Co-funded by the Erasmus+ Programme of the European Union

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

Author(s)	**Gabriella Calderari, Qatada Damra, Husam Al-Kuran, Mohamed Rady, Adel Elsamahy, Radwan Abdelhamid , Nesreen Ghaddar**		
Organisation name(s)	**SAPIENZA University of Rome (UNIROMA1), Jordan University of Science and Technology (JUST), Helwan University (HU), American university of Beirut (AUB)**		
WP Number	**1**		
Task Number	**1.3**		
WP Leader	**UNIROMA1**		
Due date of delivery	**July 2018**	**Project month**	**9**
Submission date	**September 2018**	**Project month**	**11**
Total number of pages	**59**		

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

Summary

FINAL REPORT ON "EDUCATIONAL NEEDS IN THE FIELD OF ENERGY EFFICIENCY, RENEWABLE ENERGY USE AND ENVIRONMENTAL IMPACT IN INDUSTRY AND THE BUILDING SECTOR"

1 INTRODUCTION

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 "Energy Efficiency, Renewable Energy and Environmental Impact" teaching.

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

The centers 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/improve laboratories of "EE+RE" Technologies (EEREL center)

* Contribution to guidelines for practice for EE+RE in industry and buildings

1.1 Scoping of the surveys

The survey aimed to collect information useful for the elaboration of courses on "Energy Efficiency, Renewable Energy and Environmental Impact" offered by Beneficiary Universities (included 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 questionnaire is addressed to the targeted Companies and has been filled in by the person responsible for the project and the department or faculty.

1.2 Methodology

To reach the mentioned goals, 18 questions about information on the companies, Industry needs and regulatory aspects have been included in the survey divided in three sections.

The interviewees have been asked to complete the following sections:

1 - Organization/Company/Ngo Details

Details related the organizations, like Name, Type, contacts and website, and the person involved in the compiling of the questionnaire.

2 – Industry needs

A profile of the organizations involved in the survey is drafted through specific questions related to:

- the business core in the field of energy technologies,
- the renewable technologies and energy efficiency intervention included in their specific market,
- the size (in term of employees and the area of commerce);

3 – Regulatory aspects

The third question group aims to investigate the awareness of the selected stakeholders on the importance of the regulatory aspect of RE, the influence that these aspects have in their business and the competences of the employed experts. The results of this section will be included in a specific survey on Energy regulation.

The survey was sent by email and other media communication to more than 100 stakeholders representing different industrial sectors. However, some Companies preferred to send the answers via mail using “word” files.

2 INDUSTRY 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, on the basis of parameters and standards recognized at the level international.
To this end, it was necessary to develop a market analysis, not only to understand the technological state of the industry, but also to understand what the real needs of the labor market are and what kind of skills the industries expect from recent graduates in energy disciplines. .
The survey conducted through the questionnaires has therefore enabled the identification of the situation of the industries, the type of staff currently employed, their education, the growth expectations of these companies in the next five years and the type of experience and knowledge required by the market 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 modeled 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.
This report studies the results of the feedback of trained specialists from Egypt, Lebanon and Jordan, working in the field of Energy, Environmental technology and climate change.
Considering the answers of three Countries together, the interest for the survey was quite high and the feedback received allow us to have a picture of the situation and most important needs of MENA Countries industries operating in the field of RES.
It must be mentioned that, even if the target of the survey was the Industry, the questionnaire and the results are undermined by the presence of universities and research centres. However, MENA partners confirmed that this aspect will not affect the results and their evaluation, since it is a common practice for Professor and Researcher to be involved also in Industry and have a very good knowledge of Companies' needs.
The survey showed how Industries have invested in the sector of Renewable Energy technologies, where n. 53 on 62 have at least 1 employer working on, and Energy Efficiency in Industry (42 of them have at least 1 employer operating in) and in Buildings (46 of them have at least 1 employer operating in).
According to the results, the market seems to be open to incorporate more professional in the next 5 years, especially in the sectors of Energy Efficiency in Industry (48 on 62) and in Building (50 on 62) and Renewable Energy (54 on 62). Industries are also looking with interest to Environmental control, impact and assessment.
In order to build proper and useful competences within HEBA courses, it seems relevant that the more suitable courses for the companies are the ones about "Energy Storage Technologies", "Renewable Energy Projects Evaluation & Market Analysis" and "Building Management Systems".
MENA Energy industries are in general satisfied of the professional on Energy technology, and only for the 28% is difficult to find experts with competences on renewable energies, energy efficiency and environment.
In general Industries don't have specific internal competences on political issues, climate factors and Environmental control and only 33% of interviewed declare to be interested to experts with transversal competences not only on technologies, but also on laws and economy.
Industrial facilities in contact with Heba partners were asked to fill in surveys to get a clearer image of the situation in relation to project topics; Environment, Renewable Energy, and Energy Efficiency.

