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RENEWABLES ARE HERE: WHAT DO UKRAINIANS THINK ABOUT A GREEN FUTURE FOR THEIR HOUSEHOLDS?

This research aims to determine the attitudes of Ukrainians regarding the role of renewable energy sources, particularly the development of distributed generation, in the process of post-war recovery and ensuring energy security and freedom in Ukraine.

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The sociological research and the text in Ukrainian were prepared by INFO SAPIENS INTERNATIONAL LLC researchers: **Anastasiia Shurenkova**

Editors: **Hanna Rutkovska, Kostiantyn Krynytskyi**

Proofreader: **Myroslava Kosar**

Layout and infographics: **Olha Pavlenko**

Tranlated into English: **Iryna Goyal**

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INTRODUCTION

In 2022, due to the Russia's full-scale invasion of Ukraine, attacks on energy infrastructure, nuclear terrorism, the energy security of the population of Ukraine have become a key priority. Currently, the formation of post-war reconstruction is being discussed at the international and state levels.

In accordance with the Ukraine's Recovery Plan Blueprint, presented in July 2022, in the next ten years moderate development of renewable energy sources (hereafter RES) is expected, in particular, the installation of additional 5-10 GW of green capacities. A significant increase in electricity generated from renewable energy sources is required for the country's green transformation and transition away from fossil fuels. An important prerequisite thereof is the creation of new mechanisms for guaranteeing investments in the sector. It is worth noting that in the Recovery Plan of Ukraine, the further functioning of local decentralized renewable energy generation in communities and its support mechanism at the state level is not a priority area. Moreover, the development of RES has a rather fragmented nature in terms of the post-war energy system. The social component, which envisages that the owners of the green transition are the population directly in accordance with the 4th EU Energy Package, is absent in the Recovery Plan.

Therefore, the Ecoaction team initiated sociological research to study the current attitudes of the Ukrainian population towards the development of renewable energy sources in the electricity sector, and partly heat supply, taking into account Russia's full-scale invasion of Ukraine. The research was conducted in nine regions of Ukraine: Ivano-Frankivsk, Ternopil, Chernihiv, Kyiv, Sumy, Dnipropetrovsk, Odesa, Mykolaiv and Cherkasy regions based on the quantitative method (telephone interviews). Since the research aimed at studying the attitudes of the population in different regions of Ukraine, the selection of regions was made on the basis of geographical criteria. The main goal of the research is to find out the attitude of the population regarding the development of RES, namely the installation of distributed generation in households.

The Ecoaction team analysed the results of the research and wrote down main points in Conclusions. The results can be useful to representatives of state and local authorities, experts, and public organizations to understand the attitude of the population of Ukraine towards the issues of renewable energy sources, to conduct targeted information campaigns, as well as to address the necessary political and legislative changes.

Disclaimer: It is important to note that in this report, "the population of Ukraine"." "Ukrainian society" etc. are defined as the general aggregate of the nine regions where the sociological study was conducted. We have no reason to claim that the population of other regions is categorically convinced of the opposite. However, there is also no reason to claim that similar sentiments are being observed.

SUMMARY

The Attitude of the Population of Ukraine to Renewable Energy Sources

There is a certain gap between knowledge about RES technologies and knowledge about the interpretation of the terms associated with them? Respondents are not familiar with the abbreviation RES or even its full form, i.e. "renewable energy sources:" more than half of the respondents (54%) admitted this is the first time they hear this phrase. The knowledge about RES in communities is centred around young people, in particular students.

However, if we are to deal with specific types of RES technologies, the respondents show a much higher level of knowledge. 95% of the population has at least heard of solar panels, and 88% of respondents have at least heard of boiler houses/boilers on alternative fuel. 80% know about small wind turbines, and 67% are aware of heat pumps.

If we take into account the respondents who have at least heard about RES or specific technologies, their share will be 98% of the sample. In this case, the population of Ukraine can be considered at least minimally knowledgeable.

The general attitude towards RES (not only distributed generation) in Ukraine is positive: 78% of respondents have a very positive or rather positive attitude. Respondents were asked to rate how much they agree with four statements about RES. The majority of respondents agree with all the statements:

- *"Ukraine has enough resources for the development of renewable energy sources" (89%);*
- *"Ukrainian energy industry should switch to the use of renewable energy sources as much as possible" (88%);*
- *"Ukraine should reduce the use of fossil fuels (coal, oil and natural gas) as much as possible and increase the production of electricity from renewable energy sources" (84%);*
- *"Ukraine should abandon the construction of new nuclear power units and gradually close nuclear power plants" (60%).*

The Attitude of the Population of Ukraine to distributed generation

The attitude towards distributed energy resources is more positive than towards RES in general: 50% of the population have a very positive attitude, and 34% have a rather positive attitude, i.e., the overall indicator of a positive attitude is 84%. The degree of agreement on a number of statements about small-scale RES is also at a very high level:

- *"Installing a RES power plant in your own household will increase the reliability of your own energy supply" (92%);*
- *"Installation of a RES power plant in the household will help reduce electricity bills" (89%);*
- *"The development of distributed generation in Ukraine can strengthen the country's energy independence" (86%);*
- *"The development of distributed generation in Ukraine can strengthen the energy independence of my community" (86%).*

Installation and use of distributed generation

A prerequisite for being able to install RES in a household is the availability of information on how to do it. Respondents believe the situation with information is far from the best: only 15% believe that information is widely available and sufficient. The approximate majority (44%) believe that the information is available, but it is not widely available, that is, you need to know where and how to find it.

Regarding the prospect of installing a RES power plant or heat supply system in their own household, the majority of respondents (57%) said that they “haven't thought about it yet” or “no.” Another 26% and 29% of respondents are thinking about the possibility of installing heating systems or RES power plants. The shares of those who have already installed these systems are 7% and 2% of the sample, respectively.

The share of respondents who are favourable to the idea of installing RES systems in the household (that is, those who did not choose the answer “no,” “did not think about it” or “it is difficult to say”) is 42%. Under the condition of providing compensation, the share of Ukrainians who are ready to consider the idea of installing RES in the household increases to 69% (because among those who have not yet installed RES, the share of those who are ready to think about this option, provided there are mechanisms for partial compensation of the cost of installing RES systems through money or equipment, is 63%).

Among the types of RES power plants or heat supply systems, solar panels are the undisputed leader. It is this type of RES power plant that most respondents would like to have in their households.

Among the reasons for reluctance to install RES systems in the household, the expected leader is the high cost. This is especially true of solar panels. 35% of those who do not want to install these systems appeal to this reason. In addition to cost, among the reasons for reluctance to install heating systems (both alternative fuel boilers and heat pumps), the reluctance to change something in the heating system is often cited as a reason. In addition, a significant number of respondents indicate that they know little about heat pump technology.

Most often, residents of multi-apartment buildings refuse small wind turbines, because they do not see the possibility of using this technology.

Respondents can most often get an example of RES use in communities in other households because it is often there that RES systems are installed. About every third respondent says so. RES systems are installed much less often at public or commercial facilities.

Use of RES capacities during power outages

Indicators of the presence and frequency of episodes of lack of electricity supply vary greatly in different regions, so it is pointless to analyse indicators by sample.

Residents of the Ivano-Frankivsk, Ternopil, and Odesa regions suffered the least from the lack of electricity supply: since the beginning of the large-scale invasion on 24 February 2022, they have experienced mostly isolated episodes lasting up to 3 hours, and a large proportion of the population in these regions (46%, 38% and 34% respectively) have not experienced a power outage at all.

On the contrary, among residents of the border regions (Chernihiv and Sumy), almost all respondents faced power outages. Thus, only 9% and 8%, respectively, declared the absence of such outages. What's more, it was in these regions that a large part of episodes of lack of electricity supply lasted over 24 hours.

A significant number of respondents have not used any electrical appliances and sources of electricity supply during the power outage. This behaviour is especially characteristic of residents of the Ternopil region, where power outages were single and short-term. But even among the residents of Sumy, Mykolaiv and Chernihiv regions, which suffered from the lack of electricity the most, the share of answers "did not use any sources of electricity supply" is 60%, 61% and 59%, respectively.

Ukrainians do not perceive RES systems as an emergency source of power supply in the event of a power outage. Only 2% of respondents mentioned that they used electricity provided by RES power plants. Among the sources of power supply in the event of a power outage, batteries and power banks are in the first place, and lanterns are in second place. Gasoline or diesel generators are most common in the Kyiv region, 35% of respondents used them. It is worth noting that for the rest of the regions, the level of use of generators is much lower and does not exceed 15%.

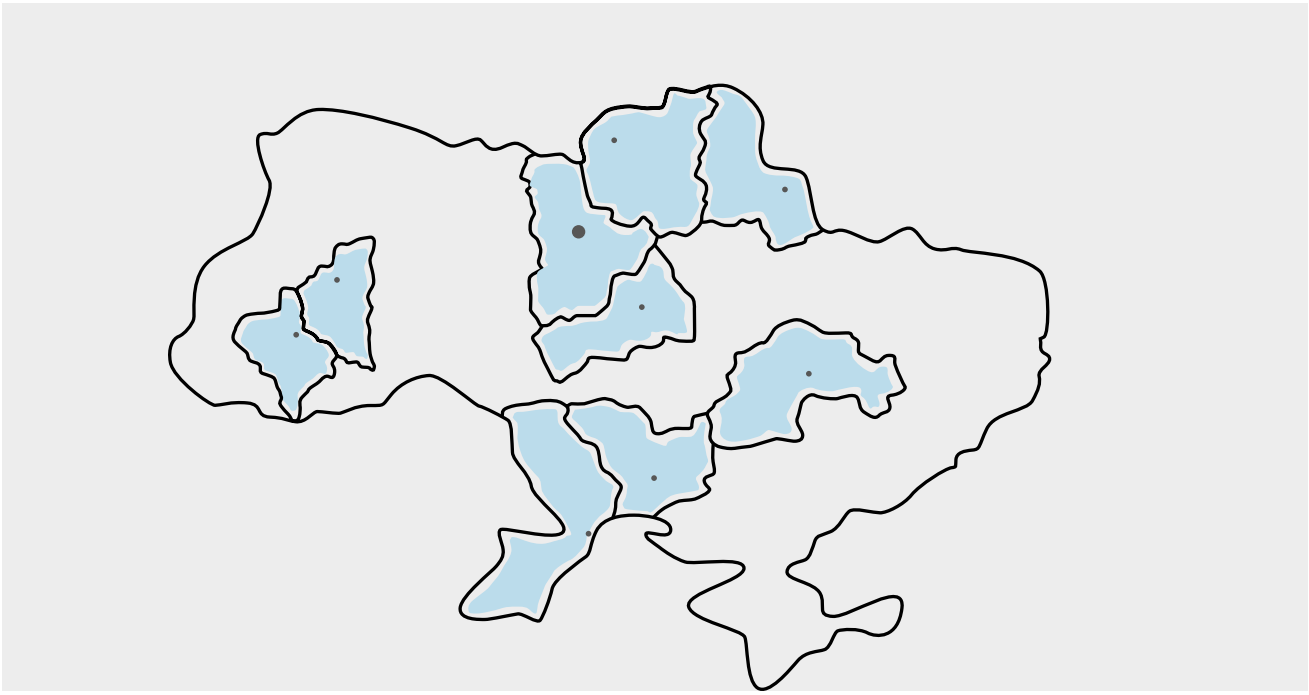
METHODOLOGY

As part of the research, a nationally representative survey of the target audience was conducted. A total of 936 telephone interviews were conducted with the target audience, namely with adult residents of different regions of Ukraine (at least 100 interviews in each region):

- Ivano-Frankivsk (102 interviews);
- Ternopil (105 interviews);
- Chernihiv (105 interviews);
- Kyiv[1] (105 interviews);
- Sumy (102 interviews);
- Dnipropetrovsk (103 interviews);
- Odesa (108 interviews);
- Mykolaiv (103 interviews);
- Cherkasy (103 interviews).

Sampling is disproportionate and random; calls were made to randomly generated cell phone numbers. For the sample analysis, the data were re-weighted taking into account the population in the target regions according to the data of the State Statistics Service of Ukraine as of January 2022.

The survey was conducted using **computerized telephone interviews**. The survey was conducted in **September 2022**.



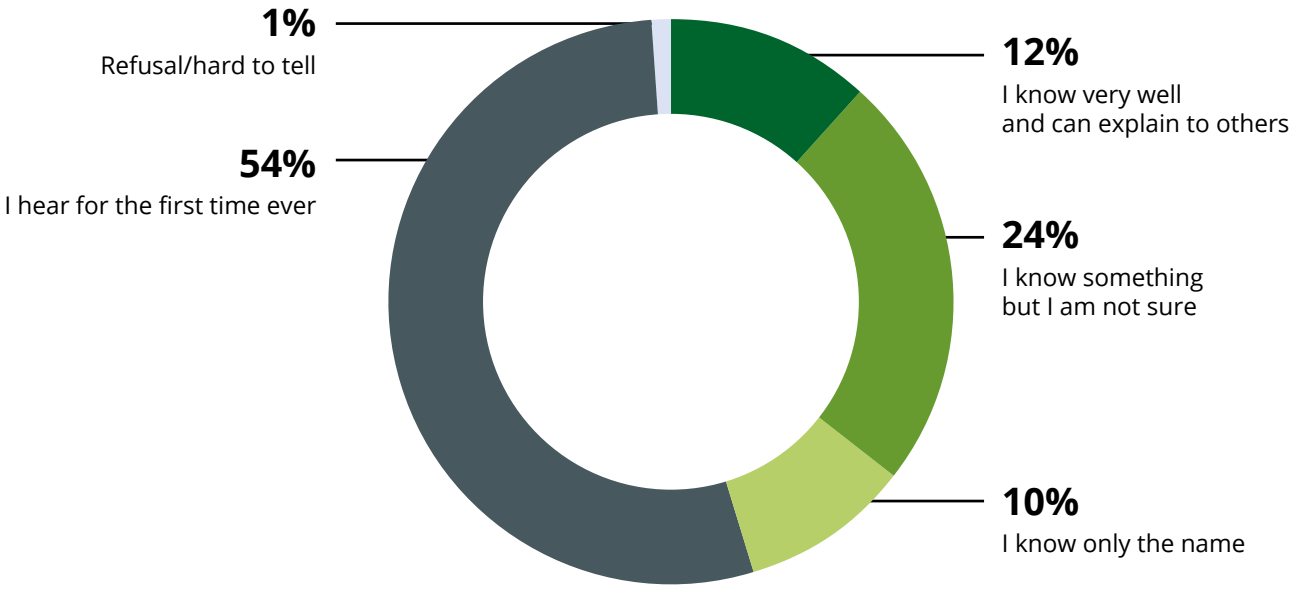
1 Not including residents of the city of Kyiv

RESEARCH RESULTS

The attitude of the Ukrainian population to renewable energy sources

Respondents are not familiar with the abbreviation RES or even its full name, i.e. “renewable energy sources” (Figure 1). More than half of the respondents (54%) admitted this is the first time they hear this phrase. Almost every fourth respondent (24%) knows something but hesitates about the correctness of their knowledge. Only 12% know about RES so well that they can explain it to others.

Figure 1. How familiar are you with the principle of RES operation?

