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## EXAMINING THE OPINIONS OF ENGINEERS ABOUT RENEWABLE ENERGY SOURCES

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### Abstract

The importance of energy is significantly increasing in the world. The consumed amount of energy indicates the development level of countries today. Oil and coal stocks are decreasing fastly, and lack of natural gas sources results in an increasing demand on renewable energy sources. The negative effects of the renewable energy sources is less than conventional energy sources on the environment. The cost of renewable energy sources is less than fossil fuels, and is not used up, and in contrast to conventional fuels they are not an important threat to human health and the environment.

The aim of this study is to determine the opinions of Libyan engineers working in Libya, the UK and the United State, about renewable energy sources. For data collection, the survey technique, the most commonly used data collection tool, was conducted. In this study, 318 Libyan engineers working in Libya, UK and the USA were surveyed. The participants answered the questionnaires between 15-20 minutes. For data analysis, the SPSS 20 program was used.

The results show that, the participants know about renewable energy sources, but this is not sufficient. Their attitudes and thoughts are high, but there are deficiencies in converting this into behavior. The reason for these shortcomings is that renewable energy sources are expensive and there is lack of education. In order to increase the use of renewable energy sources, sponsors will be found, reducing the prices and dissemination of information and training on this issue will increase the transformation into awareness as well as awareness.

**Keywords:** *Environment, Energy, Renewable Energy, Climate Change, Sustainable Energy Resources, Solar Energy, Wind Energy, Attitude.*

## Introduction

Energy is one of the basic necessities to sustain life. In heating, lighting, power tools, transport, industry etc. energy is used in many areas. However, the consumption of energy resources brings environmental problems together. The renewable energy sources that have gained importance in the face of the current energy problem, biogas seems to be capable of responding to local factors in favorable conditions. Geothermal energy is a clean and environmental friendly energy source. In particular, it contributes to the protection of air quality. Solar energy is a renewable energy source. It prevents unnecessary and excessive commercial energy consumption of buildings by using natural heating and cooling systems and protects the environmental balance. Wind energy is a stable, reliable, continuous source and not externally dependent.

After the industrial revolution in 1800s, energy has become a primary requirement for growth and development of the world and the key problem was to supply this energy demand, which increased during the years. Although coal was the primary energy source during 1800s and especially after the Second World War, a large amount of other fossil fuels such as oil and natural gas was put in use after the industrial revolution (Kostic, 2004).

People ignored the usage of fossil fuels and their effects on environment until Svante Arrhenius claimed that fossil fuel consumptions and their emitted greenhouse gases (GHG) emissions such as carbon dioxide, methane, nitrous oxide and fluorinated gases, might have an effect on the global warming by 1896 (Crawford, 2009). After his claims, many studies and technological developments on understanding greenhouse gas effects and their calculation methods were created to produce concentration curves by 1958 at Mauna Loa, in Hawaii (Malamud, 2005).

## Aim of the Study

Nowdays renewable energy sources have increased rapidly due to the high damage of the fossil fuels used today and due to the high probability of exhaustion in the near future. Increasing population, developing technology and diminishing fossil fuels mean that more work is needed on renewable energies. Therefore, the aim of this study was to determine the opinions of Libyan engineers working in Libya, the UK and the United States about renewable energy sources.

## Research Problem

What is the opinion of Libyan engineers working in Libya, UK and USA about the use of renewable energy sources

## The Importance of the Study

Today, more fossil fuels are being used to meet the increasing need for energy in parallel with the rapid population growth and developing technology in the world. This means that in the near future, fossil fuels will be exhausted, and the over consumption of fossil fuels in the years to come and the failure to replace them will necessitate new and alternative energy sources. The high potential of renewable energy sources in our country requires more work in this area. Many studies on renewable energy sources are carried out. In this study, the presence of Libyan engineers working in Libya, England and America is an important difference.

### **Research Model**

The survey model was used as a research model. The screening model is a widely used type of non-experimental research. This model is a method that we can choose when we want to determine the thoughts, opinions, attitudes and beliefs of individuals. In the screening model, the data is collected by the survey technique (Aypay, 2015).

The method applied in this study to make it more reliable is quantitative method by use of research questionnaire adopted from Amber et al., (2017) and from sources like articles, textbooks, and studies on the subject and internet source. In this study, it has been preferred to determine the opinions of teachers and teacher candidates about renewable energies and to examine these views by comparing them with different variables.

### **Data Gathering Tools**

In the data collection process, the survey technique, which is the most used data collection tool in the survey model, was used. The questionnaire is a data collection tool designed to reveal the information, opinions and attitudes of the people who form the group in order to determine the situation in any subject (Demir,2006). In the process of collecting data, similar studies were examined and in the “Survey on Renewable Energy Resources Use” developed by the researcher was used. The questionnaire (Omer, 2008) consists of two parts; demographic information and renewable energies opinion questionnaire.

