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Final Report on "Educational needs in the field of Energy Efficiency, Renewable Energy Use and Environmental Impact in the Residential Sector"

Author(s)	**Gabriella Calderari, Yasser Gaber Dessouky, Ahmed Al-Salaymeh, Leena Marashdeh, Nesreen Ghaddar**		
Organisation name(s)	**Sapienza University of Rome (UNIROMA1), Arab Academy for Science, Technology and Maritime Transport (AASTMT), The University of Jordan (UJ), American University of Lebanon (AUB)**		
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Project Coordinator
Prof. DI Dr. techn Wolfgang Streicher,
University of Innsbruck (UIBK)
Technikerstrasse 13 I 6020 Innsbruck, Austria
Tel: +43 (0) 512-507-63650 I Mob: +43 (0) 676-872-565 320 I Fax: +43 (0) 512-507 36902
Email: wolfgang.streicher@uibk.ac.at
Project website: http://sites.ju.edu.jo/en/heba/Home.aspx

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1 INTRODUCTION

1.1 Short information about the project

HEBA project aims to ensure that the universities in Egypt, Lebanon and Jordan can offer a high quality education compatible with European standards that meets the market needs of the emerging knowledge-based society by strengthening EE+RE teaching.

The main objective of HEBA is to reform and improve existing master programs in EE+RE on single technologies and energy systems level in building and industrial sectors and improving/establishing Centres of EE+RE Technologies in the partner countries cooperating with each other.

The centres will train postgraduate (PG) and undergraduate (UG) students on EE+RE methodologies and technologies for different sectors and will contribute to guidelines for best practice for the efficient use of energy and renewable energies in a joint collaboration between EU and partner universities. The former will transfer EU best practices, experiences and methodologies according to the Bologna process to support the development and diffusion of an innovative experience in technical higher education in the partner institutions supporting the capacity and knowledge building in EE+RE Technologies.

Outputs of HEBA in the partner universities will be

* adapted curricula
* At least 12 new or improved existing courses and lecture books/e-learning tools for PG and UG students on EE + RE
* 6 1-week train-the-trainers courses for the future lecturers (min. 70) of the participating EU universities
* 12 Master thesis of students from partner universities at participating EU universities
* Establish/improving laboratories of “EE+RE” Technologies (EEREL center)
* Contribution to guidelines for practice for EE+RE in industry and buildings

1.2 Scoping of the surveys

SURVEY ON RESIDENTIAL NEEDS

The survey aimed to collect information useful for the elaboration of courses on “Energy Efficiency, Renewable Energy and Environmental Impact” offered by Beneficiary Universities (including laboratories, MSc, seminars, conferences, research centers, etc.). It was designed in order to accurately identify and quantify the immediate and future needs for trained specialists in the field

of environmental technology and climate change and, thanks to the information collected, to design the detailed focus and content of the new courses in the Master programs. The survey investigates the awareness of residential and final users relating the energy use and costs in buildings, the use of renewable energy and the interest to invest in the reduction of them. Only ERASMUS+ project members use the information in this questionnaire; names and details will remain confidential.

1.3 Methodology

To reach the mentioned goals, fifteen questions about awareness of Energy efficiency measures, home and public location consumes have been included in the questionnaire.

The interviewees have been asked to complete the following sections:

1 – Residential details

For statistical purpose, the form requires details , like, name, gender, age, etc. related to the person involved in the compiling of the questionnaire.

2- Awareness

This section is created to understand the level of awareness of private about renewable energies suitable for their Country, National energy policies and regulations and measures to reduce the energy consumption.

3 – Residential aspect

The third question aims to investigate the awareness of the selected stakeholders on the importance of the consumption awareness, the influence that these aspects have in their business and private buildings.

The survey was sent by email and other media communication to more than 100 stakeholders representing different industrial sectors. A link to the questionnaire has also been published on HEBA official website.

Data Handling process, based on a first data check and the following codification of open-ended answers, have been applied.

2 RESIDENTIAL NEEDS IN MENA COUNTRIES

The aim of the HEBA project is to introduce into the university systems of the Countries involved a permanent training offer on technologies related to the use of renewable energy and to train the new generations of professionals in the sector, based on parameters and standards recognized at the level international.
To this end, it was necessary to develop an analysis, not only to understand the technological state of Academia and industry, but also to understand what the real needs of the Residential, especially about Energy Efficiency and consumptions and the general level of awareness on these topics.
The survey conducted through the questionnaires has therefore investigated the awareness of final users relating the energy use and costs in buildings, the use of renewable energy and the interest to invest in the reduction of them, both in general and for each of the Countries involved.
The analysis of surveys carried out at the local level is in fact of great importance for the project because it is essential to differentiate the skills and the training offer based on the specific needs of the Country in order to reach the same level of knowledge at the end of the project.
In fact, thanks to this analysis, the syllabus of the courses will be modelled on the results; in addition space will also be given to transversal skills that are not considered at the moment but which are important for the achievement of the general objectives of the Countries of environmental protection and of a correct use of energy.
Considering the three MENA Countries together, in general, there is a positive approach regarding the use of Renewable Energies and on its effects on the environment. According to the survey results, solar Thermal, Photovoltaic and Wind energy are the kind of energy easier to be installed for the Residential involved, while the Energy Efficiency measures considered more effective are the use of public transportation and the measures taken in the Industry sector. Measures like strength Education about environmental issues or the improvement of the policies on building efficiency are considered the best ways to reduce energy consumption. House cooling and heating and water heating seems to be the most consumer among the household activities
In general, residential are aware of their energy consumes and consider their companies and home quite efficient. However, supporting the education about environment and promoting the use of renewable energy technologies is recommended.

2.1 Residential needs in Lebanon

The survey was designed in order to accurately identify and quantify the awareness of residents in the field of environmental technology and climate change. Due to this information the detailed focus and content of the new courses in the bachelor programs will be designed. This questionnaire was addressed to the targeted residents and was filled in by the person responsible for the project and the department or faculty.

The feedback and suggested recommendations of these findings will be closely reviewed and can be applied to contribute to the design and implementation of a successful awareness campaign,

which can help increase green energy use by residents and tackle problems that seem to hinder the scalable use of environmental friendly systems.

The survey showed that the majority of participants believe that the government holds the key role of supporting renewable energy and that the use of public transportation is the more effective way as an energy efficiency measure, with 73% of the participants being prepared to reduce car use by using alternatives. Only 58% of the participants were aware of their house energy consumption, but almost all of the participants are prepared to apply home systems to improve energy efficiency. 31 of the 33 participants believe that education about environmental issues would encourage the reduction of energy consumption and 32 of the 33 participants agree that more government legislation on energy efficient products would encourage energy usage reduction. It is important to note that 46% of the participants believed that lighting the home uses the most energy, yet 97% believed that cooling the houses needed the most energy.

The majority of residents are familiar with the energy policies and legislations applicable to renewable technologies in Lebanon and list the most important programs as NEEREA and LCEC. Obstacles also arise in the implementation of renewable energy systems and the reduction of energy usage by residents. Therefore some room for improvement includes:

- Education on environmental issues and the impact of renewable energy usage
- Encourage the use of public transport as an alternative to cars
- Subsidize home systems that improve energy efficiency
- Increase the tariffs for high energy usage

2.2 Residential needs in Egypt

This survey aimed to collect information useful for the elaboration of courses on “Energy Efficiency, Renewable Energy and Environmental Impact” offered by Beneficiary Universities (including laboratories, MSc, seminars, conferences, research centers, etc.). The survey will investigate the awareness of residents and final users relating the energy use and costs in buildings, the use of renewable energy and the interest to invest in the reduction of them.

The survey was designed in order to accurately identify and quantify the awareness of residents in the field of environmental technology and climate change. Due to this information the detailed focus and content of the new courses in the bachelor programs will be designed. This questionnaire was addressed to the targeted residents and was filled in by the person responsible for the project and the department or faculty.

The feedback and suggested recommendations of these findings will be closely reviewed and can be applied to contribute to the design and implementation of a successful awareness campaign, which can help increase green energy use by residents and tackle problems that seem to hinder the scalable use of environmental friendly systems.

The total number of responses for the survey were 53 (10 female and 43 male). 96% of the participant indicated that the major benefits of the renewable energy is being "Good for the environment". The majority indicates that the renewable energy usage in Egypt should be increased. The survey showed also that the majority of participants believe that the Egyptian government holds the key role of supporting renewable energy and that the use of public transportation is the more effective way as an energy efficiency measure. Only 34% of the respondents indicate that they heard about government subsidy/grant programs for renewable energy usage investment, while the 49% haven't heard about and 17% of the respondents don't know. The vast majority (47%) of respondents indicate that they are aware that Egypt has an internal energy strategy according to the national policies, while 43% don't know about it. The vast majority (49%) of respondents indicates that they are aware about the annual consumption of their house, while 26% of them don't check it. The majority of residents are familiar with the energy policies and legislations applicable to renewable technologies in Egypt and list the most important programs as RCREEE and NREA. According to the results, most of companies in Egypt are considered as Neutral in regard to efficiency and as Quite Efficient to a lesser extent, while the houses in Egypt are considered as Quite Efficient.

In regard to energy usage, the respondents agree that "Heating the home uses the most energy", "Cooling the house needed the most", and "Heating water uses the most energy" use the most energy, followed by "Domestic hot water preparation is using the most", "Use of Electrical appliances in the home", and "Lighting the home uses the most energy" respectively.

Respondents are willing to install renewable energy and/or energy efficiency systems if they will be supported by 50% of the total investment cost.

Most likely the respondents have moderate knowledge about the Energy Policies in Egypt, Egyptian universities should raise the awareness about these policies.

2.3 Residential needs In Jordan

The purpose of this research is to investigate the awareness public attitudes of residentials and final users in regard to energy use and costs in buildings, the use of renewable energy and the interest to invest in them.

The total number of responses were 46, with 65% males and 72% aged below 40.

The participants have a very good knowledge about the renewable energy benefits "Good for the environment" and "Low cost" were the major benefits of the renewable energy as indicated by the respondents. Also; there is a good tendency to increase renewable energy projects in Jordan.

The analysis indicates that the government is manipulating the renewable energy and energy efficiency sectors, while the academics role is very low. There is a need to activate the academic role in the participatory governance.

Only 50% of respondents are aware about the government subsidy/grant for RE usage, and this may be a result of low number of these programs or the bad dissemination. Introducing this information to students and public will have a positive impact on energy sector, universities have to take the lead in promoting this information.

There is a high awareness about the suitable energy sources for Jordan, most of respondents selected Photovoltaic energy (82%), Solar thermal energy (72%), wind energy (52%) as available sources.

In regard to energy efficiency, the best three measures according to respondents were “insulating the roof of the house would be efficient, “Efficiency in industry”, “Using public transportations”.

The vast majority (72%) of respondents indicates that they are aware that Jordan has an internal energy strategy according to the national policies.

The respondents showed a good level of awareness about their annual energy consumption at their houses, which is considered a very positive point.

The majority of respondents have a strong desire to protect the environment and mitigate the climate change higher than the desire of seeking economic opportunities.

According to the results, most of companies in Jordan are considered as Neutral in regard to efficiency and as a Quite Efficient to a lesser extent, while the houses in Jordan are considered as Quite Efficient.

The vast majority of respondent indicate that “replacing the lighting lamp” will have a major effect in reducing the energy use, followed by “Installing RES”, then “Apply Isolation Systems”, then “Stop Leaving Appliance on Standby”, then “Turn Up Cooling Thermostat by One Degree”, and finally by “Public Transportation”.

The respondents agree that “Education about environmental issues”, “Improve the Policies on Building Efficiency to use less energy” and “More government legislation on energy efficient products” are the best actions to reduce the energy consumption, followed by other actions as indicated in table and chart below.

In regard to energy usage, the respondents agree that “Heating the home uses the most energy”, “Cooling the house needed the most”, and “Heating water uses the most energy” use the most energy, followed by “Domestic hot water preparation is using the most”, “Use of Electrical appliances in the home”, and “Lighting the home uses the most energy” respectively.

