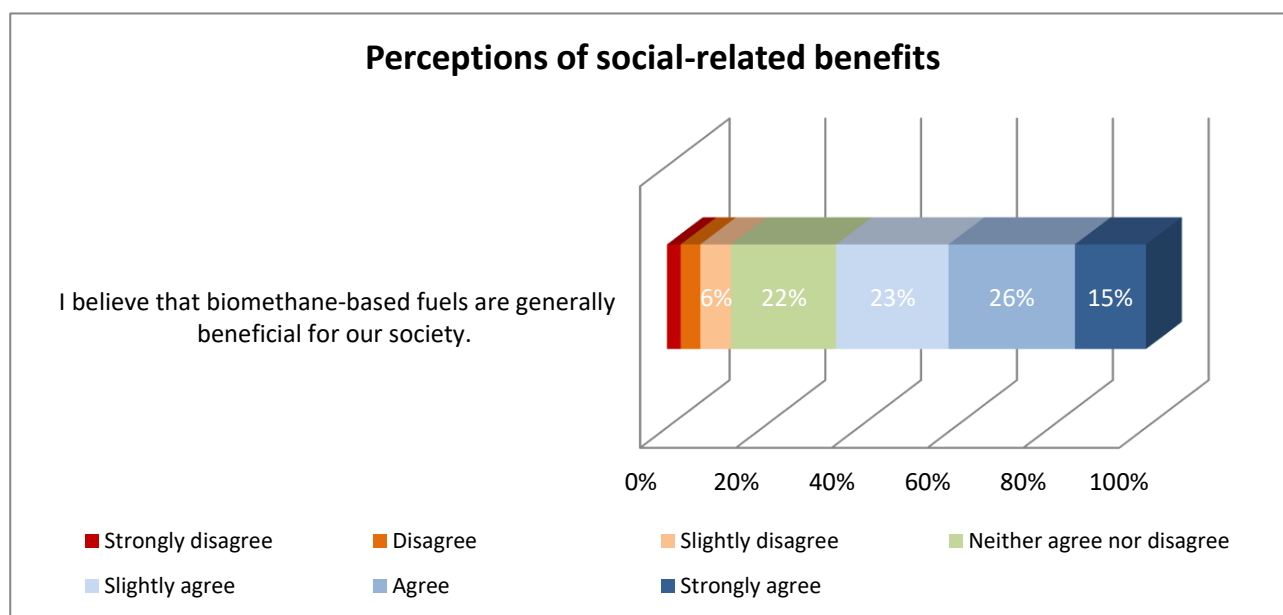


Figure 2-26: Perceptions of social benefits

On a national level, the social benefits were perceived more positively in Italy (73%), Greece (72%), Serbia (72%), Estonia (71%) and Romania (71%), and less positively in Latvia (positive responses: 36%; neutral responses: 40%) (Table 2-23).

Table 2-23: Perceptions of social benefits per country (%)

		Please indicate the extent to which you agree or disagree with the following statement						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I believe that biomethane-based fuels are generally beneficial for our society	CZ	4	7	6	29	23	21	10
	EE	4	5	7	15	25	37	9
	DE	7	3	7	23	30	24	8
	GR	1	1	6	22	34	23	15
	HU	3	6	6	17	37	14	15
	IT	1	1	5	20	18	35	20
	LV	5	12	8	40	10	21	5
	PL	1	3	6	22	27	21	18
	RO	3	3	8	16	12	34	25
	RS	2	1	7	17	23	31	18
	ES	1	5	6	22	20	29	20

2.2.5 Market acceptance of biomethane-based fuels: Risk perceptions

Participants were questioned about their perceptions of the risks of biomethane-based fuels, based on six statements concerning energy efficiency, reliability, safety, technological maturity, and environmental and economic benefits. In the overall sample, all six risks were perceived as not so important, as the percentages of respondents doubting particular aspects and benefits of biomethane-based fuels ranged from 18% (energy efficiency) to 25% (technological maturity) (Figure 2-27). Referring to the national samples, the perceived risk of technological maturity is rated as the most significant in all countries apart from Czechia, Germany, and Italy; the lack of economic benefits is evaluated as the most significant risk in Hungary, Italy and Poland; the lack of energy efficiency is perceived as the most significant risk in Hungary, the lack of reliability in Czechia and the lack of environmental benefits in Germany (Table 2-24).

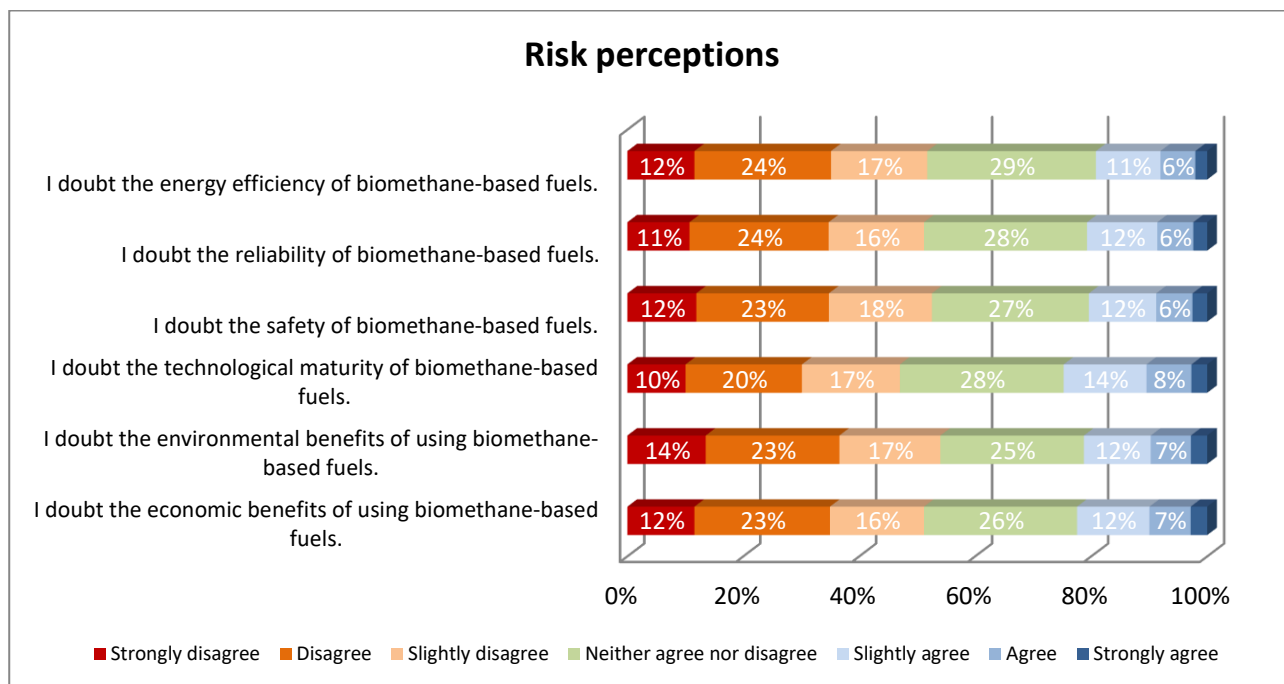


Figure 2-27: Risk perceptions

Table 2-24: Risk perceptions per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I doubt the energy efficiency of biomethane-based fuels	CZ	11	25	20	30	9	4	1
	EE	5	22	16	30	18	8	3
	DE	10	19	22	27	14	6	4
	GR	5	21	24	36	13	2	0
	HU	17	19	17	22	14	9	1
	IT	19	33	10	25	4	8	1
	LV	4	14	16	41	12	10	5
	PL	14	26	18	27	10	2	2
	RO	19	24	14	24	7	11	2
	RS	12	31	13	28	10	4	1
	ES	12	27	13	31	13	4	2
I doubt the reliability of biomethane-based fuels	CZ	9	25	18	26	15	5	3
	EE	8	22	17	29	15	9	3
	DE	8	21	17	29	16	6	4
	GR	3	24	21	37	12	4	0
	HU	14	20	18	23	12	8	3
	IT	15	35	12	21	10	6	0
	LV	4	17	13	43	12	8	6
	PL	12	24	20	26	11	4	1
	RO	20	27	13	21	10	9	3
	RS	15	26	17	24	9	5	2
	ES	11	25	16	31	13	5	1
I doubt the safety of biomethane-based fuels	CZ	11	21	20	30	12	3	3
	EE	9	25	13	29	14	6	6
	DE	11	21	19	24	14	8	5
	GR	3	20	29	32	12	5	0
	HU	14	24	19	22	11	7	2

	IT	19	29	17	20	8	6	1
	LV	6	13	13	42	15	8	5
	PL	15	22	17	26	10	5	2
	RO	22	24	10	21	13	9	3
	RS	9	31	20	26	7	5	1
	ES	11	23	20	27	13	7	1
I doubt the technological maturity of biomethane-based fuels	CZ	10	22	19	31	12	4	2
	EE	4	19	18	25	20	12	3
	DE	7	16	21	28	15	10	4
	GR	3	20	18	36	19	5	0
	HU	15	23	14	23	14	7	3
	IT	20	24	15	20	10	9	1
	LV	4	10	13	44	14	10	7
	PL	12	20	20	28	13	5	1
	RO	18	24	11	23	12	10	4
	RS	9	27	18	24	13	7	1
	ES	9	17	20	30	16	7	3
I doubt the environmental benefits of using biomethane-based fuels	CZ	10	21	20	29	10	7	2
	EE	8	27	18	23	16	7	4
	DE	9	17	20	26	17	8	5
	GR	9	21	32	25	9	5	1
	HU	14	22	21	19	15	7	1
	IT	23	29	12	18	8	8	1
	LV	5	16	12	43	12	6	7
	PL	16	25	19	22	10	5	2
	RO	26	24	8	20	9	12	3
	RS	17	28	15	25	8	4	2
	ES	13	24	18	23	13	8	3
I doubt the economic benefits of using biomethane-based fuels	CZ	10	20	18	30	10	8	4
	EE	7	23	18	24	18	10	3
	DE	9	18	16	31	16	6	6
	GR	8	23	27	28	14	2	1
	HU	15	22	16	23	15	8	1
	IT	17	31	9	20	13	8	2
	LV	3	16	13	41	13	8	8
	PL	12	24	20	25	11	6	2
	RO	23	28	8	18	11	11	3
	RS	14	31	18	23	6	5	1
	ES	12	23	17	28	12	8	1

2.2.6 Market acceptance of biomethane-based fuels: Market strategy perceptions

Participants were asked about the market strategies that could affect them regarding the use of biomethane-based fuels. When referring to the overall sample, all six factors are perceived as important [estimated as the sum of the above-average responses (5 to 7, in the 7-point scale)], with “Financial incentives” perceived as the most important (63%), and “Supplier type” as the least (47%) (Figure 2-28). Regarding the national samples, “Financial incentives” was perceived as the most important factor, with above-average responses ranging from 47% (Latvia) to 78% (Greece). Additionally, a result that stands out for Latvia is the low positive perceptions for all factors, with above-average responses ranging from 29% (Supplier type) to 47% (Financial incentives); a similar case is indicated for Czechia and Estonia, with five and four (respectively) out of the six factors scoring positive responses lower than 50% (Table 2-25).

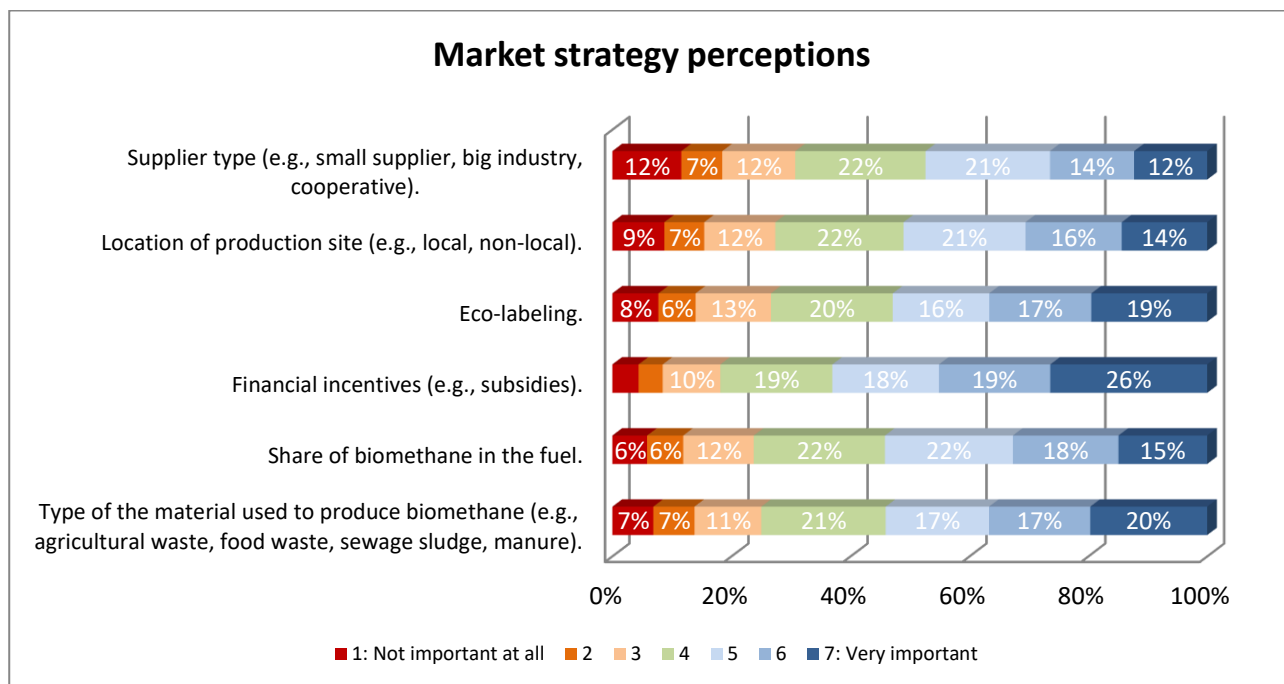


Figure 2-28: Market strategies influencing the use of biomethane-based fuels

Table 2-25: Market strategies influencing the use of biomethane-based fuels per country (%)

		How important would the following factors be for you in order to select CE construction products?						
		1: Not important at all	2	3	4	5	6	7: Very important
Supplier type (e.g., small supplier, big industry, cooperative)	CZ	17	9	12	25	18	10	9
	EE	26	7	15	19	18	9	8
	DE	12	7	10	23	21	16	13
	GR	6	3	11	24	25	16	17
	HU	10	8	13	21	21	15	11
	IT	3	3	12	22	27	22	10
	LV	22	8	14	28	14	8	7
	PL	10	7	12	21	24	9	15
	RO	9	9	12	14	19	18	20
	RS	7	9	14	23	17	13	16
	ES	7	6	11	22	27	19	10
Location of production site (e.g., local, non-local)	CZ	10	9	15	24	20	11	11
	EE	16	7	12	17	22	14	13
	DE	9	9	11	21	19	18	14
	GR	4	6	13	22	25	18	14
	HU	7	8	9	22	25	13	16
	IT	3	2	11	24	24	21	14
	LV	22	8	15	19	14	11	13
	PL	6	4	15	19	21	18	15
	RO	10	8	8	21	18	14	23
	RS	4	9	11	23	14	23	15
	ES	7	4	13	26	23	18	11
Eco-labelling	CZ	9	6	13	25	16	17	14
	EE	18	8	15	23	16	10	11

	DE	12	10	13	21	15	16	15
	GR	3	2	11	16	16	27	28
	HU	5	7	16	22	16	15	17
	IT	0	1	11	24	17	23	23
	LV	21	12	15	21	13	10	10
	PL	6	6	9	22	19	20	17
	RO	4	7	12	14	13	19	33
	RS	2	6	12	16	19	17	26
	ES	6	4	12	22	20	17	21
Financial incentives (e.g., subsidies)	CZ	6	5	12	24	19	14	19
	EE	7	9	12	18	17	13	26
	DE	7	7	13	16	16	25	19
	GR	2	1	7	13	15	26	37
	HU	3	4	11	20	19	16	26
	IT	0	1	9	22	17	25	25
	LV	13	3	14	26	17	11	19
	PL	2	3	5	15	19	22	33
	RO	5	6	7	14	18	20	32
	RS	2	4	6	18	19	16	34
Share of biomethane in the fuel	ES	3	2	11	21	22	20	22
	CZ	9	8	13	21	19	20	9
	EE	10	9	15	28	17	15	8
	DE	8	8	10	23	24	18	11
	GR	2	6	9	23	29	21	12
	HU	4	5	14	20	19	15	22
	IT	0	2	13	21	23	24	16
	LV	16	5	15	28	18	8	12
	PL	2	6	8	26	20	17	20
	RO	5	8	10	15	21	19	24
	RS	4	7	11	17	20	22	18
	ES	3	5	14	22	26	18	14
Type of the material used to produce biomethane (e.g., agricultural waste, food waste, sewage sludge, manure)	CZ	8	9	12	24	14	20	13
	EE	12	6	14	19	21	16	15
	DE	9	6	13	19	17	18	19
	GR	4	7	10	25	23	17	16
	HU	5	7	9	20	19	16	23
	IT	2	1	13	20	20	21	24
	LV	20	10	11	27	15	7	12
	PL	2	9	14	21	16	18	19
	RO	8	7	9	14	15	19	30
	RS	3	7	10	20	12	17	29
	ES	4	8	10	22	21	20	17

2.2.7 Market acceptance of biomethane-based fuels: Subjective norm perceptions

The survey participants were asked about subjective norms influencing the use of biomethane-based fuels. In the overall sample, “Experts’ opinions” were perceived as the most important regarding their effect on respondents’ choices and decisions, with positive responses summing up to 60%. Additionally, when referring to the first two statements, the positive responses were the most common responses (49 and 43%, respectively), without, however, achieving a majority (Figure 2-29). Experts’ opinion is perceived as the most important on the national level, with all countries rating it as the most important (percentages ranging from 34% (Latvia) to 74% (Italy). The low level of agreement of Latvia for all three statements (ranging from 27 to 34%) and Czechia (29 and 37%) and Estonia (33 and 35%) for the first two statements also stands out (Table 2-26).