### **Participants and Sample**

In this study, 318 Libyan engineers working in Libya, UK and USA were surveyed. As a result of the observations, it was observed that the participants answered the questionnaire between 15-20 minutes.

### **Data Analysis**

In this research SPSS 20 (Statistical Package for the Social Sciences) program was used to evaluate the opinions of Libyan engineers working in Libya, UK and USA in Energy Renewable Energy Resources Opinion Survey which is used for data

collection purposes. Descriptive analysis was performed for each item in the Renewable Energy Resources Opinion Survey; percentage and frequency values were found and also shown as tables. In analysing the data and investigating the statistics Frequency test techniques were used.

## Results And Discussion

### Analyses of Demographic Information

The findings and comments with regard to the questions about demographic features are given as follows:

Table

1.

#### *Distribution of Sample by Gender*

<i>Gender</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Male</b>	<b>196</b>	<b>61,6</b>
<b>Female</b>	<b>122</b>	<b>38,4</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As seen in Table 1, 318 people participated in the research, 61,6% female and 38,4% male. In terms of the distribution of sample by gender, we can see that males are more than females.

Table 2.

#### *Distribution of Sample by Ethnic Groups*

<i>Ethnic Groups</i>	<i>Frequency</i>	<i>Percentage</i>
Libyan Engineers working in Libya	118	37,2%
Libyan Engineers working in UK	100	31,4%
Libyan Engineers working in USA	100	31,4%
<b>Total</b>	<b>318</b>	<b>100,0</b>

As in Table 2, 37,2% of the participant Libyan Engineers working in Libya, 31,4% of the participant Libyan Engineers working in UK, 31,4% of the participant Libyan Engineers working in USA.

Table 3.

*Please tick the box which corresponds to the highest level of education you have completed.*

<i>Educational Levels</i>	<i>Frequency</i>	<i>Percentage</i>
Post Graduate (Master or PhD)	158	49,7
University degree or equivalent	96	30,2
A Levels or equivalent	27	8,5
No formal qualifications	24	7,5

GCSE/O Levels or equivalent	13	4,1
<b>Total</b>	<b>318</b>	<b>100,0</b>

In Table 3, 49, 7% of the participants are “Post Graduate” (Master or PhD), 30, 2% with “University degree or equivalent”, 8,5% with “A Levels or equivalent”, 7,5% with “No formal Qualifications”, 4, 1% with “GCSE / 0 Levels or equivalent”. Most of the participants (49,7%) are from the above table.

Table 4.

*Please tick the household income bracket that corresponds to your total household income in 2002.*

<b>Income</b>	<b>Frequency</b>	<b>Percentage</b>
Under 10.000	99	31,1
10.000 – 20.000	66	20,6
21.000 – 30.000	47	14,6
31.000 – 40.000	32	10,0
Over 50.000	30	10,0
41.000 – 50.000	25	7,8
51.000 – 60.000	19	5,9
<b>Total</b>	<b>318</b>	<b>100,0</b>

As seen in Table 4, 31,1% of the participant’s monthly income is under 10.000 (20,6%), between 10.000-20.000 (20,6%), 21.000-30.000, (14,6%), 31.000-40.000 (10,0%), over 50.000, (10,0%), 41.000-50.000, (7,8%), 51.000-60.000 (10,0%). In the distribution of the sample, the monthly income of the families is seen to be at least 10.000 (31, 1%) and between 51.000-60.000 dollars (5,9%) at maximum.

Table 5.

*What type of property do you live in?*

<b>Property</b>	<b>Frequency</b>	<b>Percentage</b>
Ground floor flat	108	33,9
Detached	80	25,1
Semi-detached	53	16,7
Middle floor flat	39	12,3
Mid terrace	18	5,7
End terrace	11	3,5
Mid terrace with passage	9	2,8
<b>Total</b>	<b>318</b>	<b>100,0</b>

As seen Table 5, 33.9% of the participants were on the “Ground floor”, 25%, “Detached”, 16.7% “Semi-detached”, 12.3% on Middle floor flat, 5.7% mid terrace, 3.5% is on “End terrace”, while 2,8% on “Mid terrace with a passage”. Most of the

participants (33.9%) live on the ground floor, while a small part (2.8%) has a mid terrace with a passage.

Table 6.