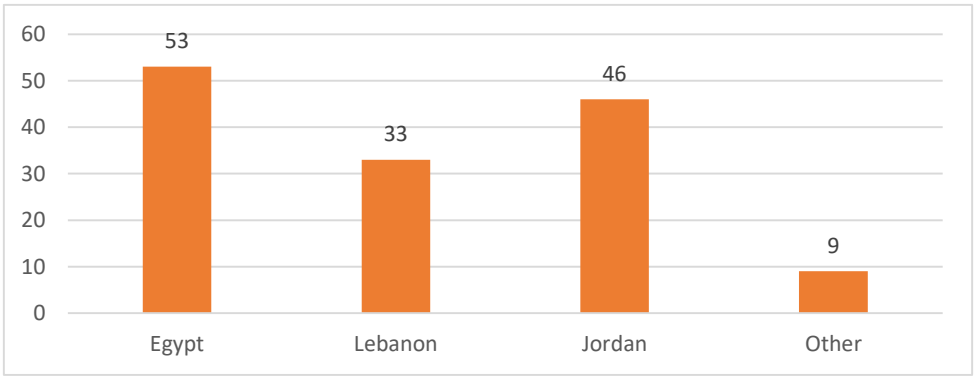
Respondents are willing to install renewable energy and/or energy efficiency systems if they will be supported by 50% of the total investment cost.

Most likely the respondents have moderate knowledge about the Energy Policies in Jordan, Jordanian universities should raise the awareness about these policies.

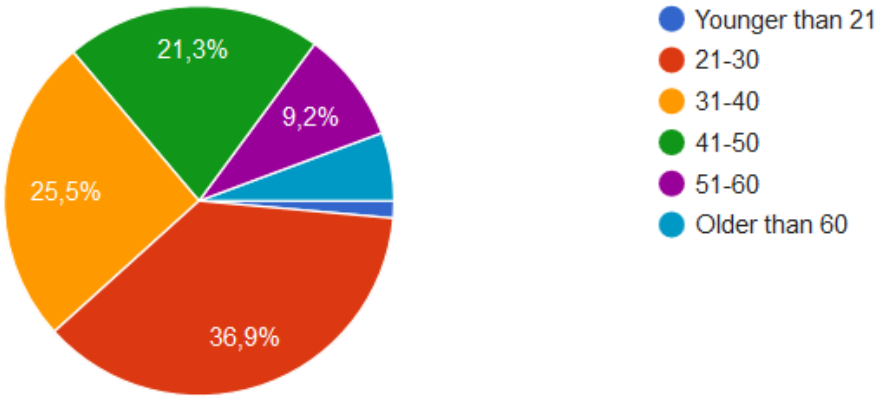
3 SURVEY IN MENA COUNTRIES

This section will show the answers in a graphical format both for the three Countries together and for each of the three MENA Countries interviewed. It allows the project to have a general view of the status of the awareness about energy consumption for the countries involved in the project and to use the data to design the courses. At the same time, the specific analysis done per Country will allow the professors involved to adjust the syllabus and the content of the courses according to the specific needs of that Country that may be different from the ones of the other partners involved.

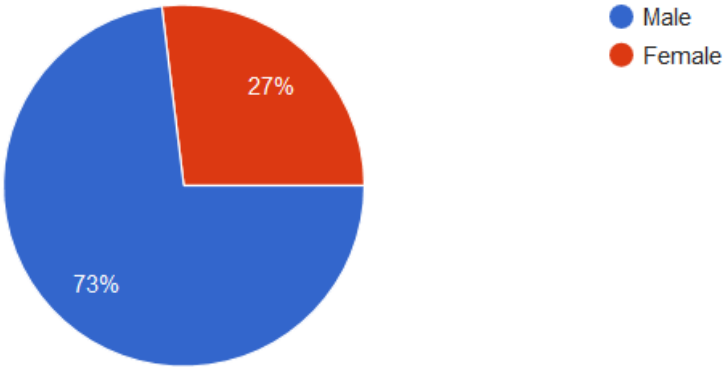
Number of answers for each Country



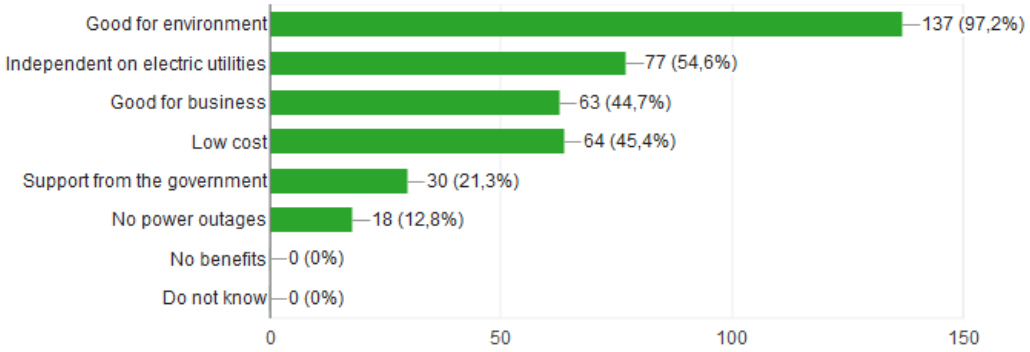
Age of people interviewed



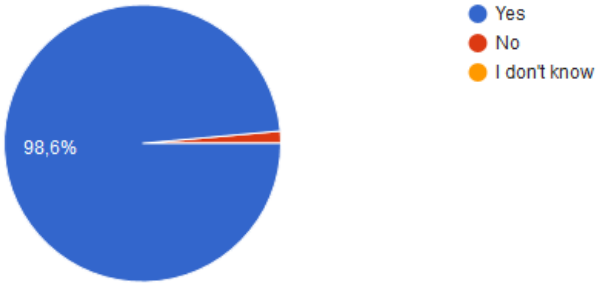
Gender Information



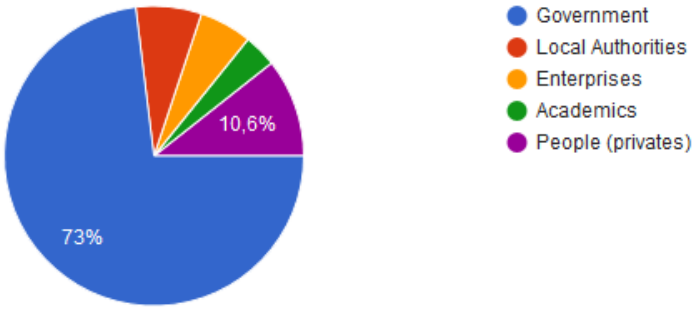
2.1 Can you tell us about benefits of renewable energy (select maximum 3 answers)?



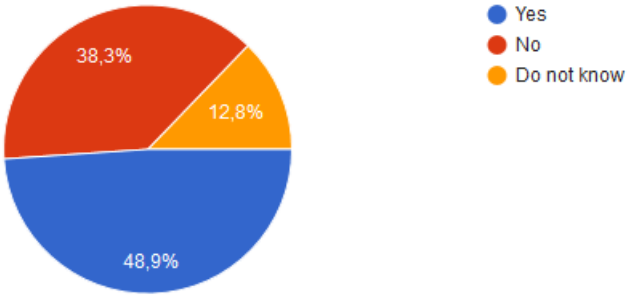
2.2 Do you think the use of renewable energy in our Country should be increased?



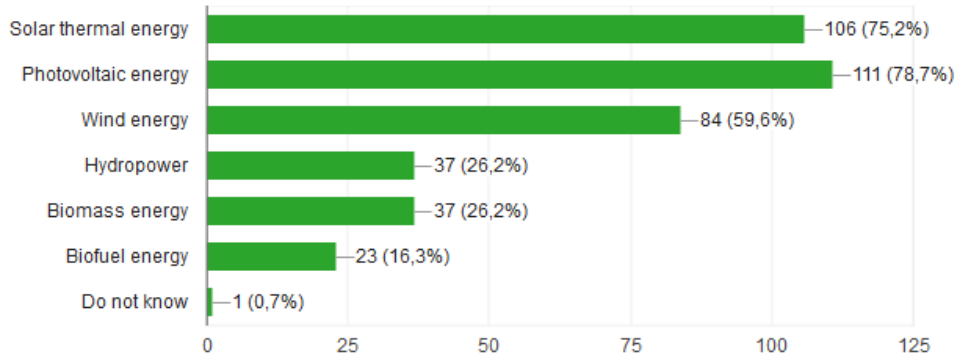
2.3 In your opinion, who holds the key role of supporting renewable energy and/or energy efficiency using?



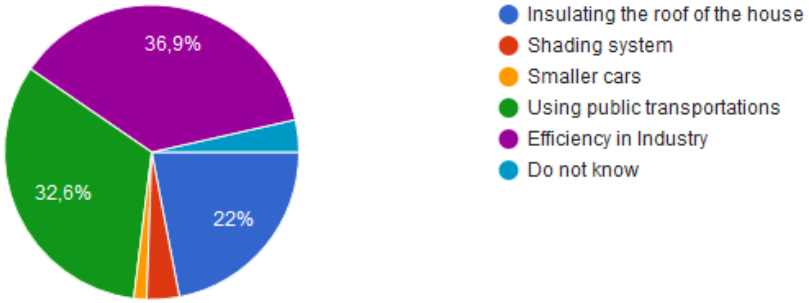
2.4 Have you ever heard about government subsidy/grant programs for renewable energy usage investment?



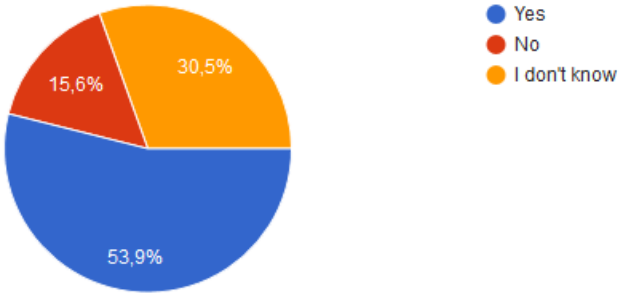
2.5 According to you, which renewable energy sources can be produced and used in your region?



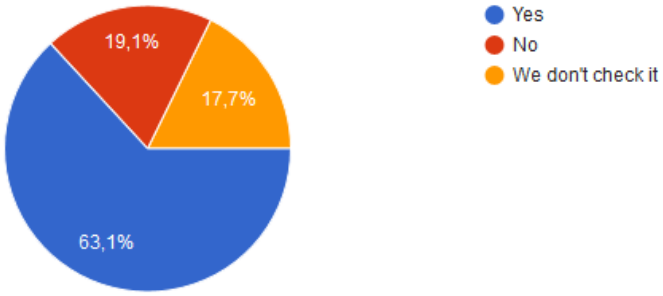
2.6 Which energy efficiency measure do you think is more effective?



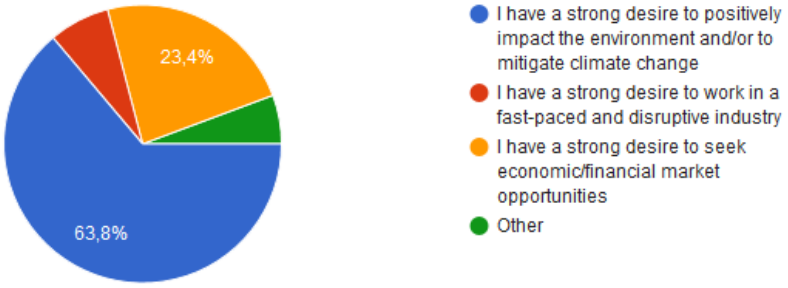
2.7 Does your Country have an internal energy strategy according to national policies?