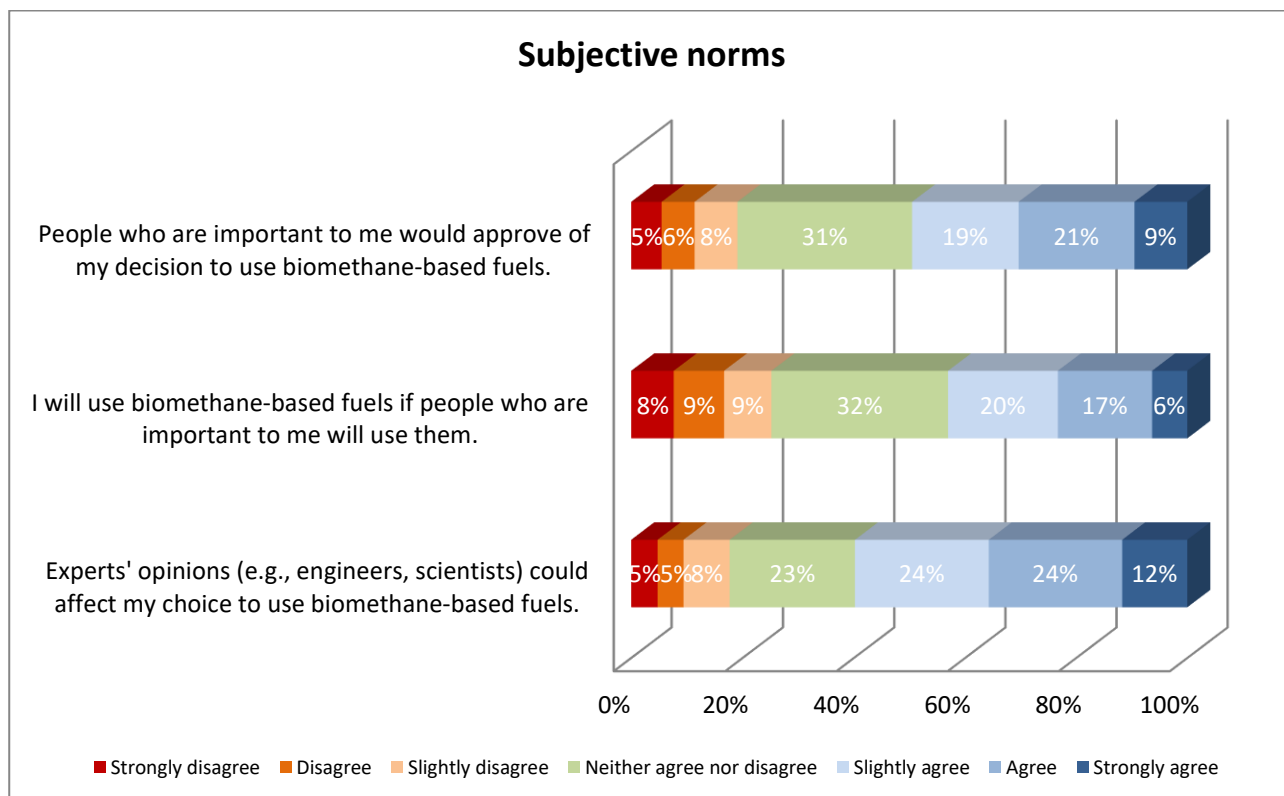


Figure 2-29: Subjective norms influencing the use of biomethane-based fuels

Table 2-26: Subjective norms influencing the use of biomethane-based fuels per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
People who are important to me would approve of my decision to use biomethane-based fuels	CZ	7	8	12	36	20	14	3
	EE	12	12	9	36	16	13	4
	DE	7	5	11	36	17	17	8
	GR	2	3	4	37	30	19	7
	HU	6	9	5	30	24	15	10
	IT	1	3	6	20	16	39	16
	LV	10	9	7	45	12	15	4
	PL	6	3	8	32	26	16	8
	RO	4	4	7	23	14	32	18
	RS	2	4	9	23	23	27	12
	ES	3	5	8	31	15	24	16
I will use biomethane-based fuels if people who are important to me will use them	CZ	8	10	13	40	16	10	3
	EE	17	12	7	32	23	11	1
	DE	10	6	10	35	24	10	7
	GR	3	9	7	30	27	20	6
	HU	7	10	9	30	20	15	7
	IT	5	11	7	28	20	23	6
	LV	14	14	9	38	10	11	6
	PL	5	5	9	31	23	18	8
	RO	5	7	6	25	20	26	14

Experts' opinions (e.g., engineers, scientists) could affect my choice to use biomethane-based fuels	RS	5	9	8	31	19	20	6
	ES	4	8	10	31	17	25	7
	CZ	6	5	12	26	26	18	6
	EE	8	5	10	24	29	19	7
	DE	8	4	9	25	27	17	12
	GR	2	1	6	22	26	32	13
	HU	4	7	8	21	24	23	13
	IT	1	2	8	15	23	33	18
	LV	9	13	8	37	12	17	5
	PL	3	0	7	19	32	25	13
	RO	6	4	5	20	21	31	14
	RS	3	3	7	20	25	24	17
	ES	2	6	12	22	22	27	11

2.2.8 Market acceptance of biomethane-based fuels: Attitude

Participants' attitudes influencing the use of biomethane-based fuels were examined through two statements. In the overall sample, both were rated positively (52% and 61% of agreement, respectively) (Figure 2-30). At the national level, the respondents from all countries expressed a higher level of acceptance with the second statement, i.e., "Using biomethane-based fuels would make me feel like an environmentally responsible consumer", compared to the first statement, with the respective percentages ranging from 37% (Latvia) to 76% (Italy). Latvia stands out due to the low levels of perceived agreement with the two statements, with the percentages of the two statements being 29% and 37% respectively (

Table 2-27).

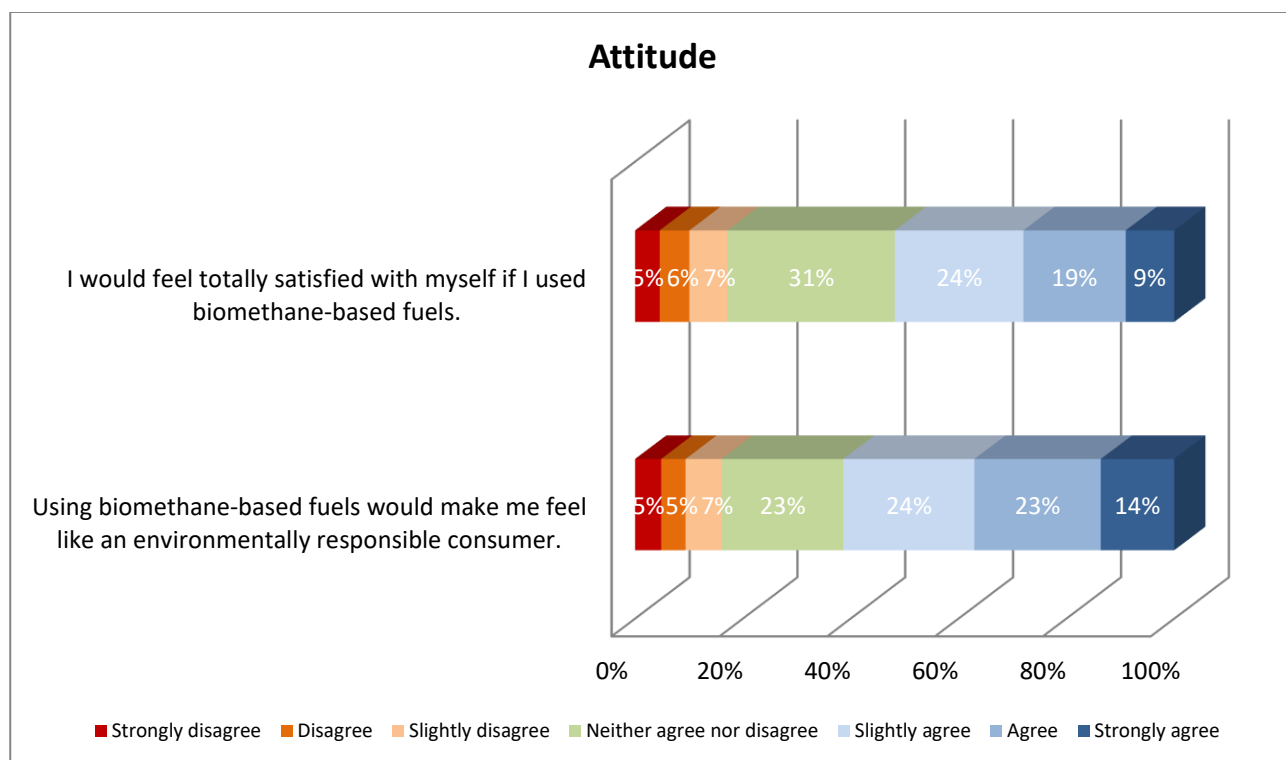


Figure 2-30: Attitudes influencing the use of biomethane-based fuels

Table 2-27: Attitudes influencing the use of biomethane-based fuels per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I would feel totally satisfied with myself if I used biomethane-based fuels	CZ	6	4	11	34	25	15	4
	EE	8	8	7	36	23	14	6
	DE	5	7	5	27	32	16	8
	GR	2	1	5	35	38	14	7
	HU	6	4	4	30	23	19	12
	IT	0	2	6	21	24	30	15
	LV	12	15	5	41	15	10	4
	PL	4	4	10	28	28	16	9
	RO	2	6	7	23	12	35	17
	RS	3	4	9	38	21	16	8
	ES	2	6	9	29	22	24	9
Using biomethane-based fuels would make me feel like an environmentally responsible consumer	CZ	6	3	10	26	26	22	7
	EE	8	6	10	25	28	19	6
	DE	7	7	7	25	26	19	11
	GR	2	3	6	23	32	23	13
	HU	6	1	7	21	30	16	17
	IT	0	3	6	15	20	36	20
	LV	13	8	7	37	15	16	6
	PL	3	5	5	24	26	20	16
	RO	3	3	5	17	14	36	24
	RS	1	6	6	15	31	22	18
	ES	3	6	6	21	22	30	13

2.2.9 Market acceptance of biomethane-based fuels: Perceived behavioral control

Participants were asked about their perception of their control over the use of biomethane-based fuels, meaning how capable they feel of buying and using them. In the overall sample, it is indicated that there is an agreement with two out of the four statements, with the statement “Whether or not using biomethane-based fuels is entirely up to me” scoring 52%, and the statement “I have sufficient time to make the proper decisions concerning the use of biomethane-based fuels” scoring 49% positive responses. On the contrary, the most common responses for the statement “I have the knowledge and information to make the proper decisions concerning the use of biomethane-based fuels” were the responses stating some level of disagreement (39%), while the responses related to the statement “I have the money necessary to buy biomethane-based fuels” were somewhat split between positive (37%), neutral (31%) and negative (32%) ones (Figure 2-31). On a country level, the first statement (“Whether or not using biomethane-based fuels is entirely up to me”) had the highest level of agreement for the majority of the countries [with percentages ranging from 39% (Latvia) to 68% (Romania)], except for Poland (58%), Italy (52%) and Germany (49%) reporting their highest level of agreement with the fourth statement (“I have sufficient time to make the proper decisions concerning the use of biomethane-based fuels”). On the contrary, the third statement (“I have the knowledge and information to make the proper decisions concerning the use of biomethane-based fuels”) was the one with the highest level of disagreement for all countries [ranging from 25% (Romania) to

50% (Estonia)], apart from Italy were the first statement (“Whether or not using biomethane-based fuels is entirely up to me”) was appointed with the highest level of disagreement (36%) (

Table 2-28).

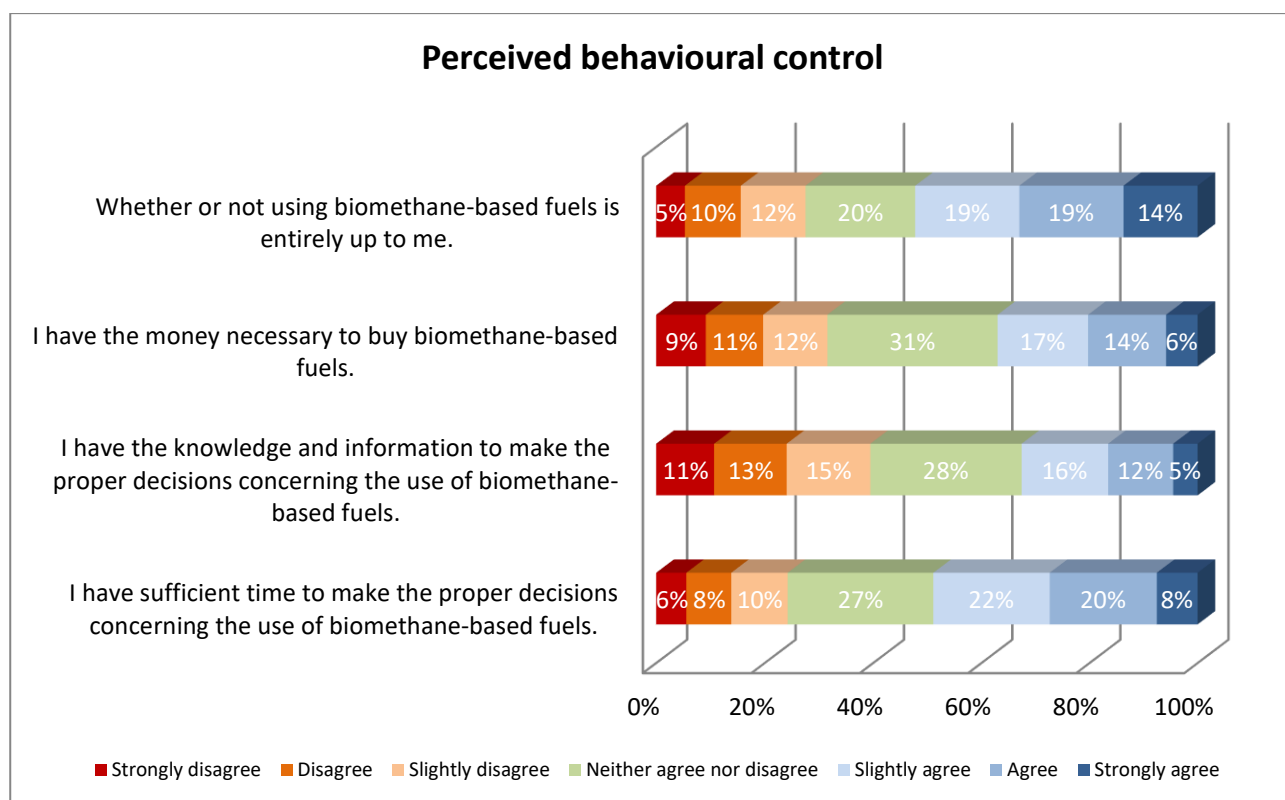


Figure 2-31: Perceived behavioral control influencing the use of biomethane-based fuels

Table 2-28: Perceived behavioral control influencing the use of biomethane-based fuels per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
Whether or not using biomethane-based fuels is entirely up to me	CZ	5	10	13	24	18	17	12
	EE	5	6	15	17	18	25	15
	DE	12	14	13	18	19	10	16
	GR	1	9	11	21	28	18	13
	HU	7	11	11	15	21	18	16
	IT	6	19	11	15	22	20	7
	LV	8	11	10	32	11	17	11
	PL	3	8	10	25	21	20	12
	RO	1	6	9	17	16	33	19
	RS	4	10	13	17	15	19	20
	ES	7	9	15	22	22	16	10
	CZ	9	14	14	33	17	10	3

I have the money necessary to buy biomethane-based fuels	EE	11	13	15	31	13	15	3
	DE	16	5	15	31	18	11	5
	GR	4	9	15	43	17	11	3
	HU	12	13	15	25	14	14	6
	IT	5	11	7	32	17	20	8
	LV	16	14	12	35	10	9	6
	PL	6	7	11	32	18	16	8
	RO	7	8	6	29	18	25	9
	RS	12	12	8	28	22	12	5
	ES	3	11	14	29	21	16	8
I have the knowledge and information to make the proper decisions concerning the use of biomethane-based fuels	CZ	8	15	18	33	12	10	3
	EE	11	16	23	27	12	10	2
	DE	15	16	14	27	17	9	3
	GR	9	16	17	34	13	11	2
	HU	14	12	19	21	15	13	6
	IT	9	11	14	21	22	16	7
	LV	17	14	12	39	11	7	3
	PL	8	10	12	31	17	13	8
	RO	6	10	10	28	20	22	5
	RS	11	15	14	25	18	10	6
I have sufficient time to make the proper decisions concerning the use of biomethane-based fuels	ES	11	12	19	22	19	13	5
	CZ	5	12	11	35	20	12	5
	EE	8	12	16	26	18	19	2
	DE	10	7	9	25	28	14	7
	GR	2	8	10	26	32	19	5
	HU	6	7	10	23	25	18	10
	IT	4	10	8	25	19	26	7
	LV	9	10	12	39	13	12	7
	PL	4	6	7	24	27	20	11
	RO	3	5	9	20	18	34	12
	RS	5	6	11	24	20	22	10
	ES	5	9	12	29	17	22	8

2.2.10 Market acceptance of biomethane-based fuels: Environmental concerns

The environmental concerns of the participants influencing the use of biomethane-based fuels were also examined. In the overall sample, the majority of the participants responded positively to both statements regarding environmental concerns – “I believe that humanity is severely mistreating the environment” (77%) and “I believe that human beings must live in harmony with nature in order to survive” (79%) (Figure 2-32). The same result occurs when examining the national samples, with positive results ranging from 59% (Czechia) to 86% (Greece) for the first statement, and from 66% (Czechia) to 88% (Greece) for the second one (Table 2-29).