*In which year was your house built?*

<i>Years</i>	<i>Frequency</i>	<i>Percentage</i>
After 1990	130	40,8
Don't know	77	24,2
1980s	31	9,7
1970s	25	7,9
Before 1900	13	4,1
1950s	10	3,1
1960s	8	2,5
1900s	7	2,2
1920s	6	1,9
1940s	5	1,6
1910s	4	1,3
1930s	2	0,6
<b>Total</b>	<b>318</b>	<b>100,0</b>

Table 6 shows the participants' answers to the question "when was your house built" was 40.8% in 1990, 24.2% of them had no knowledge of this subject, in 9.7% of 1980, 7.9% in 1970, 4.1% of before 1990, at 3.1% of 1950, 2.5% of 1960, at 2.2% in 1900, 1.9% in 1920, 1.6% in 1940, 1.3% in 1910, 0.6% in 1930. Most of the participants (40%) lived in the building built in 1990, the minority of participants (0.6%) live in houses built after 1930.

Table 7.

*Do you have access to the Internet?*

<i>Internet Access</i>	<i>Frequency</i>	<i>Percentage</i>
Yes	292	91,8
No	15	4,7
<b>Total</b>	<b>307</b>	<b>96,5</b>

In the Table 7, "Do you have access to the Internet?" 91.8% of the participants answered "Yes" and 4.7% answered "No".

Table 8.

*Where do you live?*

<i>Country</i>	<i>Frequency</i>	<i>Percentage</i>
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England	113	35,5
Libya	104	32,7
United states	100	31,4
<b>Total</b>	<b>317</b>	<b>99,7</b>

As seen in Table 8, 35.5% of the participants live in the UK, 32.7% live in Libya and 31.4% live in the USA.

Opinions about the “Evaluation of The Use of Energy Sources” and the findings obtained are presented in the table below.

Table 9.

*Which of the following terms are you aware of?*

<b>Terms are you Aware</b>	<b>Frequency</b>	<b>Percentage</b>
Global warming	123	38,7
The greenhouse effect	96	30,2
Renewable energy	34	10,7
Energy efficiency	19	6,0
The greenhouse effect	18	5,7
None of above	11	3,5
Biodiversity	10	3,1
Sustainable development	7	2,2
<b>Total</b>	<b>318</b>	<b>100,0</b>

As seen in Table 9, the majority of participants answers to the question “Which of the following terms are you aware of?” were 38.7% “Global warming” and 30.2% “The greenhouse effect”.

Table 10.

*Generally where did you hear of following?*

<b>Get Information</b>	<b>Frequency</b>	<b>Percentage</b>
Internet	114	35,8
TV	113	35,5
Other, please specify	51	16,2
Word of mouth	17	5,3
Energy Advice Centres	12	3,8
Newspapers	8	2,5
Radio	3	0,9
<b>Total</b>	<b>318</b>	<b>100,0</b>

As stated in Table 10, the majority of the participants 35.8% responded as “Internet” and 35.5% as “TV”.

Table 11.

*How concerned are you that the earth's climate and long-term are changing?*

<b><i>Weather Patterns Changing</i></b>	<b><i>Frequency</i></b>	<b><i>Percentage</i></b>
Fairly concerned	118	37,1
Very concerned	109	34,3
Indifferent	33	10,4
Not very concerned	29	9,1
Not at all concerned	15	4,7
Don't know	13	4,1
<b><i>Total</i></b>	<b><i>318</i></b>	<b><i>100,0</i></b>

The most intensive answers to the question above were "Fairly concerned" 37.1% and "Very concerned" 34.3%.

Table 12.

*In your view which of the following generate electricity in wave which significantly increase the risk of climate change?*

<b><i>Risk of climate change</i></b>	<b><i>Frequency</i></b>	<b><i>Percent</i></b>
Coal (or coal fired)	116	36,5
Oil (or oil-fired)	59	18,6
Gas/natural gas (or gas-fired)	51	16,0
Incineration (waste burning)	50	15,7
Biomass (burns wood, straw etc)	18	5,7
Nuclear	14	4,4
Wind	4	1,3
Solar	3	,9
Hydro-electric	3	,9
<b><i>Total</i></b>	<b><i>318</i></b>	<b><i>100,0</i></b>

As in the Table 12, the majority of the participant's 36.5% responded as "Coal", 18.6% "Oil", 16.0% "Gas", 15.7% "Incineration".

Table 13.

*Which of the following do you feel may be the consequences of climate change?*

<b><i>Consequences of Climate Change</i></b>	<b><i>Frequency</i></b>	<b><i>Percentage</i></b>
Change in weather conditions	123	38,7



Rise in temperatures	116	36,5
Loss of habitat	22	6,9
Increased risk of flooding	19	6,0
Drought and water shortage	15	4,7
Increased risk of disease	15	4,7
None	8	2,5
<b>Total</b>	<b>318</b>	<b>100,0</b>

As in the Table 13, 38.7% responded "Change in weather conditions" and 36.5% "Rise in temperatures".