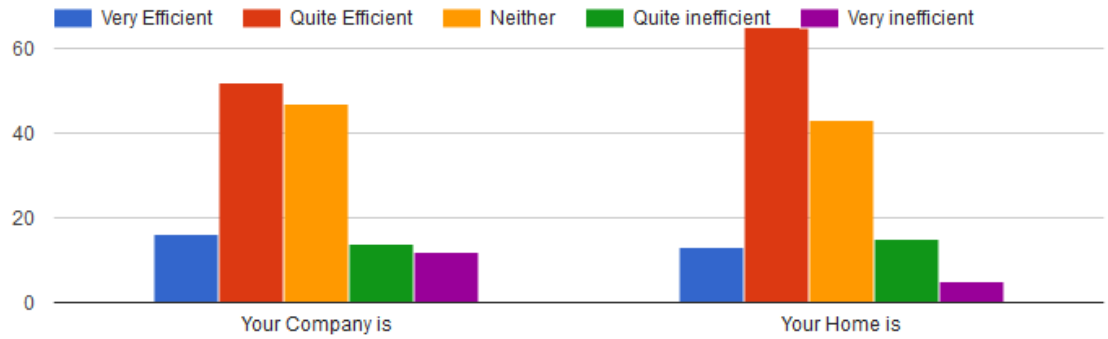
2.8 Are you aware of the annual energy consumption of your House?



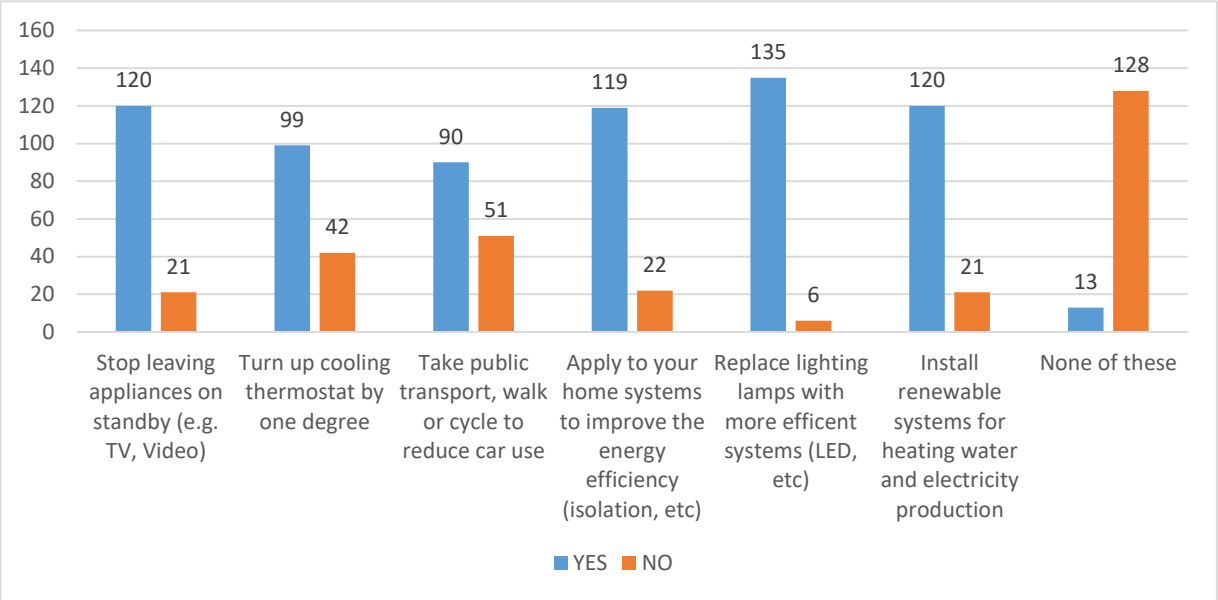
2.9 Which of the following best describes your motivation for using clean energy?



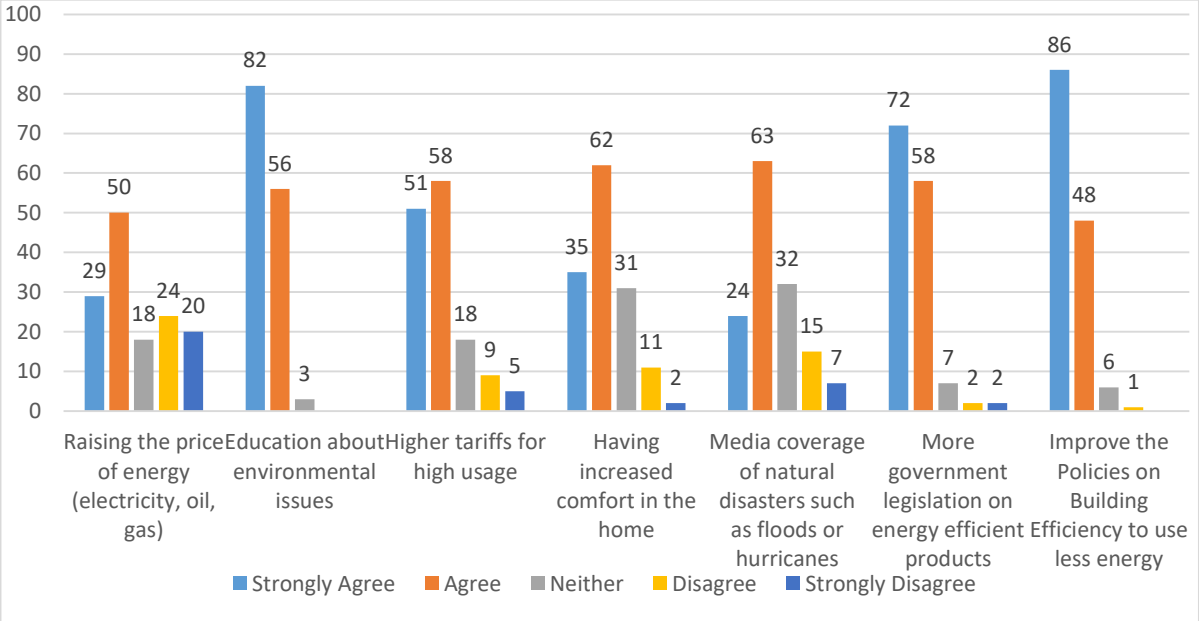
3.1 In terms of energy efficiency do you think



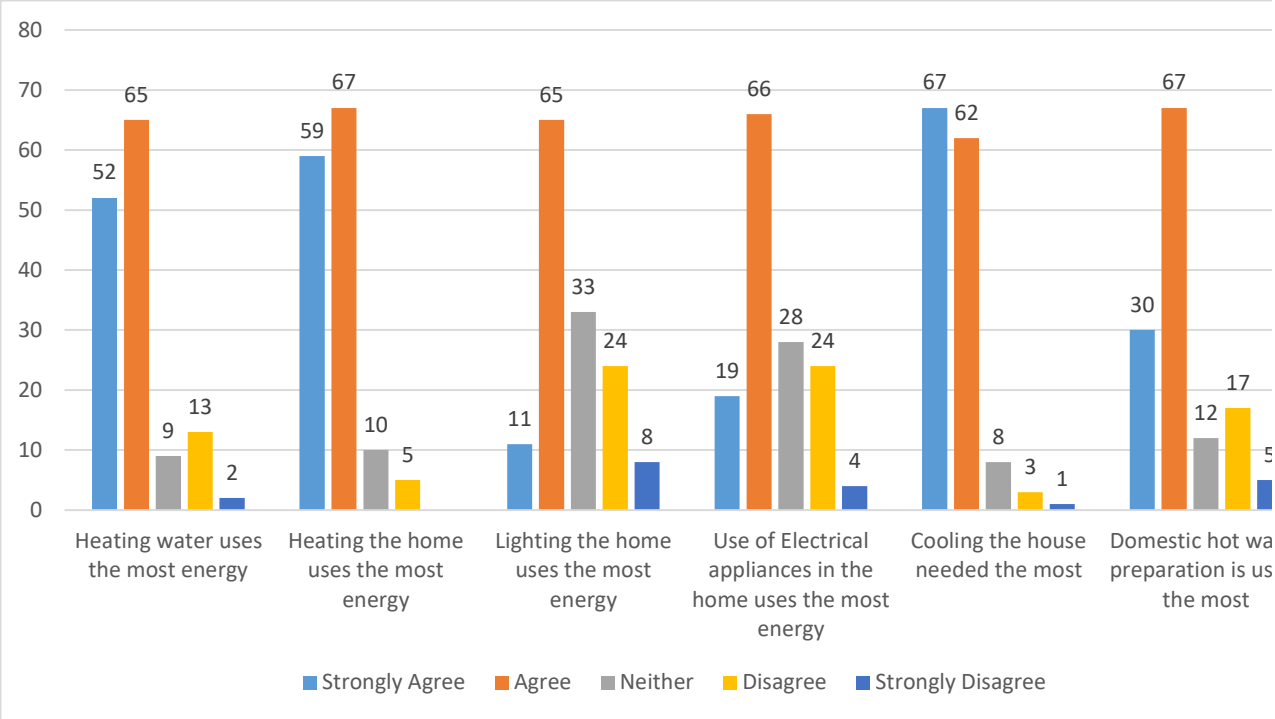
3.2 Which of these measures would you be prepared to take to reduce your energy use?



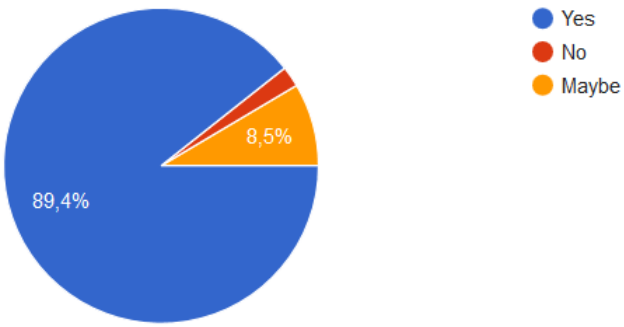
3.3 To what extent do you agree or disagree that the following would encourage you to reduce your energy consumption?



3.4 Some household activities can use more energy than others. To what extent would you agree or disagree that each of the following uses a lot of energy?



3.5 If you were supported at least 50% of total investment cost, do you install renewable energy and/erenergy efficiency systems?



3.1 Survey in Egypt

The Survey is consisting of three sections; the first is for collecting general information about students; the second is for awareness evaluation about renewable energy and energy efficiency; and the last is for evaluating the awareness about energy and renewable energy usage in residential sector.
The total number of responses was 53. The results of the survey questions are as follow:

Section 1: General Information
Gender: The majority of respondents (81%) were males while (19%) were females.

Female	Male
10	43

Age: Out of 53 surveyed persons, 28% belonged to the Age Group 21-30, and 19% belonged to the Age Group 31-40, and 28% belonged to the Age Group 41-50, and 11% belonged to the Age Group 51-60.

Younger than 21	21-30	31-40	41-50	51-60	Older Than 60
1	15	10	15	6	6

Section 2: Awareness
2.1. The benefits of renewable energy:

"Good for the environment" was the major benefit of the renewable energy as indicated in 51 answers out of the 53.

2.2. Do you think the use of renewable energy in our Country should be increased?

The majority indicates that the renewable energy usage in Egypt should be increased.

2.3 In your opinion, who holds the key role of supporting renewable energy and/or energy efficiency using?

The majority indicates that the Government in Egypt is playing the key role in supporting the renewable energy and/or energy efficiency using.

2.4 Have you ever heard about government subsidy/grant programs for renewable energy usage investment?

Only 34% of the respondents indicate that they heard about government subsidy/grant programs for renewable energy usage investment, while49% haven't heard about and 17% of the respondents don't know.

2.5 According to you, which renewable energy sources can be produced and used in your region?

This was a multi-answer question. Most of the respondents selected I do not know and some did choose the Solar Energy in Aswan and some did choose the wind energy in Zafarana.

2.6 Which energy efficiency measure do you think is more effective?
Most of the answers were "Efficiency in industry", and some others selected "Using public transportations".

2.7 Does your Country have an internal energy strategy according to national policies?
The vast majority (47%) of respondents indicates that they are aware that Egypt has an internal energy strategy according to the national policies, while 43% don't know about it.

2.8 Are you aware of the annual energy consumption of your House?
The vast majority (49%) of respondents indicates that they are aware about the annual consumption of their house, while 26% of them don't check it.

2.9 Which of the following best describes your motivation for using clean energy?
Most of the respondents have a strong desire to positively impact the environment and/or to mitigate climate change (94%).