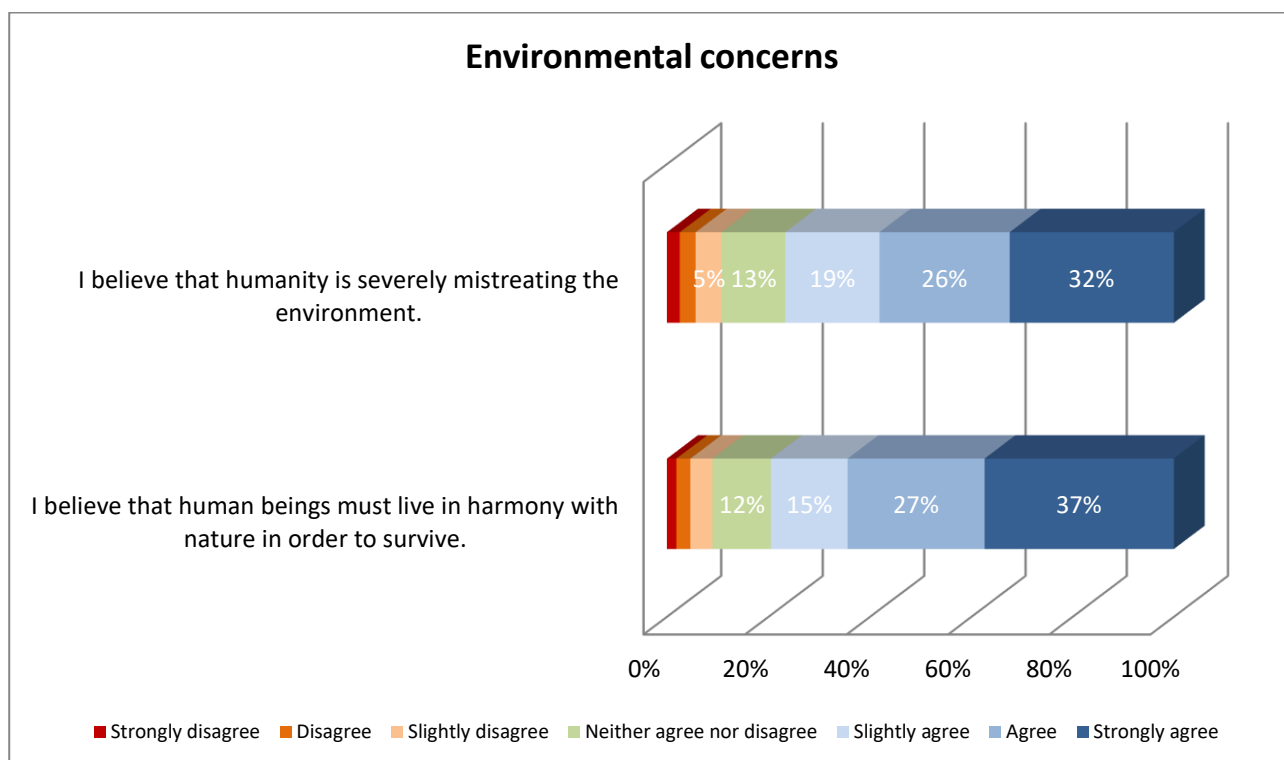


Figure 2-32: Environmental concerns influencing the use of biomethane-based fuels

Table 2-29: Environmental concerns influencing the use of biomethane-based fuels per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I believe that humanity is severely mistreating the environment	CZ	5	6	7	23	18	19	22
	EE	4	5	8	12	27	25	20
	DE	5	3	6	13	23	21	31
	GR	1	1	3	11	16	28	42
	HU	2	2	1	9	23	22	40
	IT	0	2	2	9	11	30	44
	LV	3	4	8	22	18	29	17
	PL	2	3	6	12	23	25	28
	RO	2	3	5	12	15	34	30
	RS	2	2	6	4	17	26	42
	ES	2	3	4	12	14	24	42
I believe that human beings must live in harmony with nature in order to survive	CZ	2	5	8	19	19	22	25
	EE	2	4	7	10	21	31	27
	DE	3	3	6	13	25	21	30
	GR	1	1	2	10	14	26	48
	HU	2	2	2	10	17	24	42
	IT	1	1	2	8	12	27	48
	LV	3	4	8	18	13	34	22
	PL	2	2	2	14	16	31	31
	RO	1	4	4	10	11	29	43
	RS	1	2	4	6	9	24	53
	ES	2	2	4	10	10	30	43

2.2.11 Market acceptance of biomethane-based fuels: Intention to use

Two statements were given to the participants to assess their level of agreement/disagreement regarding their intention to use biomethane-based fuels. In the overall sample, participants responded positively to both statements (55% and 56%, respectively) (Figure 2-33). The same result was obtained at the national level for the majority of the countries, with positive responses being the most common ones, ranging from 38% (Czechia) to 72% (Italy) for the first statement and from 44% (Estonia) to 70% (Italy) for the second one. Latvia was the exception; the most common answer for both statements was “Neither agree nor disagree” (43% and 38% respectively) (Table 2-30).

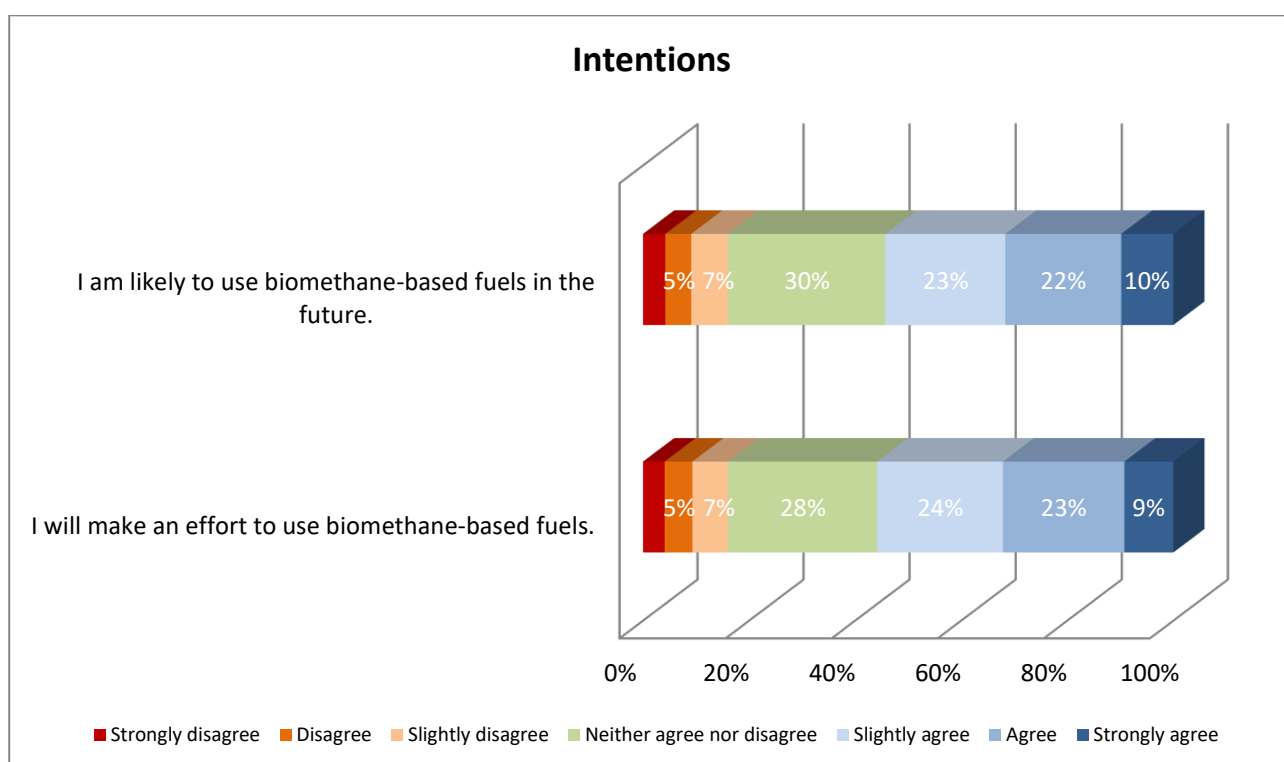


Figure 2-33: Intention to use biomethane-based fuels

Table 2-30: Intention to use biomethane-based fuels per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I am likely to use biomethane-based fuels in the future	CZ	7	10	12	33	21	11	6
	EE	8	4	8	34	24	19	5
	DE	12	8	10	33	28	6	6
	GR	1	3	3	26	35	23	11
	HU	3	5	8	32	21	19	9
	IT	0	1	4	21	20	36	16

	LV	7	9	8	43	13	16	5
	PL	3	3	3	32	26	21	10
	RO	2	2	7	23	12	40	17
	RS	2	3	8	26	27	22	10
	ES	1	6	6	24	22	28	15
I will make an effort to use biomethane-based fuels	CZ	5	6	9	34	26	12	7
	EE	7	12	10	29	24	16	4
	DE	10	5	10	29	25	17	6
	GR	3	2	6	31	32	20	7
	HU	2	5	7	27	25	22	11
	IT	1	2	4	23	20	37	13
	LV	9	11	9	38	15	15	6
	PL	3	3	5	27	31	19	11
	RO	2	2	5	23	12	40	17
	RS	2	6	3	27	23	27	11
	ES	2	4	6	23	28	28	10

2.2.12 Market acceptance of biomethane-based fuels: Behaviour

The behaviour towards the use of biomethane-based fuels was examined, based on two statements. In the overall sample, the majority of the participants expressed their acceptance toward both statements (51% and 54%, respectively) (Figure 2-34). When referring to the national samples, the most common responses to the first statement were those indicating agreement, with percentages ranging from 39% (Germany) to 70% (Romania); Latvia and Czechia were the exceptions, with “Neither agree nor disagree” being the most common responses (32 and 33% respectively). The same was the case for the second statement, with positive responses ranging from 44% (Germany) to 72% (Romania); Latvia was the exception with the neutral response scoring 45% (Table 2-31).

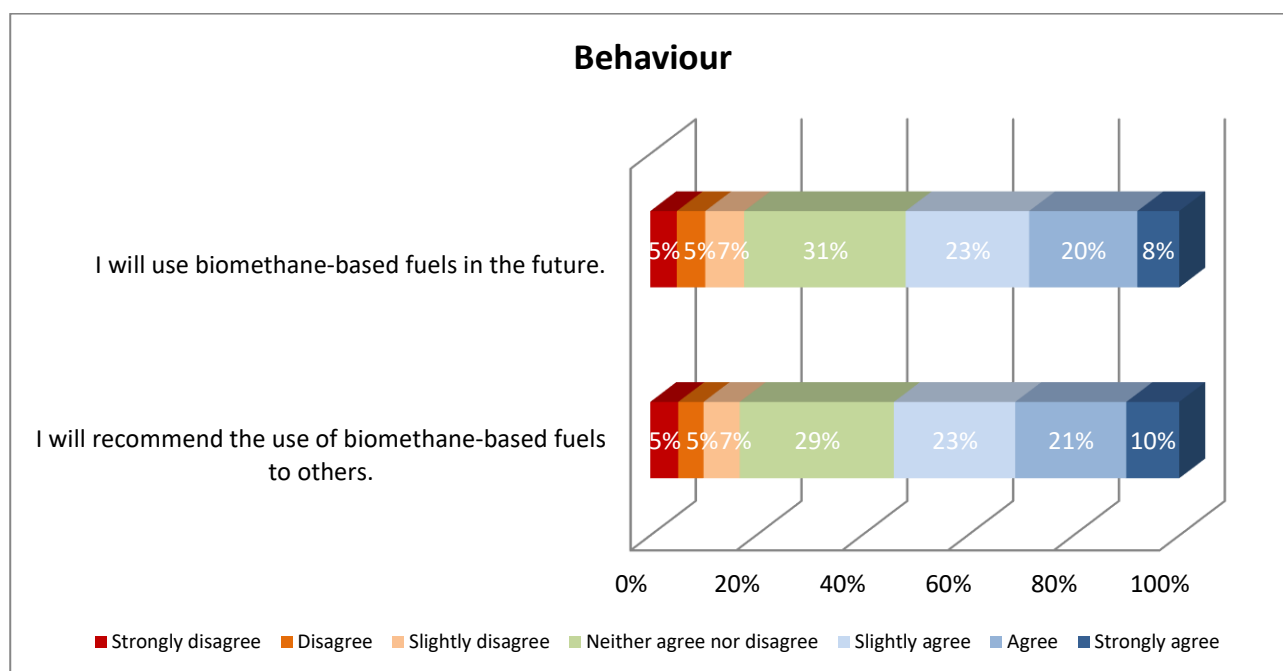


Figure 2-34: Behaviour towards the use of biomethane-based fuels

Table 2-31: Behaviour towards the use of biomethane-based fuels per country (%)

		Please indicate the extent to which you agree or disagree with the following statements						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
I will use biomethane-based fuels in the future	CZ	10	11	11	34	18	11	4
	EE	8	4	9	30	27	19	5
	DE	13	7	15	28	24	10	5
	GR	2	3	4	32	37	15	8
	HU	5	9	10	33	22	13	7
	IT	1	2	5	26	18	37	11
	LV	7	9	7	46	14	14	4
	PL	3	4	5	29	31	17	9
	RO	2	3	5	21	17	41	12
	RS	2	5	4	31	25	22	10
	ES	2	3	8	26	27	26	11
I will recommend the use of biomethane-based fuels to others	CZ	8	8	8	30	23	17	6
	EE	9	9	11	28	23	18	4
	DE	11	7	11	28	25	12	7
	GR	2	2	7	28	35	19	9
	HU	6	6	8	29	26	13	11
	IT	1	1	4	28	18	34	15
	LV	12	7	8	45	13	13	4
	PL	5	2	3	32	24	21	12
	RO	3	3	5	19	14	40	18
	RS	1	5	4	27	26	24	12
	ES	2	3	7	28	27	22	13

2.2.13 Willingness to pay for biomethane-based fuels

Survey respondents were questioned about their willingness to pay for biomethane-based fuels for different uses (electricity production, space heating, cooking, and car fuel). When referring to the overall sample for the electricity production, space heating and cooking uses, it is indicated that 13-15% would not choose a biomethane-based fuel regardless of the price, 33-34% would pay 10% to over 20% less, 7-8% would pay 1-5% less, 28-29% would pay the same, 8-9% would pay 1-5% more, and 8% would pay from 10% to over 20% more for biomethane-based fuels compared to conventional fuels (Figure 2-35). The results concerning the country samples are similar, with the most common responses in most countries being a) not choosing biomethane-based fuels regardless of the price, b) paying 10% to over 20% less, or c) paying the same price compared to conventional fuels. Some results that stand out are the percentages of Romanian respondents stating that they would pay from 10% to over 20% more for biomethane-based fuels (14-17%), and Spanish respondents stating that would pay 1-5% more for biomethane-based fuels compared to conventional fuels (14-17%) (Table 2-32).