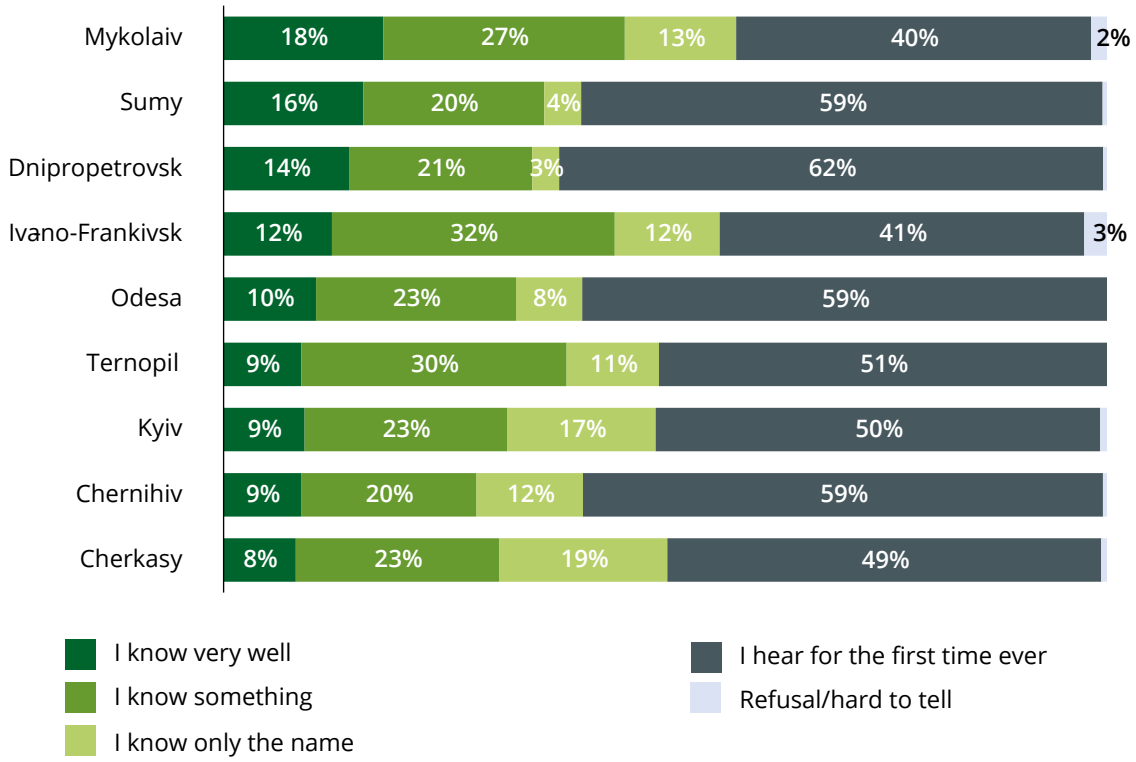


The lowest level of awareness was recorded in the Sumy, Dnipropetrovsk, Odesa and Chernihiv regions: the share of those who first heard the phrase “renewable energy sources” during the survey is almost 60% (Figure 2).

However, at the same time, in the Sumy and Dnipropetrovsk regions, one of the highest indicators of the “I know very well and can explain to others” option, which was chosen by 16% and 14% of the residents of these regions, respectively.

The best knowledge of renewable energy resources is in the Mykolaiv region: the largest share of those who “Know very well…” (18%) and at the same time the lowest share of those who “Hear about it for the first time” (40%).

Figure 2. How familiar are you with the principle of RES operation? [by regions]



The level of knowledge also varies by gender (Table 1): the share of those who "Hear about it for the first time" among men and women is 48% and 59%, respectively. The quality of knowledge varies even more: the share of those who "Know very well…" among men and women is 19% and 6%, respectively (a three-fold difference!).

Table 1. How familiar are you with the principle of RES operation? [by gender and age]

	Total	Male	Female	18-24 years	25-34 years	35-44 years	45-54 years	55-65 years	Over 65 years
Know very well and can explain to others	**12%**	19%	6%	29%	10%	11%	14%	10%	8%
Know something but I am not sure	**24%**	24%	24%	17%	26%	24%	25%	26%	21%
Know only the name	**10%**	9%	11%	17%	8%	11%	9%	9%	8%
Hear for the first time ever	**54%**	48%	59%	36%	56%	53%	51%	53%	63%
Refusal/hard to tell	**1%**	1%	1%	0%	0%	1%	1%	1%	1%

For instance, in the process of developing the communication campaigns, the term “renewable energy sources” should only be used in materials aimed at the youth audience. For the rest of the population, it is worth citing specific types of RES technologies that they know much better (Figure 3).

Youth is the main driver of knowledge about RES in communities: among respondents aged 18-24, the share of those who are well informed is 29%, and among students it is 64%!

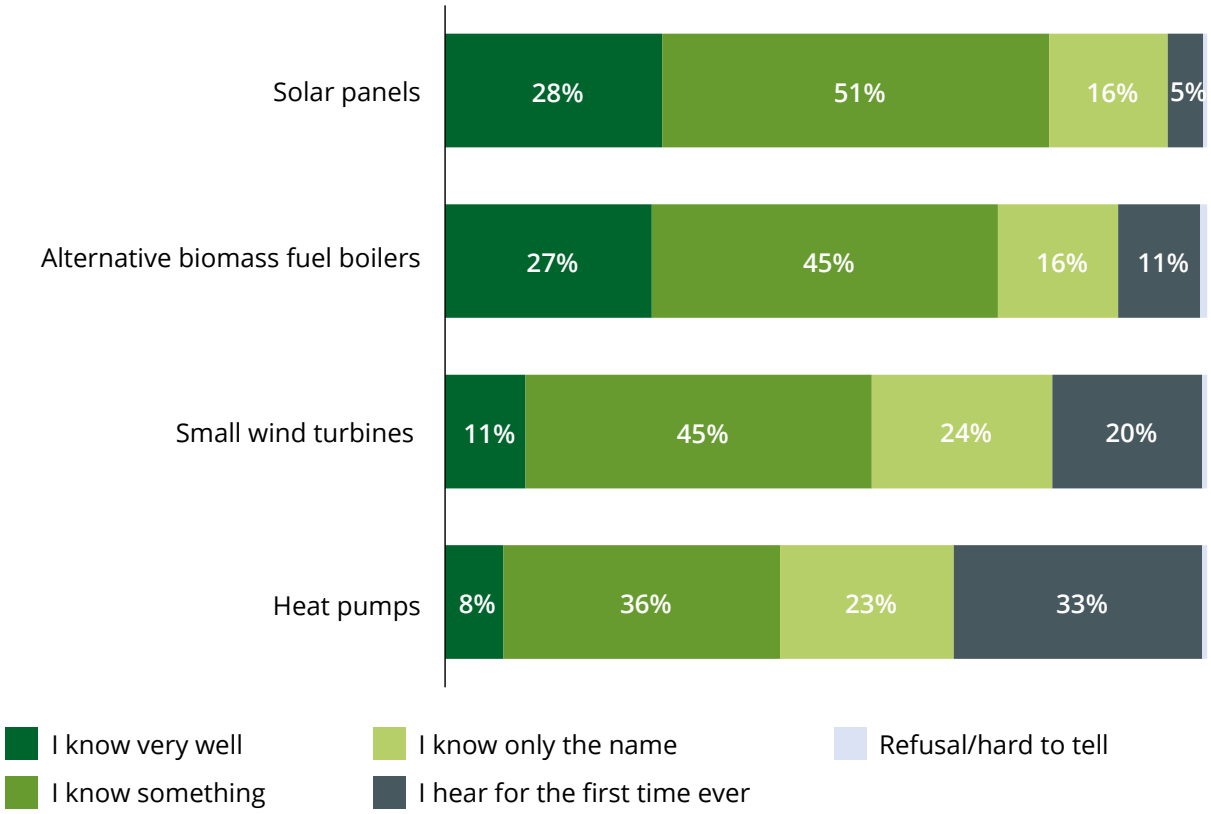
95% of the population has at least heard of solar panels, and 28% know about them very well. Solar panels are the leader in terms of knowledge among other RES technologies.

The second place is occupied by alternative fuel boiler houses. 88% of respondents have at least heard of them (the share of those who are well aware is 27%).

Less is known about small wind turbines: 80% have at least heard of them, and only 11% are well aware.

Heat pump technology closes the ranking with a total knowledge rate of 67% and a share of well-informed people of 8%.

Figure 3. How familiar are you with RES technologies?



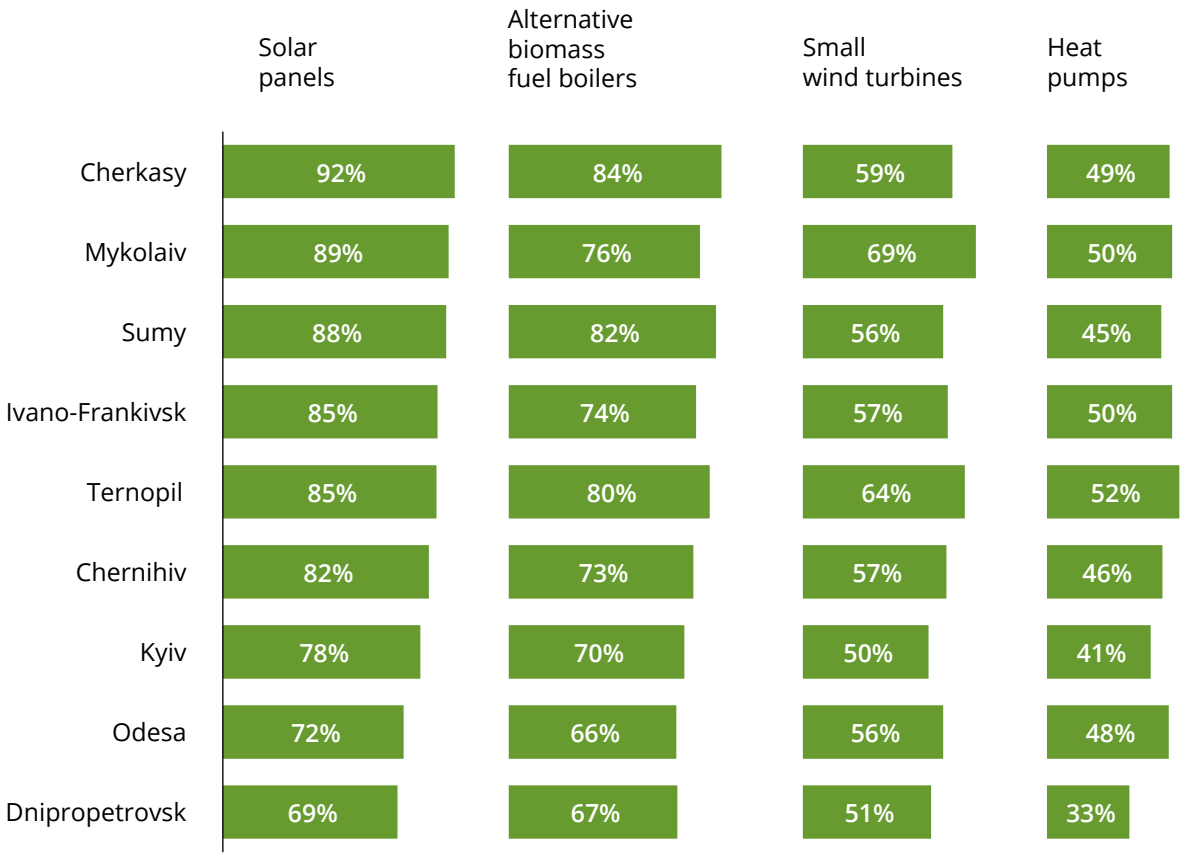
Among the target regions, the highest level of awareness of solar panels and alternative fuel boilers was recorded in the Cherkasy region: 92% and 84% are well or somewhat aware of these two technologies, respectively (Figure 4).

It should be noted that in the Cherkasy region, residents know about technologies, but do not know their general name: the region ranks last in terms of the level of knowledge about RES.

Residents from the Mykolayiv region are best informed about small wind turbines (69% know well or something). Residents of the Ternopil region (52%), as well as the Ivano-Frankivsk and Mykolaiv regions, know best about heat pumps (50% know well or something).

The lowest level of knowledge of all technologies was recorded in the Dnipropetrovsk region.

Figure 4. How familiar are you with RES technologies? [by regions]



For most technologies, the main drivers of knowledge are men and youth (Table 2). The answer "Know very well" was chosen among men and women in such a manner:

- solar panels (35% and 23%, respectively);
- alternative fuel boilers (29% and 25%, respectively);
- small wind turbines (18% and 5%, respectively);
- heat pumps (11% and 5%, respectively).

Among young people under 24 and students, the share of those who are well-informed about technologies is the following:

- solar panels (54% and 57%, respectively);
- alternative fuel boilers (21% and 19%, respectively);
- small wind turbines (30% and 57%, respectively);
- heat pumps (4% and 5%, respectively).

Therefore, only knowledge about heat pumps is mostly common among older people (14% among respondents aged 45-54).

Table 2. How well do you know these RES technologies? [by gender and age]

	Total	Male	Female	18-24 years	25-34 years	35-44 years	45-54 years	55-65 years	Over 65 years
Solar panels									
Know very well and can explain to others	**28%**	35%	23%	54%	32%	31%	31%	22%	16%
Know something but I am not sure	**51%**	46%	55%	33%	59%	57%	58%	61%	28%
Know only the name	**16%**	17%	14%	11%	4%	10%	6%	11%	46%
Hear for the first time ever	**5%**	2%	7%	2%	4%	1%	5%	5%	10%
Refusal/hard to tell	**1%**	0%	1%	0%	0%	2%	0%	0%	1%
Boiler houses/boilers using alternative types of biomass fuels									
Know very well and can explain to others	**27%**	29%	26%	21%	30%	29%	32%	33%	16%
Know something but I am not sure	**45%**	46%	45%	53%	55%	46%	47%	44%	35%
Know only the name	**16%**	17%	14%	5%	10%	10%	14%	13%	36%
Hear for the first time ever	**11%**	7%	14%	22%	5%	14%	7%	9%	13%
Refusal/hard to tell	**1%**	1%	1%	0%	1%	2%	1%	1%	1%

Small wind turbines									
Know very well and can explain to others	**11%**	18%	5%	30%	8%	12%	11%	7%	5%
Know something but I am not sure	**45%**	42%	48%	44%	49%	45%	54%	50%	31%
Know only the name	**24%**	26%	22%	6%	19%	25%	19%	22%	40%
Hear for the first time ever	**20%**	13%	25%	20%	24%	16%	16%	20%	22%
Refusal/hard to tell	**1%**	1%	0%	0%	0%	1%	0%	1%	2%
Heat pumps									
Know very well and can explain to others	**8%**	11%	5%	4%	7%	9%	14%	8%	2%
Know something but I am not sure	**36%**	37%	36%	41%	41%	38%	39%	35%	27%
Know only the name	**23%**	27%	19%	10%	17%	22%	21%	26%	33%
Hear for the first time ever	**33%**	25%	38%	44%	34%	30%	26%	31%	38%
Refusal/hard to tell	**1%**	0%	1%	0%	0%	2%	0%	0%	1%

However, if we take into account the respondents who have at least heard about RES or specific technologies, their share will be 98% of the sample. That is the population of Ukraine can be considered at least minimally knowledgeable.

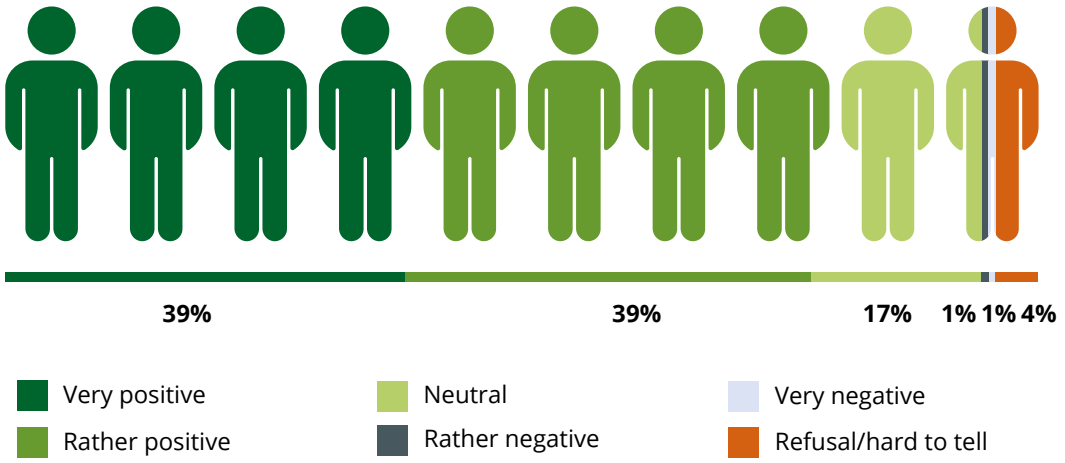
We asked these respondents the question about their attitude to RES.