Section 3: Residential Sector
3.1 In terms of energy efficiency do you think [Your Company is]
25% of the respondents consider their company as "Quite Efficient".

Label	Very Efficient 5	Quite Efficient 4	Neither 3	Quite inefficient 2	Very inefficient 1
No. of responses	4	13	26	6	4

3.1 In terms of energy efficiency do you think [Your Home is]
45% of the respondents consider their homes as "Quite Efficient".

Label	Very Efficient 5	Quite Efficient 4	Neither 3	Quite inefficient 2	Very inefficient 1
No. of responses	2	24	20	6	1

3.2 Which of these measures would you be prepared to take to reduce your energy use?

The vast majority of respondents indicate that “replacing the lighting lamp” will have a major effect in reducing the energy use, followed by “Installing RES”, “Apply Isolation Systems”, “Stop Leaving Appliance on Standby”, “Turn Up Cooling Thermostat by One Degree”, and “Public Transportation”.

3.3 To what extent do you agree or disagree that the following would encourage you to reduce your Energy consumption?

According to the results, the respondents agree that “Education about environmental issues”, “Improve the Policies on Building Efficiency to use less energy” and “More government legislation on energy efficient products” are the best actions to reduce the energy consumption, followed by other actions as indicated in table and chart below.

Energy Consumption Reduction

Action	**Strongly Agree 5**	**Agree 4**	**Neither 3**	**Disagree 2**	**Strongly Disagree 1**
Education about environmental issues	15%	36%	15%	19%	15%
Improve the Policies on Building Efficiency to use less energy	55%	45%	0.0%	0.0%	0.0%
More government legislation on energy efficient products	34.5%	43%	13%	7.5%	2.0%
Having increased comfort in the home	21%	40%	28.5%	9.5%	1%
Higher tariffs for high usage	23.5%	45%	20%	11.5%	0.0%
Media coverage of natural disasters such as floods or hurricanes	47.5%	45%	5.5%	0.0%	2%
Raising the price of energy (electricity, oil, gas)	60.5%	32%	7.5%	0.0%	0.0%

3.4 Some household activities can use more energy than others. To what extent would you agree or disagree that each of the following uses a lot of energy?

According to the results, the respondents agree that “Heating the home uses the most energy”, “Cooling the house needed the most”, and “Heating water uses the most energy” use the most energy, followed by “Domestic hot water preparation is using the most”, “Use of Electrical appliances in the home”, and “Lighting the home uses the most energy” respectively.

Energy Usage by Different Activities

Action	**Strongly Agree 5**	**Agree 4**	**Neither 3**	**Disagree 2**	**Strongly Disagree 1**
Heating the home uses the most energy	30.5%	47%	9.5%	13%	0.0%

Cooling the house needed the most	36%	43.5%	15%	5.5%	0.0%
Heating water uses the most energy	9.5%	58.5%	17%	13%	2%
Domestic hot water preparation is using the most	11.5%	56.5%	20.5%	11.5%	0.0%
Use of Electrical appliances in the home uses the most energy	49.5%	41%	5.5%	2%	2%
Lighting the home uses the most energy	17%	45%	20.5%	15%	2%

3.5. If you were supported at least 50% of total investment cost, do you install renewable energy and/or energy efficiency systems?

According to the results, 79% of respondents are willing to install renewable energy and/or energy efficiency systems if they will be supported in the total investment cost.

3.6 How well do you know the Energy Policies in your Country?

The average response on the self-report knowledge scale (1= Basic Knowledge, 5 = Expert level) was only 2.6, which means that most likely the respondents have moderate knowledge.

Conclusions and Recommendations

The purpose of this research is to investigate the awareness public attitudes of residentials and final users in regard to energy use and costs in buildings, the use of renewable energy and the interest to invest in them.

The respondents showed a good level of awareness about their annual energy consumption at their houses, which is considered a very positive point.

The majority of respondents have a strong desire to protect the environment and mitigate the climate change higher than the desire of seeking economic opportunities.

According to the results, most of companies in Egypt are considered as Neutral in regard to efficiency and as Quite Efficient to a lesser extent, while the houses in Egypt are considered as Quite Efficient.

In regard to energy usage, the respondents agree that “Heating the home uses the most energy”, “Cooling the house needed the most”, and “Heating water uses the most energy” use the most energy, followed by “Domestic hot water preparation is using the most”, “Use of Electrical appliances in the home”, and “Lighting the home uses the most energy” respectively.

Respondents are willing to install renewable energy and/or energy efficiency systems if they will be supported by 50% of the total investment cost.

Most likely the respondents have moderate knowledge about the Energy Policies in Egypt, Egyptian universities should raise the awareness about these policies.

3.3 Survey in Lebanon

SECTION 1: GENERAL INFORMATION RESULTS

Age		
Answer	**Count**	**Percentage**
Less than 21	1	3%
21-30	17	52%
31-40	8	24%
41-50	4	12%
Over 60	3	9%

The participant's range of age is variable however the largest age group is between 21 and 40 years old.

City/Town		
Answer	**Count**	**Percentage**
Mount Lebanon	6	18%
Beirut	19	58%
South Lebanon	3	9%
Beqaa	3	9%
North Lebanon	2	6%

Participants to this survey are mostly form Beirut which can be reflected later in the results. Beirut, being the capital, the awareness regarding such subject cannot reflect the opinion of all the Lebanese people especially those living in rural and remote areas.

Gender		
Answer	**Count**	**Percentage**
Female	9	27%
Male	24	73%

SECTION 2: AWARENESS RESULTS

2.1 Can you tell us about benefits of renewable energy (select maximum 3 answers)?

Answer	Count	Percentage
Good for the environment	33	35%
Independent on electric utilities	20	21%
Good for business	15	16%
Low cost	10	11%
Support from government	11	12%
No power outage	5	5%

Only 35% of the participants related the use of renewable energy systems to the environmental issues. 21% related the benefits of renewable energy use to the wish to be independent of the electric utility. This is mainly due to the electricity shortage in the country and the wish of the end-user to ensure energy security. These participants as well as the 11% that see in the renewable energy as a low cost energy production systems are aware of the high energy bills they are paying especially for the private generators.

2.2 Do you think the use of renewable energy in our country should be increased?

Answer	Count	Percentage
Yes	33	100%
No	0	0%

All the participants agreed on the fact of the necessity of increasing the use of on renewable energy on a country level. This might be the solution to the supply shortage as well as the high energy bills.

2.3 In your opinion, who holds the key role of supporting renewable energy and/or energy efficiency using?

Answer	Count	Percentage
Government	29	88%
Local Authorities	3	9%
People (Privates)	1	3%
Academics	0	0%
Enterprises	0	0%

88% of the surveyed agreed on the role of the government as key supporter of renewable energy and energy efficiency development in the country.

2.4 Have you ever heard about government subsidy/grant programs for renewable energy usage investment?

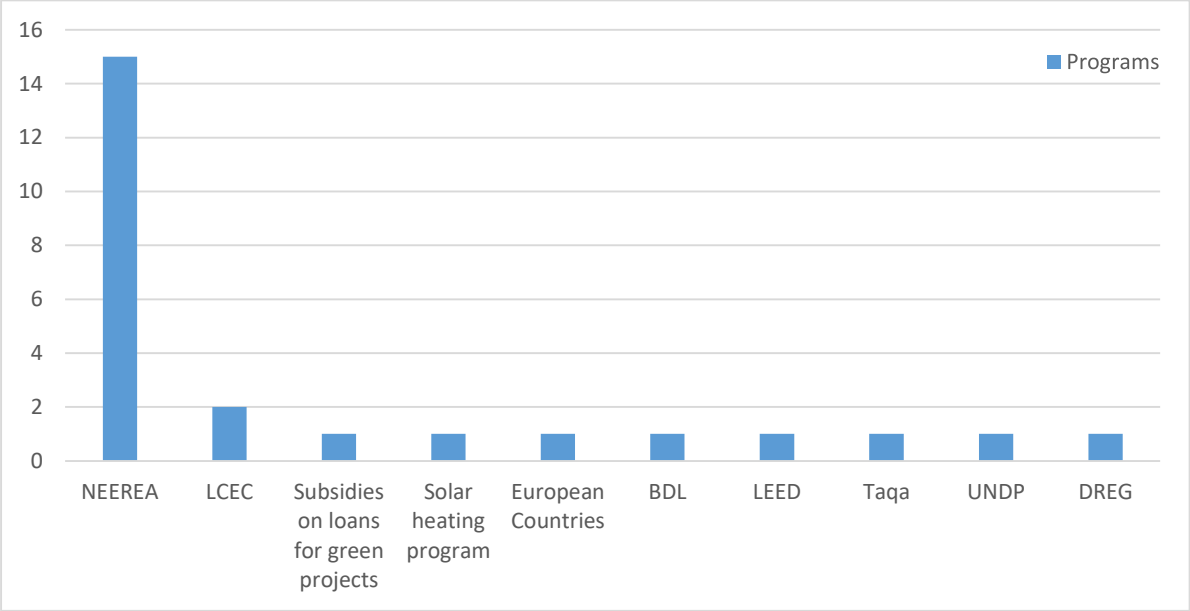
Answer	Count	Percentage
Don't know	4	12%
Yes	25	76%
No	4	12%

Data shows that surveyed people are aware of the existence of a governmental support mechanism to finance energy efficiency and renewable energy measures.

2.4 If yes, please let us know what program:

Answer	Count	Percent
Feed-In Tariff (FIT)	1	4%
Subsidies on Loans for green projects	1	4%
NEEREA	15	57%
Solar heating program	1	4%
European Countries	1	4%
LCEC	2	7%
BDL program to finance at low interests	1	4%
LEED	1	4%
Taqa	1	4%
UNDP	1	4%
The Small DREG	1	4%

The participants to this survey defined the NEEREA financing mechanism as the most known program with 57% followed by other programs such as the EU and BdL (Central Bank of Lebanon) supports.



Various opinions on the government/subsidy programs for renewable energy usage were submitted but overall the most frequent program is NEEREA followed by LCEC and finally FIT, subsidies on loans for green projects, solar heating program, European countries, BDL, Taqa, UNDP and DREG.

2.5 According to you, which renewable energy sources can be produced and used in your region?

Answer	Count	Percentage
Solar Thermal Energy	27	23%
Photovoltaic Energy	32	27%
Wind Energy	24	20%
Hydropower	24	20%
Biomass energy	8	7%
Biofuel	3	3%

Data shows that surveyed people are aware of the renewable energy technologies that could be used in Lebanon. Solar photovoltaic source and solar thermal energy registered the highest scores with 27% and 23% respectively.

2.6 Which energy efficiency measure do you think is more effective?

Answer	Count	Percentage
Efficiency Development	6	18%
Insulating the roof of the house	7	58%
Shading system	1	3%
Using public transportation	19	58%

Regarding energy efficiency measures, 58% of surveyed sample see that using public transportation and insulating the roof are the most effective. This is probably due to the traffic problems that Lebanese face every day on one hand and to the extreme temperatures (Summer and winter) on the other hand.

2.7 Does your Country have an internal energy strategy according to national policies?

Answer	Count	Percentage
I don't know	4	12%
Yes	14	42%
No	15	46%

46% of the surveyed sample think that Lebanon does not have energy strategy whereas 42% are aware of the policies proposed by the government through the ministry of energy and water.