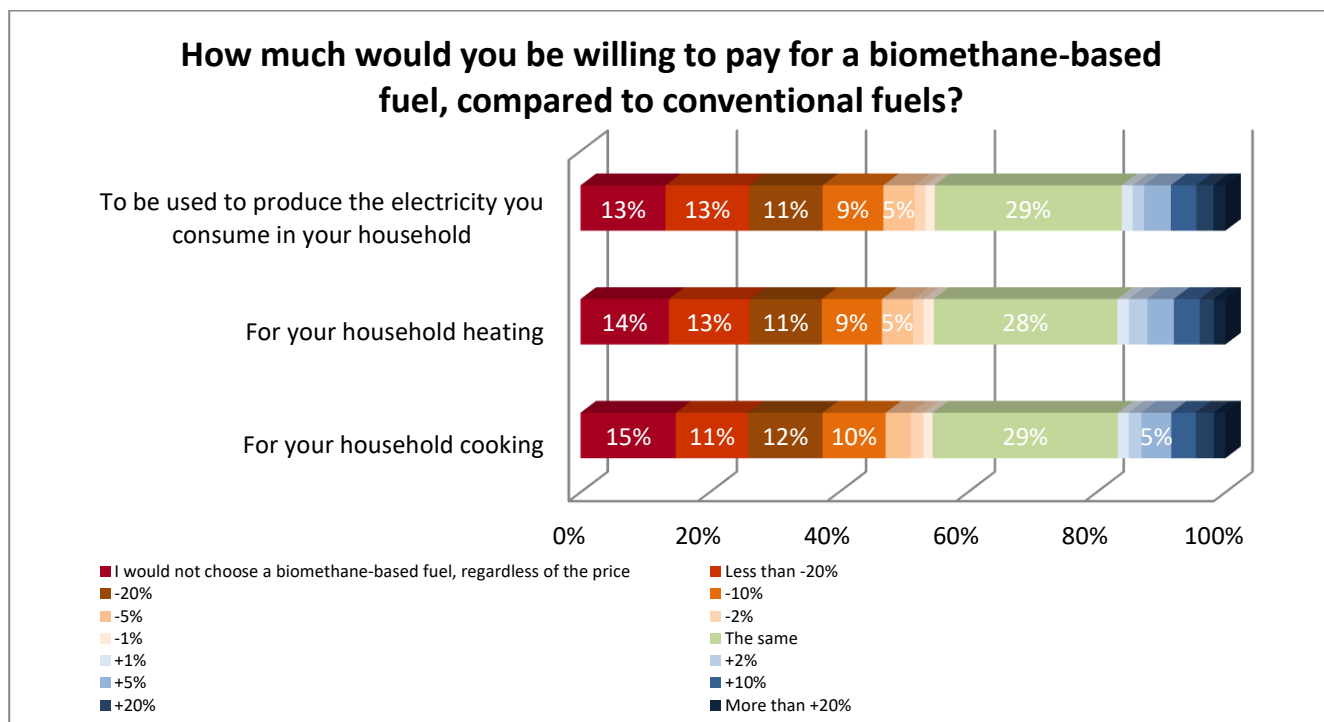


Figure 2-35: Willingness to pay for biomethane-based fuels for electricity production, space heating and cooking

Table 2-32: Willingness to pay for biomethane-based fuels for electricity production, space heating and cooking, per country (%)

		How much would you be willing to pay for a biomethane-based fuel, compared to conventional fuels?													
		I would not choose a biomethane-based fuel, regardless of the price	Less than -20%	-20%	-10%	-5%	-2%	-1%	The same	+1%	+2%	+5%	+10%	+20%	More than +20%
To be used to produce the electricity you consume in your household?	CZ	20	11	10	6	4	4	4	26	3	0	2	5	2	0
	EE	16	16	9	13	6	2	0	32	3	1	2	2	1	2
	DE	19	8	5	10	4	3	2	38	1	2	5	4	1	1
	GR	11	11	19	12	6	2	1	27	1	1	3	5	3	3
	HU	16	11	14	7	3	0	0	32	1	1	3	2	5	2
	IT	4	10	11	12	9	2	1	33	5	1	5	4	2	1
	LV	22	20	9	8	3	1	2	29	3	2	1	1	1	1
	PL	9	14	15	8	3	3	1	27	1	1	5	5	3	3
	RO	7	19	15	10	3	2	2	21	0	4	4	7	7	3
	RS	11	12	12	9	6	0	2	27	1	2	5	4	4	2
For your household heating?	ES	11	11	9	10	7	1	2	30	1	4	10	5	1	2
	CZ	18	10	9	8	7	2	2	27	2	3	4	6	0	1
	EE	18	16	11	9	4	2	4	31	1	1	2	1	1	2
	DE	21	10	8	9	6	0	3	29	1	1	7	4	2	1
	GR	11	9	17	11	5	3	1	30	0	2	3	6	2	4
	HU	18	10	13	9	2	0	0	29	2	1	5	4	3	2
	IT	4	12	9	11	8	2	1	35	4	3	4	3	1	2
	LV	25	17	10	6	4	1	0	29	4	2	2	1	1	1
	PL	8	13	14	8	4	2	1	27	1	5	4	4	3	1
	RO	9	18	13	11	4	1	2	22	2	2	3	8	6	2
	RS	9	11	14	11	3	1	2	25	1	4	5	5	3	3

	ES	10	13	7	9	6	3	1	31	4	7	6	3	1	1
For your household cooking?	CZ	18	9	10	9	4	2	3	27	0	1	5	5	1	2
	EE	19	12	13	10	3	2	0	33	2	1	3	1	2	2
	DE	22	7	6	10	4	2	1	32	3	2	7	2	3	2
	GR	14	10	16	12	4	4	1	27	1	1	4	6	2	2
	HU	19	10	12	10	1	0	2	30	1	1	4	3	4	2
	IT	2	9	12	15	9	1	1	33	2	1	6	4	2	2
	LV	27	14	13	5	1	2	1	29	3	2	2	1	2	1
	PL	8	16	11	8	2	3	1	28	1	4	5	4	4	2
	RO	10	14	17	10	4	2	2	23	1	2	4	5	7	2
	RS	13	13	10	10	4	1	3	22	2	3	5	4	4	3
	ES	11	10	8	8	5	3	1	33	2	5	7	7	1	1

The corresponding results concerning willingness to pay for biomethane-based fuels as car fuels are presented separately, as the particular scale of responses also included the “I do not drive” response. When examining the overall sample, it is indicated that 19% do not drive a car, 8% would not choose a biomethane-based fuel regardless of the price, 32% would pay 10% to over 20% less, 5% would pay 1-5% less, 23% would pay the same, 5% would pay 1-5% more, and 7% would pay from 10% to over 20% more for biomethane-based fuels compared to conventional fuels (Figure 2-36). The results concerning the country samples are similar, with the most common responses in most countries being a) not driving a car, b) paying 10% to over 20% less, or c) paying the same price compared to conventional fuels. Some results that stand out are the percentages of Romanian and Greek respondents stating that they would pay from 10% to over 20% more for biomethane-based fuels (14 and 11% respectively), Spanish, Italian and German respondents stating that would pay 1-5% more for biomethane-based fuels compared to conventional fuels (11, 11 and 10% respectively), and Czech, Latvian and German respondents stating that would not choose biomethane-based fuels regardless of the price (15, 13 and 12% respectively) (

Table 2-33).

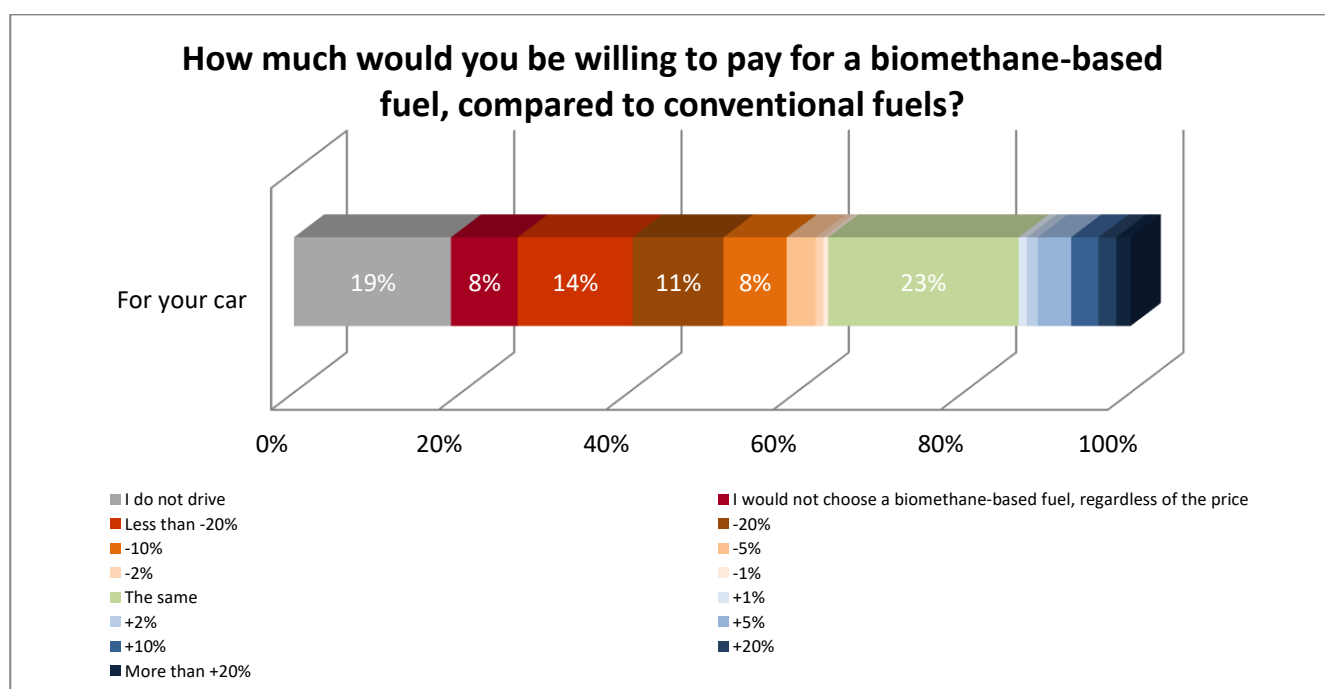


Figure 2-36: Willingness to pay for biomethane-based fuels for car fuel

Table 2-33: Willingness to pay for biomethane-based fuels for car fuel, per country (%)

	How much would you be willing to pay for a biomethane-based fuel for your car, compared to conventional fuels?														
	I do not drive	I would not choose a biomethane-based fuel, regardless of the price	Less than -20%	-20%	-10%	-5%	-2%	-1%	The same	+1%	+2%	+5%	+10%	+20%	More than +20%
CZ	20	15	11	10	6	3	0	1	18	1	1	5	4	2	1
EE	25	9	20	11	5	4	1	0	23	1	1	2	1	1	1
DE	15	12	8	6	8	4	1	0	29	1	2	7	5	2	2
GR	16	7	14	15	10	6	2	0	21	1	0	3	5	3	3
HU	27	7	15	10	6	0	1	0	20	0	1	4	3	3	1
IT	7	2	11	12	14	4	2	2	30	3	3	5	1	1	2
LV	24	13	17	11	4	3	0	1	21	2	1	4	0	1	0
PL	12	6	13	15	6	2	1	1	27	0	1	4	5	2	2
RO	21	4	19	13	7	3	1	1	16	1	1	2	6	4	4
RS	25	7	13	10	7	2	1	0	24	0	1	2	2	2	2
ES	15	6	12	7	12	6	1	2	24	2	2	7	4	3	1

2.2.14 Socio-political and community acceptance of biomethane-producing facilities: Perceived risks

In the context of examining the socio-political and community dimensions of biomethane-producing facilities acceptance, participants were questioned about the perceived risks of these facilities on a local level through four statements. When referring to the overall sample, in all cases, there seems to be a rather low level of worry; for all four cases, the level of agreement concerning negative effects ranges from 20% (negative effect on the local economy) to 28% (negative effects on the local natural environment) (Figure 2-37). The case is similar when examining the national samples; concerns regarding negative effects on the local economy rank the lowest, ranging from 12% (Greece) to 26% (Romania); concerns regarding effects on the local society follow, ranging from 16% (Serbia) to 29% (Estonia). Negative effects toward local population's health and the local natural environment present the highest level of concerns, with positive responses ranging from 21% (Serbia) to 35% (Estonia) for the potential health effects, and from 20% (Serbia) to 44% (Estonia) for the potential natural environment effects; it should be noted that the previously mentioned 44% score is the only case of agreement higher than 35%, concerning all countries and perceived effects. Overall, the lowest average perceived risk levels are presented in Greece (18,3%) and Serbia (18,5%), and the highest in Hungary (28,3%), Spain (28,3%), and Estonia (32%) (Table 2-34).

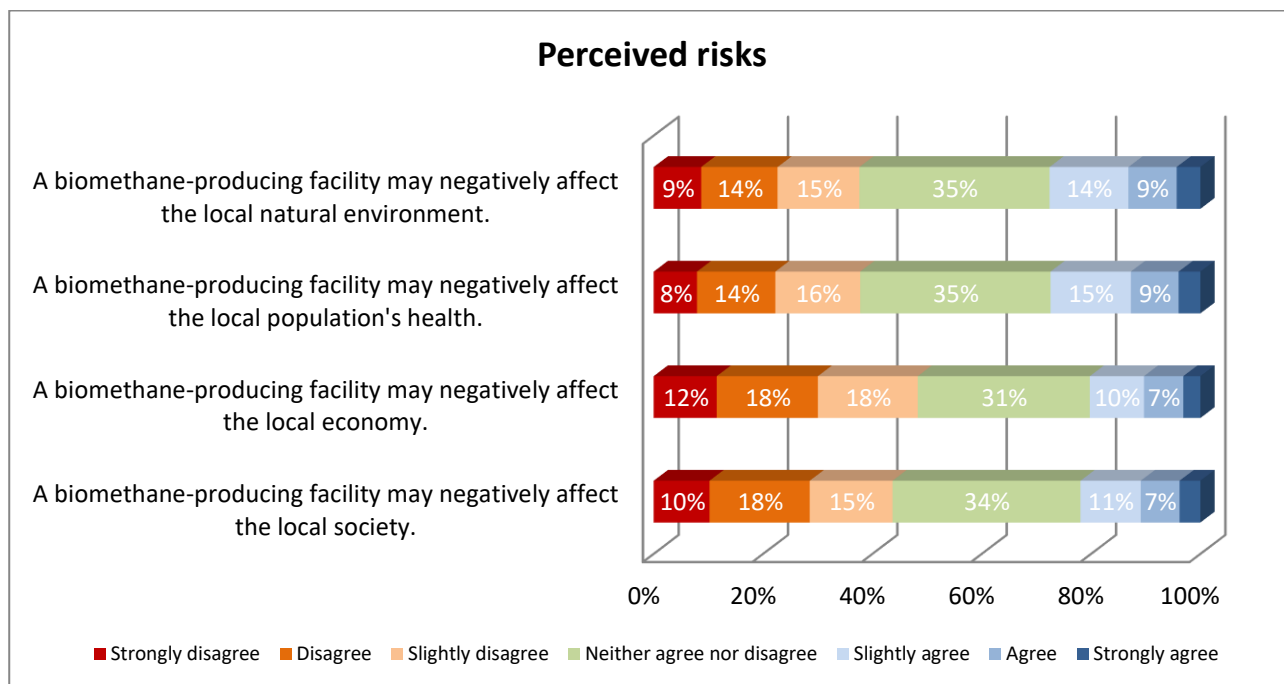


Figure 2-37: Perceived risks of biomethane-producing facilities

Table 2-34: Perceived risks of biomethane-producing facilities, per country (%)

		A biomethane-producing facility may negatively affect...						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
The local natural environment	CZ	9	11	18	36	12	9	3
	EE	4	12	14	28	28	10	6
	DE	10	11	21	33	14	7	7
	GR	5	14	14	46	15	5	2
	HU	15	11	21	24	16	8	5
	IT	10	24	15	27	9	11	3
	LV	5	9	10	46	15	11	6
	PL	8	11	17	39	13	8	3
	RO	14	18	11	31	8	15	6
	RS	11	21	10	38	13	5	2
	ES	6	13	14	36	17	9	7
The local population's health	CZ	8	14	22	33	13	5	4
	EE	3	13	17	34	22	9	4
	DE	10	11	18	35	14	7	7
	GR	7	14	17	43	14	6	2
	HU	8	12	23	23	20	8	5
	IT	13	21	12	29	13	9	2
	LV	4	11	10	44	16	11	5
	PL	6	11	20	35	14	12	1
	RO	13	20	10	28	10	13	7
	RS	11	17	12	38	12	6	3
	ES	5	14	11	42	15	11	4
The local economy	CZ	11	13	20	33	12	8	3
	EE	6	25	21	29	10	7	3
	DE	13	15	18	33	10	5	7

