# Investigate the energy misperception for "Next Generation" in Italy: An online experiment

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# Investigate the energy misperception for "Next Generation" in Italy: An online experiment

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**Abstract**

The use of renewable energy sources is the main tool to solve several issues like energy request, the excessive use of no-renewable energy sources and, in general, the global environmental pollution. In the light of this, it is important to raise awareness among individuals towards this type of energies to facilitate the circular economy transition. The investigation of misperception is crucial in the modern context of bio-economy because it could lead to an over-exploitation and depletion of several natural resources. Policymakers work for a cleaner energy system, and they need to investigate on social acceptability; "Next Generation" represents those who must contribute to this dutiful energy transition because they are the future actors of society. The aim of this work is to investigate the energy misperception on different sources among the "Next Generation" group. The analysis is carried out in Italy and the data were obtained through an internet-based survey, administered via Instagram for capturing Next Generation's perception about the national energy mix. We found the younger have more misperception and one of the possible explanations could be that are more negatively affected by media and social media, or public opinion in general. Another motivation could be that the younger generation considers sustainability important and therefore tend to over-perceive renewable energy sources.

**Keywords:** Energy; misperception; renewable; Online Experiment.

# 1 Introduction

Energy has a key role in helping economy, sustainability and the promotion of economic growth, meeting rising energy demand, and simultaneously considering the carbon emission mitigation goal, posing huge pressure on policymakers (Mei et al., 2020). In this vein, a sustainability transition needs policymakers to collect adequate information about the environmental context and especially about socio-economic system. Miller and Senadeera (2017) argue householders can have an important role in this transition, for instance adopting energy efficiency and saving behaviors, or accepting low carbon technologies. In the literature, it has been shown that public perception with respect to energy issues affects energy future condition (Boudet, 2019) and public attitudes concerning energy sources impact, energy consumption and policy choices. We can easily understand that asymmetric information may generate an "energy efficiency gap" when the optimal social level of energy investment is not achieved. (Allcott and Greenstone, 2012).

The debate is focused on what mix of energy sources would be adequate to build a sustainable energy system. The main difficulties concern the fact that it is not feasible to make rational choices among energy sources, and that individual preferences are not homogeneously distributed because they change across different population. Otherwise, it has been shown that public perceptions on energy issues affect energy future (Boudet, 2019) and this can influence decisions on energy consumption. Therefore, if consumers have misperception about energy mix, it is difficult achieve the objective of a sustainable energy system.

Generally speaking, misperception captures the scope and magnitude of the distorted reality that individuals adopt and hold (Gorodzeisky and Semyonov, 2018). The concept of misperception has been applied in several context, such as environmental quality and climate change impact (Pondorfer, 2019), electric-drive vehicles (Axsen et al., 2017), about unemployment (Cardoso et al., 2016) and immigration (Aalberg and Strabac, 2010), but the existent literature concerning energy misperception is limited. For instance, Lee et al. (2020) find that "habits" are one of the main causes of inefficient energy consumption and that feedback may be a solution to reduce energy consumption and to mitigate consumer's misperception concerning their effectiveness level of energy use. With respect to energy efficiency, Allcott (2011) demonstrates that misperception about gasoline prices and the relative energy costs could increase or decrease energy efficiency.

One important issue about the level of misperception in the energy market is its level in the "Next Generation". The literature emphasizes the importance of studying Generation Z (GenZ) and Millennial as categories of interest because they are the "future consumers", and their consumption behavior can be linked with sustainable concerns and inter-temporal consumer choices. Kymäläinen et al. (2021) argue that, due to the fact that future consumers are in the center of social acceptance, we should investigate on their attitudes from the business perspective to build sustainable choices. Moreover, their consumer behavior and lifestyle choices are different from the previous generations. Nowadays, Generation Z has developed a great interest in sustainability. This change is generating an effect on general life aspects like changes in products and services, and investment are made by institution and industry.

The aim of this paper is to investigate the presence of energy misperception, and specifically its level in the Next Generation groups (i.e., Generation Z and Millennial) to cover the gap in the economic literature. Moreover, this is the first work that analyses the energy misperception for a specific categories, thus Generation Z and Millennial.
We expected the younger ones will over-state the share of energy sources that they think are used in the production of electricity in Italy, and overall, we found the younger have more misperception then less young. One of the possible explanation could be that younger individuals are more negatively affected by media and social media, for instance with regard to oil spills and emissions, but also because GenZ is a generation for which ethics are very important. We have also seen that the younger have more misperception for renewable energy sources. According to Mosdor's survey, over 80% of Generation Z thinks that institution should invest more into renewable energy resources; this aspect could affect individual's perception.

This paper is structured as follows: Section 2 presents the method in which we describe the experimental design, Section 3 describes the empirical approach, Section 4 focuses on results, and finally in the Section 5, we explain Conclusion and Policy Implications.

# 2 Method and Data

## 2.1 Experimental design

We collected 288 complete observations through an online experiment.The Google form was published on the Instagram page of "ale.conomista" that counts 53 thousand followers. The aim was to gather a sample composed by individual from eighteen years old to twenty-four years old, to capture the "Generation Z" perception, individual from twenty-five years old to forty to analyse the "Millennial" energy perception, and individuals belonging to Generation X category (from 41 years old)[1]. Fox et al. (2007) found that the online platforms are comfortable within the younger populations, as they are familiar with online social network, and we think this aspect may help us to receive reliable answers.
In the questionnaire participants were asked to answer 30 questions in order to find evidence about individual attitudes, such as sensitive on climate change, environmental issues, propensity for social issue and to help people. We have also five socio-demographic questions. In order to capture the energy misperception about the national electricity mix for different energy sources (e.g. Biomass, Coal, Hydroelectric power, Natural Gas, Nuclear power, Solar power, Wind power) we asked how much of the electricity used in their country do they perceive is generated by each different energy sources; with respect the amount of each energy source that they perceive being produced, respondents are asked to provide their perceptions in accordance with a four option shown in table 1.[2]

[1]In our analysis we do not consider Generation X.
[2]The whole questionnaire is available in the Appendix.

Table 1: Questions about individual's perception

| Description | General question | Typology of answer |
|---|---|---|
| Coal energy | How much of the electricity used in your country do you perceive is generated from: coal/ hydroelectric power/ natural gas/ nuclear/ solar/ wind/ biomass? | 0-25% \| 25%-50% \| 50%-75% \| 75%-100% |
| Natural gas | | |
| Hydroelectric power | | |
| Nuclear power | | |
| Solar power | | |
| Wind power | | |
| Biomass energy | | |

For reaching the goal of our analysis, we need to compare actual value with perceive value and, in addition, we selected several explanatory variables for trying to capture possible determinants of energy misperception. We focused on potential misperception about national electricity mix, thus the division of electrical production among different energy sources. Therefore, we analysed how individual perceptions about the share of each energy source in the electricity mix deviate from the real values.

Table 2: Transformation of real value into quartile

| Energy sources | Electricity production | Quartile |
|---|---|---|
| Biomass | 9.16% | 0-25% |
| Coal | 5.44% | 0-25% |
| Hydroelectric power | 17.46% | 0-25% |
| Natural Gas | 45.63% | 25%-50% |
| Nuclear Power | 0% | 0-25% |
| Solar Power | 9.66% | 0-25% |
| Wind Power | 6.88% | 0-25% |

In order to build a measure of misperception, we created a dummy variables for each energy sources; specifically, we fixed 0 to state a "Well-perception"(when the answer is equal to the real value) and 1 for indicating a "Misperception". In the table 2 it is shown the percentage of electricity production in Italy in 2020, according to the "Our World in Data". The "Our World in Data" is a scientific publication site where it is possible to find data that show how

conditions in the world change and why this happens. In the table 3, it has shown the percentage of misperception for each energy sources,taken from individual's answers. From this table, we can argue that the level of energy misperception is significant, except for Nuclear power, probably due the fact that Italy does not have nuclear power plants and does not use this technologies.
In the table 4 we can see the observation number and percentage among different generation groups. Generation Z are not representative of Country but it can show a preliminary picture about the different level of misperception among them, taking into account the other two categories. In order to explain the possible determinants of different misperception among "Next generation" groups, we considered different variables; such variables concern the individual status of the respondents, their views of energy policy, as well as their attitudes towards some everyday energy use and climate issues. Most of the variables are expressed in Liker Scale (for instance, 1 = a very large amount, 2 = a large amount, 3 = a medium amount, 4 = a small amount and 5 = none at all).