Table 14.

*How much trust do you place in the following groups to make the right decisions about the environment? 1-Scientists, 2-Businesses and industry, 3-Environmental groups, 4-The government, 5-Ordinary people.*

<b>Right Decisions</b>	<b>Frequency</b>	<b>Percentage</b>
Some	153	48,1
None	89	28,0
A lot	76	23,9
<b>Total</b>	<b>318</b>	<b>100,0</b>

As in the Table 14, 48.1% responded "Some", 28.0% "None" and 23.9% "A lot". The participants' views about "Evaluation of The Use of Energy Sources" were examined and was found out that the participants from three countries gave similar and close answers. Six questions were asked and the answers were found to be similar. Most answers to the question "Which of the following terms are you aware of?" were "Global warming" (Americans 40%, British %45, Libyans 30%), and "The greenhouse effect" (Americans 7%, British 4,5%, Libyans 5,8%). Considering these percentages, there is no significant difference in the responses of the Libyan engineers living in all three countries (America, England and Libya).

Opinions about the "Perspectives on Renewable Energy" and the findings obtained are presented in the table below.

Table 15.

*Do you agree that energy generated from the following resources can replace the use of fossil fuels (oil/gas/coal etc.)? 1-Wind energy, 2-Solar energy, 3-Wood fuel.*

<b>Energy</b>	<b>Frequency</b>	<b>Percentage</b>
Agree	239	75,2
Don't know	42	13,2

Disagree	37	11,6
<b>Total</b>	<b>318</b>	<b>100,0</b>

As it can be seen in Table 15, 75,2% of the participants “Agreed”, 13,2% "Don't know" and 11.6% "Agree to disagreed".

Table 16.

*Do you feel that you need more information about renewable energy?*

<b>Information About Renewable Energy</b>	<b>Frequency</b>	<b>Percent</b>
Yes	227	71,4
No	91	28,6
<b>Total</b>	<b>318</b>	<b>100,0</b>

As in Table 16, the majority of participants 71,4% said “Yes”.

Table 17.

*Where is the most useful place for such information to be made available?*

<b>Information to be Made Available</b>	<b>Frequency</b>	<b>Percent</b>
TV	103	32,4
A website	104	32,7
Newspapers	19	6,0
Radio	11	3,5
<b>Total</b>	<b>318</b>	<b>100,0</b>

As it can be answered in Table 17, 32,4% of participants’ responded as “TV” and 32,7% as “A Website”.

Table 18.

*Do you think that we should increase the use of renewable energy?*

<b>Increase the Use of Renewable Energy</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	267	84,0
No	26	8,1
Don’t know	25	7,9
<b>Total</b>	<b>318</b>	<b>100,0</b>

Table 18 shows that 84,0% of the participants’ responded to the question as “Yes”.

Table 19.

*Who do you think should take the major responsibility for increasing our use of renewable energy?*

<i>Responsibility for Increasing our Use of Renewable Energy</i>	<i>Frequency</i>	<i>Percentage</i>
National Government	229	72,0
People like you	37	11,6
Government of the South East	20	6,3
Private businesses	19	5,9
Reading Borough Council	13	4,2
<b>Total</b>	<b>318</b>	<b>100,0</b>

Table 19, reveal that 72,0% of the participants' put the responsibility on "National Government".

Table 20.

*Have you heard of a 'renewable' or 'green' tariff from your electricity supplier?*

<i>Electricity Supplier</i>	<i>Frequency</i>	<i>Percentage</i>
Yes	98	30,8
No	211	66,4
<b>Total</b>	<b>309</b>	<b>97,2</b>

As in Table 20, 66,4% of the participants' responded as "No".

Table 21.

*Is your household on such a tariff?*

<i>Household</i>	<i>Frequency</i>	<i>Percentage</i>
Yes	131	41,2
No	187	58,8
<b>Total</b>	<b>318</b>	<b>100,0</b>

As in Table 21, 58,8% of the participants' admitted that they did not have such a tariff.

Table 22.