	GR	11	15	25	38	7	3	2
	HU	12	18	21	25	12	7	4
	IT	19	25	13	23	10	7	2
	LV	6	14	15	48	7	9	3
	PL	8	14	27	31	8	8	2
	RO	17	24	12	22	11	11	4
	RS	15	21	14	32	8	8	1
	ES	10	19	16	32	15	6	4
The local society	CZ	10	11	23	36	10	4	5
	EE	5	20	20	28	16	6	7
	DE	14	16	15	35	10	6	5
	GR	8	18	15	43	12	3	2
	HU	11	16	19	26	15	8	5
	IT	15	28	10	27	8	8	3
	LV	6	12	11	50	12	7	5
	PL	6	16	21	36	11	8	1
	RO	17	24	8	28	8	12	4
	RS	14	23	13	32	11	4	1
	ES	7	19	13	38	9	12	4

2.2.15 Socio-political and community acceptance of biomethane-producing facilities: Perceived benefits

Participants were questioned about the perceived benefits of biomethane-producing facilities on a local level through four statements. When referring to the overall sample, in all cases, there seems to be a high level of acceptance concerning the perceived positive effects on a local level. In particular, positive responses range from 48% (local population's health) to 62% (local economy) (Figure 2-38). The case is similar when examining the national samples, with levels of agreement in the majority of the cases ranging from 50 to 80%, except for benefits for the local population's health, with most countries (6 out of the 11) presenting positive scores lower than 50%. Hence, the cases were less than 50% agrees with the potential benefits of the facilities are: in the case of benefits for the local natural environment, Latvia scores 37% in terms of positive responses (neutral: 44%, negative: 21%) and Czechia scores 43% (neutral: 33%, negative: 24%); in terms of benefits for the local population's health, Latvia scores 31% in terms of positive responses (neutral: 45%, negative: 26%), Estonia scores 36% (neutral: 37%, negative: 28%), Czechia scores 42% (neutral: 33%, negative: 25%, Greece scores 43% (neutral: 44%); Serbia scores 45% (neutral: 32%, negative: 22%), and Spain scores 48% (neutral: 35%); in terms of benefits for the local economy, only Latvia has a positive score lower than 50%, being 43% (neutral: 40%); in terms of benefits for the local society, Latvia scores 36% in terms of positive responses (neutral: 49%) and Czechia scores 45% (neutral: 37%). Overall, the lowest average perceived benefits levels are presented in Latvia (36,8%) and Czechia (46,3%), and the highest in Italy (68,8%) and Romania (72,3%) (Table 2-35).

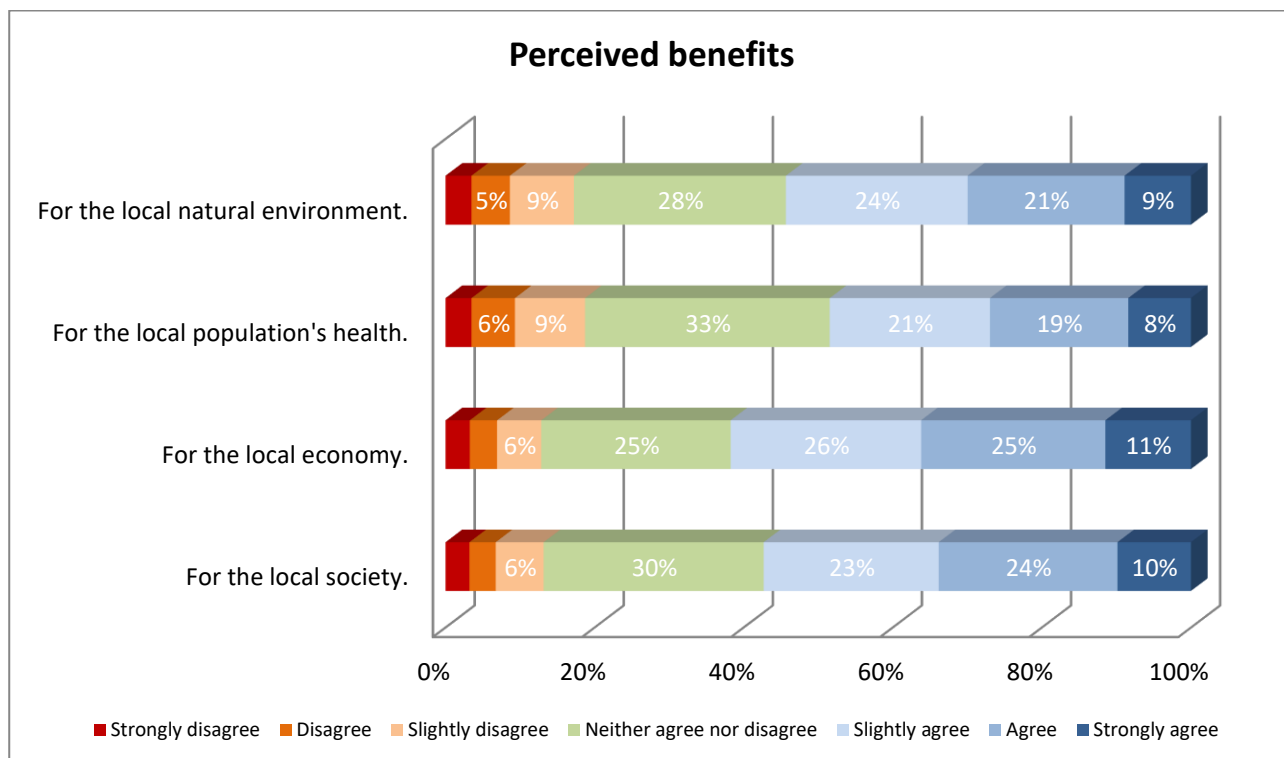


Figure 2-38: Perceived benefits of biomethane-producing facilities

Table 2-35: Perceived benefits of biomethane-producing facilities, per country (%)

		Biomethane-producing facilities can provide benefits...						
		Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
For the local natural environment	CZ	6	8	10	33	23	14	6
	EE	4	8	10	29	31	16	3
	DE	7	5	7	27	27	19	9
	GR	2	3	9	35	32	15	6
	HU	3	5	9	25	28	17	12
	IT	1	3	7	20	22	34	14
	LV	6	6	9	44	15	18	4
	PL	1	5	8	22	34	18	10
	RO	3	3	6	22	12	35	20
	RS	2	8	9	26	23	22	9
	ES	3	4	10	31	23	24	7
For the local population's health	CZ	6	5	14	33	22	14	6
	EE	4	13	11	37	23	12	1
	DE	7	6	9	30	26	16	8
	GR	2	4	8	44	23	15	5
	HU	4	4	10	26	28	15	12
	IT	1	4	5	27	22	28	13
	LV	7	7	12	45	14	12	5
	PL	0	2	9	31	30	17	9
	RO	2	4	5	22	11	37	19
	RS	3	9	10	32	19	18	8
	ES	2	6	11	35	19	21	8

For the local economy	CZ	4	5	9	28	33	16	6
	EE	4	5	7	26	26	29	6
	DE	7	4	6	29	25	20	11
	GR	2	2	4	32	32	19	11
	HU	3	2	7	21	31	21	14
	IT	1	5	5	19	20	37	14
	LV	6	6	6	40	19	18	6
	PL	1	1	4	26	32	23	12
	RO	3	2	3	16	15	44	19
	RS	4	5	10	22	21	25	12
	ES	3	4	5	24	29	21	16
For the local society	CZ	5	4	8	37	22	17	6
	EE	5	4	9	27	30	23	3
	DE	5	6	8	29	26	19	8
	GR	2	2	6	33	31	20	8
	HU	2	5	7	28	25	19	12
	IT	1	1	4	22	26	31	14
	LV	6	7	4	49	13	19	4
	PL	0	1	6	29	29	22	11
	RO	2	3	4	15	16	41	20
	RS	4	4	8	25	19	28	11
	ES	2	2	6	31	22	25	12

2.2.16 Socio-political and community acceptance of biomethane-producing facilities: Perceived trust toward stakeholders

Participants were asked about their level of trust referring to stakeholders responsible for decisions on the development of a biomethane-producing facility in the respondents' neighborhoods. When examining the overall sample, it is evident that there are different levels of trust between the five stakeholder types. In specific, the government industries are the least trusted (27% positive answers), followed by industries (30% positive answers), local companies/ cooperatives (38% positive answers), and environmental NGOs (41% positive answers). On the contrary, scientists and researchers face a much higher level of trust, with the positive perceptions being 60% (Figure 2-39). On a country level, a variety of diverse responses are indicated between the 11 countries. Trust toward the government is quite low in all countries, ranging from 17% (Latvia) to 37% (Romania). Trust toward the industries is also quite low, ranging from 21% (Serbia) to 38% (Romania). When referring to trust concerning local companies/ cooperatives, higher positive scores are observed, ranging in the broad span of 22% (Serbia) to 50% (Germany); the same is the case concerning environmental NGOs, with positive responses spanning from 29% (Latvia) to 56% (Italy). As already mentioned above, trust toward scientists and researchers presents the higher scores; on a country level, they range from 45% (Latvia) to 74% (Greece). Overall, the lowest average trust levels are presented in Latvia (29,6%) and Serbia (30,4%), and the highest in Romania (46,6%) and Italy (48,2%) (Table 2-36).

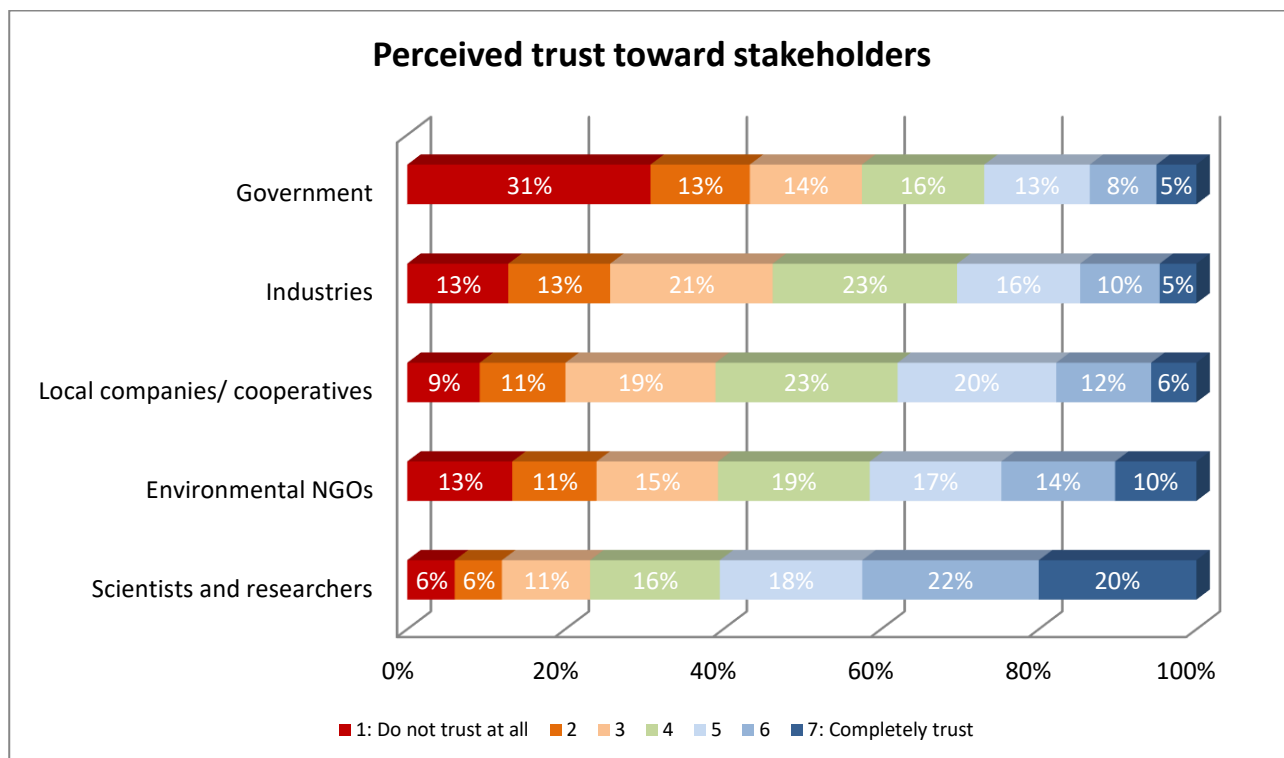


Figure 2-39: Perceived trust toward stakeholders responsible for decisions on the development of a biomethane-producing facility

Table 2-36: Perceived trust toward stakeholders responsible for decisions on the development of a biomethane-producing facility, per country (%)

		How much would you trust each of the following to make good decisions on the development of a biomethane-producing facility in your neighborhood?						
		1: Do not trust at all	2	3	4	5	6	7: Completely trust
Government	CZ	36	19	10	15	12	3	3
	EE	27	13	14	15	20	8	4
	DE	31	11	13	21	14	9	3
	GR	33	11	19	14	15	9	2
	HU	40	15	11	9	9	8	7
	IT	14	9	18	24	15	13	7
	LV	34	16	17	18	9	5	3
	PL	21	14	15	19	12	12	6
	RO	32	9	9	15	16	12	9
	RS	37	11	16	12	10	6	6
Industries	ES	34	11	15	10	17	9	6
	CZ	6	11	23	32	14	10	3
	EE	12	16	21	22	20	6	5
	DE	14	12	19	25	19	9	3
	GR	17	14	22	23	16	8	2
	HU	17	14	22	16	12	12	5
	IT	10	12	17	25	18	14	4
	LV	17	13	16	27	16	9	4
	PL	6	11	19	26	14	14	8
	RO	14	11	20	18	17	13	8

	RS	14	13	31	20	12	5	4
	ES	15	16	18	23	15	9	6
Local companies/ cooperatives	CZ	5	6	16	32	25	12	4
	EE	10	10	21	25	21	12	3
	DE	8	10	16	18	32	14	4
	GR	8	11	18	26	23	13	3
	HU	14	10	19	20	16	9	10
	IT	6	10	16	23	20	18	6
	LV	14	10	19	31	15	8	5
	PL	5	12	19	18	18	16	10
	RO	11	11	19	16	19	15	10
	RS	13	19	29	16	15	4	3
	ES	7	12	18	29	18	12	6
Environmental NGOs	CZ	14	11	23	17	15	12	7
	EE	14	14	13	21	19	14	8
	DE	16	10	9	22	23	14	8
	GR	16	12	15	22	19	10	8
	HU	13	8	15	15	13	16	19
	IT	5	9	13	16	18	22	16
	LV	18	11	20	23	14	9	6
	PL	7	11	13	23	17	16	12
	RO	14	9	14	16	15	19	15
	RS	16	12	22	17	18	7	7
	ES	14	10	14	21	13	21	8
Scientists and researchers	CZ	7	4	14	20	14	25	16
	EE	3	6	11	16	24	21	22
	DE	7	8	10	20	17	26	12
	GR	4	3	12	9	22	31	21
	HU	9	8	12	17	14	16	24
	IT	2	6	7	15	12	28	30
	LV	13	7	16	22	18	15	12
	PL	4	6	9	19	18	21	22
	RO	9	5	10	13	19	25	21
	RS	6	7	16	16	20	19	16
	ES	4	6	7	15	24	20	26

2.2.17 Socio-political and community acceptance of biomethane-producing facilities: Perceived attitudes

Perceived acceptance of biomethane-producing facilities on the national and local level was examined, based on respondents' attitudes in terms of welcoming or protesting against such facilities. Four different levels of spatial proximity were under question (country/ region/ city/ neighborhood), to examine the effect that distance from such facilities has on respondents' attitudes. It is evident that as the level of proximity increases, the level of positive attitudes decreases: positive responses toward having biomethane-producing facilities in the country score 59%, in the region/ province score 54%, in the city/ town 49%, and in the neighborhood score 41% (Figure 2-40). This result is also evident when referring to a national level; as depicted in Figure 2-41, in all countries, the level of positive attitudes reduces as the level of spatial proximity increases. Moreover, when examining the results separately for each country, it could be mentioned that Romania has the highest level of positive attitudes for all levels of proximity (almost tied with Italy for the two first levels: country and region), while Latvia has the lowest levels of positive attitudes, and at the same time the highest levels of negative attitudes for all four proximity levels (Table 2-37).