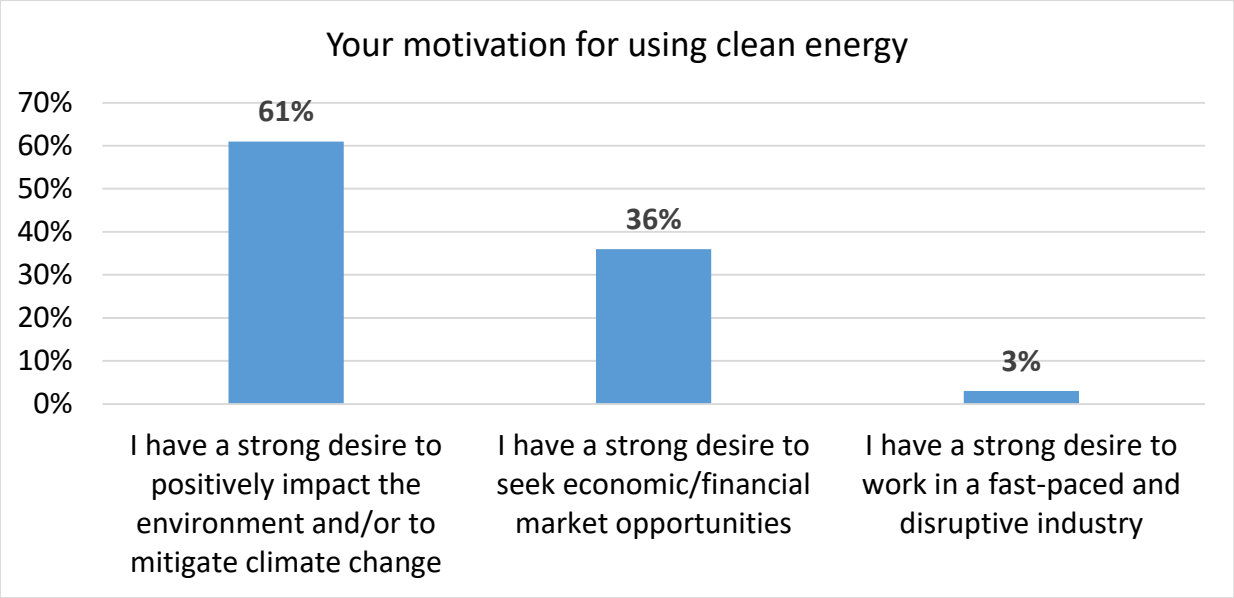
2.8 Are you aware of the annual energy consumption of your House?

Answer	Count	Percentage
We don't check	3	9%
Yes	19	58%
No	11	33%

Participants are mostly aware of their houses energy consumption with 58%.

2.9 Which of the following best describes your motivation for using clean energy?

Answer	Count	Percentage
I have a strong desire to positively impact the environment and/or to mitigate climate change	20	61%
I have a strong desire to seek economic/financial market opportunities	12	36%
I have a strong desire to work in a fast-paced and disruptive industry	1	3%



The motivation for using clean energy is related to the desire of positively impacting the environment as per 61% of the participants. This shows the level of awareness regarding the environmental issues that the country is facing. Only 3% of the participants expressed their desire to work in a disruptive industry.

SECTION 3: RESIDENTIAL SECTOR RESULTS

3.1 In terms of energy efficiency do you think:

	Neither	Quite Efficient	Quite Inefficient	Very Efficient	Very Inefficient
Your company is	33%	46%	6%	12%	3%
Your home is	46%	27%	9%	12%	6%

The data shows that the participants to this survey are not aware of the energy efficiency state of their company/home. Only 46% of them stated that their company is quite efficient.
The data also shows that on 3% and 6% of the participants consider their company and home respectively very inefficient.

3.2 Which of these measures would you be prepared to take to reduce your energy use?

	No	Yes
Stop leaving appliances on standby (e.g. TV, Video)	6%	94%
Turn up cooling thermostat by one degree	33%	67%
Take public transport, walk or cycle to reduce car use	27%	73%
Apply to your home systems to improve the energy efficiency (isolation, etc)	9%	91%
Replace lighting lamps with more efficient systems (LED, etc)	0%	100%
Install renewable systems for heating water and electricity production	3%	97%
None of these	97%	3%

In response to the questions to the energy efficiency (EE) measures that could be implemented, data shows that participants are ready to take initiatives to decrease their energy consumption. 100% are willing to change the type of lighting to more efficient one probably due to the simplicity of the task. 97% could install solar systems for heating and electricity production. This might be due to the high energy bills paid by the end-user (generators mainly) and the will to ensure energy security on a personal level. Turning up cooling thermostat by one degree is the measure having the lowest percentage in the "Yes" rubric due the subjectivity of the thermal comfort principal.

3.3 To what extent do you agree or disagree that the following would encourage you to reduce your energy consumption?

	Agree	Disagree	Neither	Strongly Agree	Strongly Disagree
Raising the price of energy (electricity, oil, gas	55%	6%	6%	27%	6%
Education about environmental issues	36%	0%	6%	58%	0%
Higher tariffs for high usage	15%	3%	9%	46%	3%
Having increased comfort in the home	43%	15%	21%	21%	0%
Media coverage of natural disasters such as floods or hurricanes	37%	15%	27%	15%	6%
More government legislation on energy efficient products	36%	0%	3%	61%	0%
Improve the Policies on Building Efficiency to use less energy	42%	0%	0%	58%	0%

Raising the price of energy is the main cause that might lead participants to reduce their energy consumption (55% agree and 27% Strongly agree).
Lack of awareness regarding environmental issues among end-users of all types is the main reason in the increase on the energy demand. This is reflected in the answer of the participants were 94% of them agree on the impact of education on environmental issues.
Nearly 98% agreed on the necessity of legislation as a main factor in increasing EE awareness.

3.4 Some household activities can use more energy than others. To what extent would you agree or disagree that each of the following uses a lot of energy?

	Agree	Disagree	Neither	Strongly Agree	Strongly Disagree
Heating water uses the most energy	42%	3%	6%	49%	0%
Heating the home uses the most energy	48%	0%	0%	52%	0%
Lighting the home uses the most energy	40%	21%	30%	6%	3%
Use of Electrical appliances in the home uses the most energy	34%	21%	30%	9%	6%

Cooling the house needed the most	45%	0%	3%	52%	0%
Domestic hot water preparation is using the most	58%	3%	15%	24%	0%

Data also shows that the participants are aware of the usages that consumes electricity the most. In fact heating, water heating, cooling and lighting are considered as high electricity consumers. However, as per the participants, the electrical appliances were not considered as high energy consumers.

3.5 If you were supported at least 50% of total investment cost, do you install renewable energy and/energy efficiency systems?

Answer	Count	Percentage
No	1	3%
Yes	32	97%

Data shows that participants (97%) are willing to install renewable energy systems and energy efficiency measures if they were supported with at least 50% of the total investment cost. This might be due to the electricity shortage that the country is facing especially in the summer. Being aware of the high cost of water heating, the installation of solar water heaters could reduce the participants' energy bills.

3.6 How well do you know the energy policies in your country? (1= Basic Knowledge and 5= Expert Knowledge)

Answer	Count	Percentage
1	4	12%
2	2	6%
3	8	24%
4	10	31%
5	9	27%

Answers to this question are scattered. However, 58% of the participants consider that they have a good to excellent knowledge of the energy knowledge in the country. This might be due to the curiosity to find solutions and reduce energy bills at the individual level. It might also be due to the awareness and media campaigns performed by the LCEC as well as the ministry of energy and water regarding using efficient lamps, net-metering systems.

3.4 Survey in Jordan

The Survey is consisting of three sections; the first is for collecting general information about students; the second is for awareness evaluation about renewable energy and energy efficiency; and the last is for evaluating the awareness about energy and renewable energy usage in residential sector.
The total number of responses was 46. The results of the survey questions are as follow:
Section 1: General Information
Gender: The majority of respondents (65%) were males while 35% were females.

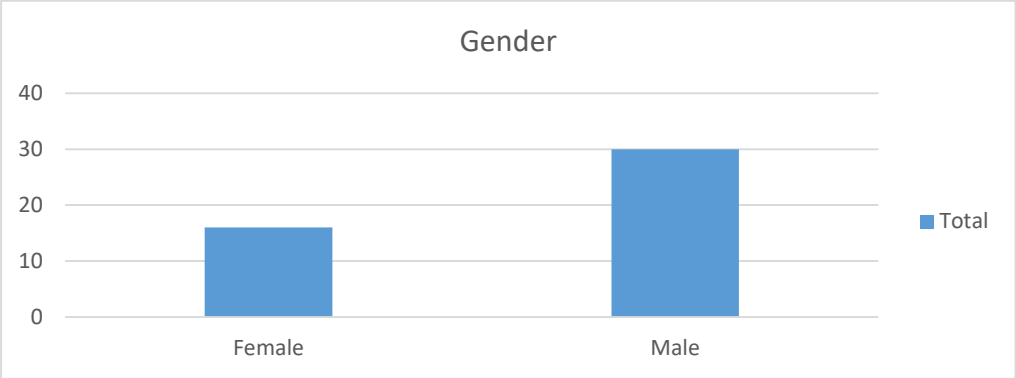


Figure 1 Gender

Age: Out of 46 surveyed persons, 40% belonged to the Age Group 21-30, and 32% belonged to the Age Group 31-40. Which means the majority of respondents (72.34%) aged below 40.

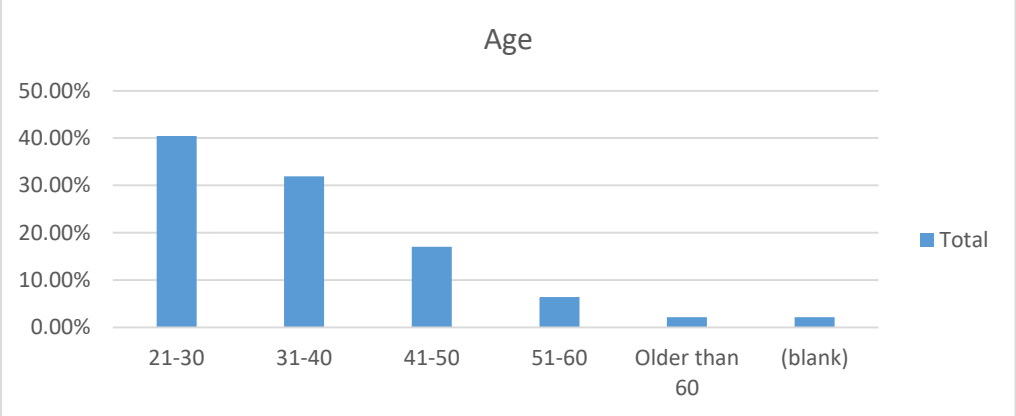


Figure 2 Age

Section 2: Awareness

2.1. The benefits of renewable energy:

"Good for the environment" and "Low cost" were the major benefits of the renewable energy as indicated in the following table, which indicating that the respondents have an excellent level of awareness.

Table 1 Benefits of Renewable Energy

Single choice	Percentage
Good for environment	100.00%
Low cost	82.61%
Independent on electric utilities	47.83%
Good for business	43.48%
Support from the government	13.04%
No power outages	4.35%
No benefits	0.00%
Do not know	0.00%

2.2. Do you think the use of renewable energy in our Country should be increased?

The majority indicates that the renewable energy usage in Jordan should be increased.

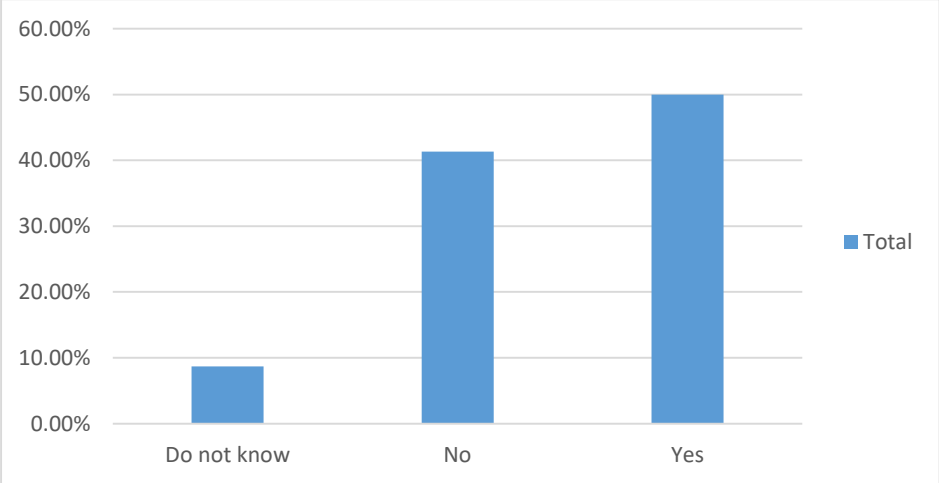


Figure 3 Level of Renewable Energy Usage

2.3 In your opinion, who holds the key role of supporting renewable energy and/or energy efficiency using?

The majority indicates that the Government in Jordan is playing the key role in supporting the renewable energy and/or energy efficiency using.