2.1 Industry needs in Lebanon

After these findings and the feedback of professionals, the majority of participants are from industrial production and that the best courses for their company/institution are 'Energy Storage Technologies' and 'Renewable Energy Projects Evaluation & Market Analysis'. The current level of education in employees in renewable energies is Bachelors' and Masters' however for energy efficiency the majority have a Bachelors' degree. For general employee requirements, graduates with a strong specialization in the technology field are the most important. 3 out of 11 participants

voted that 6-10 employees are working in renewable energy whereas 9 participants voted that 0 employees work in the environmental and climate sector. However, the majority have voted that it is not difficult to get qualified employees in the specific branches of energy efficiency, renewable energy and environmental impact therefore in the next 5 years an increase is expected.

The majority are familiar with the policies and legislations applicable to renewable technologies in Lebanon and list the most important ones as net metering and NEEREA. National and international regulations are very important in setting forth the motion of new technology solutions and the government also plays a very important role in terms of loans and permits.

Obstacles also arise in the implementation and regulation for construction, installation and use of renewable energy technologies such as lack of licensing, long processing time for loans, and strict installation laws. Therefore some room for improvement includes:

- More subsidized loans from the Central Bank of Lebanon
- Less strict permits for installing solar panels on rooftops
- Licensing for using the roof of a building for a PV system
- PV mounting structures should be exempted from Building Permits

Recommendations to guide the MS program:

It is clear that the market is changing in terms of its requirements for skilled labor in renewable energy technologies and in energy efficiency in buildings. Employers focus on the need of personnel who are strong in technical skills while also emphasizing the importance of having green laws. The current Master Programs could be enhanced to equip students with relevant skills on the technology side. This may include adding courses on technology transfer and project based courses that address design approach on projects that are well connected to the local industry. Revisions may also take place on courses such as energy economics and policy; renewable energy integration in buildings and solar electricity to emphasize topics such as energy storage, smart building designs, and effective HVAC designs that can utilize renewable energy sources such as desiccant dehumidification systems. We also propose that some of the courses soft part become blended using online delivery to encourage responsible learning and enhance enrollments in these courses.

2.2 Industry needs in Egypt

The present report summarizes the survey results of industrial needs in Egypt. The survey was designed in order to accurately identify and quantify the immediate and future needs for trained specialists in the field of energy efficiency, renewable energy, environmental technology and climate change. The survey results in addition to other surveys and desk studies conducted within the scope of HEBA project shall help in constructing the detailed focus and content of the new high-level energy efficiency and renewable energy courses in the master and bachelor programs. Salient findings, conclusions, and recommendations of the present survey are summarized as follows:

- The survey analysis shows that renewable energy and energy efficiency education is of interest at high level postgraduate programs. This represents a sort of an inverted triangle and draws the attention to the necessity to direct more efforts to increase renewable energy education at both the Bachelor`s and technical level.
- More than 35% of organization do not have specialized employees in energy efficiency in buildings and industry.
- The percentage of organizations that do not have employees working in the field of environmental assessment, impacts, climate issues, economic issues, and law issues is very high and exceeds about 50% of organizations. This highlights the need to equip graduates with knowledge and skills required to work and manage these important issues in buildings and industrial organizations.
- More than 60% of the organizations find difficulty in obtaining qualified employees in the fields of renewable energy and energy efficiency.
- The results show that about 65 to 70 % of organizations are planning to employ 1 to 5 graduates in the field of energy efficiency in buildings, industry, and renewable energy.
- About 60% of the organizations consider that it is important to get graduates with a strong specialization in the technology field. While about 20% of organizations see the importance of getting graduates with knowledge in economics, politics, and laws related to energy efficiency and environmental impacts.
- More than 85% of highly-qualified employees in the energy field are graduated from universities. The role of technical schools is minor and represents about 20%. This highlights the need to improve education programs in the technical schools to offer high quality training in the field of energy efficiency and renewable energy.
- Only about 15% have the chance for training in foreign countries. This calls for more efforts for the internationalization and modernization of high level energy efficiency and renewable energy education programs in cooperation with foreign universities and institutions. This represents one of the important objectives of HEBA project.
- Companies and organizations are in need for high level courses in the field of energy efficiency, storage, renewable energy, and energy management in buildings.
- More than 70% of the organizations are not aware about the policies and legislations applicable to renewable energy technologies in the country. Much more awareness is needed to clarify the importance of these legislations.
- About 50% of the organization think that energy international, national and regional strategies fit the real needs of research and industry. More efforts are needed to establish strategies capable of satisfying the remaining 50%.