*Under what circumstances would you be interested in having such an energy tariff?*

<i>About Energy Tariff</i>	<i>Frequency</i>	<i>Percentage</i>
Interested if it was the same cost as my current tariff	94	29,6

<b>Interested if it was cheaper than my current tariff</b>	<b>74</b>	<b>23,3</b>
<b>Interested regardless of cost</b>	<b>58</b>	<b>18,2</b>
<b>Not interested</b>	<b>49</b>	<b>15,4</b>
<b>Interested at above the cost of my current tariff</b>	<b>34</b>	<b>10,7</b>
<b>Other</b>	<b>9</b>	<b>2,8</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As it can be observed in Table 22, 29,6% said “Interested if it was the same cost as my current tariff”, 23,3% “Interested if it was cheaper than my current tariff”, 18,2% “Interested regardless of cost” and 15,4% “Not interested”.

**Table 23.**

*Do you have any of the following in your house?*

<i>Following in your House</i>	<i>Frequency</i>	<i>Percentage</i>
<b>None of above</b>	<b>209</b>	<b>65,7</b>
<b>Solar hot water heating</b>	<b>43</b>	<b>13,5</b>
<b>Solar panels/PV</b>	<b>30</b>	<b>9,4</b>
<b>Other</b>	<b>19</b>	<b>6,1</b>
<b>A wood burning /Stove/fire place</b>	<b>17</b>	<b>5,3</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

Table 23, indicates that 65,7% of the participants had “None of above”.

**Table 24.**

*Are you aware that government grants to help you to invest in renewable energy such as solar panels, small wind turbines, and wood fired boiler systems?*

<i>Turbines, and wood fired boiler systems</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>127</b>	<b>39,9</b>
<b>No</b>	<b>191</b>	<b>60,1</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

The majority of participants, 60,1% disagreed and answered as “No”.

**Table 25.**

*Would you like to install the following technologies into your home? Tick as many as apply, 1- Solar electric PV panels, 2-Solar water heating, 3-Small wind turbine, 4-Small hydro, 5-Ground source heat pumps, 6-Wood fired boiler system, 7-Wood pellet stoves, 8-No.*

<i>Technologies</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>150</b>	<b>47,2</b>
<b>No</b>	<b>91</b>	<b>28,6</b>
<b>Don't Know</b>	<b>77</b>	<b>24,2</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As in Table 25, the answers “Yes” come from 47,2% of the participants’.

**Table 26.**

*If you do not plan to install renewable energy technology at your home, which of the following reasons apply?*

<i>Renewable Energy Technology</i>	<i>Frequency</i>	<i>Percentage</i>
<b>I think that installations would be too expensive</b>	<b>68</b>	<b>21,4</b>
<b>Other</b>	<b>26</b>	<b>8,2</b>
<b>They are unattractive</b>	<b>23</b>	<b>7,2</b>
<b>I don't understand how they work</b>	<b>22</b>	<b>6,9</b>
<b>They would not produce enough electricity for my home</b>	<b>17</b>	<b>5,3</b>
<b>My current supply of energy is adequate</b>	<b>12</b>	<b>3,8</b>
<b>They are noisy</b>	<b>12</b>	<b>3,8</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As revealed in the Table 26, reasoned as “Too expensive”, 7,2% “Unattractive”, 6,9% as “They don't know how they work” and 8,2% “Other reason”.

**Table 27.**

*Do you know of anyone personally who have used renewable energy?*

<i>Renewable Energy</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>171</b>	<b>53,8</b>
<b>No</b>	<b>147</b>	<b>46,2</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As respond to the question above, 53,8% said “Yes” and 46,2% said “No”.

**Table 28.**

*If you were looking to buy a home would you be more likely to buy one with renewable energy installations?*

<i>Energy Installations</i>	<i>Frequency</i>	<i>Percentage</i>
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<b>Yes</b>	<b>215</b>	<b>67,6</b>
<b>No</b>	<b>51</b>	<b>16,0</b>
<b>Don't Know</b>	<b>52</b>	<b>16,4</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

The majority of participants' responded in favour of the question saying 67,6% "Yes". Participants from three countries gave similar and close answers to "Perspectives on Renewable Energy". A total of thirteen questions in "Perspectives on Renewable Energy" were asked and the answers were found to be similar. Most answers about the question "Where is the most useful place for such information to be made available?" were as "TV" (Americans 48%, British 42%, Libyans 51%), and "Website" (Americans 27%, British 26%, Libyans 32%). Considering these percentages, there is no significant difference in the responses of the Libyan engineers living in all three countries (America, England and Libya).

Opinions about the "Perspectives on The Environment in Terms of Renewable Energy? And the findings obtained are presented in the table below.

**Table 29.**

*What type of fuel do you use in your home?*

<i>Type of Fuel</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Oil</b>	<b>191</b>	<b>60,1</b>
<b>Gas</b>	<b>92</b>	<b>28,9</b>
<b>Coal</b>	<b>18</b>	<b>5,6</b>
<b>Electricity</b>	<b>7</b>	<b>2,2</b>
<b>Wood</b>	<b>4</b>	<b>1,3</b>
<b>Don't know</b>	<b>4</b>	<b>1,3</b>
<b>Other</b>	<b>2</b>	<b>0,6</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As in Table 29, 60,1% of participants' said they used "Oil" and 28,9% used "Gas" in their house.