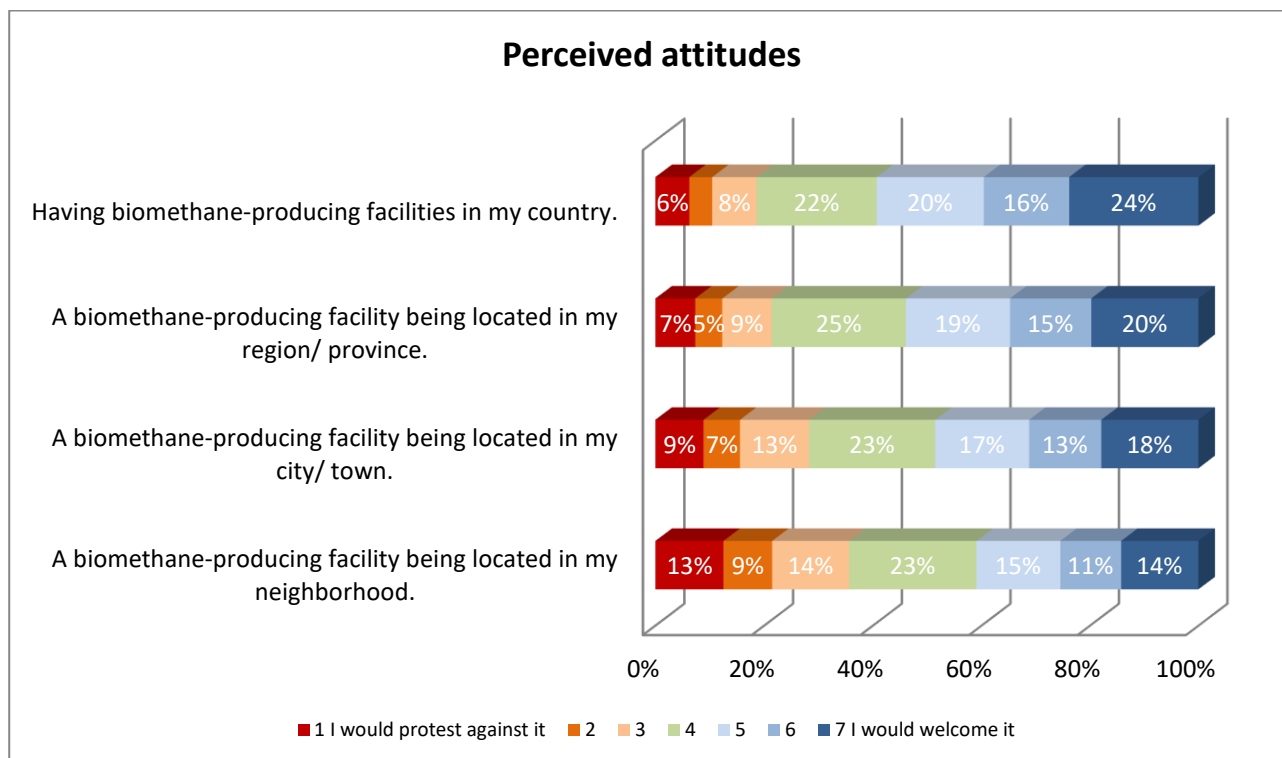


Figure 2-40: Perceived attitudes towards biomethane-producing facilities on a national and local level

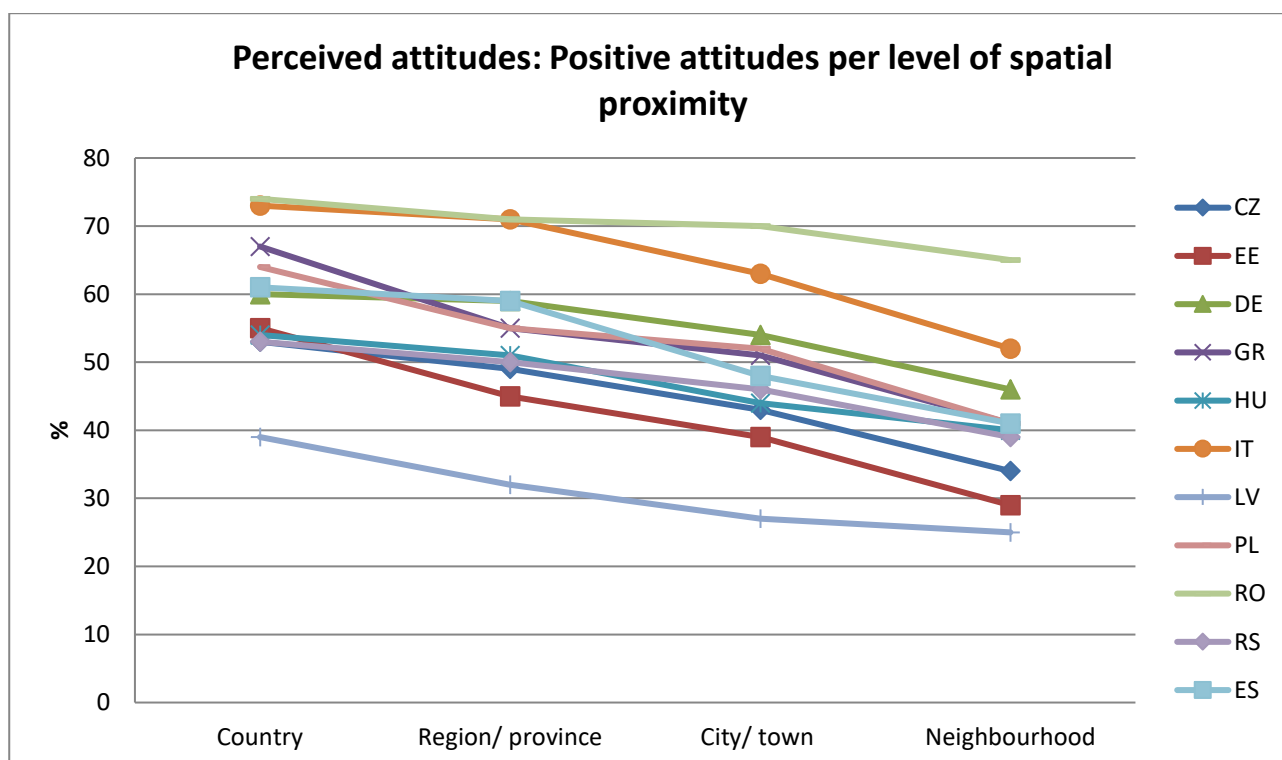


Figure 2-41: Perceived attitudes towards biomethane-producing facilities on a national and local level: positive attitudes per proximity level of the potential facility for each country

Table 2-37: Perceived attitudes towards biomethane-producing facilities on a national and local level, per country (%)

		Which of the below is true for you regarding each of the following statements?						
		1: I would protest against it	2	3	4	5	6	7: I would welcome it
Having biomethane-producing facilities in my country	CZ	6	4	9	27	21	14	18
	EE	6	5	12	23	20	15	20
	DE	10	3	4	24	24	19	17
	GR	5	3	6	21	28	16	23
	HU	8	6	9	21	19	13	22
	IT	1	2	5	18	26	19	28
	LV	15	5	16	27	17	7	15
	PL	6	4	6	19	18	17	29
	RO	6	6	3	13	12	23	39
	RS	5	5	13	23	11	15	27
	ES	2	4	7	27	21	15	25
A biomethane-producing facility being located in my region/ province	CZ	5	6	9	31	20	18	11
	EE	11	7	14	24	21	11	13
	DE	8	3	6	25	25	16	18
	GR	6	5	11	24	23	15	17
	HU	10	5	8	25	18	13	20
	IT	1	2	6	19	28	17	26
	LV	21	7	9	33	11	8	13
	PL	7	3	10	24	20	15	20
	RO	5	5	7	13	14	22	35
	RS	5	8	9	28	12	16	22
	ES	3	3	10	28	21	14	24
A biomethane-producing facility being located in my city/ town	CZ	9	4	15	30	21	13	9
	EE	13	9	22	18	17	12	10
	DE	7	7	8	27	20	18	16
	GR	8	8	10	24	22	12	17
	HU	11	7	11	26	13	12	19
	IT	3	2	13	19	22	17	24
	LV	25	8	18	24	12	6	9
	PL	6	7	12	22	20	12	20
	RO	4	5	6	17	13	22	35
	RS	8	11	11	23	12	13	21
	ES	5	6	15	27	19	11	18
A biomethane-producing facility being located in my neighborhood	CZ	10	9	18	28	16	10	8
	EE	19	12	17	24	11	10	8
	DE	9	9	11	28	19	14	13
	GR	13	10	15	23	19	9	13
	HU	13	10	12	25	15	8	17
	IT	6	5	16	21	20	14	18
	LV	28	9	14	25	13	4	8
	PL	13	12	9	24	13	15	13
	RO	6	7	7	17	12	23	30
	RS	9	10	18	23	17	6	16
	ES	13	8	19	21	17	11	13

3 Stakeholder interviews: Methodology and results

3.1 Methodology

A qualitative study, via an open-ended questionnaire interview protocol, was conducted on different socio-political and market-level key stakeholders such as government representatives, policy & decision-makers, project developers, distributors, suppliers (however, excluding citizens, which were covered through the quantitative citizen survey) in all GreenMeUp target countries. An interview protocol was created by CRES and was verified by all partners; the questionnaire was available both in a printable format to distribute by hand (see Annex II) and as an online questionnaire on Google Forms. Responses to the interviews were collected by all national partners through email communications, during the final Hub meetings, or other events. The collection of responses was performed between May and July 2025. In total, responses from 62 stakeholders from 11 countries were collected:

- Czechia (8); responses were collected by CZ Biom.
- Danube Region (Hungary, Romania, Serbia) (15) - the responses were collected during an online workshop using the Miro board tool, and were provided as an overall report presenting a composition of the responses of the 15 individuals participating in the workshop; responses were collected by INCE.
- Estonia (7); responses were collected by EstBA.
- Greece (7); responses were collected by CRES.
- Latvia (3); responses were collected by LBA.
- Poland (5); responses were collected by PIGEOR.
- Portugal (1) – collected during the Spanish Hub meeting; response was collected by
- Slovakia (2) – collected during the Czechian Hub meeting; responses were collected by CZ Biom.
- Spain (14); responses were collected by AEBIG.

It should be noted that the findings of the qualitative study should be interpreted with caution, as they do not reflect the opinions of all biomethane-related stakeholders in the countries under investigation. In each country, a small number of different types of stakeholders were interviewed. Hence, it should be highlighted that all the results that follow concerning the societal aspects of the biomethane market for each country are based solely on the opinions of the interviewed stakeholders.

In the following section, a composition of the responses to each question is presented, depicted as particular themes and topics raised by the interviewees. In addition, for each question of the interview protocol, a word count was performed for all provided responses; the results of the word counts are illustrated in the form of word clouds, with larger words indicating the more frequent appearance of a word. The online tool Wordclouds (<https://www.wordclouds.com/>) was used for this analysis and illustration.

3.2 Results

Q1: How are you involved in the biomethane sector?

Based on the interview responses, the main characteristics of the respondents' involvement in the biomethane sector are summarized as follows:

1. Roles and Positions

- Producers and Developers: Including biomethane producers, biogas plant developers, and project developers.
- Support and Advisory Roles: Encompassing consultants, legal advisors, and entities providing policy guidance and investment support.
- Research and Innovation: Comprising researchers, biogas technologists, and project designers focused on technological advancements and project development.
- Policy and Regulatory Participation: Including policymakers, local municipalities, and national associations involved in policy development and regulation.
- Business and Industry: Consisting of engineering firms, construction companies, and industry players engaged in building, maintaining, and operating biomethane plants.

2. Types of Involvement

- Technical and Project Development: Designing, building, and managing biogas and biomethane plants.
- Policy and Advocacy: Supporting policy development, investment support, and participating in regulatory frameworks.
- Operational Activities: Operating biogas plants, managing sales, and overseeing plant performance.
- Research and Innovation: Conducting research for GHG calculations, developing and upgrading technologies, and supporting sustainable practices.
- Investment and Funding: Engaging in project financing, investor relations, and stakeholder communication.

3. Sector Representation

- Public Sector: Involvement through administration, policy support, and public projects.
- Private Sector: Companies, shareholders, and private investors.
- Industry Associations and Networks: National and international associations advocating for biomethane projects.

4. Geographical and Sectoral Scope

- Local, National, and European Levels: Stakeholders operate at various levels, from local municipalities to national agencies and European-wide organizations.
- Cross-sectoral Engagement: Involvement spans energy, agriculture, environmental sustainability, and industrial sectors.

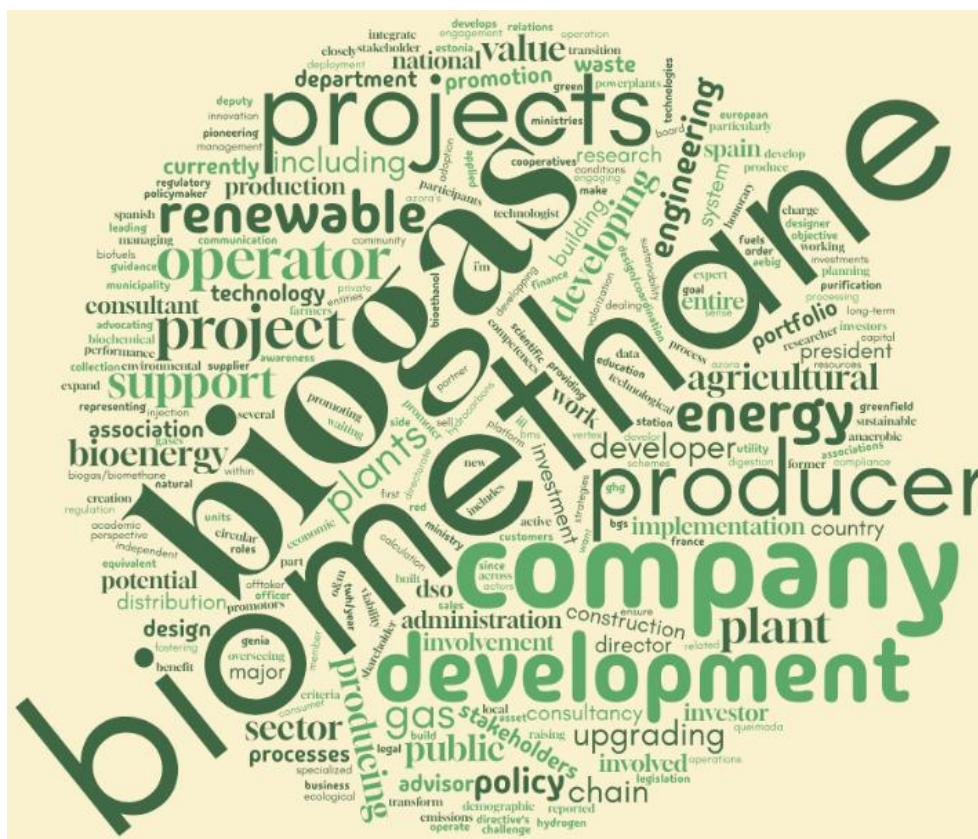


Figure 3-1: Based on Respondents' Language: Personal Involvement in the Biomethane Sector

Q2: How do you assess the societal needs and expectations regarding biomethane projects in your region? What factors should be prioritized to align with community values and interests?

Based on the interview responses, the main points on how stakeholders assess societal needs and expectations regarding biomethane projects in their regions, along with key factors to prioritize, are the following:

1. Evaluation of Societal Needs and Expectations

- **Community Perception and Awareness:** Recognition that awareness levels vary; some emphasize the need for increased community understanding. Effective engagement and face-to-face communication are viewed as essential.
- **Expectations for Benefits:** Local communities expect tangible benefits such as new jobs, local economic support, and benefits to the environment. There is an emphasis on local benefits, including green energy, self-sufficiency, and supporting the local economy.
- **Social Acceptance:** Social acceptance is crucial; communities often have mixed or limited expectations. Some responses highlight the importance of understanding local community expectations, especially in areas with existing installations.

2. Factors to Prioritize for Alignment with Community Values

- **Transparency and Communication:** Building awareness and providing clear, face-to-face engagement are fundamental. Managing expectations through open dialogue helps increase transparency and acceptance.

- ### 3. Challenges and Concerns

-
- The word cloud features the following terms:
- Local Food Projects** (Main Title)
 - community**
 - projects**
 - benefits**
 - waste**
 - plants**
 - public**
 - energy**
 - production**
 - important**
 - support**
 - needs**
 - values**
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 - transport**
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 - materials**
 - educational**
 - people**
 - sector**
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 - residents**
 - municipalities**
 - resulting**
 - farming**
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 - social**
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 - digestate**
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Q3: What existing policies do you believe effectively support the development of biomethane, and what gaps exist that might hinder community acceptance or project success?