The attitude towards renewable energy sources in Ukraine is positive: 78% have a very positive or rather positive attitude, i. e. equally for each answer option (Figure 5).

The share of respondents who have a negative attitude is 1.4%. Another 21% have a neutral attitude or are hesitant to answer.

The attitude towards renewable energy sources in Ukraine is positive: 78% have a very positive or rather positive attitude

Figure 5. What is your personal attitude to RES?



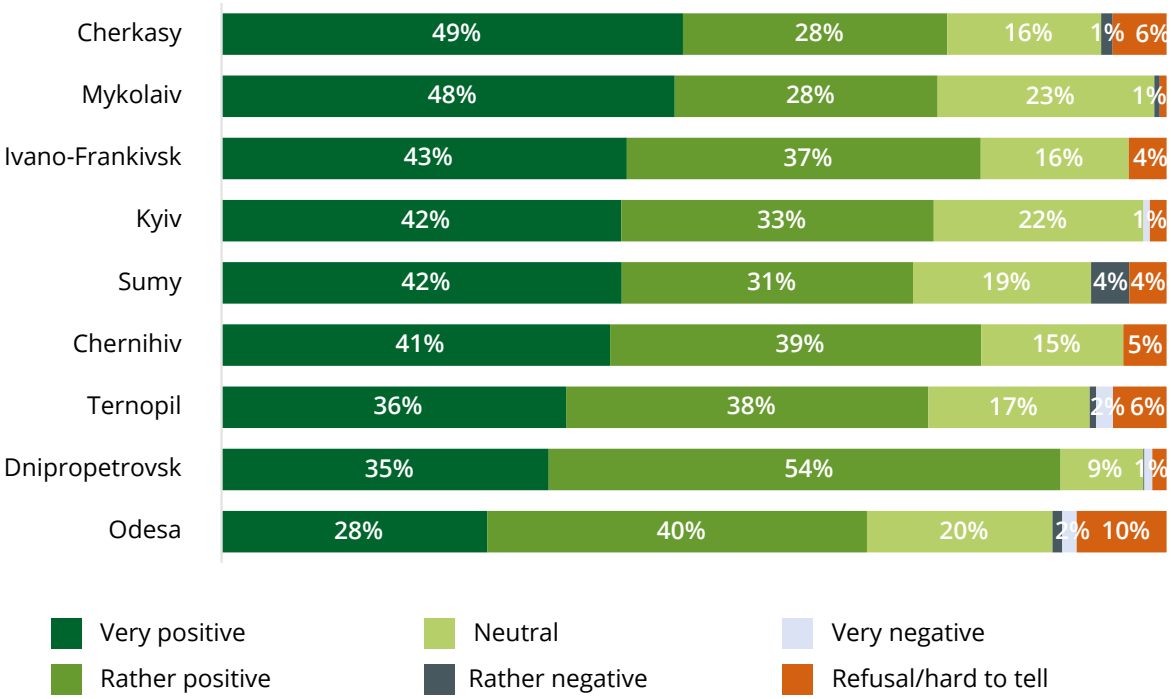
RES technology is well-regarded in all regions (Figure 6).

The highest level of "very positive" attitude was recorded in the Mykolaiv and Cherkasy regions (48% each, that is, almost half of the population has a very positive attitude). We have to note that this indicator correlates with the level of knowledge about distributed generation technologies.

The Dnipropetrovsk region is the leader in terms of the sum of indicators ("very positive" and "rather positive") — 89% of residents expressed a positive attitude.

The largest share of negative attitudes (4%) was recorded in the Sumy region.

Figure 6. What is your personal attitude to RES? [by regions]



Respondents were asked to rate whether they agree with four statements about RES:

- "Ukraine should reduce the use of fossil fuels (coal, oil and natural gas) as much as possible and increase the production of electricity from renewable energy sources";
- "Ukraine should abandon the construction of new nuclear power units and gradually close nuclear power plants";
- "Ukrainian energy industry should switch to the use of renewable energy sources as much as possible";
- "Ukraine has enough resources for the development of renewable energy sources";

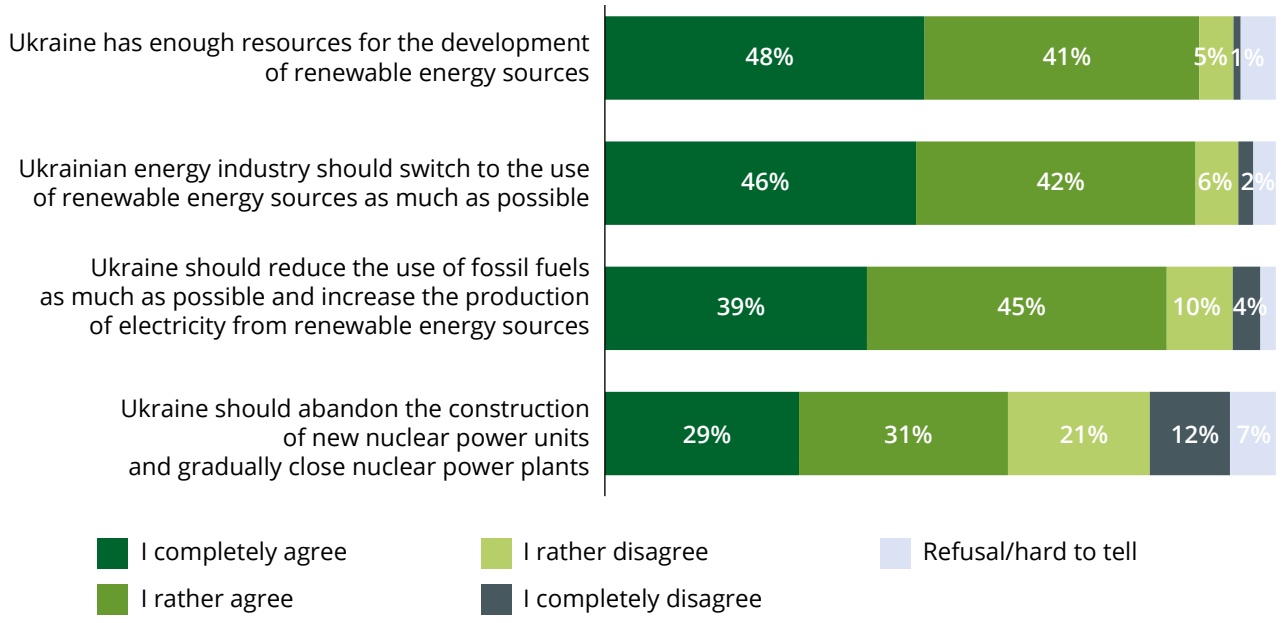
Two statements received the most support: "Ukraine has enough resources for the development of RES" and "Ukraine should switch to the use of RES as much as possible". 88-89% of respondents agree with them (Figure 7).

A slightly smaller share of respondents (84%) agrees that "Ukraine should reduce the use of fossil fuels as much as possible..."

The lowest degree of agreement (60%) was recorded for the statement "Ukraine should abandon the construction of new nuclear power units and gradually close nuclear power plants."

Two statements received the most support: "Ukraine has enough resources for the development of RES" and "Ukraine should switch to the use of RES as much as possible". 88-89% of respondents agree with them.

Figure 7. To what extent do you agree with the outlined statements about RES?

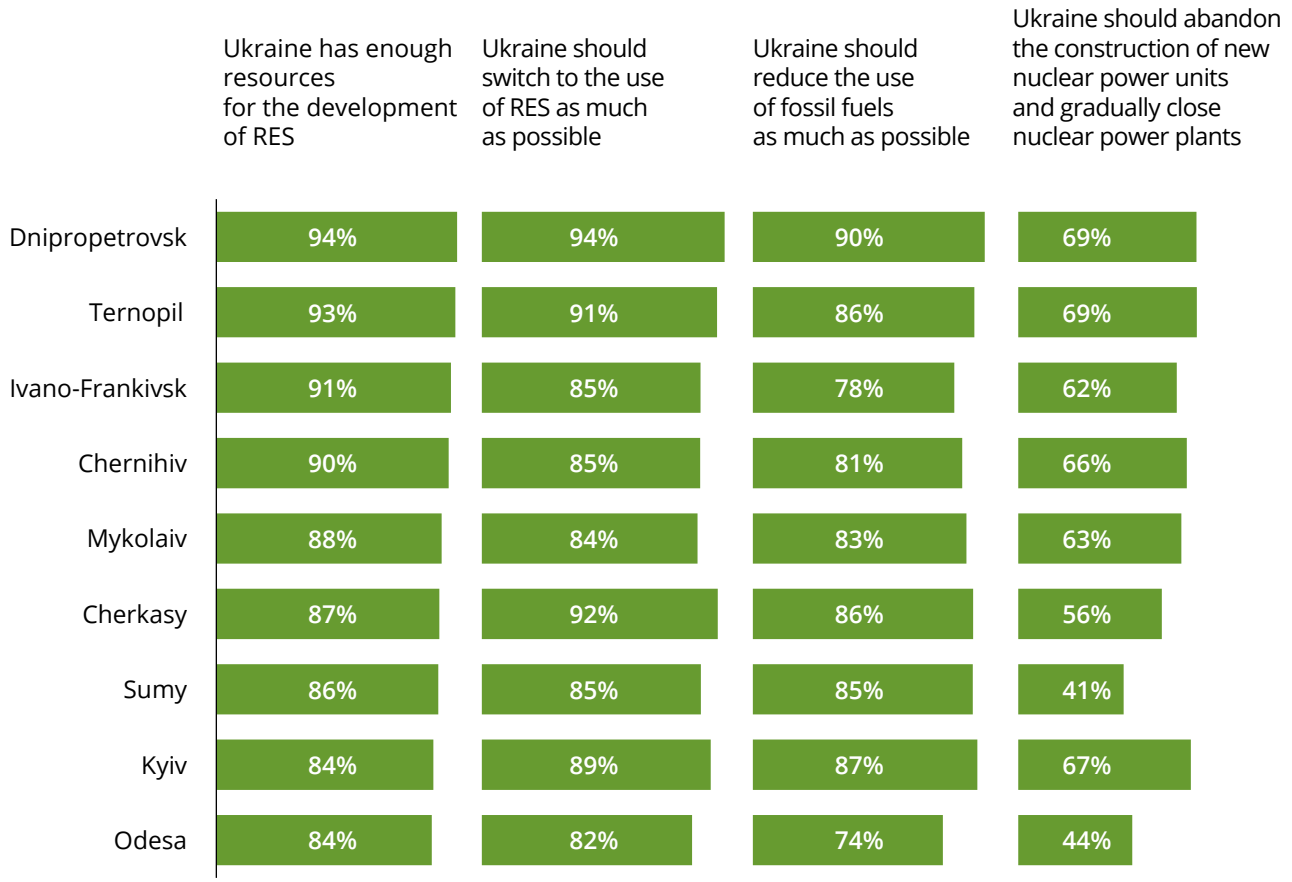


As for the difference in responses by region, no significant difference was recorded for the first three statements (Figure 8).

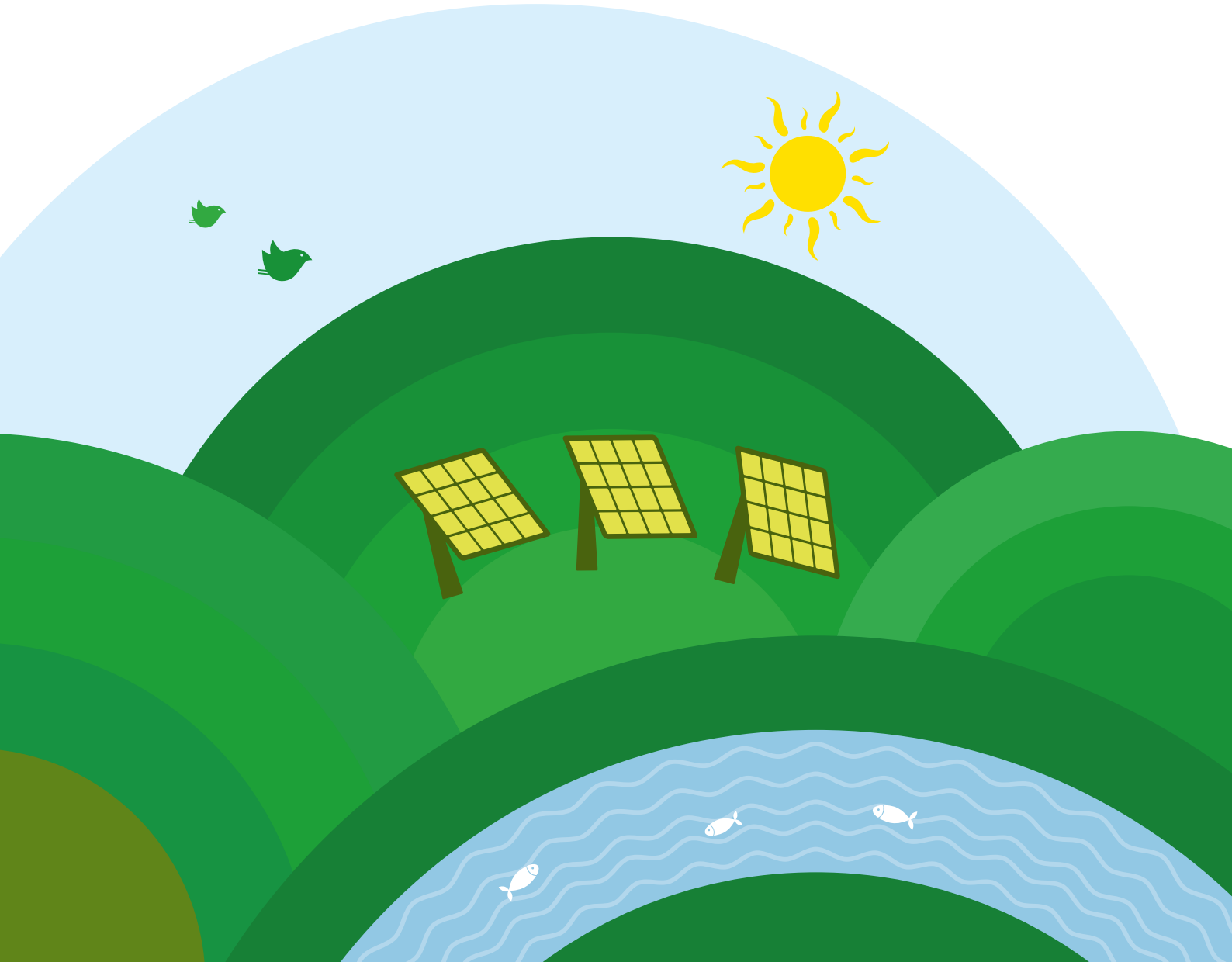
The biggest difference in the opinions of residents of different regions is observed regarding the assessment of the need to reduce nuclear energy. Thus, residents from the Dnipropetrovsk, Ternopil, Chernihiv, and Kyiv regions mostly agree with this (66-69%), in the opinion of residents of the Chernihiv and Kyiv regions, the Chornobyl tragedy of 1986 may influence this.