**Table**

**30.**

*What is your estimated annual fuel bill with your home currency?*

<i>Home Currency</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Electricity bill</b>	<b>194</b>	<b>61,0</b>
<b>Gas bill</b>	<b>67</b>	<b>21,1</b>
<b>Oil bill</b>	<b>31</b>	<b>9,7</b>
<b>Wood bill</b>	<b>18</b>	<b>5,7</b>
<b>Coal bill</b>	<b>8</b>	<b>2,5</b>

<b>Total</b>	<b>318</b>	<b>100,0</b>
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The answer as “Electricity bill” come from 61,0% of the participants’ and 21,1% as “Gas bill”.

**Table 31.**

*Do you try to conserve energy in your home by the following?*

<b>Energy in Your Home</b>	<b>Frequency</b>	<b>Percent</b>
Turning off electric appliances when not in use	184	57,9
Use energy saving light bulbs	31	9,7
Wash full loads when using dishwasher	29	9,1
Showers instead of baths	25	7,9
Keep temperatures at home between 18C – 21C	17	5,3
Buy eco-friendly appliances	13	4,1
Other, please specify	11	3,4
None of above	8	2,6
<b>Total</b>	<b>318</b>	<b>100,0</b>

As it can be seen in Table 31, 57,9% of participants’ turned off electric appliances when not in use to save energy in their houses.

**Table 32.**

*If your local authority were to provide you with containers and a collection service for green (organic) waste, how likely would you be to participate?*

<b>Waste</b>	<b>Frequency</b>	<b>Percentage</b>
Very likely	116	36,5
Fairly likely	76	23,9
Don’t know	41	12,9
Indifferent	31	9,7
Not at all likely	29	9,1
Fairly unlikely	25	7,9
<b>Total</b>	<b>318</b>	<b>100,0</b>

As it can be observed in Table 32, the “Very likely” answer come from 35,5% of the participants’ and “Fairly likely” come from 23,9%.

**Table 33.**

*Do you have a recycling box provided by Reading Borough Council?*

<b>Reading Borough Council</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	164	51,6

<b>No</b>	<b>154</b>	<b>48,4</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

**Table 33, reserved 51,6% of the participants' have a recycling box, whereas 48,4% do not.**

#### **Table 34.**

*Do you have any of the following in your home? Please tick as many as apply. 1- Double-glazing, 2-Loft insulation, 3-Cavity wall insulation, 4-Energy saver light bulb/s, 5-Other (energy saving device).*

<i>Home</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>126</b>	<b>39,6</b>
<b>No</b>	<b>112</b>	<b>35,2</b>
<b>Don't know</b>	<b>80</b>	<b>25,1</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As Table 34, reveals, 39,6% of the participants responded as “Yes”, 35,2% as “No” and 25,1% as “Don't know” to the question above. When the participants' views about “Perspectives on the Environment in Terms of Renewable Energy” are examined, it is seen that the participants from three countries have similar and close answers. A total of seven questions were asked for views about the subject question and the answers were found to be similar. The most answers to the question, “What type of fuel do you use in your house?” were “Gas” (Americans 48%, British 42%, Libyans 51%), and “Oil” (Americans 28%, British 29%, Libyans 32%). Considering these percentages, there is no significant difference in the responses of the Libyan engineers living in all three countries (America, England and Libya).

Opinions about the “Attitudes and Opinions about Environmental Issues” and the findings obtained are presented in the table below.

#### **Table 35.**

*Would you be prepared to make a financial contribution to local environmental projects?*

<i>Environmental Project</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>135</b>	<b>42,5</b>
<b>No</b>	<b>73</b>	<b>22,9</b>
<b>Don't know</b>	<b>110</b>	<b>34,6</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

**As stated in Table 35, 42,5% said they would be prepared to contribute, 22,9% said wouldn't, and %34,6 said they didn't know.**



**Table 36.**

*Would you be prepared to make a voluntary contribution (give your time) to local environmental projects?*

	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>147</b>	<b>46,2</b>
<b>No</b>	<b>98</b>	<b>30,8</b>
<b>Don't know</b>	<b>73</b>	<b>23,0</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

**Table 36, shows that 46,2% of the participants contributed to environmental projects, 30,8% didn't contribute and 23,0% didn't know about two subject question.**