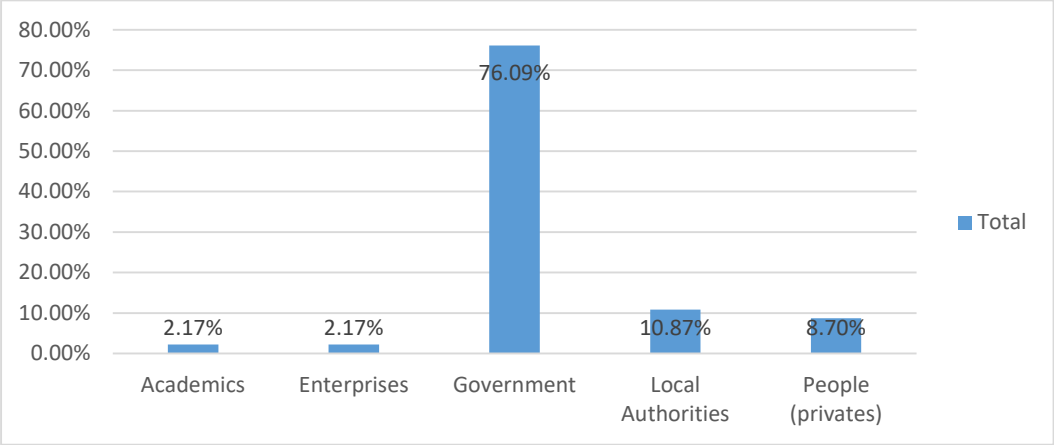


Figure 4 Supporters of Renewable Energy Sector

2.4 Have you ever heard about government subsidy/grant programs for renewable energy usage investment?

Only (50%) of the respondents indicates that they heard about government subsidy/grant programs for renewable energy usage investment, while the (41.1%) haven't heard about and (8.7%) of the respondents don't know.

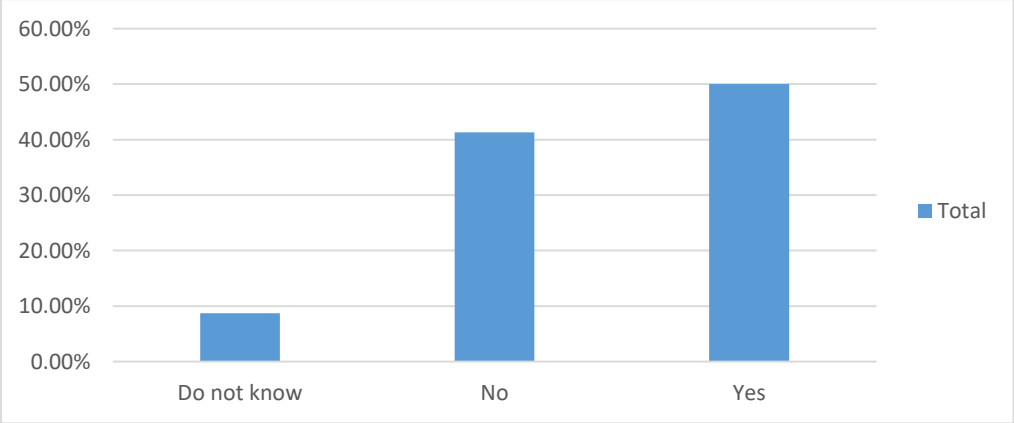


Figure 5 Government subsidy/grant programs

2.5 According to you, which renewable energy sources can be produced and used in your region?
This was a multi-answer question. Most of the respondents selected Photovoltaic energy (82%), Solar thermal energy (72%), wind energy (52%) as available sources that could be exploited in Jordan easily, followed by Biomass energy (28%), Biofuel energy (22%), Hydropower (11%) and only (1%) don't know.

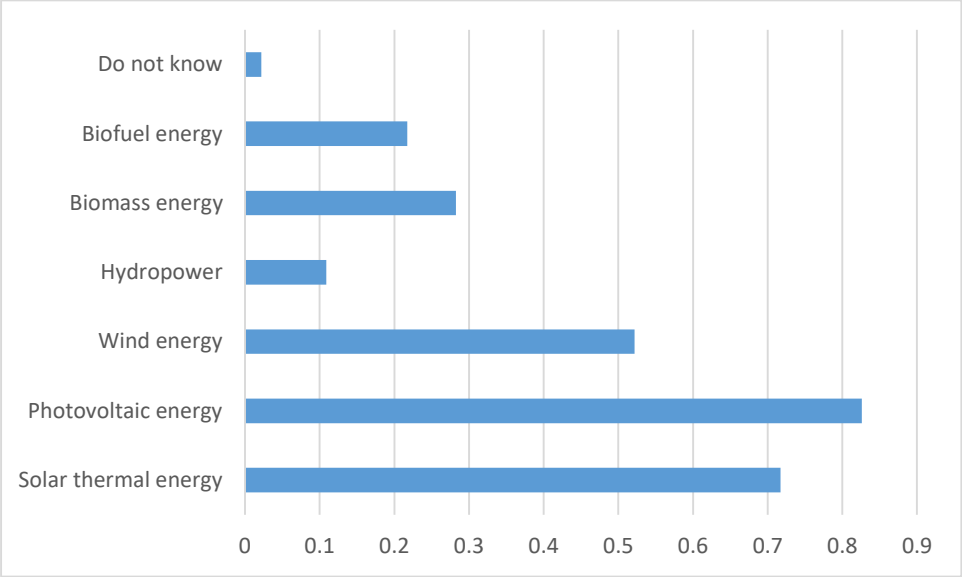


Figure 6 Renewable Energy Sources

2.6 Which energy efficiency measure do you think is more effective?

Around (33%) of respondents stated that "insulating the roof of the house would be efficient, while (30%) selected "Efficiency in industry", (28%) selected "Using public transportations".

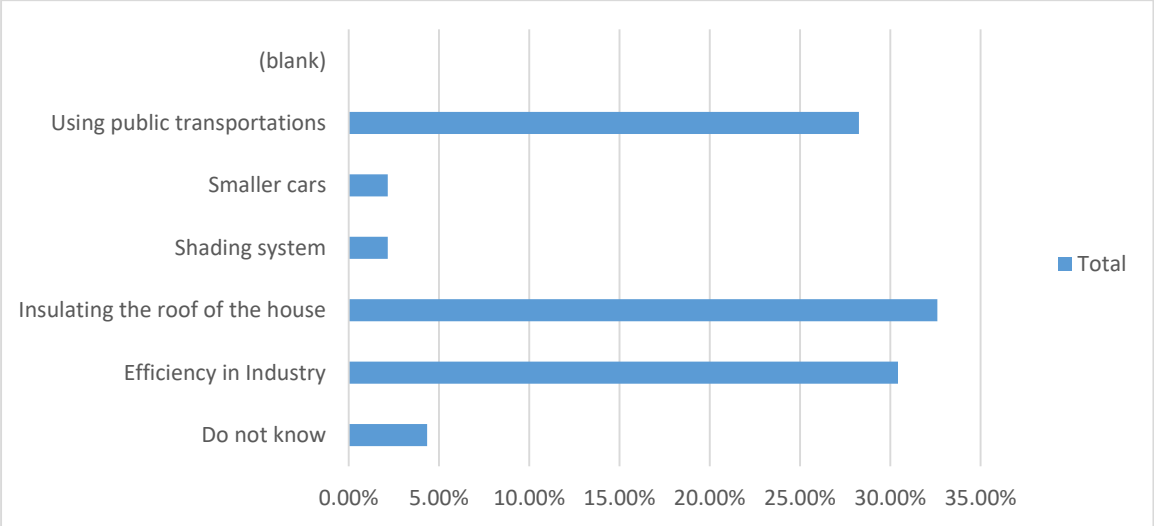


Figure 7 Energy Efficiency Measures

2.7 Does your Country have an internal energy strategy according to national policies?

The vast majority (72%) of respondents indicates that they aware that Jordan has an internal energy strategy according to the national policies, while (22%) don't know about it.

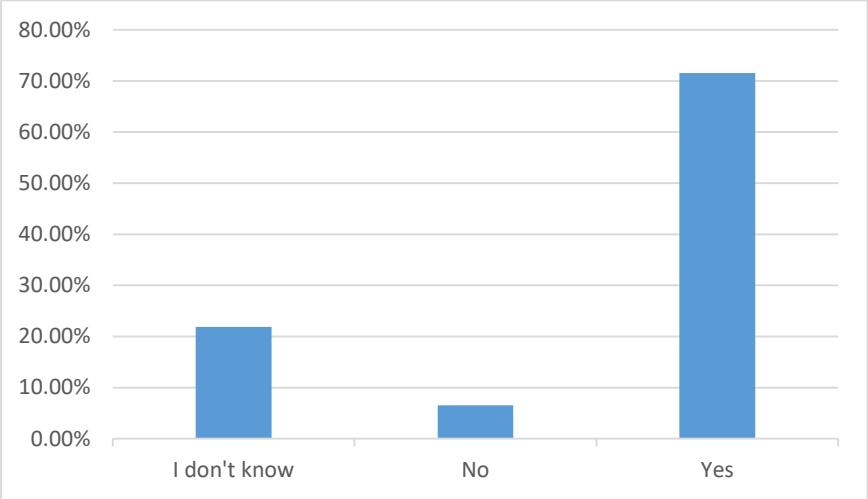


Figure 8 Internal Energy Strategy

2.8 Are you aware of the annual energy consumption of your House?

The vast majority (82%) of respondents indicates that they aware about the annual consumption of their house, while 11% of them don't check it.

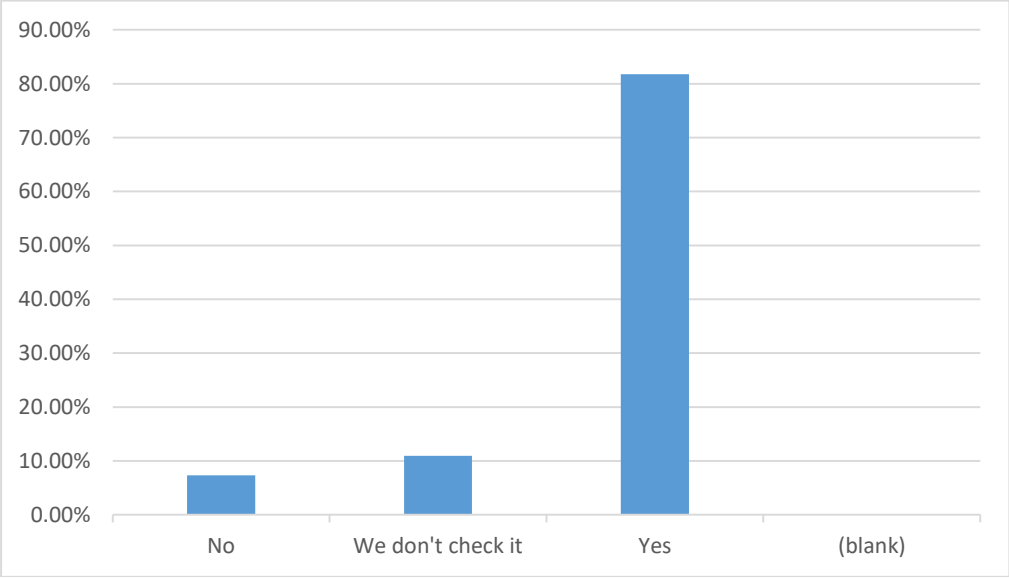


Figure 9 Annual Consumption

2.9 Which of the following best describes your motivation for using clean energy?

Most of the respondents (59.9%) have a strong desire to positively impact the environment and/or to mitigate climate change, while only 25.5% have a strong desire to seek economic/financial market opportunities, and 6.6% to have a strong desire to work in a fast-paced and disruptive industry.