Residents of the Sumy and Odesa regions oppose the reduction of nuclear energy (41% and 44%, respectively).

Figure 8. To what extent do you agree with the outlined statements about RES? [by regions]



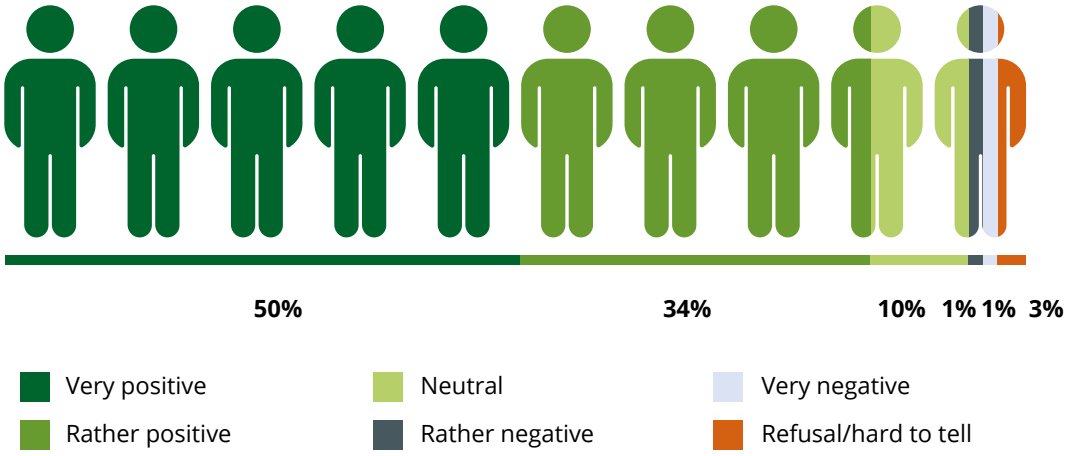
The attitude of the Ukrainian population to distributed generation



The attitude towards distributed generation is even more positive than towards renewable energy sources in general: 50% of respondents have a very positive and 34% have a rather positive attitude (Figure 9). Therefore, the overall indicator of positive attitude is 84% (we should mention that for RES this indicator is slightly lower and is 78%, where 38% have a very positive attitude).

The share of negative attitudes is only 2%.

Figure 9. What is your personal attitude to distributed energy resources?

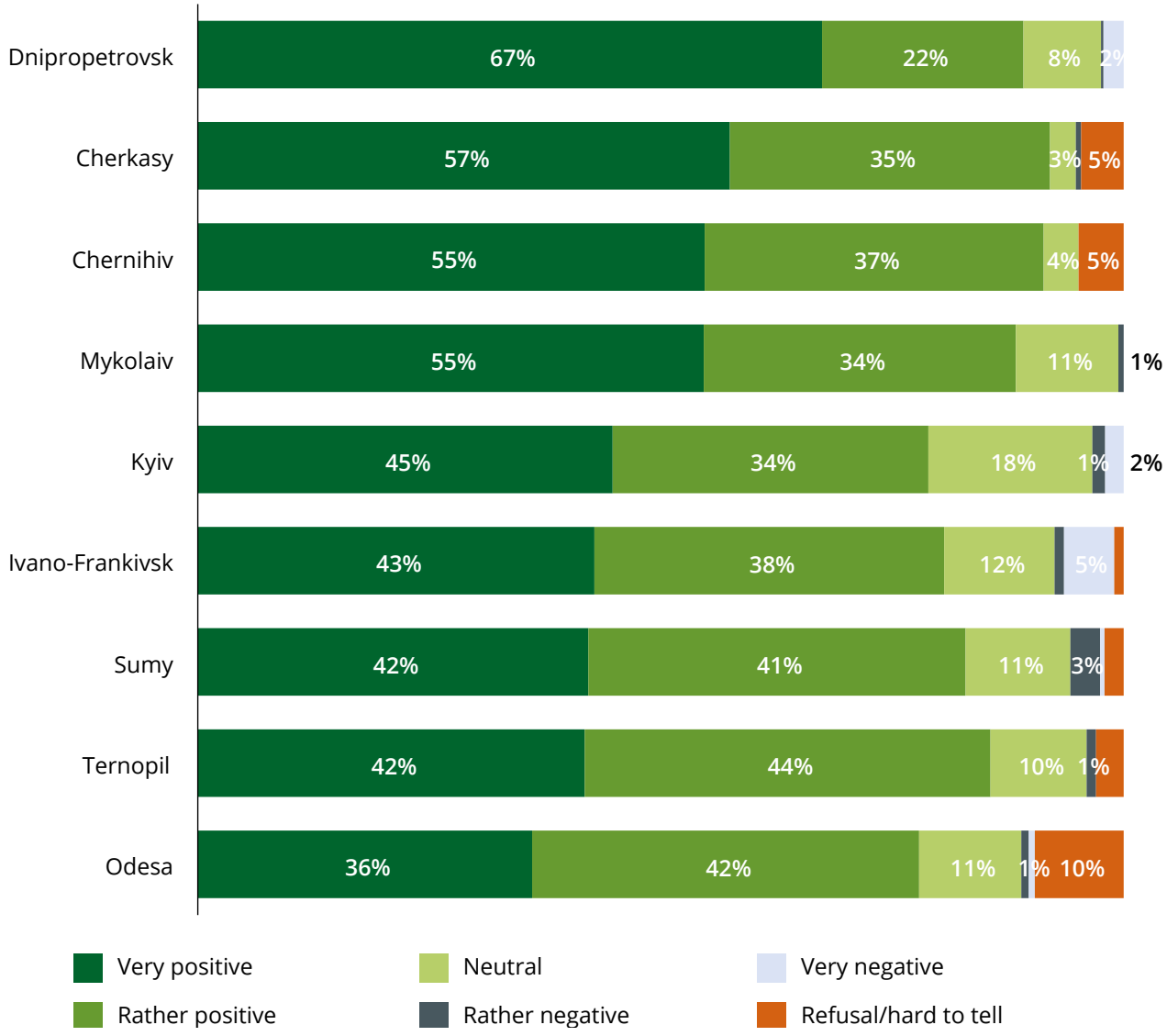


Residents of the Dnipropetrovsk region show the best attitude towards distributed generation, two out of three residents declare a very positive attitude

Residents of the Dnipropetrovsk region show the best attitude towards distributed generation, two out of three residents declare a very positive attitude (Figure 10.). The number of the largest supporters of distributed generation in the Dnipropetrovsk region is almost twice as large as the number of the largest supporters of RES.

Residents of the Odesa region are the most sceptical of distributed generation among other regions, but the share of supporters still significantly outweighs the share of critics: 36% of respondents have a very positive and 42% have a rather positive attitude.

Figure 10. What is your personal attitude to distributed of energy resources? [by regions]

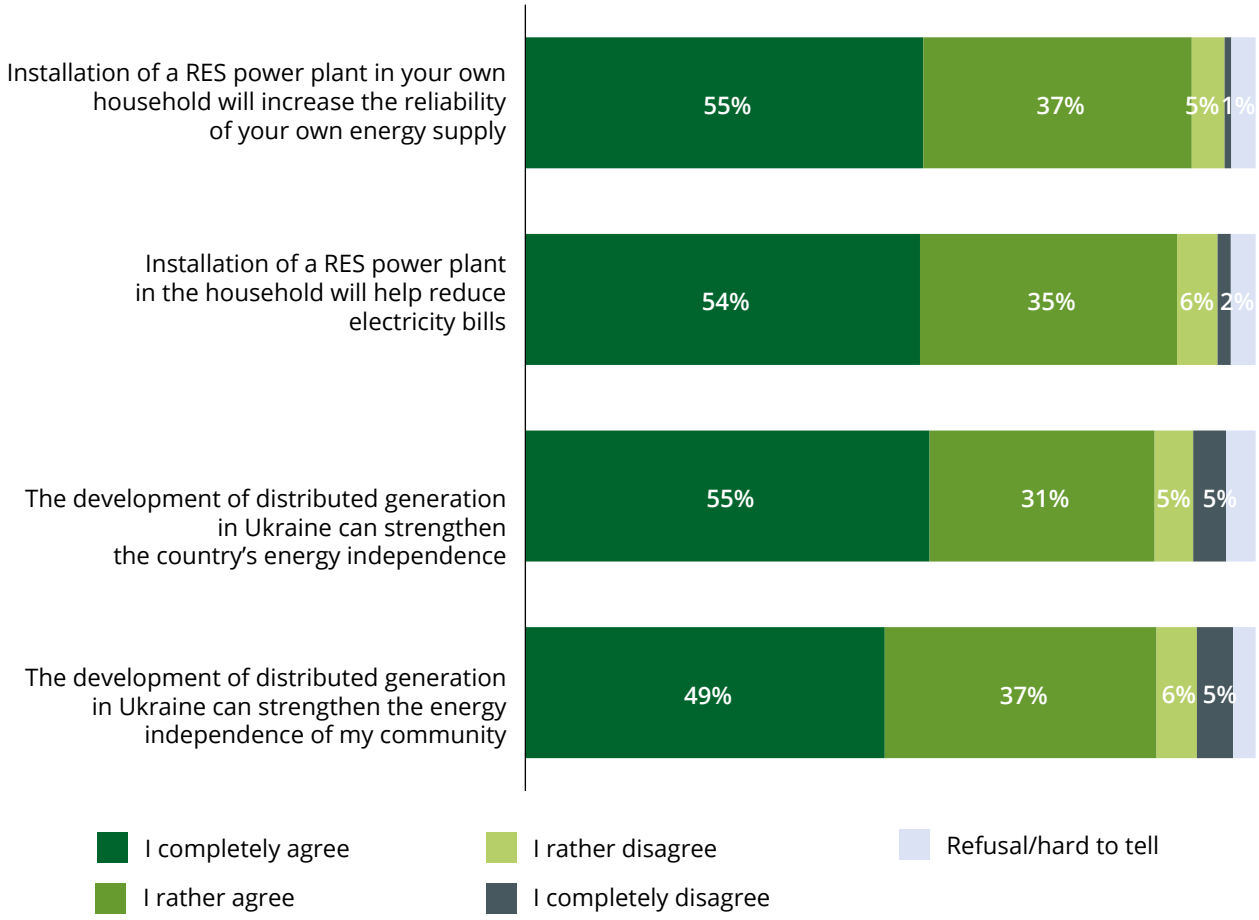


Respondents were asked to rate the degree of agreement with a number of statements about distributed generation:

- "The development of distributed generation in Ukraine can strengthen the country's energy independence";
- "The development of distributed generation in Ukraine can strengthen the energy independence of my community";
- "Installation of a RES power plant in the household will help reduce electricity bills";
- "Installing a RES power plant in your own household will increase the reliability of your own energy supply";

All these statements are supported by the majority of Ukrainians. 86-92% of respondents agree with them (Figure 11).

Figure 11. To what extent do you agree with the outlined statements about distributed energy resources?



The majority of respondents support all four statements, and more than half of the sample strongly agrees with three of them. The statement "The development of distributed generation in Ukraine can strengthen the energy independence of my community" received slightly less support. 49% of respondents fully agree with it.

A significant difference in the degree of support for statements among residents of different regions was also not recorded (Figure 12).

The "Installation of a RES power plant in your own household will increase the reliability of your own energy supply" statement is most supported in the Chernihiv region (98%). "Installation of a RES power plant in the household will help reduce electricity bills" is the most supported in the Sumy region (96%). "The development of distributed generation in Ukraine can strengthen the energy independence of my community" statement is the most supported in the Mykolaiv region (92%), and "The development of distributed generation in Ukraine can strengthen the country's energy independence" statement is the most supported in the Chernihiv region (92%).

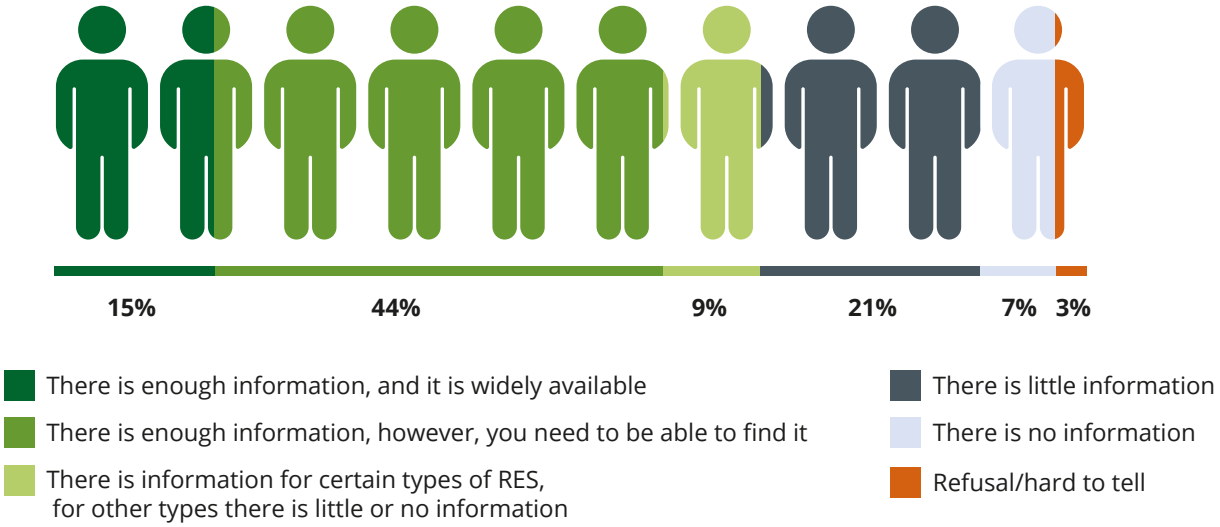
Figure 12. To what extent do you agree with the outlined statements about distributed energy resources? [by regions]

Installation and use of distributed generation

A prerequisite for being able to install RES in a household is the availability of information on how to do it. Respondents believe the situation with information is far from the best (Figure 13).

Only 15% believe that information is widely available and sufficient. The approximate majority (44%) believe that the information is available, but it is not widely available, that is, you need to know where and how to find it. Another 37% believe that there is no information on at least some types of RES, of which 7% categorically state that there is no information.

Figure 13. Do you think there is enough information about how to install a RES power plant or renewable heating system for your own household?