- About 67% are neutral about the relevance of regulatory issues to the scientific / technological activity that they carry out.
- About 19% of the organizations have had problems related to technical standards or regulation for construction, installation and use of RE technologies.
- Survey results show that, in about 60% of the organizations, engineers deal with regulatory aspects. This highlights the need to equip engineering graduates with knowledge and skills sufficient to carry out these tasks in cooperation with the law office.

2.3 Industry needs in Jordan

Industrial facilities in contact with HEBA partners were asked to fill in surveys to get a clearer image of the situation in Jordan in relation to project topics; Environment, Renewable Energy, and Energy Efficiency. The following subsections show the result of individual questions of the surveys. The final goal of the survey is to help the HEBA partners select the skills and competencies needed to be included when they develop the courses.
Contact Person Age and Gender:
Most contact persons were males in the age of 30 – 50 with fewer persons under 30 and only one person above the age of 50. This reflects a young male dominated population of contact persons.

Company Profiles:
The vast majority of facilities are in Amman as Amman has 2/3 of the total industrial facilities in Jordan. Next comes Zarqa and Irbid. Facilities are mostly local and national. Few facilities expand to the gulf. And those who do often also expand internationally.
About half of the surveyed facilities are big companies employing more than 200 employee, other surveyed facilities varied from small to medium enterprises, this makes sensee because HEBA project seeks the point of view of the industrial employers.
Energy Efficiency:
Companies commonly have 1 – 5 employees working on Energy Efficiency in Buildings with a similar number of positions planned. Many facilities don't have employees working on this and many don't plan to. Facilities having more than 10 employees in this field are either governmental or educational.
Most companies have no employees working on Industrial Energy Efficiency, but many plan to have 1 – 5 employees in the near future. None of the facilities surveyed reported more than 5 current employees.
Environmental positions:
Most facilities have little to no investment in environmental positions. This is due to lack of legal enforcement and to local facilities not seeing the return on investment on environmental control, assessment or climate issues.
Renewable Energy:

Most companies have few employees working on renewable energy and plan to have more in the near future with some companies reporting more than 10 current employees/planned positions. Renewable energy has been trending in Jordan now for several years so far. This is why it receives more attention than energy efficiency.
Sourcing talent:
Some companies do report some difficulty in sourcing talent in the fields of Energy Efficiency, Renewable Energy and Environmental Impact. While the majority report no problems faced. Most facilities (81%) source their employees from within Jordan.
Interest in Economic, Political and Law issues:
Companies have shown little interest in Economic, Political and Law issues showing a focus on technical aspects on their fields.
About half of facility contact persons reported good knowledge of the local and international Renewable Energy Laws with about 15% denied such knowledge and the rest reporting partial knowledge of legislations.

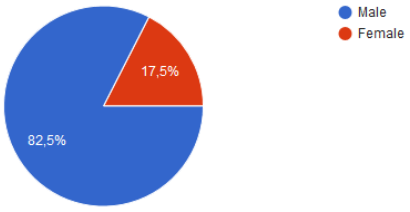
3 SURVEYS

3.1 MENA COUNTRIES

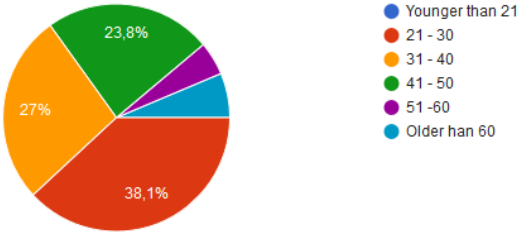
This section will show the answers in a graphical format both for the three Countries together and for each of the three MENA Countries interviewed. It allows the project to have a general view of the status of Industries working in Energy field for the countries involved in the project and to use the data to design the courses. At the same time, the specific analysis done per each 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.