Table 3: Percentage of misperception for each energy sources

| **Energy sources** | **Misperception(%)** | **Obs** |
|---|---|---|
| **Biomass** | 35.07% | 288 |
| **Coal** | 70.14% | 288 |
| **Hydroelectric power** | 61.81% | 288 |
| **Natural Gas** | 56.94% | 288 |
| **Nuclear Power** | 19.79% | 288 |
| **Solar Power** | 57.64% | 288 |
| **Wind Power** | 43.40% | 288 |

Table 4: Descriptive statistic for GenZ, Millennial and GenX

| | **Obs** | **Percentage** |
|---|---|---|
| **Generation Z** | 225 | 78.13% |
| **Millennial** | 42 | 14.58% |
| **Generation X** | 21 | 7.29% |
| **Total** | **288** | **100%** |

# 3 Empirical approach

In order to reach our research goal, we proceed as follow: firstly, to reduce the dimensionality of possible explanatory variables we conducted a factor analysis for all variables, excluding socio-demographic variables, and to each factor we gave an economic interpretation. Secondly, we analyzed the correlation between misperceptions and factors previously determined in the factor analysis, among misperceptions and, finally, between Next Generation and misperceptions. Thirdly, for each energy sources, we ran different Linear Probability Models (LPM); at the beginning, with only socio-demographic variables, and then with the factors found in the previous step and the socio-demographic variables jointly. In addition, we considered other LPMs taking into account the two age groups separately. The last two steps concern a Logit model in order to capture over perception and under perception for Natural gas source, because it is the only one that is in the range 25%-50% of market share, and finally, we used an Ordered logit model to investigate the bias intensity for each energy sources.
In the next subsections we will explain the different analysis applied.

## 3.1 Factor Analysis

We firstly provided a Factor analysis in order to reduce the dimensionality of our analysis. This technique allows us to show that there is a statistical and interpretative association among our covariates. Generally, the obtained factors are not correlated and they can explain almost the same information embodied in the original variable; for this reason, Factor Analysis can help us to avoid multicolineality problems. After running a factor test, we verified the feasibility of factor analysis through the Kaiser-Meyer-Olkin test (KMO)[3], and we considered 12 factors[4] with eigenvalue bigger than 1, each of them embodying variables that capture similar determinants of misperception. Table 4 provides an explanation of our factors, and we can notice that our Factor analysis are efficient because we have a coherence in the obtained factors. In the figure 1 we can see the Scree-plot of eigenvalues.

[3]The KMO is equal to 0.737, with a p-value equal to 0.000; therefore, we can reject the null hypothesis that variables are not inter-correlated.

[4]We obtained 14 factors but we considered only 12 factors because two of them embodied only one variable.

Figure 1: Scree-plot

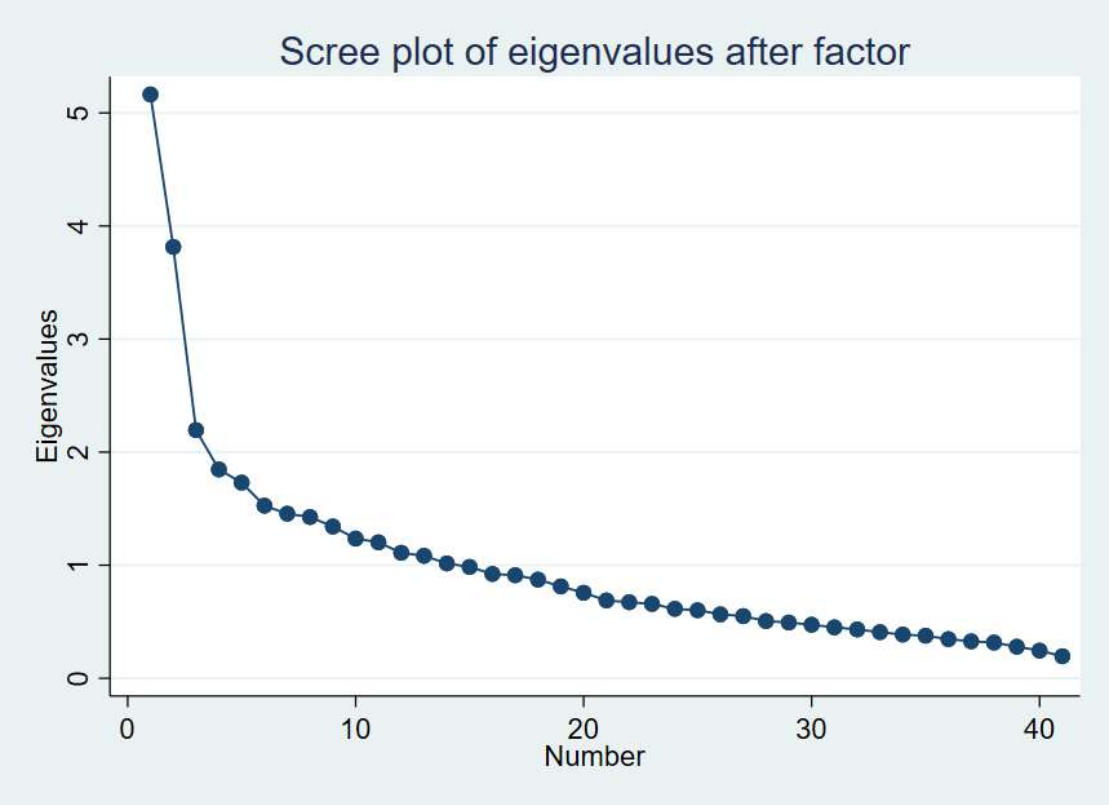

Figure 2: Factor Analysis

| ***FACTORS*** | ***Questions*** |
|---|---|
| **F1 Worried about energy issues** | *How much individuals are worried about energy may be subject to power cuts/may be too expensive for many people/ energy supplies could be interrupted by natural disasters/ energy supplies could be interrupted by insufficient power being generated /energy supplies could be interrupted by technical failures/ energy supplies could be interrupted by terrorist attack/ Extreme weather.* |
| **F2 Care about environment and Climate Change** | *If you were to buy a large electrical appliance for your home how likely is it that you would buy one of the most energy efficient ones? / Importance to care for nature and environment/ Individual's opinion about the possibility that limitation of their own energy use would help reduce climate change / Individuals' thoughts about their responsibility to spread the climate change across the world/worried about climate change.* |
| **F3 Trust and satisfaction** | *People trust in other individuals/Government/ politicians.* |
| **F4 Sensitive for social issues** | *Political attitude (right/left)/ Social benefits/services lead to a more equal society/ How much individuals agree with this statement: For fair society, differences in standard of living should be small/ importance to be fair.* |
| **F5 Discrimination** | *To allow people of the different ethnic group to come and live in their country/ bad or good for your country's economy that people come to live in their country from other countries.* |
| **F6 Worried about being dependent on others and fossil fuel** | *How much individuals are worried being too dependent on energy imports/ being too dependent on using energy generated by fossil fuels such as oil, gas and coal.* |

| | |
|---|---|
| **F7 Opinion on climate change** | *To what extent individuals feel a personal responsibility to try to reduce climate change/ Individual's opinion about climate change cause.* |
| **F8 Social sensitive** | Social benefits only for people with lowest incomes/ *When should immigrants obtain rights to social benefits/services?* |
| **F9 Individual feelings** | Important to behave properly/ *tendency to be empathetic/ Important to help people and care for others well-being* |
| **F10 Patriotism** | *How much an individual is emotionally attached to his/her country/ how much an individual is emotionally attached to his/her country/ how much an individual is religious.* |
| **F11 Worried about Climate Change (ways for reducing climate change)** | *To what extent are individuals in favour or against the following policies in their country to reduce climate change with:* Subsidise on renewable energy/ *Law banning the sale of the least energy efficient household appliances.* |
| **F12 Politic/social well-being** | *Did you vote in the last country national election? / Important to be rich, have money and expensive things.* |