**Table 37.**

*Has anyone in your household...1-Signed a petition about an environmental issue?, 2- Given money to an environmental group?, 3-Taken part in a protest or demonstration about an environmental issue?*

<i>Environmental Issue</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>79</b>	<b>24,8</b>
<b>No</b>	<b>167</b>	<b>52,6</b>
<b>Don't know</b>	<b>72</b>	<b>22,6</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

**The "No" answer come from 52,6% of the participants' to the question in Table 37.**

**Table 38.**

*Do you agree with the following statements?, 1-I give first priority to the quality of the environment, even if it cost me more money, 2-Renewable technologies can help to improve the local environment, 3-Renewable energy is too expensive for me to consider.*

<i>Environment</i>	<i>Frequency</i>	<i>Percent</i>
<b>Agree</b>	<b>185</b>	<b>58,2</b>
<b>Indifferent</b>	<b>84</b>	<b>26,4</b>
<b>Disagree</b>	<b>29</b>	<b>9,1</b>
<b>Don't know</b>	<b>20</b>	<b>6,3</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

**The majority of participants', %58,2 agreed with the subject question in Table 38.**

**Table 39.***Which main mode of transport do you use to travel to work/study?*

<i>Travel to Work/Study</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Car</b>	<b>228</b>	<b>71,7</b>
<b>Walk</b>	<b>32</b>	<b>10,1</b>
<b>Bus</b>	<b>28</b>	<b>8,8</b>
<b>Car share</b>	<b>12</b>	<b>3,8</b>
<b>Train</b>	<b>10</b>	<b>3,1</b>
<b>Bicycle</b>	<b>8</b>	<b>2,5</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

A big majority, %71,7 of the participants' as shown in table 39, used their cars to work / study.

**Table 40.***Do you agree that many of the journeys that you take using a car can be avoided?*

<i>Using a Car</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Yes</b>	<b>148</b>	<b>46,5</b>
<b>No</b>	<b>118</b>	<b>37,1</b>
<b>Don't know</b>	<b>52</b>	<b>16,4</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

46,5% of the participants' admitted that they can avoid using cars when they travel.

**Table 41.**

*How concerned are you about the following issues?, 1-The need to save energy, 2-The need to recycle, 3-The development of renewable energy, 4-Household waste disposal, 5-Traffic congestion, 6-Traffic fumes emissions, 7-Pollution of waterways.*

<i>Environment</i>	<i>Frequency</i>	<i>Percentage</i>
<b>Very Concerned</b>	<b>162</b>	<b>50,9</b>
<b>Fairly Concerned</b>	<b>131</b>	<b>41,2</b>
<b>Not Concerned</b>	<b>25</b>	<b>7,9</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

As it is revealed in Table 41, 50,9% of the participants' are very concerned and 41,2% are fairly concerned about the subject question.

**Table 42.**

*What is your opinion on the following forms of energy sources?, 1-Wind energy, 2-Solar panels, 3-Hydro, 4-Nuclear power, 5-Biomass plants, 6-Waste incineration, 7-Fossil fuel*

<i>Energy Sources</i>	<i>Frequency</i>	<i>Percentage</i>
<b>No real opinion</b>	<b>127</b>	<b>39,9</b>
<b>Oppose</b>	<b>114</b>	<b>35,8</b>
<b>Support</b>	<b>77</b>	<b>24,3</b>
<b>Total</b>	<b>318</b>	<b>100,0</b>

While 35,8% of the participants' opposed to the subject question in Table 42, 39,9% had no real opinion. When the views of the participants about "Attitudes and Opinions about

Environmental Issues" are examined, it is seen that the participants from three countries have similar and close answers. A total of nine question were asked and the answers were found to be similar. The most answers to "Would you be prepared to make a financial contribution to local environmental projects?" were "Yes" (Americans 50%, British 50%, Libyans 52%), and "No" (Americans 40%, British 36%, Libyans 32%). Considering these percentages, there is no significant difference in the responses of the Libyan engineers living in all three countries (America, England and Libya).

### **Conclusion, and Discussion**

318 people, 61,6% female and 38,4%male, participated in this study. In terms of the distribution of the sample by gender, there are more males than females, 31,4% living in the U.K, 37,2% in Libya, and 31,4% in the U.S.A. As it is started in Table 4, 28,0% of the participants' had a monthly income under 10.000, 19,5% between 10.000- 20.000, 14,2% between 21.000-30.000, 10,1% between 31.000-40.000, 6,3% between 41.000-50.000, 10,1% over 50.000 and 4,1% between 51.000-60.000. As for the family monthly income, the least is 10.000 (28.10%). Maximum family income of some participants' (4.1%) is between 51.000-60.000 dollars.