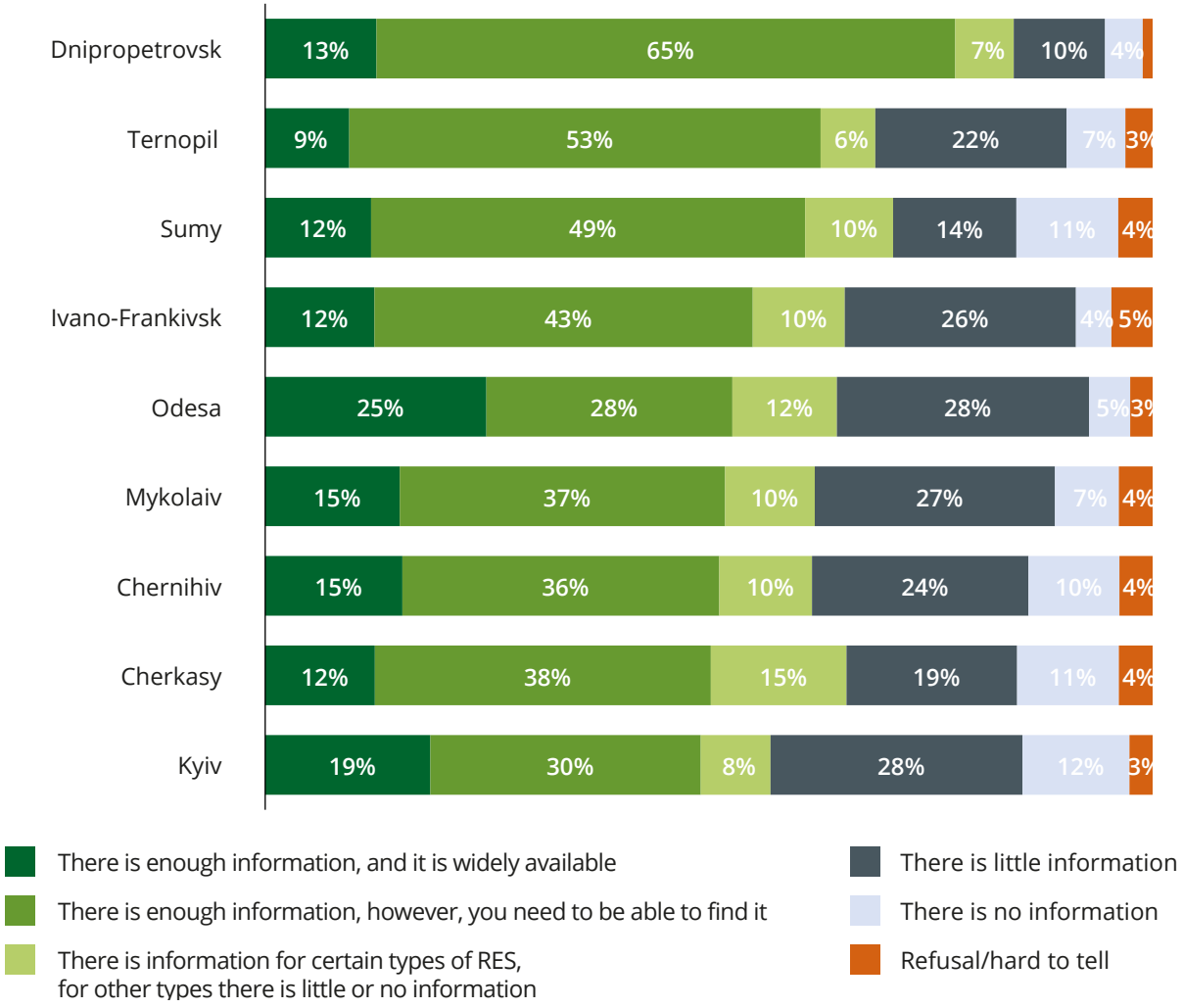
The assessment of the availability of information varies slightly by region (Figure 14). Thus residents of the Dnipropetrovsk region more often than others believe that information is available, you just need to be able to find it (65%). It is due to this group of respondents, the Dnipropetrovsk region is the leader in terms of the share of residents who believe that information is available.

On the other hand, residents of the Odesa region are mostly convinced that information is widely available and sufficient (25%). Another 28% believe that it is necessary to know how and where to find information.

The Kyiv region shows the brightest multi-directional trend. On the one hand, the share of those who believe that information is available and widely available is higher than the sample rate (19%). On the other hand, the Kyiv region has the highest share among all regions of those who claim that there is little information (28%) and those who say that there is no information at all (12%). This is probably due to the fact that the Kyiv region has (as we will see later) the largest share of those who are thinking about installing a heating or power plant with RES technology.

Only 15% believe that information is widely available and sufficient. The approximate majority (44%) believe that the information is available, but it is not widely available, that is, you need to know where and how to find it.

Figure 14. Do you think there is enough information about how to install a RES power plant or renewable heating system for your own household? [by regions]



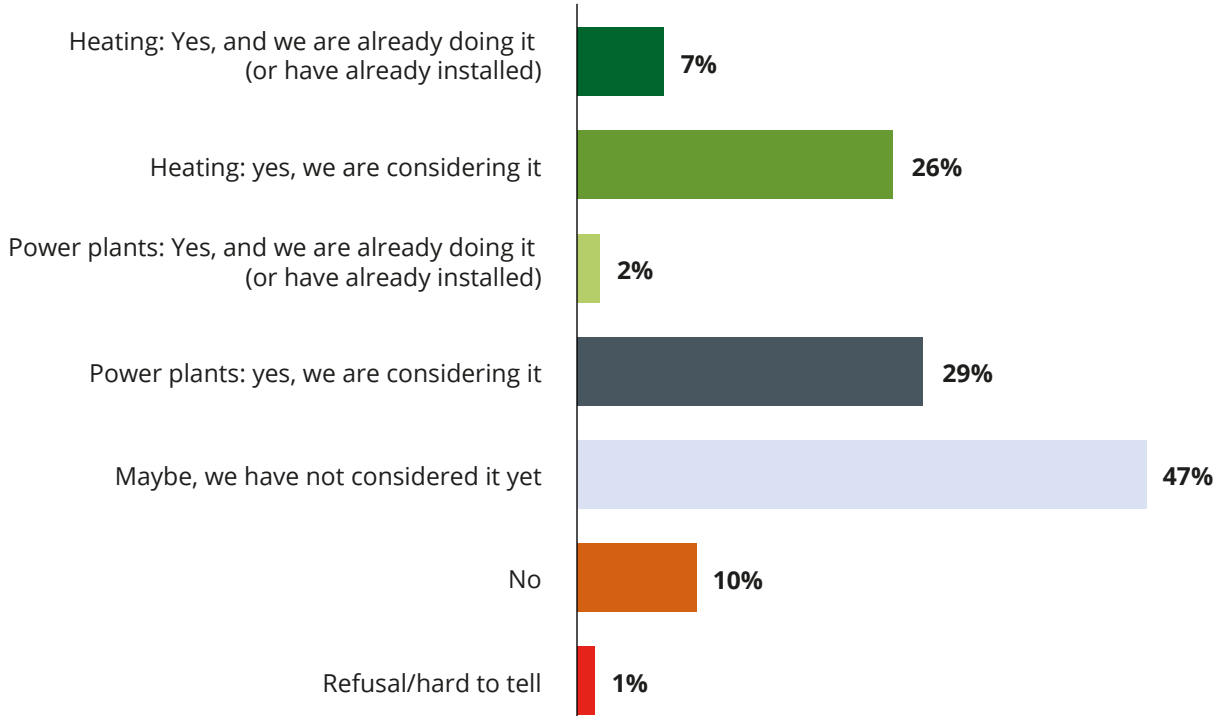
Regarding the prospect of installing electricity generation or heat supply systems based on renewable energy sources in their own household, 57% of respondents said they had "not thought about it yet" or "no" (Figure 15).

The shares of those who have already installed these systems are 7% and 2% of the sample, respectively.

26% and 29% of respondents respectively are thinking about the possibility of installing RES heating systems or power plants. The shares of those who have already installed these systems are 7% and 2% of the sample, respectively.

The share of respondents who are favourable to the idea of installing RES systems in the household (that is, those who did not choose the answer "no," "did not think about it" or "it is difficult to say") is 42%.

Figure 15. Would you personally like to install a RES power plant or heating system in your household?



During the survey, certain regional differences were recorded in the intentions to install RES electricity generation or heat supply systems in respondents' households (Figure 16).

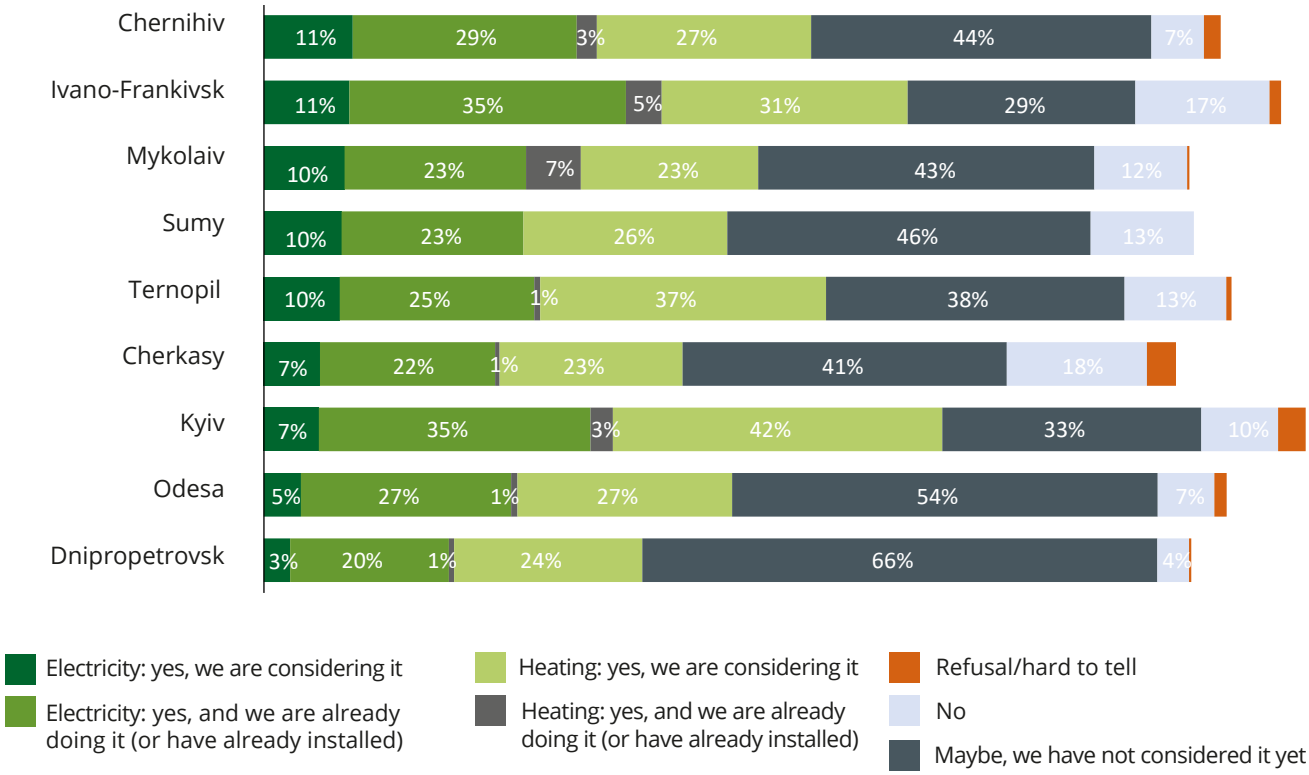
Thus, the greatest chances of installing heating systems are in the Ivano-Frankivsk and Kyiv regions: here, 46% and 42% of respondents have already installed or think about installation, respectively.

Residents of the Kyiv region are also more likely than others to think about installing RES power plants or even have already installed them. The share of these respondents reaches 45%.

In the Kyiv and Ivano-Frankivsk regions, the share of respondents who do not reject the idea of installing RES capacities in the household is more than half of the sample (54% and 52%, respectively). In the Ternopil, Chernihiv and Mykolaiv regions, the share of respondents is 42-48%.

The smallest share of respondents who are ready to think about installing RES heating or power supply systems is in the Dnipropetrovsk region (heating — 23%, power plants — 25%). 30% of respondents do not reject the idea of installing the capacities of renewable energy sources in the household. These indicators correlate with the lowest level of knowledge about RES technologies in this region. We should mention that the low level of knowledge about renewableenergy sources and the low level of desire to have this system in the household is combined with the confidence of the residents of the Dnipropetrovsk region that the information is available, you just need to know how to find it. This indicates the insufficiency of targeted information campaigns.

Figure 16. Would you personally like to install a RES power plant or renewable heating system in your household? [by regions]

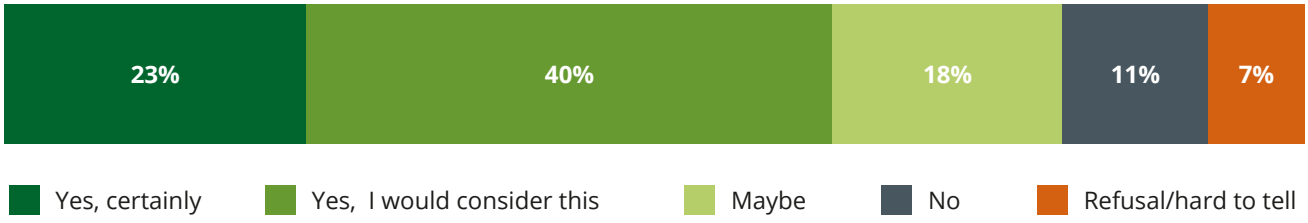


Under the condition of providing compensation, the share of Ukrainians who are ready to consider the idea of installing RES in the household is 69%.

Under the conditions of offering respondents mechanisms for partial compensation of the cost of installing RES systems in the household (with money or equipment), the number of interested people is growing sharply. Thus, among those who have not yet installed RES, 63% are ready to think about it (Figure 17).

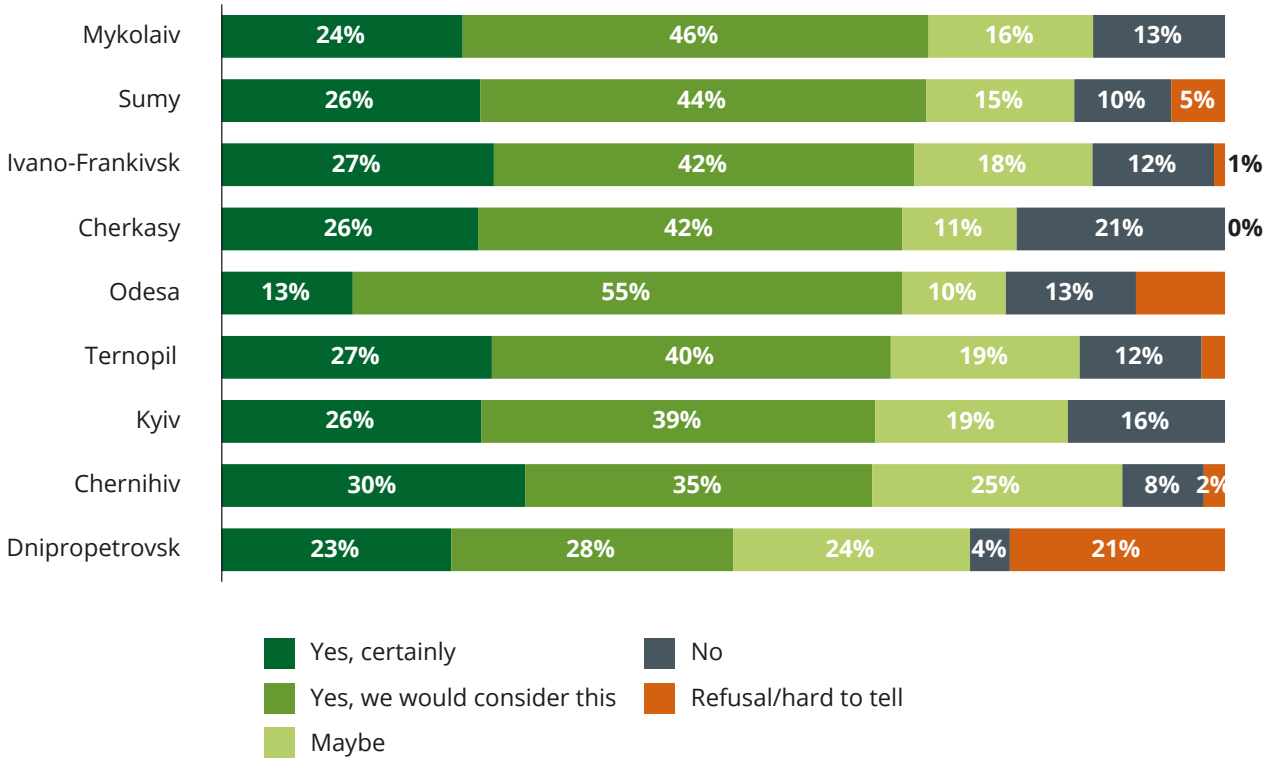
So, under the condition of providing compensation, the share of Ukrainians who are ready to consider the idea of installing RES in the household is 69%.