## 3.2 Correlation

We firstly estimated a correlation between each misperception and the factors obtained in the previous step, in order to consider only significant factors in the analysis. Moreover, we checked the correlation between all misperceptions of different energy sources. In the tables 6 and 7 it is shown the correlation with factors, and in the table 8 the correlation among misperceptions. The robustness of these correlations will be check in the linear probability model. An interesting aspect could be the study of correlation among misperceptions of different energy sources, in order to try to capture how individuals consider these sources similar to each other. We have a positive correlation among biomass and all energy sources, and this leads us to understand that individuals do not have a good perception of biomass. For coal and natural gas, we have a positive correlation with nuclear; we can notice the peculiar position of nuclear power as a source that, despite its zero CO2 emissions, is perceived as similar to climate-altering sources, in fact individuals tend to misperceive the relative contribution of different energy sources to tackle greenhouse gas emission issue; probably for this reason they evaluate nuclear similar to natural gas in this context. This is in line with findings by Bickerstaff et al. (2008) who studies the "nuclear resurgence"(people tend to consider it negatively due to the eventually consequences). Finally, we can conclude with correlation between misperceptions and both Generation Z and Millennial (Table 9). Overall, for Generation Z category we have positive correlation with all energy misperception, except for coal that it is not statistically significant. For the other category, we have overall a negative correlation with energy misperception except for hydroelectric power and natural gas (they are not statistically significant). From this analysis we may aspect that, overall "Generation Z" has more misperception than "Millennial"; we will test it with linear probability model.

Table 5: Descriptive correlation analysis between misperception and energy sources

| ENERGY SOURCES | FACTORS |
|---|---|
| **Biomass** | ○ Positive correlation with "Worried about energy issues" (F1), "Sensitive for social issues" (F4), "Individual feelings" (F9) and "Politic\social" (F12).<br>○ Negative correlation with "Care about environment and climate change" (F2), "Discrimination" (F5), "Worried about being dependent on others and fossil fuel" (F6). |
| **Coal** | ○ Positive correlation with "Sensitive for social issues" (F4), "Individual feelings" (F9), "Patriotism" (F10), and "Politic\Social" (F12).<br>○ Negative correlation with "Care about environment and climate change" (F2) and "Opinion on climate change" (F7). |
| **Eolic power** | ○ Positive correlation with "Worried about energy issues" (F1), "Sensitive for social issues" (F4), "Individual feelings" (F9) and "Patriotism" (F10).<br>○ Negative correlation with "Care about environment and climate change" (F2), "Trust and Satisfaction" (F3), "Discrimination (F5), "Worried about being dependent on others and fossil fuel" (F6), "Opinion on climate change" (F7), "Social sensitive" (F8), and "Worried about climate change (ways for reducing climate change)" (F11). |
| **Hydroelectric power** | ○ Positive correlation with "Worried about energy issues" (F1), "Sensitive for social issues" (F4), and "Worried about climate change (ways for reducing climate change)" (F11).<br>○ Negative correlation with "Trust and Satisfaction" (F3), "Discrimination (F5), and "Worried about being dependent on others and fossil fuel" (F6). |
| **Natural gas** | ○ Positive correlation with "Worried about energy issues" (F1), "Trust and Satisfaction" (F3), "Social sensitive" (F8), "Individual feelings" (F9), "Patriotism" (F10), and "Worried about climate change (ways for reducing climate change)" (F11), and "Politic\social" (F12).<br>○ Negative correlation with "Opinion on climate change" (F7). |
| **Nuclear power** | ○ Positive correlation with "Worried about energy issues" (F1), "Sensitive for social issues" (F4), and "Opinion on climate change" (F7).<br>○ Negative correlation with "Trust and Satisfaction" (F3), "Discrimination" (F5), and "Social sensitive" (F8). |
| **Solar** | ○ Positive correlation with "Worried about energy issues" (F1), "Patriotism" (F10), and "Politic\Social" (F12).<br>○ Negative correlation with "Worried about being dependent on others and fossil fuel" (F6), and "Opinion on climate change" (F7). |

Table 6: Correlation with factors

| Misperceptions | | Factors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F1 Worried about energy issues | F2 Care about environment and Climate Change | F3 Trust and satisfaction | F4 Sensitive for social issues | F5 Discrimination | F6 Worried about being dependent on others and fossil fuel | F7 Opinion on climate change | F8 Social sensitive | F9 Individual feelings | F10 Patriotism | F11 Worried about Climate Change (ways for reducing climate change) | F12 Politic/social |
| | **Biomass** | 0.1048* | -0.0650* | 0.0004 | 0.1114* | -0.0693* | -0.0884* | -0.0100 | -0.0163 | 0.0817* | 0.0065 | -0.0386 | 0.0926* |
| | **Coal** | 0.0196 | -0.0950* | 0.0184 | 0.0760* | -0.0029 | -0.0135 | -0.0629* | -0.0015 | 0.0759* | 0.0674* | 0.0078 | 0.0606* |
| | **Eolic** | 0.0911* | -0.0439* | -0.0471* | 0.1150* | -0.0575* | -0.0895* | -0.0461* | -0.0780* | 0.0976* | 0.1041* | -0.0576* | -0.0180 |
| | **Hydro** | 0.0412* | -0.0298 | -0.0721* | 0.0764* | -0.1378* | -0.0827* | -0.0346 | -0.0303 | -0.0104 | -0.0264 | 0.0764* | -0.0087 |
| | **NGas** | 0.0440* | 0.0203 | 0.0598* | -0.0033 | -0.0118 | -0.0229 | -0.1433* | 0.0882* | 0.0646* | 0.1231* | 0.0600* | 0.0446* |
| | **Nuclear** | 0.1256* | -0.0016 | -0.0963* | 0.0820* | -0.0862* | -0.0233 | 0.0601* | -0.0693* | 0.0329 | 0.0304 | -0.0337 | -0.0391 |
| | **Solar** | 0.1416* | -0.0285 | -0.0160 | 0.0191 | -0.0297 | -0.0547* | -0.0961* | -0.0157 | -0.0144 | 0.1262* | 0.0004 | 0.0715* |

Table 7: Correlation among misperceptions

| Misperception | | Misperception | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Biomass | Coal | Eolic | Hydro | NGas | Nuclear | Solar |
| | Biomass | 1.0000 | | | | | | |
| | Coal | **0.2221*** | 1.0000 | | | | | |
| | Eolic | **0.1930*** | 0.0056 | 1.0000 | | | | |
| | Hydro | **0.1982*** | -0.0100 | 0.3679* | 1.0000 | | | |
| | NGas | **0.1199*** | 0.1144* | **0.0963*** | **0.0562*** | 1.0000 | | |
| | Nuclear | **0.2212*** | **0.1038*** | 0.1456* | 0.1271* | **0.0481*** | 1.0000 | |
| | Solar | **0.1897*** | 0.0280 | 0.6125* | 0.3671* | **0.0786*** | 0.0968* | 1.0000 |