Based on the interview responses, the main points on how stakeholders assess the existing policies that support biomethane development and the gaps that may hinder community acceptance or project success are the following:

1. Effective Policies and Supports

- Long-term Price Guarantees & Support Schemes: State long-term price guarantees and new biomethane support schemes (e.g., from 2026) are seen as crucial.
- Operational Support & Incentives: Support through tariffs, subsidies, and mechanisms like RES support, RED II, and RED III directives.
- Regulatory Frameworks: Clear and supportive policies such as the Spanish Biogas Roadmap, EU RED directives, and national regulations.
- Permitting and Certification: Simplified permit conditions and supportive certification processes are appreciated.
- Investment & Financial Support: Need for financial support for CAPEX and operational expenses, with emphasis on the importance of public acceptance.
- Sustainable Energy Goals: Policies aligned with renewable energy targets and climate commitments.
- Community Engagement & Acceptance: Recognized as key to project success, with policies supporting community acceptance being effective in some areas.
- Research & Development: Existing policies support biomethane R&D, which is vital for technological advancement.

2. Gaps and Challenges Hindering Development and Acceptance

- Lack of Systematic and Clear Policies: Absence of systematic conditions or support mechanisms, especially in some countries (e.g., Czech Republic, Greece).
- Legal and Regulatory Uncertainty: Lack of dedicated regulatory frameworks or support for biomethane projects.
- Barriers to Private Investment: Existing policies do not fully facilitate private investments, especially regarding subsidies and incentives.
- Community Acceptance Issues: Energy affordability concerns and community fears about potential odors or nuisances.
- Insufficient Financial Support: Need for more financial support for CAPEX and operational costs.
- Lack of Frameworks for Biogas Guidance: The absence of clear biogas guidelines or directives in some regions.
- Slow Policy Adoption or Implementation: Delays or absence of policies, such as in Spain or Greece, hinder project acceleration.
- Complexity and Lack of Clarity: Regulations are often complex or vague, making project planning and approval difficult.
- Limited Recognition of Community and Local Benefits: Policies do not always emphasize local benefits or community engagement sufficiently.

- Utilizing Various Channels: Using social media campaigns and providing information from day one to local councils. Maintaining transparency through continuous information sharing.
- Involving Local Communities: Emphasizing the importance of involving local communities when launching projects. Establishing early contact and participation opportunities.
- Involvement in Agreements and MoUs: Signing Memoranda of Understanding (MoUs) to formalize cooperation.
- Promoting Experience Sharing: Demonstrating real examples and success stories to foster trust.

2. Most Effective Strategies for Trust and Collaboration

- Personal and Direct Communication: One-on-one meetings, early contact, and personal engagement are highly valued.
- Transparency and Information Sharing: Clear, continuous communication about project progress and benefits.
- Community Involvement in Decision-Making: Involving local stakeholders from the outset through workshops and consultations.
- Educational Campaigns: Raising awareness about biomethane, its benefits, and safety.
- Building Relationships with Local Authorities and Stakeholders: Establishing partnerships through formal agreements and ongoing dialogue.
- Utilizing Multiple Communication Channels: Combining face-to-face meetings, social media, and public events for a broader reach.



Based on the interview responses, the most common community concerns about biomethane projects and how organizations address these issues are the following:

- **Odor, Noise, and Traffic:** Concerns about unpleasant odors, noise pollution, and increased traffic, especially during project construction and operation.
- **Smell from Biogas Plants:** Fears related to unpleasant odors from biogas facilities.
- **Environmental Impact:** Worries about negative environmental effects, including pollution, water, and soil contamination.
- **Health and Safety Risks:** Concerns about potential hazards like gas leaks, explosions, and pollution.
- **Aesthetic and Local Impact:** Impact on landscape and local environment, including increased traffic and visual pollution.
- **Proximity to Communities:** Fears about the closeness of projects to residential areas and community spaces.
- **Odors and Stench:** Specific concern about offensive smells, especially from waste treatment and landfill sites.

- **Disinformation and Lack of Information:** Misinformation and lack of clear, accessible information about project safety and benefits.
- **Waste and Pollution:** Concerns regarding waste management, potential water and soil pollution, and emissions.
- **Project Stalling and Lack of Support:** Projects halted due to public and governmental opposition.
- **Lack of Clear Legislation:** Absence of specific regulations and standards governing feedstock collection, biogas infrastructure, and safety.
- **Environmental and Social Impact:** General worries about environmental degradation and social acceptance.

2. How Organizations Address These Concerns:

- **Clear Communication and Education:** Providing technical information, transparency, and correcting misinformation. Explaining the safety measures and environmental benefits.
- **Community Engagement:** Organizing public consultations, accessible public discussions, and involving local communities early.
- **Environmental and Safety Policies:** Implementing and communicating strict safety standards, odor control measures, and pollution mitigation strategies.
- **Addressing Odor and Noise:** Using odor control technologies and noise barriers. Scheduling construction and operational activities to minimize disturbances.
- **Legislation and Regulation:** Advocating for clear national and local regulations to ensure project safety and compliance.
- **Stakeholder Collaboration:** Working with local authorities, community leaders, and residents to find mutually acceptable solutions.
- **Transparency and Regular Updates:** Providing ongoing updates about project progress, safety measures, and environmental monitoring.
- **Mitigating Impact:** Planning projects to minimize visual, environmental, and social impacts.
- **Responding to Concerns Promptly:** Addressing issues as they arise and adjusting practices accordingly.

- Supports local energy security and reduces reliance on imported fuels.
- Leads to cost savings with lower and stable payments for waste treatment.

3. Social and Community Benefits

- Enhances local farm resilience and employment opportunities.
- Improves local waste management practices.
- Builds local capacity through community engagement.
- Promotes community awareness and understanding of project benefits.
- Supports local infrastructure such as CNG stations and waste management facilities.

4. Project Development and Support

- Focuses on local biogas power plants and infrastructure.
- Supports local energy security and stability.
- Provides a range of benefits, including local jobs and waste reduction.
- Encourages community participation and buy-in through communication.
- Supports municipal management and planning.

5. Communication and Stakeholder Engagement

- Use of informational sessions, community meetings, and transparent communication.
- Sharing success stories and benefits to build trust.
- Emphasizing local job creation and environmental improvements.
- Highlighting economic advantages and long-term sustainability.
- Addressing community concerns to foster understanding and support.

6. Challenges and Considerations

- Difficulty in quantifying benefits, particularly economic ones.
- Need for proper management of residues and waste.
- Ensuring investments are worthwhile.
- Addressing potential local resistance or misconceptions.

- Flexibility in regulatory frameworks to adapt to local contexts.
- Use of public participation to enhance legitimacy.

3. Distributive Justice

- Equitable sharing of economic benefits, such as jobs and revenues.
- Compensation or benefits for local communities affected by projects.
- Ensuring the benefits from the operation are accessible to local populations.
- Avoiding disproportionate negative impacts on marginalized groups.
- Promoting local development and infrastructure improvements.
- Ensuring community members receive tangible benefits, possibly through early involvement.

4. Social Equity Considerations

- Community Engagement: Early and ongoing involvement of local communities. Inclusive decision-making processes that respect local knowledge. Engagement with marginalized or vulnerable groups.
- Capacity Building: Providing training and support to local stakeholders. Empowering communities to participate effectively.
- Fairness and Transparency: Clear communication about project impacts and benefits. Transparency in project planning and implementation.
- Monitoring and Feedback: Continuous assessment of social impacts. Mechanisms for grievances and conflict resolution.

5. Governance and Responsibility

- Role of Local Authorities: Clear responsibility and competence of local authorities. Local development agreements with community involvement.
- Regulatory and Licensing Procedures: Ensuring licensing aligns with fairness standards. Use of guidelines specifically for biomethane plant siting and operation.

6. Challenges and Considerations

- Balancing economic, environmental, and social goals.
- Addressing power imbalances among stakeholders.
- Adapting projects to local contexts and needs.
- Ensuring projects are affordable and accessible to local populations.

7. Practical Recommendations

- Start discussion early with communities.
- Develop clear guidelines and standards for biomethane projects.
- Incorporate social impact assessments early in project planning.
- Ensure community participation is meaningful and ongoing.
- Promote policies that make biomethane accessible and affordable.
- Treat biomethane projects as part of broader community development strategies.

3. Policy and Regulatory Support

- Dependence on subsidy policies to support industry development.
- The critical role of public sector regulatory frameworks.
- Legislative acts promoting national-based consumption.
- Regulatory support to create an enabling environment.

4. Joint Investment and Financial Mechanisms

- Development of joint investment platforms.
- Streamlined permitting processes.
- Incentives such as tariffs, subsidies, and shared costs.
- Public authorities offering regulatory support and incentives.

5. Collaborative Models and Frameworks

- Public-private-community (PPC) collaboration models.
- Developing initiatives through collective efforts.
- Designing flexible and inclusive frameworks that adapt to local contexts.

6. Stakeholder Engagement and Early Involvement

- Early involvement of stakeholders, including civil society and non-governmental organizations.
- Active participation of feedstock producers and local communities.
- Designating representatives from different parties to foster trust.

7. Role of Public Authorities

- Key role in creating enabling policies and facilitating market growth.
- Supporting active involvement and strategic planning.
- Ensuring support is aligned with market needs.

8. Community and Local Private Sector Engagement

- Engagement of local private companies and community organizations.
- Promoting inclusive and comprehensive partnerships.
- Recognizing the importance of community benefits and local development.

9. Monitoring, Events, and Communication

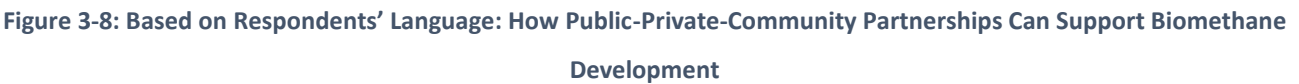
- Organizing more events and continuous communication.
- Building trust through regular dialogue and information exchange.

10. Incentives and Market Expansion

- Leveraging the strengths of stakeholders.
- Offering financial incentives for strategic projects.
- Ensuring market growth through collaborative efforts.

11. Mutual Benefits and Trust Building

- Ensuring partnerships are comprehensive, flexible, and transparent.
- Building trust through shared responsibilities and mutual benefits.



4 Recommendations on improving societal perception of biomethane

Following, two sets of recommendations on improving societal perceptions of biomethane are provided. The first set is based on the results of the citizen survey, while the second set is based on the findings of the stakeholder interviews.

4.1 Recommendations on improving societal perception of biomethane based on citizen survey results

Summary of recommendations for improving societal perceptions of biomethane, based on the citizen survey results:

1. Enhance Public Knowledge and Awareness

- Given the generally low self-perceived knowledge about biofuels, biogas, and biomethane, implement targeted educational campaigns to inform the public about these technologies, their benefits, and their environmental impact.
- Address misconceptions directly, clarifying that biomethane is produced from organic matter and is a renewable resource, not a fossil fuel.

2. Promote Socioeconomic Benefits

- Emphasize positive impacts on the local economy, natural environment, population health, and society, especially emphasizing benefits that resonate with diverse income levels and age groups.
- Tailor communication to different demographic segments, especially those in rural areas and older age groups, where perceptions of benefits may vary.

3. Build Trust in Stakeholders

- Increase transparency around project development, involving local communities and stakeholders in decision-making processes.
- Engage scientists, engineers, and trusted local figures to endorse biomethane projects, since expert opinions are highly influential.
- Enhance trust in local companies, NGOs, and authorities through credible communication and participatory decision-making.
- Improve perceptions of government and industry stakeholders to foster greater acceptance.

4. Address Perceived Risks

- Focus on reducing concerns related to negative effects on the local natural environment and population health, as these present higher levels of concern.
- Emphasize the environmental benefits, such as reduction in greenhouse gases and waste management contributions, to align with participants' environmental concerns.
- Showcase how biomethane contributes to sustainability goals and ecological harmony.

5. Improve Perceived Behavioral Control

- Reduce perceived barriers by providing clear information on how individuals can access, use, and benefit from biomethane (e.g., for car fuels, household heating).
- Offer financial incentives, subsidies, or supportive policies to make adoption more feasible and attractive, as these are perceived as influential factors.

6. Address Proximity and Local Acceptance

- Foster positive attitudes toward biomethane facilities in local communities by emphasizing local benefits and engaging residents early in project planning.
- Use community involvement initiatives and transparent communication to reduce protest tendencies, particularly in neighborhoods close to potential facilities.

7. Leverage Positive Attitudes and Social Norms

- Promote social proof by highlighting examples of community members and influential figures using biomethane fuels.
- Encourage endorsement from trusted social groups and opinion leaders to shift subjective norms and increase willingness to adopt biomethane.

8. Focus on Environmental and Ethical Messaging

- Emphasize the social responsibility and environmental stewardship aspects, as these are highly valued and positively perceived globally.
- Use messaging that aligns with the belief that humans need to live in harmony with nature to motivate behavioral change.

9. Tailor Strategies to Demographic Variances

- Recognize that younger and older populations may have different levels of knowledge and acceptance; customize communication accordingly.
- Consider cultural and regional differences, such as varying perceptions of benefits and risks, to craft effective, localized outreach.

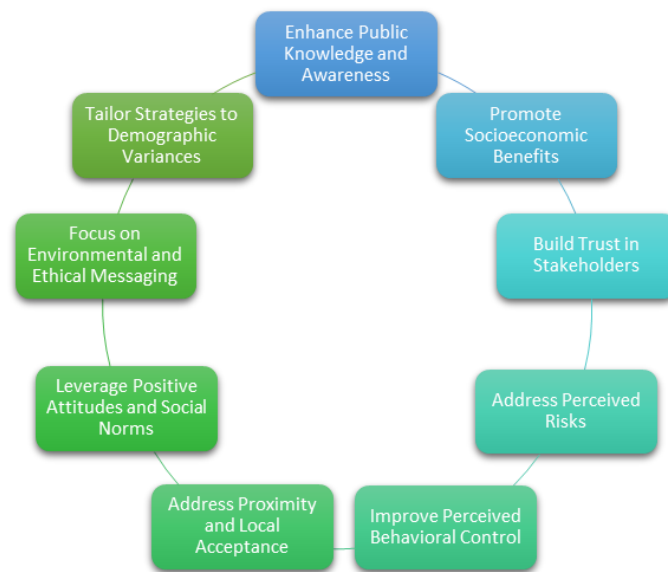


Figure 4-1: Recommendations on improving societal perception of biomethane based on citizen survey results

4.2 Recommendations on improving societal perception of biomethane based on stakeholder interview results

Summary of recommendations for improving societal perceptions of biomethane, based on the stakeholder interview results:

1. Assessment and Engagement Strategies

- Effective face-to-face communication and community engagement.
- Early contact and ongoing involvement of local communities.
- Building trust through direct communication and relationship building.
- Using various channels such as social media and public events.
- Involving local authorities and stakeholders early in projects.
- Formalizing cooperation through agreements and MoUs.
- Demonstrating real examples and success stories.

2. Addressing Community Concerns

- Providing technical information and transparency.
- Correcting misinformation about safety and environmental benefits.
- Implementing odor control, noise mitigation, and other nuisance management measures.
- Advocating for clear regulations and standards.
- Working with local authorities and community leaders to find acceptable solutions.
- Providing regular updates and environmental monitoring.
- Planning projects to minimize visual and environmental impacts.
- Responding promptly to concerns and issues.

3. Communication of Benefits

- Highlighting environmental and sustainability benefits.
- Emphasizing economic benefits such as local jobs and community development.
- Promoting social and community benefits.
- Using communication strategies like informational sessions, community meetings, and sharing success stories.
- Addressing community concerns to foster understanding and support.

4. Ensuring Fairness and Social Equity

- Early and ongoing community involvement.
- Including marginalized groups in decision-making.
- Ensuring benefits are accessible to local populations.
- Promoting community participation and feedback mechanisms.
- Incorporating social impact assessments.
- Developing clear guidelines for project siting and operation.

5. Partnerships and Market Support

- Supporting partnerships between public authorities, private companies, and community organizations.
- Promoting shared goals and strategic planning.
- Facilitating joint investments and financial mechanisms.
- Using collaborative models to promote market growth.
- Engaging stakeholders early and maintaining ongoing communication.
- Building trust through transparency, mutual benefits, and shared responsibilities.

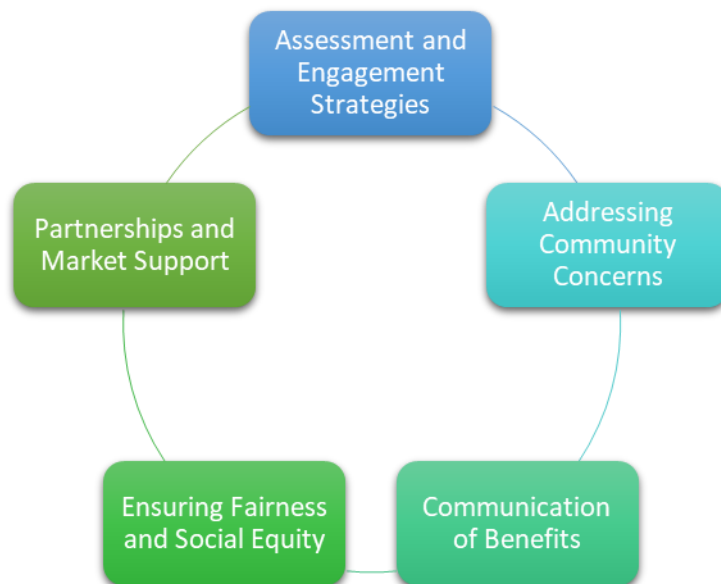


Figure 4-2: Recommendations on improving societal perception of biomethane based on stakeholder interview results

Annex I: Citizen Survey questionnaire

Welcome! This questionnaire was set up by researchers from the Center for Renewable Energy Sources and Saving (CRES). In this survey, we ask you to give your opinion about the residential use of biomethane. Your opinion is valuable, even if you are unfamiliar with biomethane. There are no correct or incorrect answers, only your own opinion. Filling in the questionnaire takes about 15 minutes.