Table 3 reveals the participants' education levels as 49,7% with Higher Degrees (M.A or Ph.D), 30,2% with University Degrees, 8,5% with "A" Levels, 7,5% without formal qualification, and 4,1% with GCSE/O levels. The distribution of the Ethnic groups is described in Table 3. The majority (75,2%) from Libya, smallest group (0,6%) from Nigeria, and 0,3% from different ethnic groups.

Opinions of the participants about the use of energy resources. Looking at the results obtained in this context, global warming, greenhouse effect, renewable energy, energy efficiency, greenhouse effect, biodiversity, and sustainable development are the top issues. This information was obtained from internet and television programs. The processing of these issues on television and the Internet may have an impact on this outcome. In addition, the majority of the participants stated that they were very concerned about climate changes. This concern is also a sign that the

participants are aware of environmental problems. The main factors affecting climate changes are Coal (or coal-fired), Oil (or oil-fired), Gas/natural gas (or gas-fueled), and incineration (incineration). These effects mostly cause changes in air conditions and temperature rise. The participants often rely on institutions (scientists, business owners, government, etc.) that make decisions for the solution of the problems. The reason for this trust is always the fact that the environmental problems continue and the solution cannot be produced. When the results obtained from the first sub-problems are examined in general, it is concluded that the participants are concerned about the use of energy resources and their negative effects on the environment, and they are also concerned about the negative picture. Toolin and Watson (2010), Saraç and Bedir (2014), Aslanova, Gökçekuş & Alhadl (2019) concluded in their study that individuals are aware of renewable energy sources and that they have knowledge about it. This study supports the results of the research.

About study dealt with the participant's views about their perspectives on renewable energy. When the findings related to renewable energy are overviewed, it can be noted that the participants' mostly agreed on the use of wind energy, solar energy, and wood fuel instead of oil and derivatives. They stressed that such alternatives to oil and derivatives are increased.

Meanwhile, they pointed to the role of TV and the internet in raising awareness and providing more information about the subject matter. The statements by the participants revealed that they did not have renewable or green programs on their electricity tariffs which are an indication of lack of information. Among the results of the first sub-problem of the study, it was observed that the participants' reached most of the information about the environment through TV and web-pages. These two parallels show that TV and the internet are important sources of information. They also emphasized that Governments had the most responsibility for widespreading the use of renewable energy. The participants' expressed that they can not install renewable energy in their houses because of high costs. Considering the environmental problems, the use of renewable energy to disseminate the current problems and prevent the loss of the existing ones, the cost of this path seems cheaper. Results in Liarakou's study (2009) have similar indications with the ones in this research.

About study dealt with the participant's opinions about their perspectives on the environment in terms of renewable energy. Most of the participants stated that renewable energy sources were less harmful to the environment, they are a kind of nature friendly energy that does not harm the environment and human health, and that renewable energy sources do not harm the environment like fossil fuels. But the most used fuel in their homes is oil and gas. This result shows that the participants have a positive perspective on renewable energy but do not turn into behavior. This deficiency is thought to be caused by financial insufficiency and lack of information. The question asked about the annual invoices of the money spent on the fuel of the participants (61,0%) and the question about energy saving were closed when we were not at home (57,9%). most of the participants stated "Yes" (51,6%). Çolak, Kaymakçı and Akpınar (2015)., Bozdoğan and Yiğit (2014)., Saraç and Bedir (2014)., Çelikler and Kara (2011), Aslanova and Gökçekuş & Alhadl (2019), the results of their studies on renewable energy sources coincide with this result.

About study dealt with the participant's views about attitudes and opinions towards about environmental issues. The findings in this dimension reflected the participants' (42,5%) interest in the subject question and their desire to participate in projects related to environmental issues both voluntarily and financially. Though the high costs, the majority (58,2%) wanted to participate in environmental quality issues (Table 38). Even more, they suggested that the use of cars could be restricted to an extent. When the attitudes and opinions of the participants' are considered, it can be noted that they are positive about renewable energy in general, but not an effective factor itself to adapt new behaviors. In a similar study by Karatepe et al., (2012) with engineering students, it was found out that female students knowledge and awareness of renewable energy was higher than of male students. Kaldellis, Kapsali &Katsanou (2012) argued in their study that the more positive attitudes people exhibit, the more they become aware of renewable energy. In conclusion, the findings in this research indicated that the participants are well aware of renewable energy resources, they have positive thoughts and attitudes, but due to some defficiencies, they can not adapt new behaviors. In order to benefit more from renewable energy sources, sponsors should be involved in the process, costs should be reduced and dissemination of information and training in the subject matter should address to masses of people to raise awareness.

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