Table 8: Correlation between misperception and Next Generation

| | | Generation Z | Millennials |
|---|---|---|---|
| Misperception | Biomass | 0.0884* | -0.0015 |
| | Coal | -0.0290 | 0.1045* |
| | Eolic | 0.1151* | -0.0644* |
| | Hydroelectric | 0.0113 | 0.0418* |
| | NGas | 0.0323* | 0.0001 |
| | Nuclear | 0.0778* | -0.0189 |
| | Solar | 0.1350* | -0.0752* |

## 3.3 Linear Probability model

We estimated different Linear probability models (LPM) for each energy sources in order to detect if the sample of interest, Generation Z and Millennial, has a misperception, and which group has more misperception than the other. In Appendix we display all the complete Linear probability models for each energy sources, with and without all factors considered. This technique models the response probability as a function linear in parameters, and we use that because our dependent variable (all energy misperception) is binary. One of the drawbacks of the Linear Probability model is the heteroskedasticity problem that we solved using the robust standard errors. We firstly run a LPM considering the results for our two dummy variables of interest, Generation Z and Millennial, and not considering the third Generation X in our sample. In the Table 10 it is illustrated the results for both Generation Z and Millennial, and we may observe that the younger (Generation Z) have more misperception for renewable resources than less young, except for the Hydroelectric power. Moreover, we find Millennial have more misperception for Coal than Generation Z; for Natural Gas, the less young have less misperception than younger; in the latter case, the coefficients for GenZ and Millennial are not statistically significant. We then run a second LPM considering separately the two age groups in order to identify what are the determinants of the misperception for both Generation Z and Millennial, and for avoiding a problem of heterogeneity between the two groups. In the Appendix, we show all regression tables[5]. The main results are that for Generation Z the determinants of misperception for non-renewable sources

[5]Misperception could be affected by media (newspapers, TV, Internet, etc.) and for this reason we used a variable that shows if respondents use social media to share news about politics as proxy, in order to avoid possible omitted variables bias. The results of our analysis do not change significantly.

(Coal and Natural gas) are Factor 2 (Care about environment and Climate Change, with negative sign), Factor 3 (Trust and satisfaction, positive sign), Factor 7 (Opinion on climate change,negative sign) and Factor 9 (Individual feelings, positive sign), while for Millennial the main determinants are Factor 1 (Worried about energy issues, positive sign), Factor 2 (Care about environment and Climate Change, negative sign), Factor 4 (Sensitive for social issues, negative sign), Factor 5 (Discrimination, negative sign), Factor 6 (Worried about being dependent on others and fossil fuel, positive sign), Factor 10 (Patriotism, positive sign) and Factor 12 (Politic/social well-being, negative sign).
Otherwise, the misperception of renewable sources for Generation Z depends on several factors, such as Factor 1 (worried about energy issues, positive sign), Factor 5 (Discrimination, negative sign), Factor 6 (Worried about being dependent on others and fossil fuel, negative sign), Factor 7 (Opinion on climate change, positive sign), Factor 9 (Individual feelings, positive sign), Factor 10 (Patriotism, positive sign) and Factor 12 (Politic/social well-being, negative sign). As concern Millennial, the main determinants are Factor 1 (worried about energy issues, positive sign), Factor 4 (Sensitive for social issues, positive sign) and Factor 11 (Worried about Climate Change (ways for reducing climate change), positive sign).

Table 9: Misperception of GenerationZ and Millennial

| | Biomass | Coal | Hydro | NGas | Nuclear | Solar | Eolic |
|---|---|---|---|---|---|---|---|
| Generation Z | 0.291*** | 0.210 | 0.160 | 0.0809 | 0.188*** | 0.206 | 0.163 |
| | (2.91) | (1.51) | (1.14) | (0.56) | (2.65) | (1.43) | (1.32) |
| Millennials | 0.242** | 0.410*** | 0.241* | 0.0368 | 0.0552 | 0.109 | 0.0335 |
| | (2.10) | (2.75) | (1.57) | (0.25) | (0.70) | (0.71) | (0.26) |
| Observations | 288 | 288 | 288 | 288 | 288 | 288 | 288 |

## 3.4 Logit Model

As we have seen in the previous table 1, Natural Gas source is the only one that is in the second quartile (25%-50%) and for this reason, we can investigate if Generation Z and Millennial have an under perception or an over perception for this energy sources. For this purpose, we used a Logit model regression in order to capture the direction of bias for both groups; the main results are shown in the table below.[6]

[6]We interpreted the marginal effects.

Table 10: Logit model to capture bias direction for Natural Gas

| | (Over-perception) | (Under-perception) |
|---|---|---|
| Generation Z | .389** | -.460*** |
| | (.126) | (.134) |
| Millennials | .351 | -.387** |
| | (.279) | (.122) |
| Observations | 288 | 288 |

We can notice that the youngest people (GenZ) tend to over-estimate the production level from Natural Gas source. We may conclude that, not only Generation Z shows an higher percentage of energy misperception with respect the older, but younger individual over-estimate the electricity production level, and not under-estimate it.

## 3.5 Ordered Logit

Finally, since our dependent variable is defined as a categorical ordinal variable, for our last analysis we considered an Ordered logit regression, to identify the bias intensity for each different energy sources, using the same previous covariates. In this case, our dependent variables are structured considering the distance from the the real value (Well-perception) of each energy sources and the different level of misperceptions. We tested the parallel assumption with the Brant test and overall, we accept the null hypothesis with a p-value greater than 0.05; therefore, we can use the Ordered logit model. The main results are displayed in the table 12[7].

[7]Both tables show the marginal effects.

Table 11: Intensity of bias for Generation Z and Millennial

| | | Generation Z | | | |
|---|---|---|---|---|---|
| | | **(0%-25%)** | **(25%-50%)** | **(50%-75%)** | **(75%-100%)** |
| **Misperception** | *Biomass* | 60.5%*** | **24.7%*** ** | 12.8%*** | 1.9%* |
| | *Coal* | 29.3%*** | **34.4%*** ** | 29.7%*** | 6.5%*** |
| | *Eolic* | 55.3%*** | **29.6%*** ** | 11.2%*** | 3.9%** |
| | *Hydroelectric* | 35.6%*** | **45.34%*** ** | 14.02%*** | 5.05%*** |
| | *Nuclear* | 76.8%*** | **13.4%*** ** | 8%*** | 1.6%** |
| | *Solar* | 39.6%*** | **42.7%*** ** | 11.7%*** | 5.8%*** |
| | | **Millennials** | | | |
| | | **(0%-25%)** | **(25%-50%)** | **(50%-75%)** | **(75%-100%)** |
| **Misperception** | *Biomass* | 71.4%*** | **19.2%*** ** | 8.3%*** | 1.14%* |
| | *Coal* | 24.7%*** | 33.5%*** | **33.6*** ** | 8.2%** |
| | *Eolic* | 68.5%*** | **22.5%*** ** | 2.4%** | 2.12%** |
| | *Hydroelectric* | 35.02%*** | **45.51%*** ** | 14.3%*** | 5.2%** |
| | *Nuclear* | 91.8*** | **5.3%** ** | 2.4* | 0.4% |
| | *Solar* | 46.03%*** | **40%*** ** | 9.5%*** | 4.5%** |

Overall, we found that the level of bias can be identified in the range between 25%-50% for both Generation Z and Millennial, except for Coal source with respect to Millennial; in this case the intensity of bias is a little higher. An interesting result regards Nuclear power. We can notice that very few individuals have a strong misperception on Nuclear, specifically for the older ones. Moreover, the intensity of bias for each level is not very consistent; this finding could be linked with the current situation in Italy. Italy closed its nuclear power plants in 1990, after the Chernobyl accident. The reluctance towards nuclear energy in Italy is confirmed when in 2008 Italian government tried to propose a new nuclear program in the Country, but this proposal, in which it was established arrangements to generate 25% of the country's electricity from nuclear power by 2030, was rejected in a referendum in June 2011; therefore, we could aspect these results. We can conclude that, overall Generation Z shows a higher probability to over-perceive energy sources in the electricity energy mix in Italy. Otherwise, we can notice that the intensity of this bias for Generation Z is similar Millennial.