Figure 17. Would you be willing to install a RES power plant or heating system in your household if you were partially compensated (in money or equipment)?



If analysed by the regions, the Mykolaiv and Sumy regions are the leaders in terms of the prospects for the installation of RES capacities under conditions of partial compensation. The Dnipropetrovsk region is again an outsider, and with a significant difference (Figure 18).

Figure 18. Would you be willing to install a RES power plant or heating system in your household if you were partially compensated (in money or equipment)? [by regions]



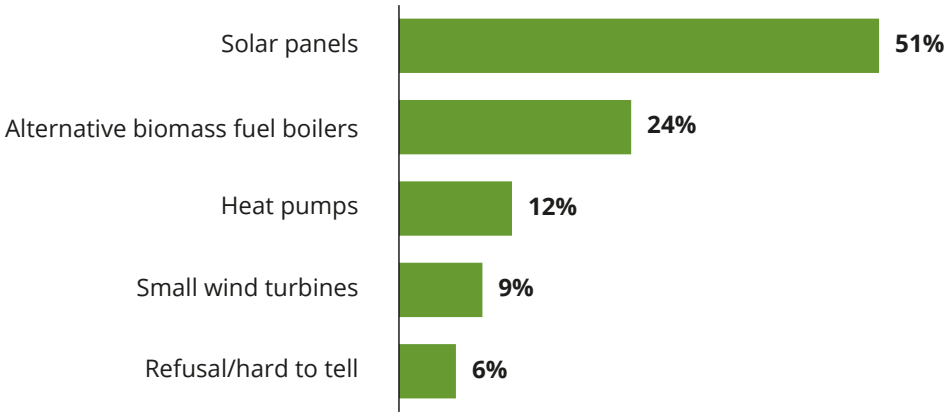
Among RES capacities, solar panels are the undisputed leader, it is this type of renewable energy source that most respondents would like to have in their household (Figure 19). We should mention that it is solar panels that are the leader in terms of knowledge about this renewable energy technology.

However, almost the same number of respondents know about alternative fuel boilers as about solar panels. The number of respondents who have the intention or desire to install boilers lags behind solar panels by two times.

Heat pumps and small wind turbines close the rating of the popularity of RES power plants or heat supply systems with a significant difference.

Among RES capacities, solar panels are the undisputed leader, it is this type of renewable energy source that most respondents would like to have in their household.

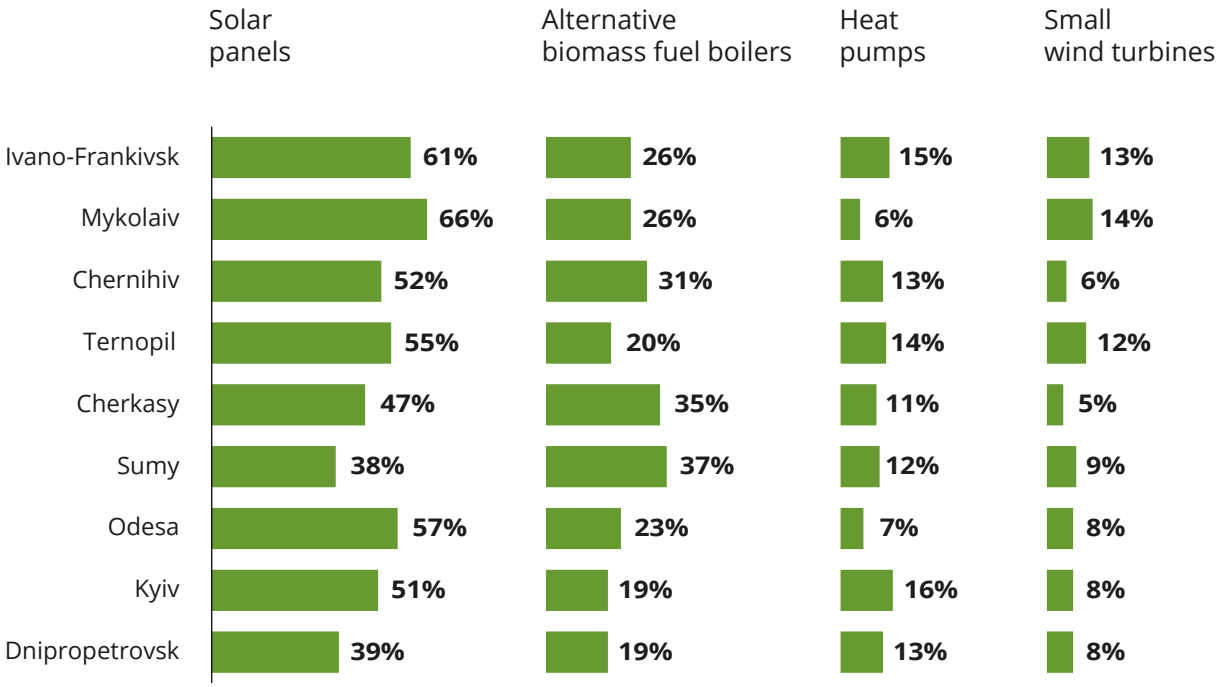
Figure 19. What type of RES power plant or renewable heating system would you install (or have already installed)?



The leadership of solar panels among other RES systems is maintained in all the regions. It is worth noting that in the Sumy region, the gap between solar panels and alternative fuel boilers is minimal. Heat pumps and small wind turbines are anti-rating leaders in all regions as well.

The Ivano-Frankivsk and Mykolaiv regions are leaders in the desire to install certain RES systems (in particular, under the conditions of partial compensation), and the Dnipropetrovsk region closes the ranking.

Figure 20. What type of RES power plant or heating systems would you install (or have already installed)? [by regions]



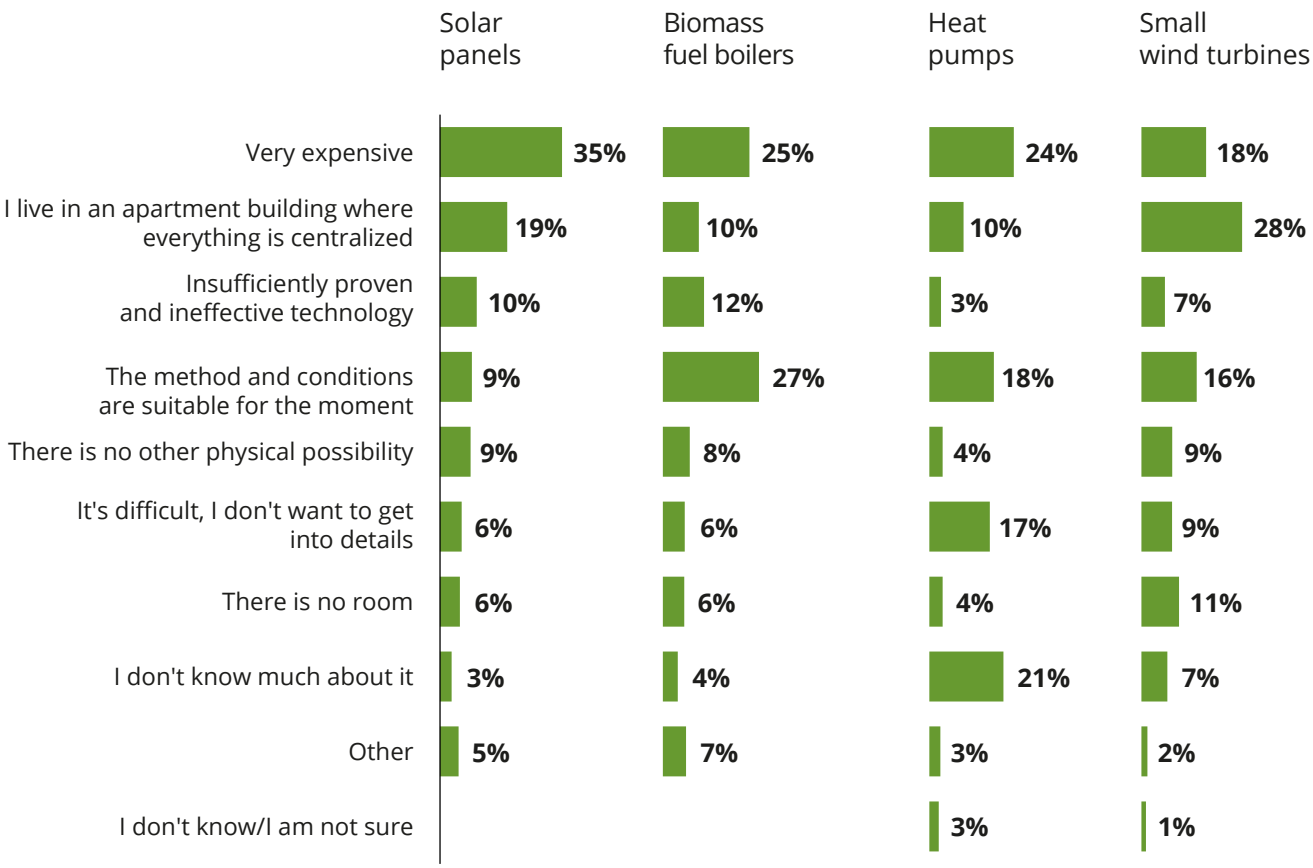
Among the reasons for reluctance to install RES systems in the household, the main one is the high cost, especially with regard to solar panels. 35% of those who do not want to install these systems appeal to this reason (Figure 21).

Among the reasons for reluctance to install boilers on alternative fuel, in addition to cost (25%), the reluctance to change something in the heating system is most often mentioned ("the method and conditions are suitable for the moment", 27%).

Reluctance to change something in the heating system is one of the three main reasons for reluctance to install heat pumps (18%), but a larger share of respondents indicate that they are not familiar with this technology (21%).

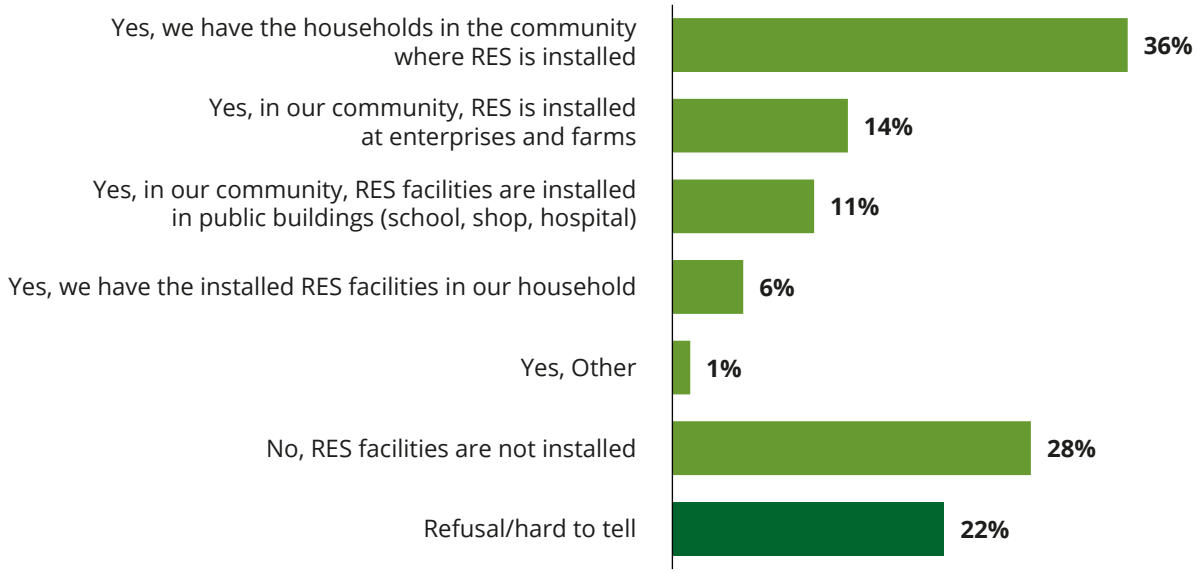
Most often, residents of multi-apartment buildings (28%) refuse small wind turbines, because they do not see the possibility of using this technology.

Figure 21. Why do you deny the possibility of installing a RES power plant or renewable heating system at home?



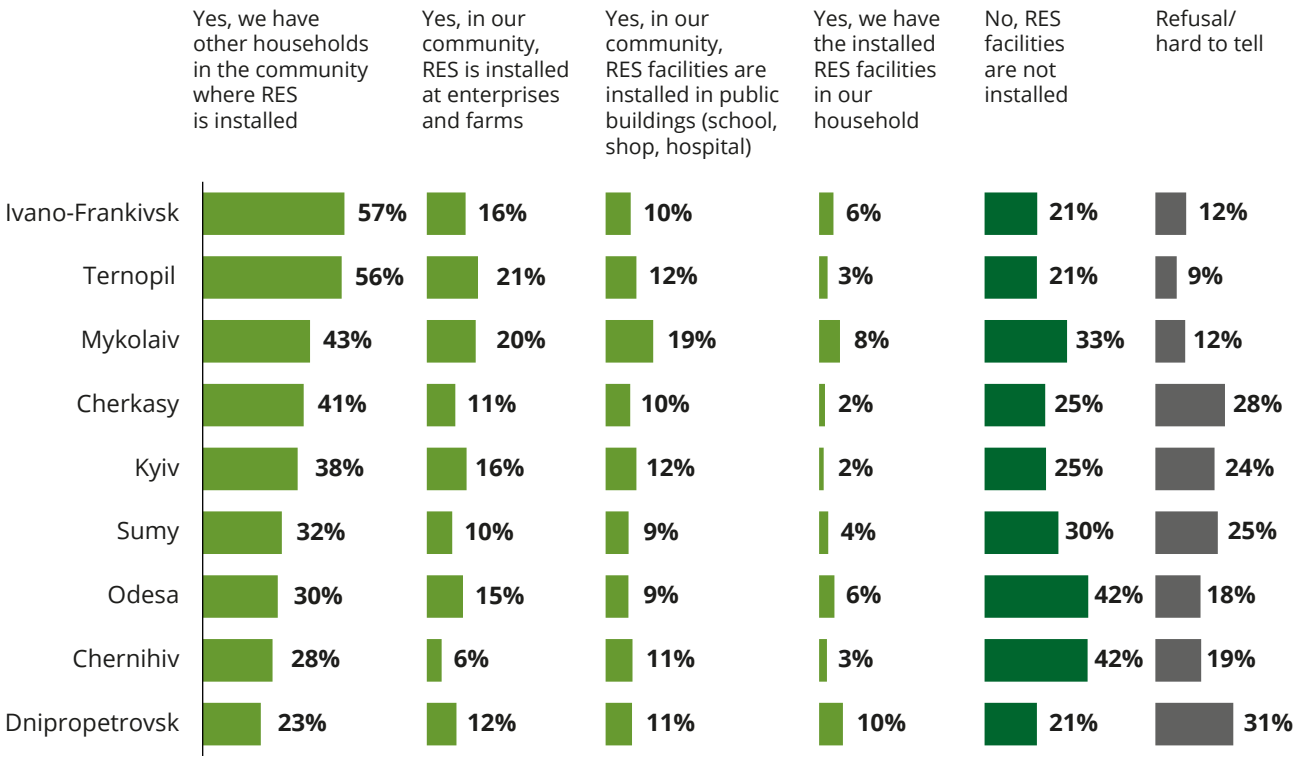
Respondents answered that, most often, RES facilities are installed in other households. About every third respondent says so (Figure 22). RES systems are installed much less often at public or commercial facilities.

Figure 22. Are RES facilities installed in your community?