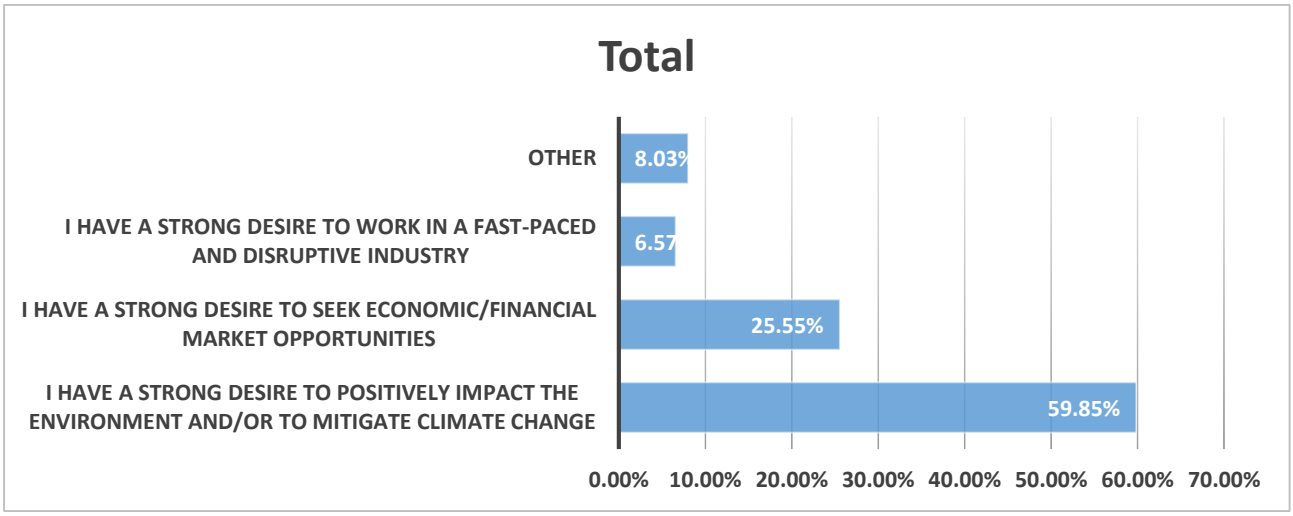


Figure 10 Motivation for Using Clean Energy

3: Residential Sector

3.1 In terms of energy efficiency do you think [Your Company is]

The average answer was 3.3 which means that the companies are most likely considered as neutral to "Quite Efficient". 41% of the respondent consider their company as "Quite Efficient".

Label	Very Efficient 5	Quite Efficient 4	Neither 3	Quite inefficient 2	Very inefficient 1
No. of responses	6	19	10	5	6

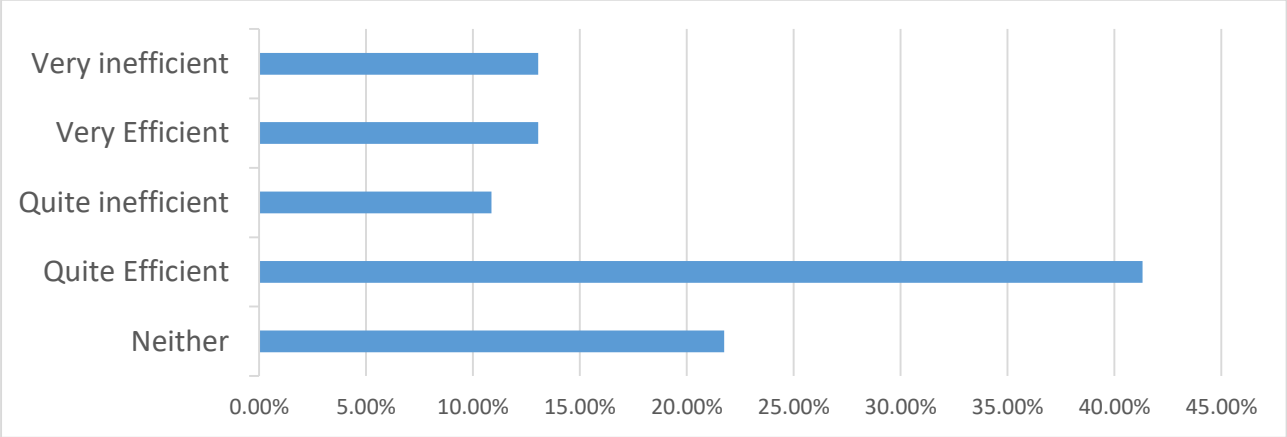


Figure 11 Energy Efficiency in companies

3.1 In terms of energy efficiency do you think [Your Home is]

The average answer was 3.7 which means that the homes are most likely considered as "Quite Efficient". 63% of the respondent consider their homes as "Quite Efficient".

Label	Very Efficient 5	Quite Efficient 4	Neither 3	Quite inefficient 2	Very inefficient 1
No. of responses	5	29	8	3	1

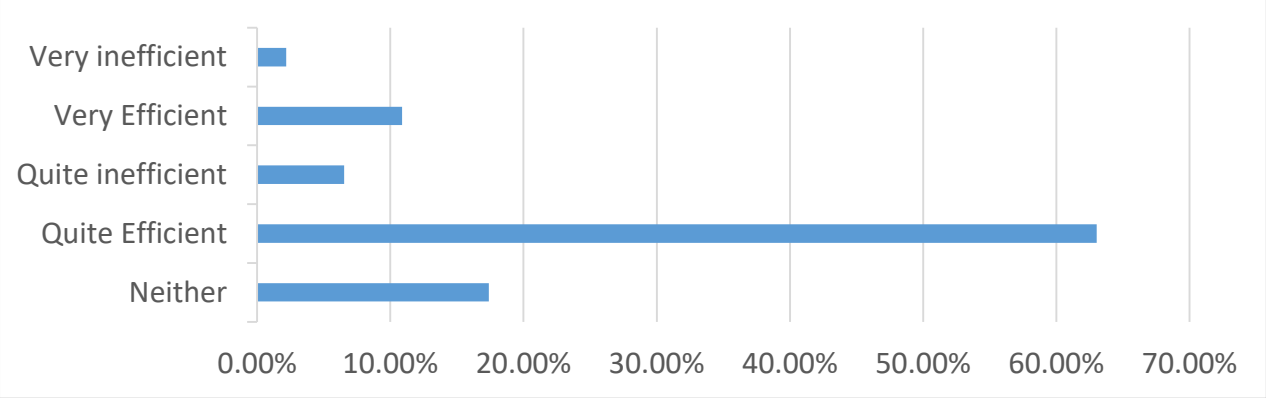


Figure 12 Energy Efficiency at homes

3.2 Which of these measures would you be prepared to take to reduce your energy use?

The vast majority of respondent indicate that "replacing the lighting lamp" will have a major effect in reducing the energy use, followed by "Installing RES", "Apply Isolation Systems", "Stop Leaving Appliance on Standby", "Turn Up Cooling Thermostat by One Degree", and "Public Transportation".

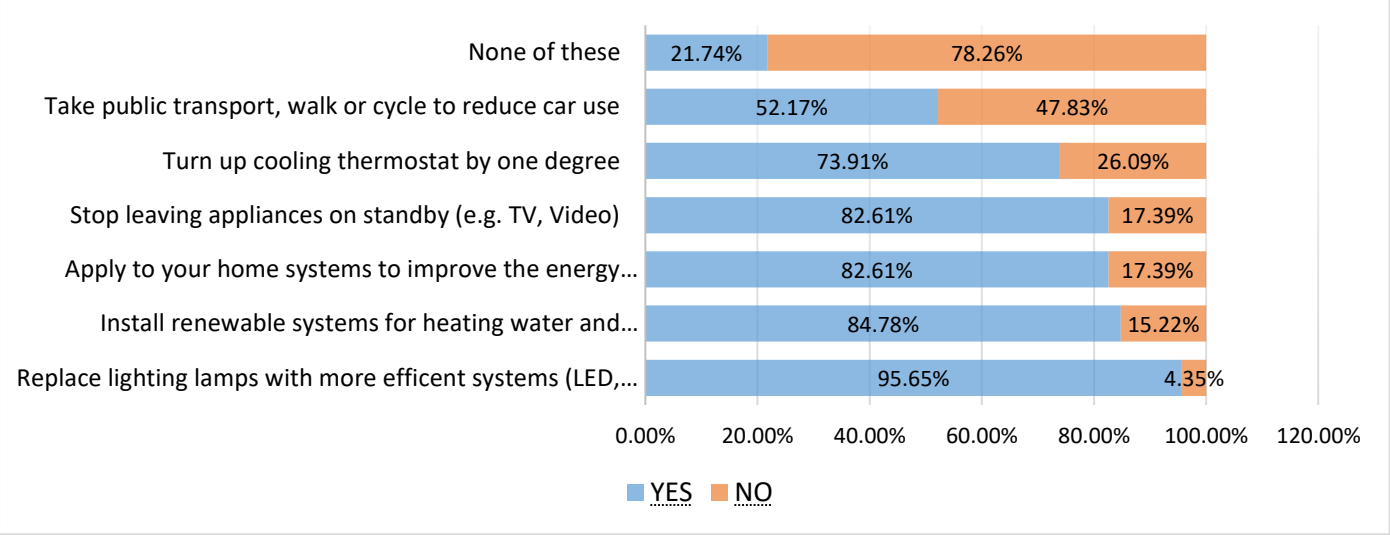


Figure 13 Energy Efficiency at companies

3.3 To what extent do you agree or disagree that the following would encourage you to reduce your Energy consumption?

According to the results, the respondents agree that "Education about environmental issues", "Improve the Policies on Building Efficiency to use less energy" and "More government legislation on energy efficient products" are the best actions to reduce the energy consumption, followed by other actions as indicated in table and chart below.

Table 2 Energy Consumption Reduction

Action	Average Answer	Strongly Agree 5	Agree 4	Neither 3	Disagree 2	Strongly Disagree 1
Education about environmental issues	4.52	54.3%	43.5%	2.2%	0.0%	0.0%
Improve the Policies on Building Efficiency to use less energy	4.50	58.7%	34.8%	4.3%	2.2%	0.0%
More government legislation on energy efficient products	4.20	41.3%	45.7%	6.5%	4.3%	2.2%
Having increased comfort in the home	4.02	28.3%	52.2%	15.2%	2.2%	2.2%
Higher tariffs for high usage	3.85	30.4%	41.3%	15.2%	8.7%	4.3%
Media coverage of natural disasters such as floods or hurricanes	3.50	13.0%	52.2%	17.4%	6.5%	10.9%
Raising the price of energy (electricity, oil, gas)	3.11	23.9%	21.7%	13.0%	23.9%	17.4%

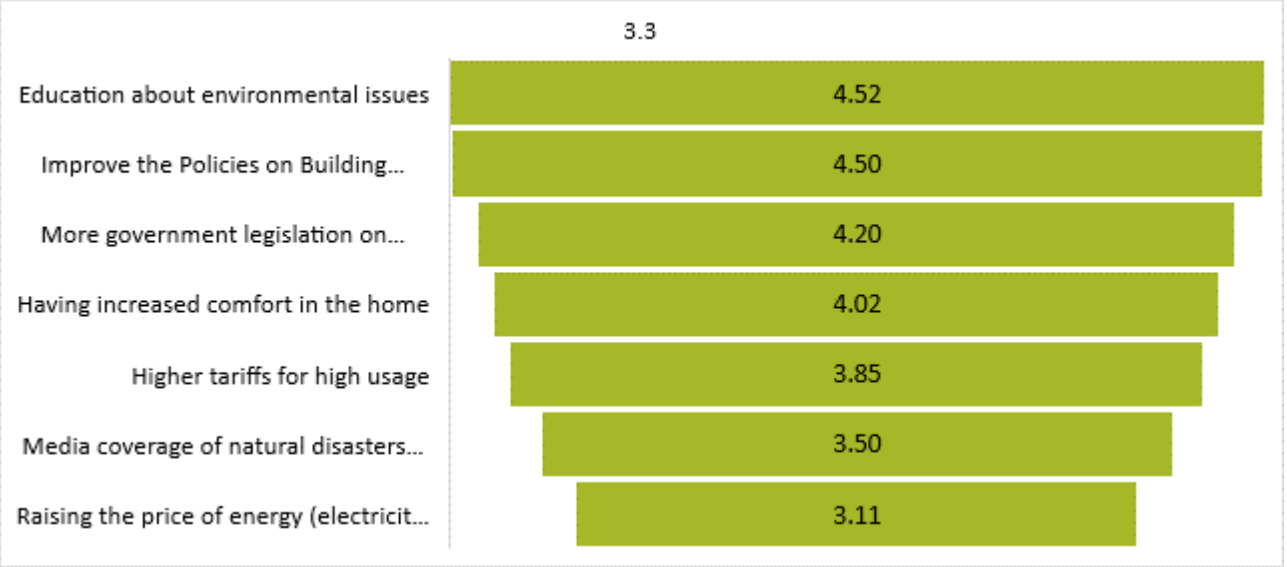


Figure 14 Energy Consumption Reduction

3.4 Some household activities can use more energy than others. To what extent would you agree or disagree that each of the following uses a lot of energy?