# 4 Results

In this paper the main goal is to investigate the energy misperception with respect the energy electricity mix in Italy, among "Next Generation". Specifically, we focused on two different groups: the younger ones Generation Z, and Millennial. We considered questions from European Social survey,multi-country survey administered annually in 30 different European countries, between 2002 and 2018, and we conducted an online experiment through Instagram platform. In the questionnaire administered, the subjects were asked to indicate their perception about how they perceive energy share among four different options: 1) 0%-25%, 2) 25%-50%, 3) 50%-75%, 4) 75%-100%, and in addition they answered to other several questions, in order to capture individual characteristics and attitude, such as propensity for environmental problem, attitude for helping people, their trust in general, trust in politics and people, and a socio-demographic questions. The actual electricity mix is measured through "Our World in Data", and we considered the 2020 production in Italy.

In order to provide an answer to our research question, first we run a factor analysis in order to reduce the dimensionality of the analysis, and we estimated the correlation between misperception for each energy sources, misperception and the obtained factors, and finally the correlation between each energy sources misperception and both groups Generation Z and Millennial. After these steps, we implemented a liner probability models in order to compare both groups Generation Z and Millennial, and to determine which group has more misperception. Then, we considered another linear probability analysis for trying to capture the possible determinants of misperception. For natural gas source, due to the fact that it is the only one has a real value grater than 0-25%, we was able to implement a logit model in order to look into which group has more under perception and over perception; finally, we ran an Ordered logit to identify the measure of bias for both Generation Z and Millennial.

From the correlation analysis we have argued that overall, people do not have a good perception across different energy sources; in fact, we can easily observe that individuals believe that these energy sources are similar each other, and particularly that Generation Z has more misperception than Millennial.This is in line with the results by Bollani et al. (2019) whom find Millennial's students are sensitive to sustainability concerns (e.g., they believe in labeling and certification system as communication tools to reduce environmental impact). In light of this, our estimate results lend support to our hypothesis that the younger have more misperception than older, specifically in the Linear Probability Model we found that not only both categories

have energy misperception, but Generation Z group has more misperception for renewable resources than non-renewable, except for Hydroelectric power. As concern the possible determinants of misperception we found that, regarding non-renewable resources (e.g., Coal and Natural Gas), people that are concerned about protecting environment and that they feel responsible for environmental conditions, therefore those who have a grater propensity against climate change, have less misperception on non-renewable resources. Pidgeon et al. (2008) in their analysis find that perception on energy sources is related to climate policy goals. In their survey, respondents chose the use of renewable technologies as the best solution to climate change; therefore, people that have less attitudes and concern on climate and environmental issues should have more misperception for non-renewable resources.
Regarding factor 3 (trust and satisfaction), it seems that individual who trust more in politicians and policy in general shows a misperception on non-renewable resources. This could mean that the "Next generation" groups thinks that the policymakers do not follow pro-environmental practices. As suggested by Harring (2014), people perceive environmental policy instruments less effective due to high level of corruption in public sector, and this suggests that well-functioning institutions are crucial for environmental policy support.
Moreover, individuals who are more sensitive to equity issues, are more inclined being fair, could be prudent about energy transition, and therefore people may over-perceive non-renewable resources. This is in line with the findings of Islar et al. (2017) that argue decisions on energy processions may have social implications (for instance, some consequences could affect workers employed status).
With respect to renewable resources, our findings show that individuals who are worried about energy issues, such as "security supplies", tend to misperceive some energy sources, like nuclear power. Pidgeon et al. (2008) affirmed that traditional sources are perceived more suitable to guarantee security of supply, and this can be interpreted as more inclined attitudes of individuals to prefer locally sources, or to consider and support banned sources (e.g., nuclear in Italy). In addition, we found that individuals who are more sensitive to equity issues, are more inclined being fair, and that have more propensity to the foreigner acceptance, tend to have misperception on renewable resources.
Another determinant of misperception may be political orientation, that in our case is captured by attachment to country and EU (factor 10), that can affect perception and judgment with respect to different energy sources; specifically, in our study we argued that people that are attached to country and EU have more misperception, both for renewable and non-renewable re-

sources.
Finally, we should highlight how Nuclear energy source is not perceived as a renewable sources; indeed, in our results we have seen that, people who feel responsible for reducing climate change, have a misperception on nuclear energy. Therefore, individuals can misperceive the relative contribution of energy sources to greenhouse gas emissions, indeed nuclear tends to be considered, for instance, similar to natural gas,because people perceive negative environmental consequences of nuclear power (e.g.explosions of nuclear power plants, radioactive waste.)
Another important step is represented by the identification of over perception and under perception for natural gas energy source, for both Generation Z and Millennial. We concluded that Generation Z tends to have more over-perception on natural gas and, on the other hand, Millennial have more under-perception of natural gas than Generation Z.
Finally, with the Ordered logit model, we have seen that, although the response percentage is different for each percentage range, the bias intensity is quite similar for both groups analyzed.

# 5 Conclusion and Policy Implications

Based on empirical findings, our work points out that Next generation in Italy does not have a real perception on the actual electricity energy mix, and this could be a hurdle which might not allow the necessary energy and sustainable transition. Young people between 17-25 years old usually move away from their household, and this inevitably increases their responsibility, developing opportunities for sustainable consumption habits (Kymäläinen et al. 2021), and therefore investigating their energy consumption habits and possible obstacles to sustainable transition is crucial. In the light of this, in order to increase the awareness in the Generation Z category, it may be useful to promote awareness-raising campaigns that focus on the possibility of having a good job opportunities in the energy sector. This can be a good strategy due to the fact that this generation has experienced the economic crisis, unlike the Millennial, and they strongly aspire to future stability. In addition, also information campaigns could be an helpful tool in order to increase individual awareness for those who have few knowledge, or for those who do not have any kind of knowledge about energy issues. in the literature, this is consistent with several studies about consumers perceptions that highlight the presence of low levels of knowledge and awareness; this is

a crucial, because the increasing of awareness could lead the individual to solve environmental and energy-consumption problems.