Most people are not familiar with the topic discussed in this questionnaire. Therefore, you will read information about it before we ask for your opinion.

This survey has been supported by the EU's Horizon Europe GreenMeUp project (grant agreement No. 101075676, www.greenmeup-project.eu).

A. Socioeconomic characteristics

A00. Please select the country that you live in:

- Czechia ☐
- Estonia ☐
- Germany ☐
- Greece ☐
- Hungary ☐
- Italy ☐
- Latvia ☐
- Poland ☐
- Romania ☐
- Serbia ☐
- Spain ☐

A0. Please select the region that you live in:

OPTIONS ADDED BY SURVEYING COMPANY:

COUNTRY	NUTS1
CZECH REPUBLIC	• Czech Republic
ESTONIA	• Estonia
GERMANY	• Baden-Württemberg • Bavaria • Berlin • Brandenburg • Free Hanseatic City of Bremen • Hamburg • Hessen • Mecklenburg-Vorpommern • Lower Saxony • North Rhine-Westphalia • Rhineland-Palatinate • Saarland • Saxony • Saxony-Anhalt • Schleswig-Holstein • Thuringia
GREECE	• Attica • Nisia Aigaiou, Kriti

- | | |
|---------|---|
| | <ul style="list-style-type: none"> • Voreia Ellada • Kentriki Ellada |
| HUNGARY | <ul style="list-style-type: none"> • Central Hungary • Transdanubia • Great Plain and North |
| ITALY | <ul style="list-style-type: none"> • North West • North East • Centre • South • Islands |
| LATVIA | <ul style="list-style-type: none"> • Latvia |
| POLAND | <ul style="list-style-type: none"> • South Macroregion • North-west Macroregion • South-west Macroregion • North Macroregion • Central Macroregion • East Macroregion • Masovian Macroregion |
| ROMANIA | <ul style="list-style-type: none"> • Macroregion One • Macroregion Two • Macroregion Three • Macroregion Four |
| SERBIA | <ul style="list-style-type: none"> • Serbia |
| SPAIN | <ul style="list-style-type: none"> • North West • North East • Community of Madrid • Centre • East • South • Canary Islands |

A1. Please indicate the type of area you live in:

- | | |
|----------|-----------------------|
| Urban | ☐ |
| Suburban | ☐ |
| Rural | ☐ |

A2. Please indicate your gender:

- | | |
|--------|-----------------------|
| Male | ☐ |
| Female | ☐ |

A3. Please record your exact age:

OPTIONS ADDED BY SURVEYING COMPANY

A4. What is your highest level of completed education?

- | | |
|--------------------------------------|-----------------------|
| High school graduate | ☐ |
| Vocational training degree | ☐ |
| University/University college degree | ☐ |
| Master's degree | ☐ |

- PhD (Doctor of Philosophy) degree ☐
- None of the above ☐

A6. Have you worked or are you currently working in the energy or environmental sectors, or been professionally associated with them?

- Yes ☐
- No ☐

A7. Please indicate the extent to which you agree or disagree with the statement: "My household income meets my everyday needs".

- Strongly disagree ☐
- Disagree ☐
- Slightly disagree ☐
- Neither agree nor disagree ☐
- Slightly agree ☐
- Agree ☐
- Strongly agree ☐

B. Residence characteristics

B1. Please define the type of your residence.

- Detached house ☐
- Semi-detached house ☐
- Apartment building ☐
- Other (please define) ☐

B2. Please define the ownership status of your residence.

- Privately owned ☐
- Rented ☐
- Other (please define) ☐

B3. Please indicate when your residence was constructed.

- before 1919 ☐
- 1919 - 1945 ☐
- 1946 - 1960 ☐
- 1961 - 1980 ☐
- 1981 - 1990 ☐
- 1991 - 2000 ☐
- 2001 - 2010 ☐
- 2011 - 2020 ☐
- 2021 onwards ☐

B4. What is the size of your residence (square meters)?

- 0 - 50 ☐
- 50 - 100 ☐
- 100 - 150 ☐
- 150 - 200 ☐
- 200+ ☐

B5. What is the main heating system in your residence?

- Heating oil boiler ☐

- Natural gas boiler ☐
- Air source heat pump ☐
- Split unit air-conditioning system ☐
- Ground source heat pump ☐
- Gas-fired space heater ☐
- Electric space heater ☐
- Biomass boiler ☐
- Wood-burning or pellet stove ☐
- Energy-efficient wood-burning fireplace ☐
- District heating system ☐
- Other [please define] ☐

B6. What kind of energy source do you use for cooking in your household?

- Electricity (e.g., electric stove, oven, kettle) ☐
- Gas (e.g., natural gas or propane-powered stove or oven) ☐
- Biomass (e.g., burning firewood, charcoal, or agricultural waste) ☐
- Other [please define] ☐

B7. Do you drive a car?

- Yes ☐
- No ☐

B8. What types of fuel/s does the car you drive run on? (choose all that apply)

- ☐ Gasoline (petrol)
- ☐ Diesel
- ☐ Electricity
- ☐ Hybrid (gasoline and electricity)
- ☐ Hydrogen
- ☐ Liquefied petroleum gas (LPG)
- ☐ Compressed natural gas (CNG)
- ☐ Other [please define]
- ☐ I don't drive a car/ I don't have a car of my own

C. Knowledge & awareness

C1. How much do you know about:

Please use a scale from 1 to 7, where 1 means "Nothing at all" and 7 "A lot".

	Nothing at all						A lot
Biofuels	1	2	3	4	5	6	7
Biogas	1	2	3	4	5	6	7
Biomethane	1	2	3	4	5	6	7

C3. Please choose all that apply:

- ☐ Biomethane is the purified version of biogas (note: correct answer)
- ☐ Biogas is the purified version of biomethane
- ☐ Biomethane and biogas are the same
- ☐ Biomethane is produced from the breakdown of organic matter (note: correct answer)
- ☐ Biomethane is produced from the breakdown of inorganic matter
- ☐ Biomethane is considered to be a fossil fuel
- ☐ None of the above

D. Information Box

Biomethane, coming from biogas upgrading or biogas purification, is a renewable energy source derived from organic materials such as agricultural waste, food waste, sewage sludge and other biological sources. It is produced in a biomethane-producing facility through a process called anaerobic digestion, where microorganisms break down organic matter (i.e., the collected feedstock) in the absence of oxygen in anaerobic digesters, resulting in the production of biogas, which is captured from the top of the digester. This biogas mainly consists of methane (CH₄) and carbon dioxide (CO₂). To produce biomethane, the impurities in the biogas are removed, and the methane content is increased to meet the quality standards of natural gas. Biomethane can be used on its own or can be injected into the natural gas grid (as they have the same properties) for heating and power generation or as a vehicle fuel. Thus, biomethane can be used in various residential applications, such as a) a fuel for heating homes and water, b) cooking, c) a source of energy to generate electricity, and d) a fuel for powering vehicles, such as cars.

E. Perceptions/ Attitude/ Behaviour

E1. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
CBP1: I believe that biomethane-based fuels are cheaper than conventional fuels (e.g., oil, natural gas).	1	2	3	4	5	6	7
CBP2: I believe that biomethane-based fuels are more energy efficient than conventional fuels (e.g., oil, natural gas).	1	2	3	4	5	6	7
CBP3: I believe that biomethane-based fuels positively impact the economy.	1	2	3	4	5	6	7
CBP4: I believe that biomethane-based fuels reduce dependence on foreign energy.	1	2	3	4	5	6	7
EBP1: I believe that biomethane-based fuels improve environmental quality.	1	2	3	4	5	6	7
EBP1: I believe that biomethane-based fuels contribute to the reduction of greenhouse gas emissions.	1	2	3	4	5	6	7
EBP3: I believe that biomethane-based fuels contribute to waste management.	1	2	3	4	5	6	7
EBP4: I believe that biomethane-based fuels contribute to using fewer natural resources.	1	2	3	4	5	6	7
SBP1: I believe that biomethane-based fuels are generally beneficial for our	1	2	3	4	5	6	7

society.							
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E2. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
RP1: I doubt the energy efficiency of biomethane-based fuels.	1	2	3	4	5	6	7
RP2: I doubt the reliability of biomethane-based fuels.	1	2	3	4	5	6	7
RP3: I doubt the safety of biomethane-based fuels.	1	2	3	4	5	6	7
RP4: I doubt the technological maturity of biomethane-based fuels.	1	2	3	4	5	6	7
RP5: I doubt the environmental benefits of using biomethane-based fuels.	1	2	3	4	5	6	7
RP6: I doubt the economic benefits of using biomethane-based fuels.	1	2	3	4	5	6	7

E3. How important would the following factors be for you to use biomethane-based fuels?

Please use a scale from 1 to 7, where 1 means "Not important at all" and 7 "Very important".

	Not important at all						Very important
MS1: Supplier type (e.g., small supplier, big industry, cooperative).	1	2	3	4	5	6	7
MS2: Location of production site (e.g., local, non-local).	1	2	3	4	5	6	7
MS3: Eco-labeling.	1	2	3	4	5	6	7
MS4: Financial incentives (e.g., subsidies).	1	2	3	4	5	6	7
MS5: Share of biomethane in the fuel.	1	2	3	4	5	6	7
MS6: Type of the material used to produce biomethane (e.g., agricultural waste, food waste, sewage sludge, manure).	1	2	3	4	5	6	7

E4. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
SN1: People who are important to me would approve of my decision to use biomethane-based fuels.	1	2	3	4	5	6	7
SN2: I will use biomethane-based fuels if people who are important to me will use them.	1	2	3	4	5	6	7

SN3: Experts' opinions (e.g., engineers, scientists) could affect my choice to use biomethane-based fuels.	1	2	3	4	5	6	7
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E5. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
ATT1: I would feel totally satisfied with myself if I used biomethane-based fuels.	1	2	3	4	5	6	7
ATT2: Using biomethane-based fuels would make me feel like an environmentally responsible consumer.	1	2	3	4	5	6	7

E6. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
PBC1: Whether or not using biomethane-based fuels is entirely up to me.	1	2	3	4	5	6	7
PBC2: I have the money necessary to buy biomethane-based fuels.	1	2	3	4	5	6	7
PBC3: I have the knowledge and information to make the proper decisions concerning the use of biomethane-based fuels.	1	2	3	4	5	6	7
PBC4: I have sufficient time to make the proper decisions concerning the use of biomethane-based fuels.	1	2	3	4	5	6	7

E7. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
EC1: I believe that humanity is severely mistreating the environment.	1	2	3	4	5	6	7
EC2: I believe that human beings must live in harmony with nature in order to survive.	1	2	3	4	5	6	7

E8. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
--	-------------------	----------	-------------------	----------------------------	----------------	-------	----------------

INT1: I am likely to use biomethane-based fuels in the future.	1	2	3	4	5	6	7
INT2: I will make an effort to use biomethane-based fuels.	1	2	3	4	5	6	7

E9. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
BH1: I will use biomethane-based fuels in the future.	1	2	3	4	5	6	7
BH2: I will recommend the use of biomethane-based fuels to others.	1	2	3	4	5	6	7

F. Willingness to Pay (WTP)

F1. How much would you be willing to pay for a biomethane-based fuel for your car, compared to conventional fuels?

I do not drive	I would not choose a biomethane-based fuel, regardless of the price	Less than -20%	-20%	-10%	-5%	-2%	-1%	The same	+1%	+2%	+5%	+10%	+20%	More than +20%
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

F2. How much would you be willing to pay for a biomethane-based fuel to be used to produce the electricity you consume in your household, compared to conventional fuels?

I would not choose a biomethane-based fuel, regardless of the price	Less than -20%	-20%	-10%	-5%	-2%	-1%	The same	+1%	+2%	+5%	+10%	+20%	More than +20%
o	o	o	o	o	o	o	o	o	o	o	o	o	o

F3. How much would you be willing to pay for a biomethane-based fuel for your household heating compared to conventional fuels?

I would not choose a biomethane-based fuel, regardless of the price	Less than -20%	-20%	-10%	-5%	-2%	-1%	The same	+1%	+2%	+5%	+10%	+20%	More than +20%
o	o	o	o	o	o	o	o	o	o	o	o	o	o

F4. How much would you be willing to pay for a biomethane-based fuel for your household cooking, compared to conventional fuels?

I would not choose a biomethane-based fuel, regardless of the price	Less than -20%	-20%	-10%	-5%	-2%	-1%	The same	+1%	+2%	+5%	+10%	+20%	More than +20%
0	0	0	0	0	0	0	0	0	0	0	0	0	0

G. Local acceptance

G1. Please indicate the extent to which you agree or disagree with the following statements.

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
LR1: A biomethane-producing facility may negatively affect the local natural environment.	1	2	3	4	5	6	7
LR2: A biomethane-producing facility may negatively affect the local population's health.	1	2	3	4	5	6	7
LR3: A biomethane-producing facility may negatively affect the local economy.	1	2	3	4	5	6	7
LR4: A biomethane-producing facility may negatively affect the local society.	1	2	3	4	5	6	7

G2. Please indicate the extent to which you agree or disagree with the following statements. Biomethane-producing facilities can provide benefits...

	Strongly disagree	Disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Agree	Strongly agree
LB1: For the local natural environment.	1	2	3	4	5	6	7
LB2: For the local population's health.	1	2	3	4	5	6	7
LB3: For the local economy.	1	2	3	4	5	6	7
LB4: For the local society.	1	2	3	4	5	6	7

G3. How much would you trust each of the following to make good decisions on the development of a biomethane-producing facility in your neighborhood?

Please use a scale from 1 to 7, where 1 means "Do not trust at all" and 7 "Completely trust".

	Do not trust at all						Completely trust
ST1: Government	1	2	3	4	5	6	7
ST2: Industries	1	2	3	4	5	6	7
ST3: Local companies/ cooperatives	1	2	3	4	5	6	7
ST4: Environmental NGOs	1	2	3	4	5	6	7
ST5: Scientists and researchers	1	2	3	4	5	6	7

G4. Which of the below is true for you regarding each of the following statements?

Please use a scale from 1 to 7, where 1 means "I would protest against it" and 7 "I would welcome it".

	I would protest against it						I would welcome it
NA1: Having biomethane-producing facilities in my country.	1	2	3	4	5	6	7
LA1: A biomethane-producing facility being located in my region/ province.	1	2	3	4	5	6	7
LA2: A biomethane-producing facility being located in my city/ town.	1	2	3	4	5	6	7
LA3: A biomethane-producing facility being located in my neighborhood.	1	2	3	4	5	6	7

Annex II: Stakeholder interview protocol

Investigating societal perspectives related to biomethane market uptake

Thank you for agreeing to participate in this interview. This questionnaire was set up by researchers from the Center for Renewable Energy Sources and Saving (CRES). This interview aims to gain deeper insights into the socio-political and market dynamics surrounding biomethane projects within your country and region.

The names and organizations of the stakeholders that will be interviewed will not be mentioned in any publication. Your responses will remain confidential and will be used solely for academic and research purposes. Only a synthesis of the findings from the performed interviews will be presented, meaning that we will not publish any parts of individual interviews.

This work has been supported by the EU's Horizon Europe GreenMeUp project (grant agreement No. 101075676, www.greenmeup-project.eu).

0. What country are you from?

--

1. How are you involved in the biomethane sector?

--

2. How do you assess the societal needs and expectations regarding biomethane projects in your region? What factors should be prioritized to align with community values and interests?

--

3. What existing policies do you believe effectively support the development of biomethane, and what gaps exist that might hinder community acceptance or project success?

--

4. How do you currently engage with community members regarding biomethane initiatives? What strategies do you find most effective in fostering trust and collaboration?

--

--

5. What are the most common concerns you hear from the community about biomethane projects, and how do you address these concerns within your policies or business practices?

--

6. What specific benefits do you foresee biomethane projects bringing to local communities, and how do you communicate these potential benefits to stakeholders?
--

--

7. What constitutes fair procedural and distributive justice in the context of biomethane projects? How do you ensure that biomethane projects are designed and implemented with social equity in mind?

--

8. How could partnerships between public authorities, private companies, and community organizations support the market growth of biomethane?

--

Thank you for your participation!