According to the results, the respondents agree that "Heating the home uses the most energy", "Cooling the house needed the most", and "Heating water uses the most energy" use the most energy, followed by "Domestic hot water preparation is using the most", "Use of Electrical appliances in the home", and "Lighting the home uses the most energy" respectively.

Table 3 Energy Usage by Different Activities

Action	Average Answer	Strongly Agree 5	Agree 4	Neither 3	Disagree 2	Strongly Disagree 1
Heating the home uses the most energy	4.30	39.13%	54.35%	4.35%	2.17%	0.00%
Cooling the house needed the most	4.20	36.96%	50.00%	8.70%	4.35%	0.00%
Heating water uses the most energy	4.11	36.96%	50.00%	4.35%	4.35%	4.35%
Domestic hot water preparation is using the most	3.70	26.09%	45.65%	8.70%	10.87%	8.70%
Use of Electrical appliances in the home uses the most energy	3.63	19.57%	47.83%	10.87%	19.57%	2.17%
Lighting the home uses the most energy	3.17	8.70%	39.13%	23.91%	17.39%	10.87%

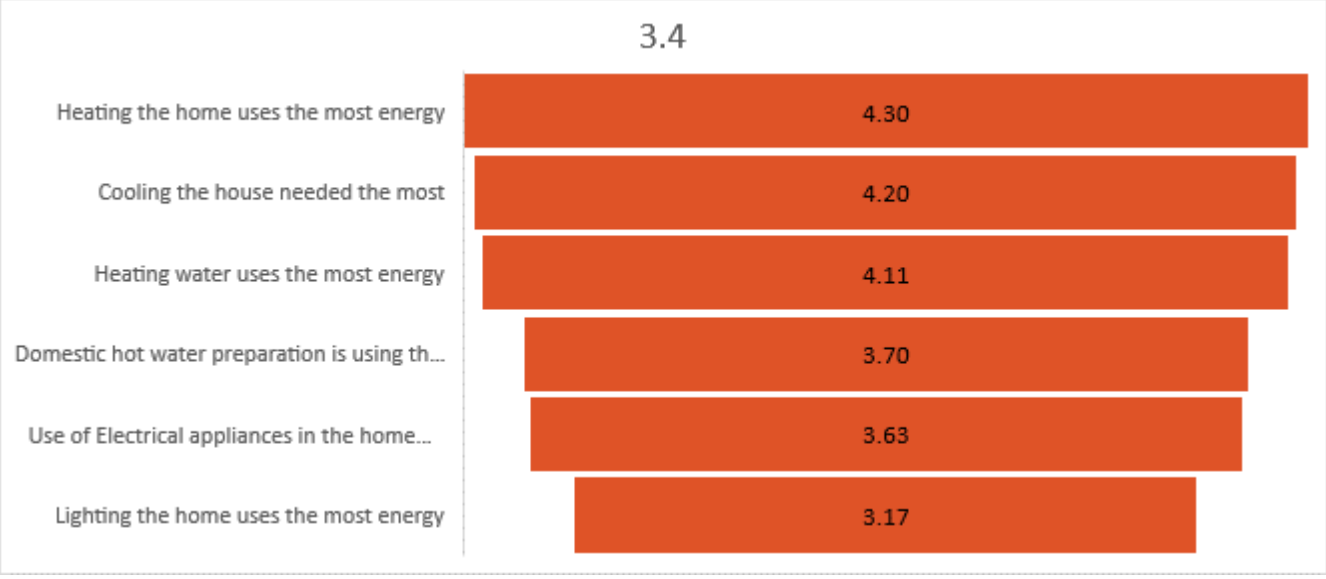


Figure 15 Energy Usage by Different Activities

3.5. If you were supported at least 50% of total investment cost, do you install renewable energy and/or energy efficiency systems?

The following chart shows that (97.8%) of respondents are willing to install renewable energy and/or energy efficiency systems if they will be supported by 50% of the total investment cost.

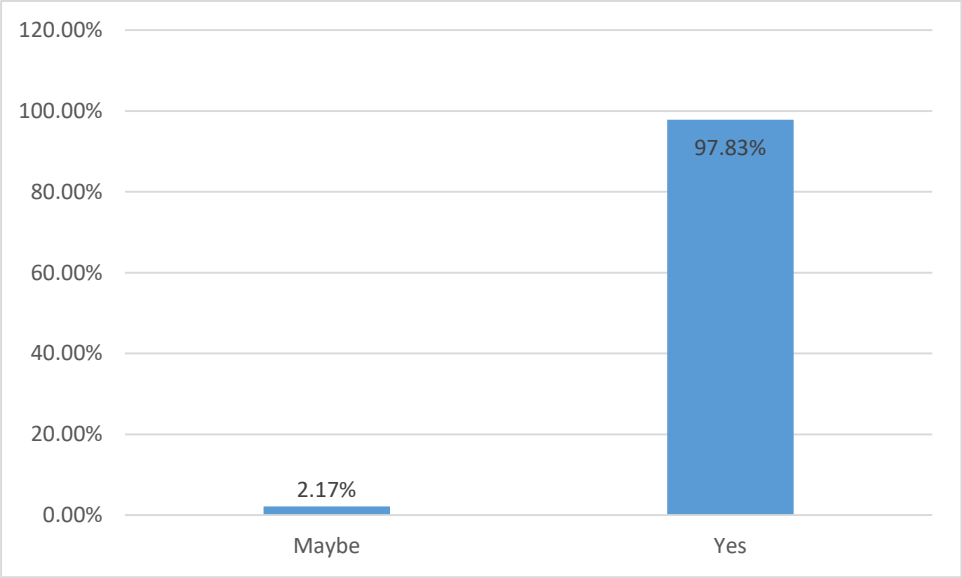


Figure 16 Renewable Energy Systems Installations

3.6 How well do you know the Energy Policies in your Country?

The average response on the self-report knowledge scale (1= Basic Knowledge, 5 = Expert level) was only 2.98, which means that most likely the respondents have moderate knowledge.

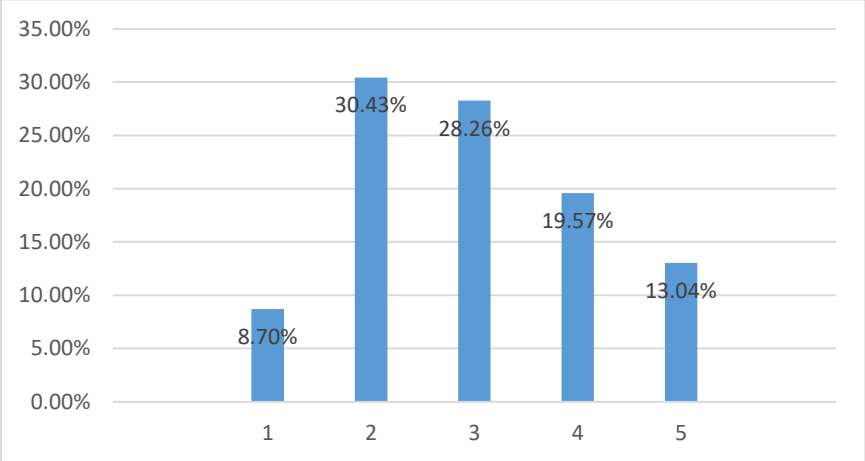


Figure 17 Knowledge about Energy Policies

Annex: List of questions

SECTION 1 GENERAL INFORMATION

INFORMATION ABOUT YOURSELF

Full Name (optional)

Email Address (optional)

Age

□ 21-30

□ 31-40

□ 41-50

□ 51-60

□ Older than 60

Country _____

City/ Town _____

Gender

□ Male

□ Female

SECTION 2 AWARENESS

2.1 Can you tell us about benefits of renewable energy (select maximum 3 answers)?

- □ Good for environment
- □ Independent on electric utilities
- □ Good for business
- □ Low cost
- □ Support from the government
- □ No power outages
- □ No benefits
- □ Do not know

2.2 Do you think we should increase the use of renewable energy in our Country?

- □ Yes
- □ No
- □ Do not know

2.3 In your opinion, who holds the key role of supporting renewable energy and/or energy efficiency

using?

- □ Government
- □ Local Authorities
- □ Enterprises
- □ Academics
- □ People (privates)

2.4 Have you ever heard about government subsidy/grant programs for renewable energy usage/investment?

- □ Yes
- □ If yes, please let us know what program:
- □ No
- □ Do not know

2.5 According to you, which of renewable energy sources can be produced and used in your region?

- □ Solar thermal energy
- □ Photovoltaic energy
- □ Wind energy
- □ Hydropower
- □ Biomass energy
- □ Biofuel energy
- □ Do not know

2.6 Which energy efficiency measure do you think is more effective?

- □ Insulating the roof of the house
- □ Shading system
- □ Smaller cars
- □ Using public transportations
- □ Efficiency in Industry
- □ Do not know

2.7 Does your Country have an internal energy strategy according to national policies?

- □ YES
- □ NO
- □ I DON'T KNOW

2.8 Are you aware of the annual energy consumption of your House?

- □ YES
- □ NO
- □ I DON'T CHECK IT

2.9 Which of the following best describes your motivation for using clean energy?

- □ I have a strong desire to positively impact the environment and/or to mitigate climate change
- □ I have a strong desire to work in a fast-paced and disruptive industry

- □ I have a strong desire to seek economic/financial market opportunities
- □ Other

SECTION 3 RESIDENTIAL SECTOR

3.1 In terms of energy efficiency do you think……

	Very Efficient	Quite Efficient	Neither	Quite Efficient	Very inefficient
Your Company is					
Your Home is					

3.2 Which of these measures would you be prepared to take to reduce your energy use?

	YES	NO
Stop leaving appliances on standby (e.g. TV, Video)		
Turn up cooling thermostat by one degree		
Take public transport, walk or cycle to reduce car use		
Apply to your home systems to improve the energy efficiency (isolation, etc)		
None of these		

3.3 To what extent do you agree or disagree that the following would encourage you to reduce your Energy consumption?

	Strongly Agree	***Agree***	***Neither***	***Disagree***	***Strongly Disagree***
Raising the price of energy (electricity, oil, gas)					
Education about environmental issues					
Higher tariffs for high usage					
Having increased comfort in the home					
Media coverage of natural disasters such as floods or hurricanes					
More government legislation on energy efficient products					
Improve the Policies on Building Efficiency to use less energy					

3.4 Some household activities can use more energy than others. To what extent would you agree ordisagree that each of the following uses a lot of energy?

	Strongly Agree	***Agree***	***Neither***	***Disagree***	***Strongly Disagree***
Heating water uses the most energy					
Heating the home uses the most					

energy					
Lighting the home uses the most energy					
Use of Electrical appliances in the home uses the most energy					
Cooling the house needed the most					
Domestic hot water preparation is using the most					

3.5 If you were supported at least 50% of total investment cost, do you install renewable energy and/or energy efficiency systems?

- □ *YES*
- □ NO
- □ MAYBE

3.6 How well do you know the Energy Policies in your Country?

Basic Knowledge

1

2

3

Expert level