In the proposed online experiment, the considered sample is not heterogeneous because we did not want to consider different population groups. For this reason, it might be notable to detect how different skilled individuals could respond to our investigation. An interesting extension could be comparing the perception of our sample with the "Experts" category, such as academic professors, researchers, assistants, associate lecture, and so on. Therefore, the first step could be first to expand our current sample on "Next Generation", and then collect a new sample for "Experts" category; in this way, not only we will be able to compare "Next generation" with "Experts", but we may consider other "age-category" such as "Generation X", thus people between 41-56 years old, and "Boomers" those between 57-66 years old. Finally, it might be interesting to extend our research to other EU countries, in order to improve our findings and investigate how energy perception among different European countries changes.
In addition, this work analyses the act of individual attitudes but our results are limited, due to our main purpose; however, it is crucial to emphasize the importance of applying an approach that considers a human and behavioral dimension of the individual, to better understand the psychological factors that most influence energy behaviour and, consequently, a sustainable energy transition. []

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## Appendix

Table 12: Questionnaire

1. What is your country of origin?
2. Number of inhabitants of city of residence
3. Sex
4. Age
5. Are there children/young people in your household?
6. Please indicate a score from 0 to 10. 0 means that you do not trust at all, and 10 means that you trust completely. You can be trusted:
    - Most people
    - About your country's government
    - Politicians and political parties
7. Which party did you vote for in that election?
8. Have you posted or shared anything about politics online, for example on blogs, via email or on social media such as Facebook or Twitter?
9. In politics people sometimes talk about 'left' and 'right': where would you place yourself considering this scale, where 0 means left and 10 means right?
10. To what extent do you think your country should allow people of the different ethnic group to come and live here?
11. Would you say it is generally bad or good for your country's economy that people come to live here from other countries?
12. Would you say that it is a behaviour that can always be justified, never justified, or something in between that of cheating on taxes to be paid if you have the chance?
13. How is your health in general?
14. Choose a number from 0 to 10, where 0 means 'not at all emotionally attached' and 10 means 'very emotionally attached':
    - Your Country
    - To Europe
15. Regardless of whether you belong to a particular religion, how religious would you say you are?
16. If you were to buy a large electrical appliance for your home, how likely is it that you would buy one of the most energy efficient ones?
17. There are somethings that can be done to reduce energy use, such as switching off appliances that are not being used,walking for short journeys, or only using the heating or air conditioning when really needed. In your daily life, how often do you do things to reduce your energy use?
18. Overall, how confident are you that you could use less energy than you do now?
19. What extent you agree or disagree that social benefits and services in your country:
    - Place too great a strain on the economy
    - Lead to a more equal society
20. How much of the electricity used in your country do you perceive is generated by:
    - Biomass
    - Coal
    - Hydroeletric power
    - Natural gas
    - Nuclear
    - Solar
    - Wind
21. How worried are you that:
    - May be power cuts in your country
    - Power too expensive for many people
    - Being too dependent on energy imports from other countries
    - your country being too dependent on using energy generated by fossil fuels such as oil, gas and coal
22. How worried are you that energy supplies could be interrupted by:
    - Natural disasters
    - Extreme weather
    - Technical failures
    - Insufficient power being generated
    - Terrorist attacks
23. You may have heard the idea that the world's climate is changing due to increases in temperature over the past 100 years. What is your personal opinion on this? Do you think the world's climate is changing?
24. Do you think that climate change is caused by natural processes, human activity, or both?
25. To what extent do you feel a personal responsibility to try to reduce climate change?
26. How worried are you about climate change?
27. To what extent are you in favour or against the following policies in your country to reduce climate change:
    - Increasing taxes on fossil fuels, such as oil, gas and coal
    - Using public money to subsidise renewable energy
    - Law banning the sale of the least energy efficient household appliances
28. Are there children/young people in your household?
29. Now I will briefly describe some people. Please listen to each description and tell me how much each person is or is not like you:
    - It is important to her/him to be rich. She/he wants to have a lot of money and expensive things.
    - It is important to her/him to listen to people who are different from her/him. Even when she/he disagrees with them, she/he still wants to understand them.
    - It is important to her/him always to behave properly. She/he wants to avoid doing anything people would say is wrong.
    - She/he thinks it is important that every person in the world should be treated equally. She/he believes everyone should have equal opportunities in life.
    - It's very important to her/him to help the people around her/him. She/he wants to care for their well-being.
    - She/he strongly believes that people should care for nature. Looking after the environment is important to her/him.

Table 13: LPM for Biomass with Robust Standard errors

| | LPM(1) | LPM(2) |
|---|---|---|
| Generation Z | 0.313*** | 0.291*** |
| | (6.04) | (2.91) |
| Millennials | 0.296*** | 0.242** |
| | (3.76) | (2.10) |
| Sex | -0.149*** | -0.0655 |
| | (-3.41) | (-1.05) |
| Child | 0.0369 | 0.0404 |
| | (0.86) | (0.71) |
| Not good health | 0.559*** | 0.621 |
| | (2.65) | (1.45) |
| Pretty good health | 0.476*** | 0.451*** |
| | (8.01) | (5.02) |
| Good health | 0.458*** | 0.419*** |
| | (10.69) | (6.18) |
| Very good Health | 0.472*** | 0.371*** |
| | (9.94) | (5.12) |
| Worried about energy issues | | 0.0281 |
| | | (0.95) |
| Care about environment and climate change | | -0.0319 |
| | | (-1.14) |
| Trust and Satisfaction | | 0.0183 |
| | | (0.63) |
| Sensitive for social issues | | 0.0417 |
| | | (1.37) |
| Discrimination | | -0.0253 |
| | | (-0.90) |
| Worried about being dependent on others and fossil fuel | | -0.0449* |
| | | (-1.64) |
| Opinion on climate change | | 0.00156 |
| | | (0.05) |
| Social sensitive | | 0.00664 |
| | | (0.22) |
| Individual feelings | | 0.0397 |
| | | (1.47) |
| Patriotism | | -0.0116 |
| | | (-0.41) |
| Worreid about climate change (ways for reducing climate change | | -0.0309 |
| | | (-1.09) |
| Vote/Political social | | 0.0273 |
| | | (0.88) |
| _cons | -0.331*** | -0.305*** |
| | (-5.47) | (-2.69) |
| Observations | 288 | 288 |

Table 14: LPM for Coal with Robust Standard errors

| | LPM (1) | LPM (2) |
|---|---|---|
| Generation Z | 0.171 | 0.210 |
| | (1.54) | (1.51) |
| Millennials | 0.325*** | 0.410*** |
| | (2.72) | (2.75) |
| Sex | -0.0698* | 0.00896 |
| | (-1.66) | (0.15) |
| Child | -0.0394 | -0.0704 |
| | (-0.94) | (-1.28) |
| Not good health | -0.176 | -0.0780 |
| | (-1.09) | (-0.71) |
| Pretty good health | -0.282*** | -0.271*** |
| | (-5.04) | (-2.80) |
| Good health | -0.291*** | -0.342*** |
| | (-7.32) | (-4.37) |
| Very good health | -0.307*** | -0.285*** |
| | (-6.64) | (-3.26) |
| Worried about energy issues | | -0.00843 |
| | | (-0.29) |
| Care about environment and climate change | | -0.0616** |
| | | (-2.32) |
| Trust and Satisfaction | | 0.0232 |
| | | (0.85) |
| Sensitive for social issues | | 0.0295 |
| | | (1.08) |
| Discrimination | | 0.0101 |
| | | (0.36) |
| Worried about being dependent on others and fossil fuel | | -0.0125 |
| | | (-0.49) |
| Opinion on climate change | | -0.0277 |
| | | (-1.01) |
| Social sensitive | | 0.0187 |
| | | (0.64) |
| Individual feelings | | 0.0371 |
| | | (1.30) |
| Patriotism | | 0.0258 |
| | | (0.95) |
| Worreid about climate change (ways for reducing climate change | | 0.000351 |
| | | (0.01) |
| Vote/Political social | | 0.0159 |
| | | (0.48) |
| _cons | 0.849*** | 0.815*** |
| | (7.35) | (5.30) |
| Observations | 288 | 288 |