This trend (leadership of the population in the installation of RES facilities) is observed in all the regions where the research was conducted (Figure 23). Most often, residents of the Ternopil and Ivano-Frankivsk regions indicate that RES systems are installed in households of their communities. Most rarely, RES capacities are installed in the yards in the Dnipropetrovsk and Chernihiv regions.

Figure 23. Are RES facilities installed in your community? [by regions]



Use of RES facilities during power outages

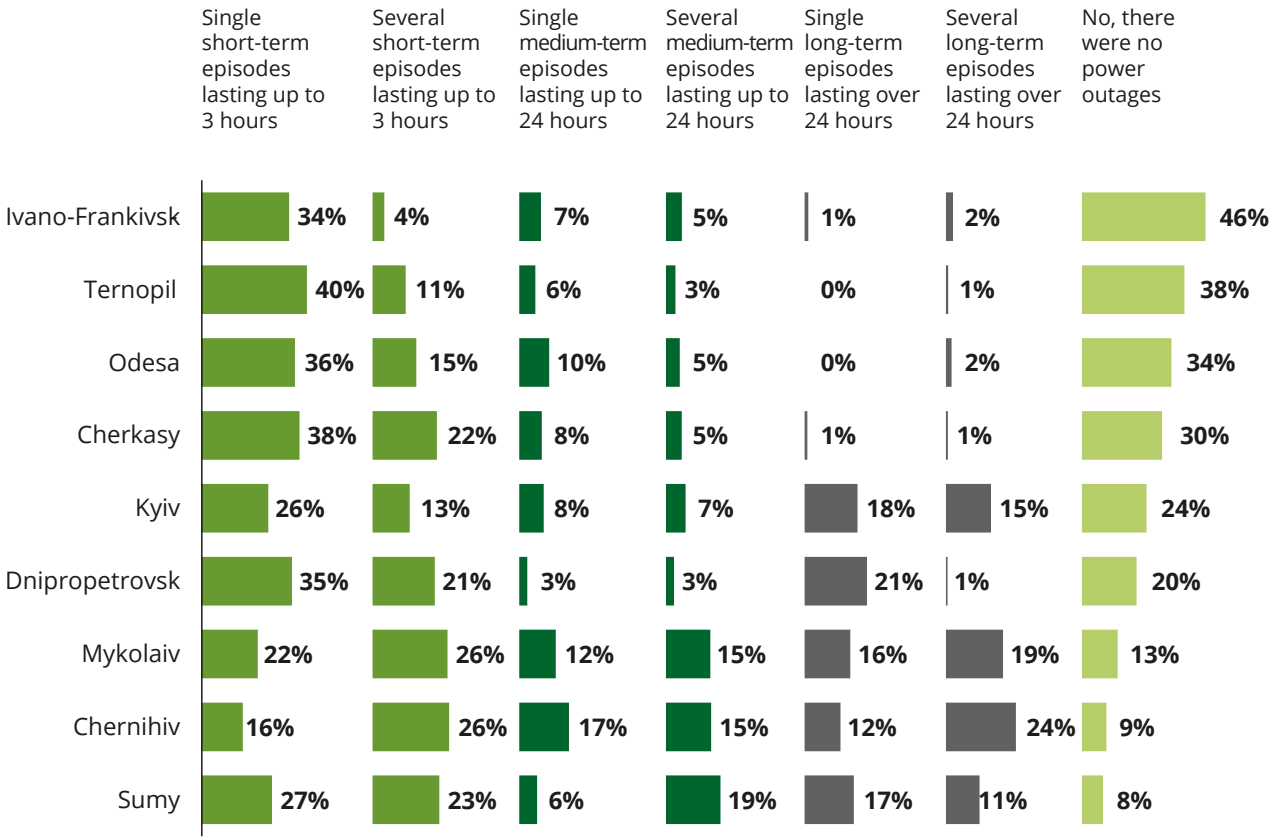
Indicators of the presence and frequency of episodes of lack of electricity supply vary greatly in different regions (Figure 24), so it is pointless to analyse indicators by sample.

Residents of the Ivano-Frankivsk, Ternopil, and Odesa regions suffered the least from the lack of electricity supply: since the onset of the large-scale invasion on 24 February 2022, they have mostly encountered single episodes lasting up to three hours. A significant part of the population of these regions (46%, 38% and 34%, respectively) did not experience a power outage at all.

On the contrary, among residents of the border regions (Chernihiv and Sumy), almost all respondents faced power outages. Thus, only 9% and 8%, respectively, declared the absence of such outages. What's more, it was in these regions that a large part of episodes of lack of electricity supply lasted over 24 hours.

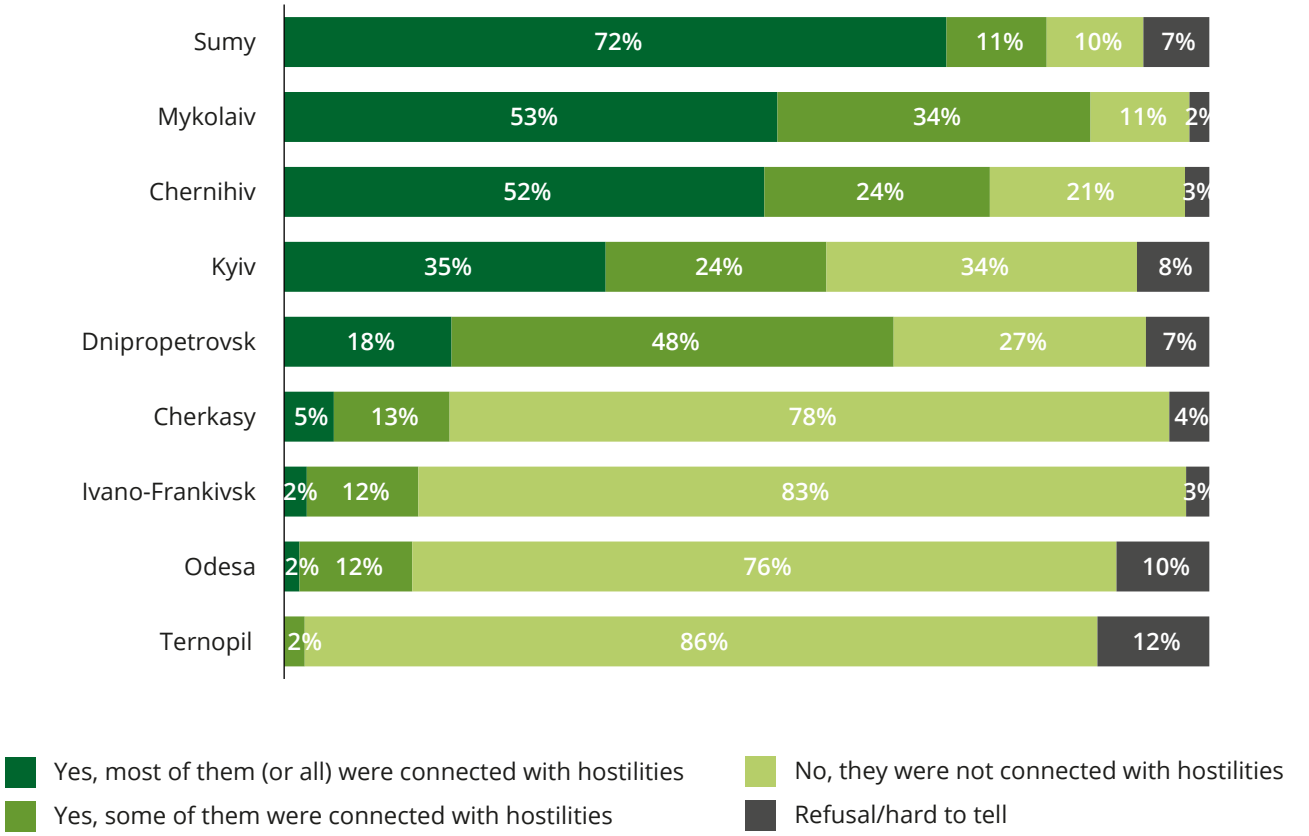
A large number of respondents in the Mykolaiv, Dnipropetrovsk, and Kyiv regions faced long-term power outages.

Figure 24. Have you experienced blackouts in the past six months (since the beginning of Russia's full-scale invasion of Ukraine)? [by regions]



Residents of the Sumy, Mykolaiv, and Chernihiv regions most often associate episodes of power outages with hostilities (Figure 25). They were the ones who suffered the most from power outages.

Figure 25. Were the episodes of power outages related to hostilities in or near the community? [by regions]



A significant number of respondents waited during periods of a power outage, while not using electrical appliances and sources of electricity supply (Figure 26). 79% of residents of the Ternopil region did this (Table 3) if the power outages were one-time and short-term. Even among the residents of Sumy, Mykolaiv and Chernihiv regions, which suffered from the lack of electricity the most, the share of answers “did not use any sources of electricity supply” is 60%, 61% and 59%, respectively.

Among the sources of power supply in the event of a power outage, batteries and power banks are in the first place, and lanterns are in second place. Gasoline or diesel generators are most common in the Kyiv region, 35% of respondents used them. It is worth noting that for the rest of the regions, the level of use of generators is much lower and does not exceed 15%.

A significant number of respondents waited during periods of a power outage, while not using electrical appliances and sources of electricity supply

Figure 26. What sources of power supply did you use during periods of a power outage?

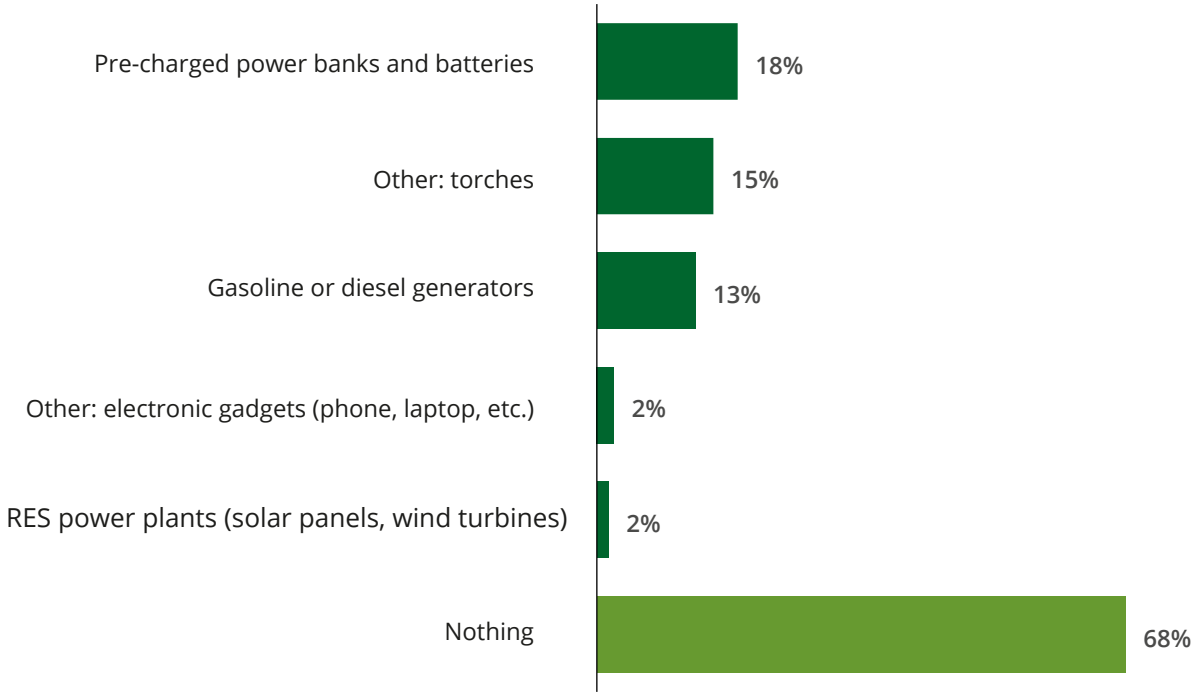
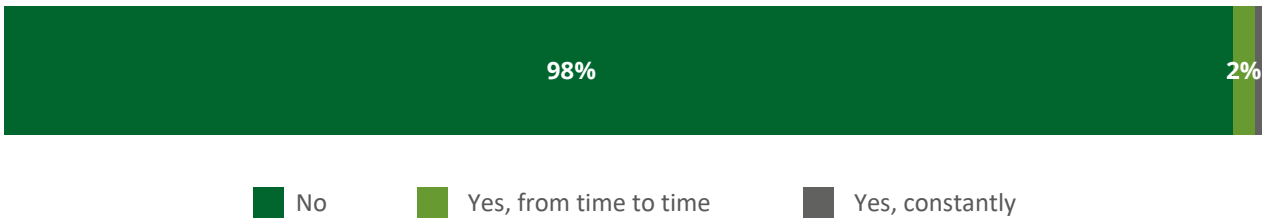


Table 3. What sources of power supply did you use during periods of a power outage? [by regions]

	Total	Dnipropetrovsk	Ivano-Frankivsk	Kyiv	Mykolaiv	Odesa	Sumy	Ternopil	Cherkasy	Chernihiv
Pre-charged batteries	**18%**	10%	10%	19%	17%	23%	24%	15%	25%	25%
Torches	**15%**	9%	5%	18%	27%	16%	20%	4%	20%	20%
Gasoline or diesel generators	**13%**	5%	9%	35%	15%	14%	10%	9%	5%	12%
Electronic gadgets	**2%**	3%	0%	1%	5%	1%	2%	1%	1%	4%
RES power plants	**2%**	2%	5%	1%	0%	1%	2%	0%	0%	2%
Did not use any electricity sources	**45%**	83%	74%	55%	61%	59%	60%	79%	71%	59%

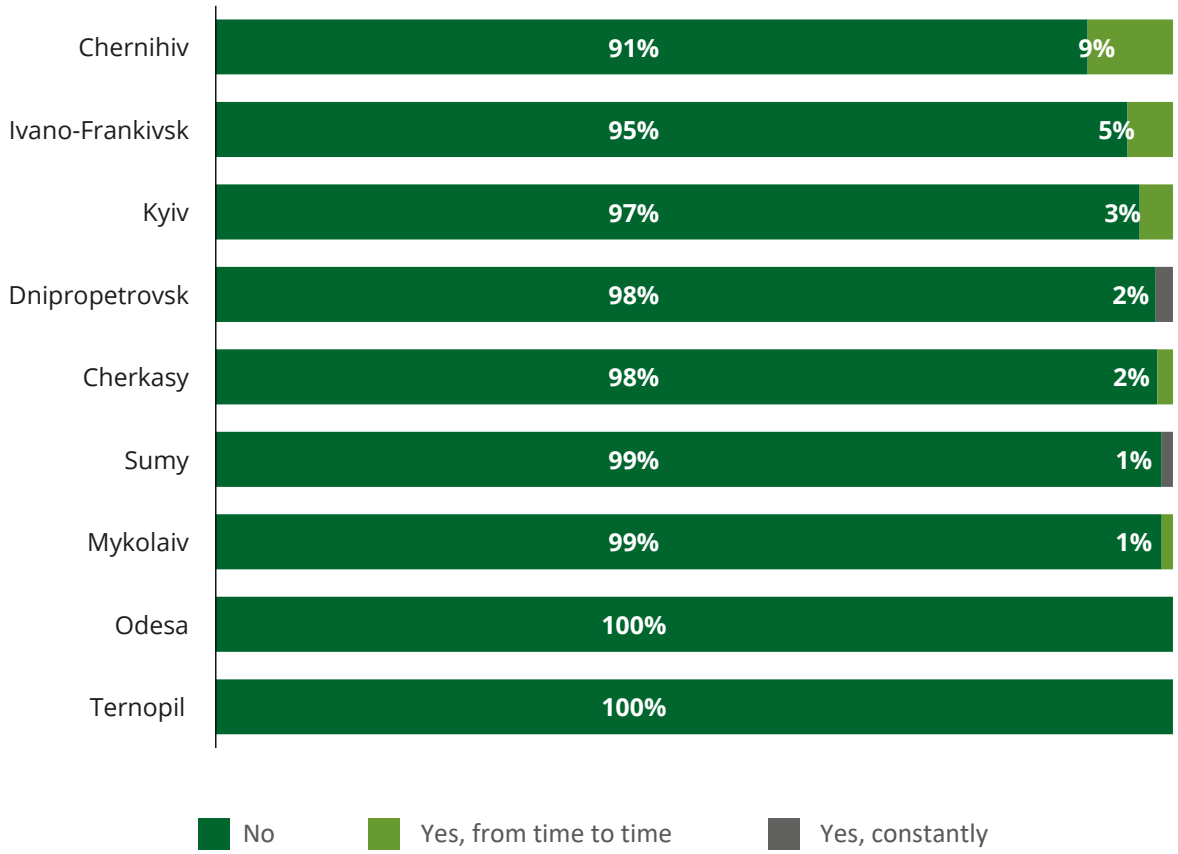
Only 2% of respondents mentioned that they used electricity produced from RES. Respondents confirmed this answer in the direct question “Have you used energy from RES power plants during a power outage” (Figure 27).