Table 15: LPM for Hydroelectric power with Robust Standard errors

| | LPM (1) | LPM (2) |
|---|---|---|
| Generation Z | 0.167 | 0.160 |
| | (1.61) | (1.14) |
| Millennials | 0.222* | 0.241 |
| | (1.86) | (1.57) |
| Sex | -0.113** | -0.0369 |
| | (-2.56) | (-0.59) |
| Child | 0.0491 | 0.0235 |
| | (1.11) | (0.40) |
| Not good health | -0.630*** | -0.633** |
| | (-3.51) | (-2.04) |
| Pretty good health | -0.269*** | -0.289*** |
| | (-4.56) | (-3.24) |
| Good health | -0.349*** | -0.384*** |
| | (-7.87) | (-5.59) |
| Very good health | -0.346*** | -0.426*** |
| | (-7.22) | (-5.77) |
| Worried about energy issues | | -0.0253 |
| | | (-0.83) |
| Care about environment and climate change | | -0.0197 |
| | | (-0.65) |
| Trust and Satisfaction | | -0.0303 |
| | | (-1.07) |
| Sensitive for social issues | | 0.0131 |
| | | (0.41) |
| Discrimination | | -0.0616** |
| | | (-2.23) |
| Worried about being dependent on others and fossil fuel | | -0.0477* |
| | | (-1.70) |
| Opinion on climate change | | -0.00778 |
| | | (-0.25) |
| Social sensitive | | 0.00574 |
| | | (0.20) |
| Individual feelings | | -0.00642 |
| | | (-0.22) |
| Patriotism | | -0.0223 |
| | | (-0.72) |
| Worreid about climate change (ways for reducing climate change | | 0.0327 |
| | | (1.11) |
| Vote/Political social | | -0.0114 |
| | | (-0.36) |
| _cons | 0.808*** | 0.845*** |
| | (7.33) | (5.68) |
| Observations | 288 | 288 |

Table 16: LPM for Natural gas with Robust Standard errors

| | LPM(1) | LPM(2) |
|---|---|---|
| Generation Z | 0.0657 | 0.0809 |
| | (0.59) | (0.56) |
| Millennials | 0.0752 | 0.0368 |
| | (0.59) | (0.25) |
| Sex | -0.119*** | -0.0976 |
| | (-2.66) | (-1.54) |
| Child | -0.00781 | -0.00459 |
| | (-0.18) | (-0.08) |
| Not good health | -0.130 | 0.0331 |
| | (-0.92) | (0.31) |
| Pretty good health | -0.344*** | -0.278*** |
| | (-5.92) | (-3.11) |
| Good health | -0.394*** | -0.373*** |
| | (-9.62) | (-5.11) |
| Very good health | -0.322*** | -0.256*** |
| | (-7.12) | (-3.30) |
| Worried about energy issues | | 0.0154 |
| | | (0.54) |
| Care about environment and climate change | | 0.00409 |
| | | (0.13) |
| Trust and Satisfaction | | 0.0525* |
| | | (1.70) |
| Sensitive for social issues | | -0.00278 |
| | | (-0.09) |
| Discrimination | | -0.00696 |
| | | (-0.24) |
| Worried about being dependent on others and fossil fuel | | -0.00355 |
| | | (-0.12) |
| Opinion on climate change | | -0.0635** |
| | | (-2.43) |
| Social sensitive | | 0.0440 |
| | | (1.47) |
| Individual feelings | | 0.0247 |
| | | (0.86) |
| Patriotism | | 0.0535* |
| | | (1.83) |
| Worreid about climate change (ways for reducing climate change | | 0.0167 |
| | | (0.58) |
| Vote/Political social | | 0.0127 |
| | | (0.38) |
| _cons | 0.938*** | 0.868*** |
| | (8.09) | (5.65) |
| Observations | 288 | 288 |

Table 17: LPM for Nuclear power with Robust Standard errors

| | LPM(1) | LPM(2) |
|---|---|---|
| Generation Z | 0.175*** | 0.188*** |
| | (6.52) | (2.65) |
| Millennials | 0.150*** | 0.0552 |
| | (2.85) | (0.70) |
| Sex | -0.0980*** | -0.0680 |
| | (-2.75) | (-1.34) |
| Child | -0.0183 | -0.0400 |
| | (-0.53) | (-0.85) |
| Not good health | -0.300 | -0.487 |
| | (-0.79) | (-1.49) |
| Pretty good health | -0.230 | -0.281 |
| | (-0.65) | (-0.87) |
| Good health | -0.253 | -0.303 |
| | (-0.72) | (-0.95) |
| Very good health | -0.260 | -0.232 |
| | (-0.74) | (-0.72) |
| Worried about energy issues | | 0.0352 |
| | | (1.34) |
| Care about environment and climate change | | -0.00254 |
| | | (-0.10) |
| Trust and Satisfaction | | -0.0232 |
| | | (-0.89) |
| Sensitive for social issues | | 0.0361 |
| | | (1.35) |
| Discrimination | | -0.0268 |
| | | (-1.21) |
| Worried about being dependent on others and fossil fuel | | -0.00690 |
| | | (-0.27) |
| Opinion on climate change | | 0.0322 |
| | | (1.30) |
| Social sensitive | | -0.0152 |
| | | (-0.59) |
| Individual feelings | | 0.00725 |
| | | (0.32) |
| Patriotism | | 0.00536 |
| | | (0.21) |
| Worreid about climate change (ways for reducing climate change | | -0.0187 |
| | | (-0.78) |
| Vote/Political social | | -0.0419 |
| | | (-1.62) |
| _cons | 0.334 | 0.374 |
| | (0.95) | (1.16) |
| Observations | 288 | 288 |

Table 18: LPM for Solar power with Robust Standard errors

| | LPM(1) | LPM(2) |
|---|---|---|
| Generation Z | 0.274** | 0.206 |
| | (2.57) | (1.43) |
| Millennials | 0.136 | 0.109 |
| | (1.12) | (0.71) |
| Sex | -0.167*** | -0.0713 |
| | (-3.79) | (-1.15) |
| Child | 0.0897** | 0.0401 |
| | (2.04) | (0.67) |
| Not good health | 0.0935 | 0.491 |
| | (0.25) | (1.45) |
| Pretty good health | 0.201 | 0.270 |
| | (0.61) | (0.88) |
| Good health | 0.207 | 0.174 |
| | (0.63) | (0.58) |
| Very good health | 0.152 | 0.0943 |
| | (0.46) | (0.31) |
| Worried about energy issues | | 0.0548* |
| | | (1.90) |
| Care about environment and climate change | | -0.00480 |
| | | (-0.16) |
| Trust and Satisfaction | | 0.00395 |
| | | (0.13) |
| Sensitive for social issues | | -0.0138 |
| | | (-0.43) |
| Discrimination | | -0.0104 |
| | | (-0.34) |
| Worried about being dependent on others and fossil fuel | | -0.0279 |
| | | (-0.96) |
| Opinion on climate change | | -0.0324 |
| | | (-1.15) |
| Social sensitive | | 0.00913 |
| | | (0.29) |
| Individual feelings | | -0.00342 |
| | | (-0.12) |
| Patriotism | | 0.0445 |
| | | (1.52) |
| Worreid about climate change (ways for reducing climate change | | -0.0109 |
| | | (-0.37) |
| Vote/Political social | | 0.0261 |
| | | (0.76) |
| _cons | 0.181 | 0.250 |
| | (0.53) | (0.76) |
| Observations | 288 | 288 |