Figure 27. Have you used energy from RES power plants during a power outage?



Residents of the Chernihiv, Ivano-Frankivsk, and Kyiv regions have the greatest experience of using energy produced from RES during power outages (9%, 5%, and 3%, respectively), however, this experience was episodic in nature (Figure 28).

Figure 28. Did you use energy from RES power plants during a power outage? [by regions]



CONCLUSIONS

Based on the research results, several key statements regarding the attitude of Ukrainian society to renewable energy sources, in particular the development of distributed generation, were identified and formed.

The attitude of the population of Ukraine to renewable energy sources:

- the majority of the population of Ukraine is familiar with the technologies of solar panels, wind turbines, boilers on alternative fuel and heat pumps, but the results of the study indicate a low level of awareness of the concept of "renewable energy sources" among the public;
- the majority of people (78%) have a positive attitude towards renewable energy sources, and the leader is the Dnipropetrovsk region, where 89% of respondents support the development of renewable energy sources.
- analysing the development of the energy sector in the future, the population mostly (88%) agrees with the opinion that Ukraine has enough natural resources for the development of clean energy sources; society also supports the idea of reducing the use of fossil fuels and increasing the production of electricity from renewable energy sources;
- at the same time, the majority of the population (60%) supports the closure of nuclear power plants, however, there is a division on this opinion in society because a large part of the population opposes the reduction of energy from nuclear power plants. Residents of the Sumy and Odesa regions oppose the reduction of nuclear energy (41% and 44%, respectively).

The attitude of the population of Ukraine to distributed generation:

- 84% of respondents positively perceive distributed generation: Residents of the Dnipropetrovsk region show the best attitude towards distributed resources, two out of three residents declare a very positive attitude;
- according to the research results, the majority of Ukrainians (~90%) agree with the advantages of the development of distributed generation in Ukraine, such as: increasing the state's energy independence; reduction of payments for electricity; reliability of own energy supply.

Installation and use of distributed generation:

- despite the high level of positive attitude towards RES, less than 10% of the population have installed RES capacities in their households;
- readiness to install distributed generation in one's own household is quite low (42%) among the population which is favourable to the idea of installing RES facilities; however, in case of implementation of a support mechanism in the form of partial compensation, 69% of respondents would consider the possibility of installing distributed generation; among RES technologies, solar panels are the undisputed leader, this is the type of power supply most respondents would like to have in their household;
- every third respondent claims that RES facilities are most often installed in other households; the highest level of RES installation in communities is observed in the Ivano-Frankivsk and Ternopil regions (56% and 57%, respectively); at the same time, less than 20% of RES are installed on critical infrastructure facilities, farms and other community buildings;

- one of the barriers to establishing distributed generation among the population is insufficient coverage of the topic of RES in the media space: 37% of respondents believe that there is no information about some types of RES, and 44% of the population cannot find information easily accessible.

Use of RES capacities during emergency power outages:

- Residents of the Ivano-Frankivsk, Ternopil, and Odesa regions suffered the least from the lack of electricity supply: since the beginning of the Russian full-scale invasion of Ukraine on 24 February 2022, they have experienced mostly isolated episodes lasting up to 3 hours; at the same time, almost 20% of the residents of the Sumy, Mykolaiv, and Chernihiv regions did not have electricity supply for more than 24 hours due to hostilities;
- a significant number of respondents (~60%) waited during a period of no electricity supply, while not using electrical appliances and sources of electricity supply;
- according to the survey results, less than 2% of the population used renewable energy sources during an emergency power outage; for the most part, most residents used batteries, power banks, and torches; gasoline or diesel generators were mostly used by residents of the Kyiv region (35%).

It is worth noting that due to the lack of large-scale sociological studies on renewable energy sources in the past years, we do not have the opportunity to monitor the dynamics of the attitude of Ukrainians to RES facilities.

Nevertheless, according to the results of the study, it can be concluded that the population of Ukraine has a fairly positive opinion about the development of renewable energy sources. However, due to the lack of information, as well as the current uncertainty, the use of renewable energy sources is not a widespread practice.

Nevertheless, according to the results of the survey, it can be concluded that the population of Ukraine has a fairly positive opinion about the development of renewable energy sources.

Almost the majority of the population is convinced that clean energy sources are the key source of the future development of the energy system of Ukraine and the key to improving energy security. The sentiments of Ukrainian society once again emphasize that taking into account the principles of the 4th EU Energy Package in the development of Ukraine's post-war energy system is a critically important component for increasing Ukraine's energy independence based on a holistic and systemic approach.

APPENDICES. SAMPLE DEMOGRAPHIC PARAMETERS

Figure 29. Demography: Respondents' gender and age

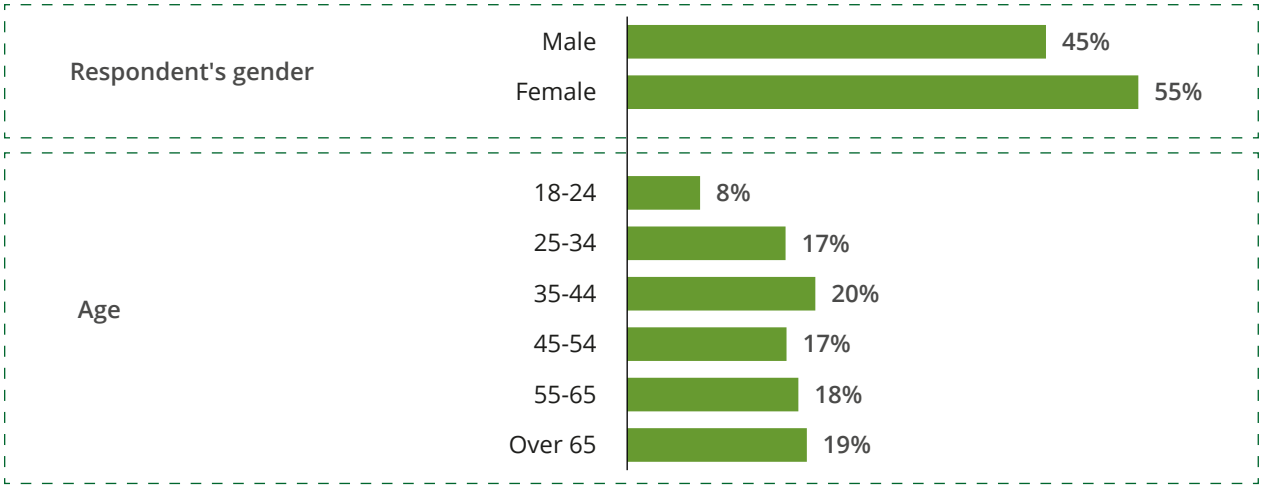


Figure 30. Demography: Size of the settlement, district, region of residence of the respondents

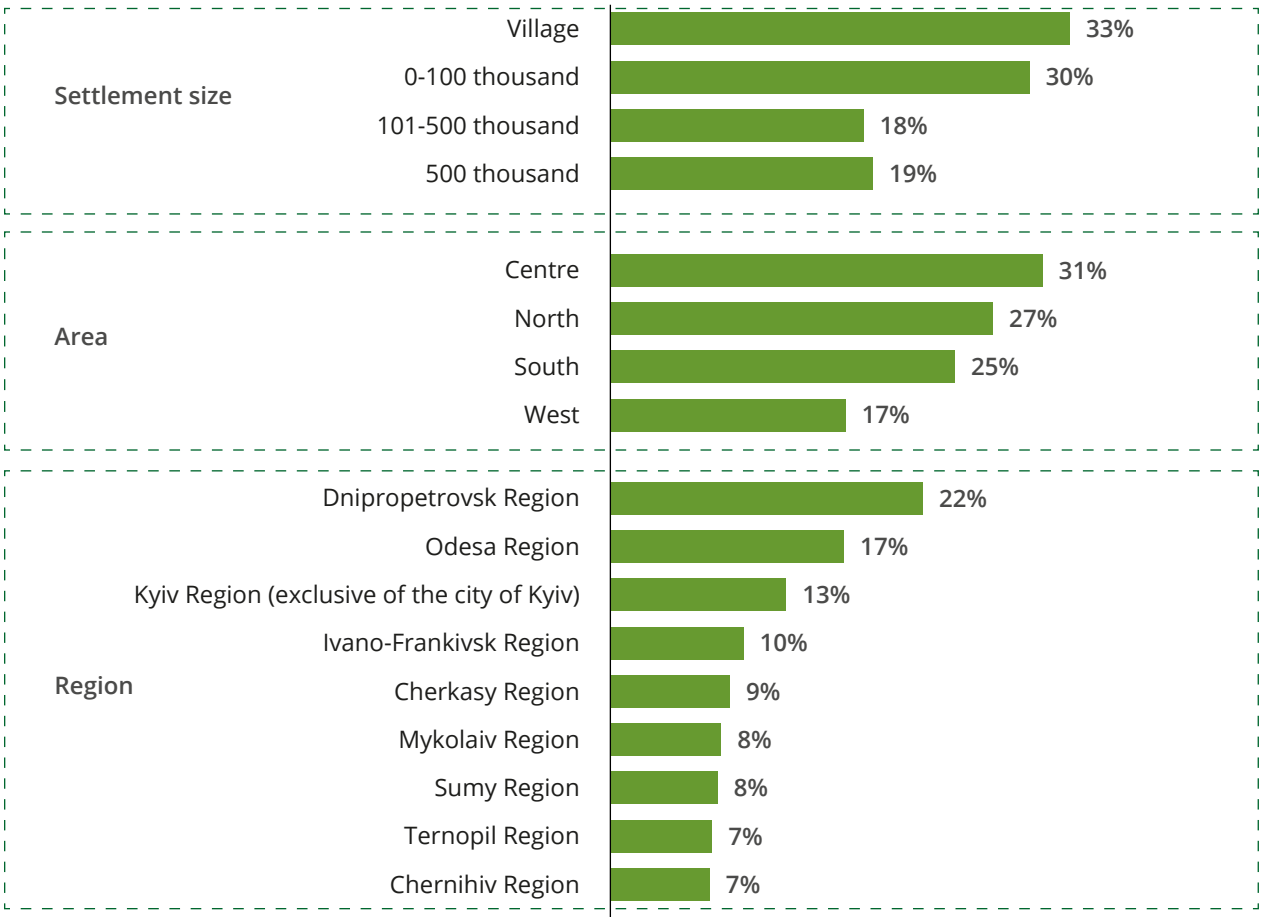


Figure 31. Demography: Location of respondents

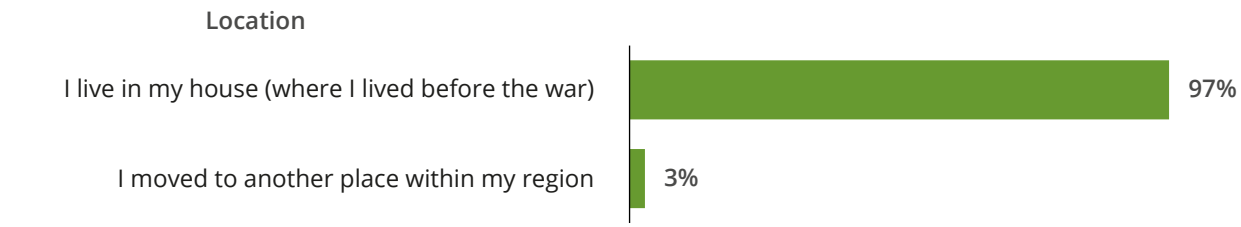


Figure 32. Demography: Respondents' education and employment

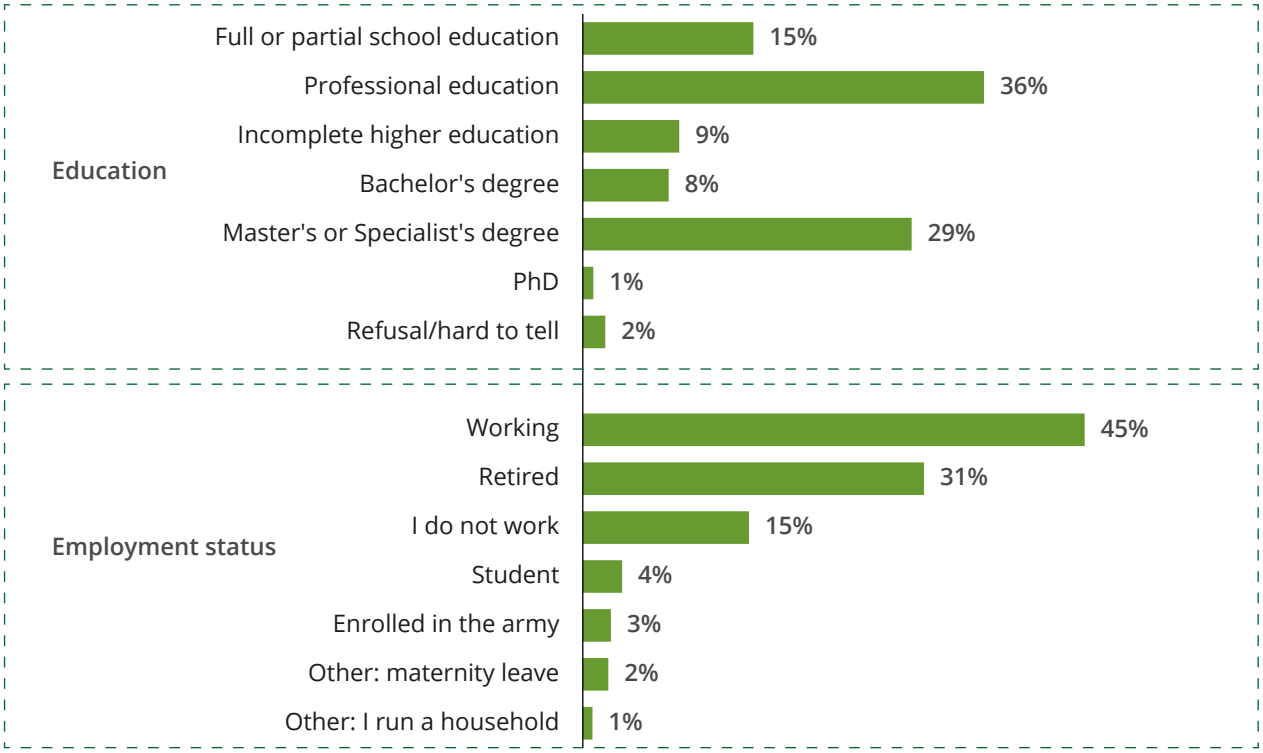


Figure 33. Demography: Economic situation of the family

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