Table 19: LPM for Eolic power with Robust Standard errors

| | LPM(1) | LPM(2) |
|---|---|---|
| Generation Z | 0.251*** | 0.163 |
| | (2.95) | (1.32) |
| Millennials | 0.126 | 0.0335 |
| | (1.26) | (0.26) |
| Sex | -0.159*** | -0.127** |
| | (-3.55) | (-2.01) |
| Child | 0.0499 | 0.0171 |
| | (1.14) | (0.30) |
| Not good health | 0.582*** | 1.120*** |
| | (3.06) | (8.77) |
| Pretty good health | 0.644*** | 0.608*** |
| | (10.61) | (6.74) |
| Good health | 0.569*** | 0.528*** |
| | (12.74) | (7.63) |
| Very good health | 0.494*** | 0.384*** |
| | (10.00) | (5.17) |
| Worried about energy issues | | 0.0214 |
| | | (0.72) |
| Care about environment and climate change | | -0.00410 |
| | | (-0.15) |
| Trust and Satisfaction | | -0.00875 |
| | | (-0.30) |
| Sensitive for social issues | | 0.0289 |
| | | (0.93) |
| Discrimination | | -0.0290 |
| | | (-0.97) |
| Worried about being dependent on others and fossil fuel | | -0.0404 |
| | | (-1.51) |
| Opinion on climate change | | -0.00370 |
| | | (-0.14) |
| Social sensitive | | -0.0314 |
| | | (-1.00) |
| Individual feelings | | 0.0540* |
| | | (1.93) |
| Patriotism | | 0.0311 |
| | | (1.14) |
| Worreid about climate change (ways for reducing climate change | | -0.0436 |
| | | (-1.56) |
| Vote/Political social | | -0.00786 |
| | | (-0.24) |
| _cons | -0.276*** | -0.137 |
| | (-2.99) | (-1.04) |
| Observations | 288 | 288 |

Table 20: Marginal effects for Logit model

| | Over | Under |
|---|---|---|
| Generation Z | .3894502 * | -.4608657*** |
| | (.12666) | (.13479 ) |
| Millennials | .3519359 | -.3875403** |
| | (.2795) | (.12215) |
| Sex | -0.762** | -0.559* |
| | (-2.26) | (-1.69) |
| Child | -0.00842 | -0.108 |
| | (-0.02) | (-0.35) |
| Not good health | 0.622 | |
| | (0.44) | |
| Pretty good health | 0.827* | -15.55*** |
| | (1.74) | (-16.17) |
| Good health | -0.262 | -14.91*** |
| | (-0.68) | (-18.52) |
| Worried about energy issues | 0.270* | -0.190 |
| | (1.65) | (-1.16) |
| Care about environment and climate change | 0.0933 | -0.0620 |
| | (0.53) | (-0.39) |
| Trust and Satisfaction | 0.224 | 0.0478 |
| | (1.26) | (0.29) |
| Sensitive for social issues | 0.0500 | 0.0913 |
| | (0.29) | (0.59) |
| Discrimination | 0.0919 | 0.0367 |
| | (0.57) | (0.24) |
| Worried about being dependent on others and fossil fuel | -0.245 | 0.0231 |
| | (-1.45) | (0.16) |
| Opinion on climate change | -0.140 | -0.219 |
| | (-0.94) | (-1.48) |
| Social sensitive | 0.269 | 0.0660 |
| | (1.51) | (0.41) |
| Individual feelings | 0.563*** | -0.0576 |
| | (3.05) | (-0.38) |
| Patriotism | 0.136 | 0.0581 |
| | (0.84) | (0.36) |
| Worreid about climate change (ways for reducing climate change | 0.0175 | 0.123 |
| | (0.10) | (0.84) |
| Vote/Political social | 0.0420 | 0.108 |
| | (0.21) | (0.63) |
| Very good health | | -14.60*** |
| | | (-17.53) |
| _cons | -2.328* | 16.79*** |
| | (-1.84) | (15.61) |
| Observations | 197 | 91 |

Table 21: Marginal effects for Ordered Logit model (Biomass)

| | **Well-percetion** | |
|---|---|---|
| | Generation Z | Millennials |
| ***Biomass*** | **.6045996*** ** | **.7137272*** ** |
| | **(25%-50%)** | |
| | Generation Z | Millennials |
| ***Biomass*** | **.247322*** ** | **.1920364*** ** |
| | **(50%-75%)** | |
| | Generation Z | Millennials |
| ***Biomass*** | **.1285432*** ** | **.0827589** ** |
| | **(75%-100%)** | |
| | Generation Z | Millennials |
| ***Biomass*** | **.0195352** ** | **.0114775* ** |

** p<0.1, ** p<0.05, *** p<0.01*

Table 22: Marginal effects for Ordered Logit model (Coal)

| | **Well-percetion** | |
|---|---|---|
| | Generation Z | Millennials |
| ***Coal*** | **.2927633*** ** | **.2471779*** ** |
| | **(25%-50%)** | |
| | Generation Z | Millennials |
| ***Coal*** | **.3441168*** ** | **.3348897*** ** |
| | **(50%-75%)** | |
| | Generation Z | Millennials |
| ***Coal*** | **.2975963*** ** | **.3360752*** ** |
| | **(75%-100%)** | |
| | Generation Z | Millennials |
| ***Coal*** | **.0655235*** ** | **.0818572** ** |

** p<0.1, ** p<0.05, *** p<0.01*

Table 23: Marginal effects for Ordered Logit model (Hydroelectric power)

| | **Well-percetion** | |
|---|---|---|
| | Generation Z | Millennials |
| ***Hydro*** | **.3557445*** ** | **.3502277*** ** |
| | **(25%-50%)** | |
| | Generation Z | Millennials |
| ***Hydro*** | **.4534392*** ** | **.4551213*** ** |
| | **(50%-75%)** | |
| | Generation Z | Millennials |
| ***Hydro*** | **.1402243*** ** | **.1428186*** ** |
| | **(75%-100%)** | |
| | Generation Z | Millennials |
| ***Hydro*** | **.050592*** ** | **.0518323** ** |

** p<0.1, ** p<0.05, *** p<0.01*

Table 24: Marginal effects for Ordered Logit model (Nuclear power)

| | **Well-percetion** | |
|---|---|---|
| | Generation Z | Millennials |
| ***Nuclear*** | **.7686302*** ** | **.9180759*** ** |
| | **(25%-50%)** | |
| | Generation Z | Millennials |
| ***Nuclear*** | **.134602 *** ** | **.0532531** ** |
| | **(50%-75%)** | |
| | Generation Z | Millennials |
| ***Nuclear*** | **.080003*** ** | **.0243196* ** |
| | **(75%-100%)** | |
| | Generation Z | Millennials |
| ***Nuclear*** | **.0167648* ** | **.0043515** |

** p<0.1, ** p<0.05, *** p<0.01*

Table 25: Marginal effects for Ordered Logit model (Solar power)

| | **Well-percetion** | |
|---|---|---|
| | Generation Z | Millennials |
| ***Solar*** | **.3966835*** ** | **.4603255*** ** |
| | **(25%-50%)** | |
| | Generation Z | Millennials |
| ***Solar*** | **.4275224*** ** | **.3994912*** ** |
| | **(50%-75%)** | |
| | Generation Z | Millennials |
| ***Solar*** | **.1173131*** ** | **.0951759*** ** |
| | **(75%-100%)** | |
| | Generation Z | Millennials |
| ***Solar*** | **.058481*** ** | **.0450073** ** |

** p<0.1, ** p<0.05, *** p<0.01*

Table 26: Marginal effects for Ordered Logit model (Eolic power)

| | **Well-percetion** | |
|---|---|---|
| | Generation Z | Millennials |
| ***Eolic*** | **.5529558*** ** | **.6854996*** ** |
| | **(25%-50%)** | |
| | Generation Z | Millennials |
| ***Eolic*** | **.2958867*** ** | **.2253093*** ** |
| | **(50%-75%)** | |
| | Generation Z | Millennials |
| ***Eolic*** | **.1122861*** ** | **.0679178** ** |
| | **(75%-100%)** | |
| | Generation Z | Millennials |
| ***Eolic*** | **.0388714** ** | **.0212732** ** |

** p<0.1, ** p<0.05, *** p<0.01*