SECTION 1 GENERAL INFORMATION

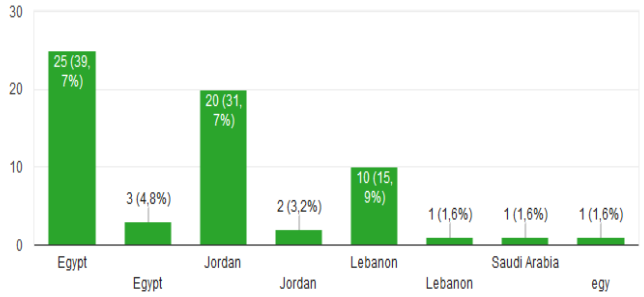
Gender



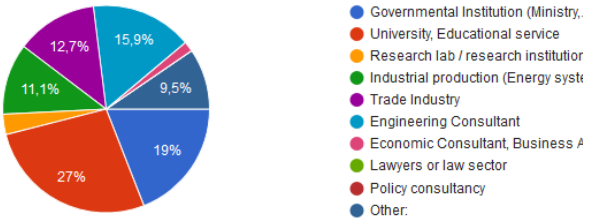
Age Group



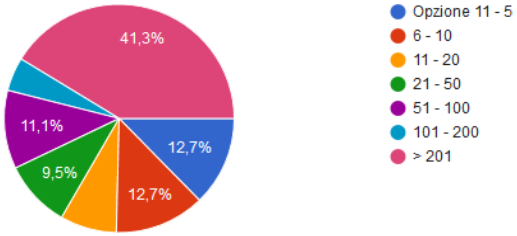
Country



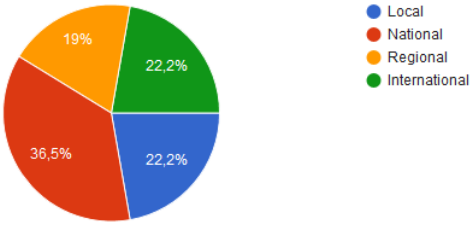
Type of Institution (one option)



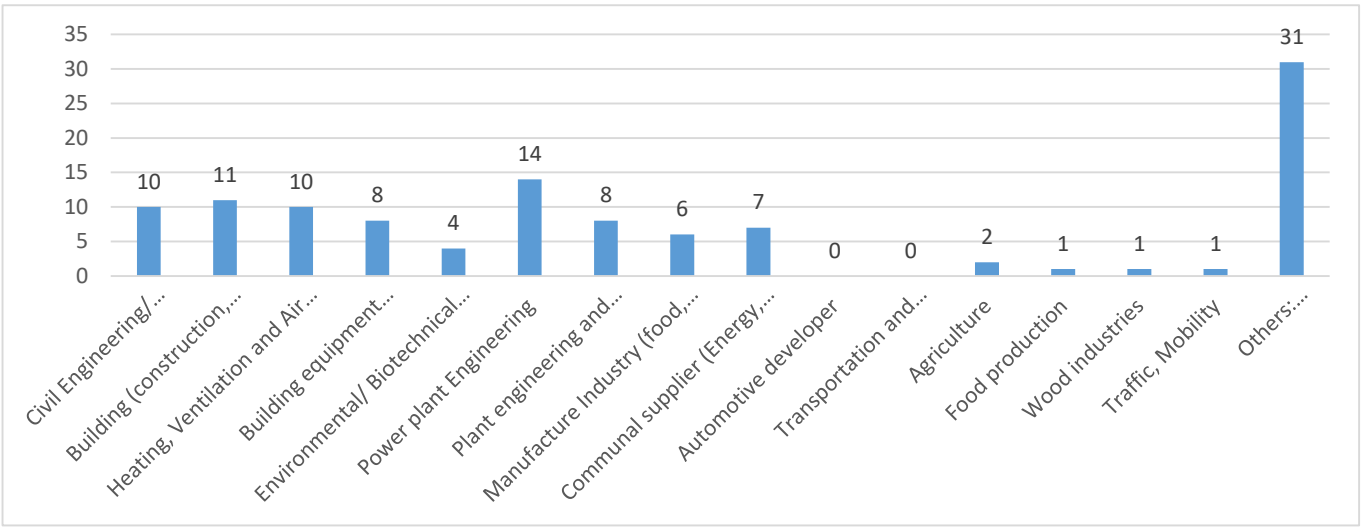
Overall Employees



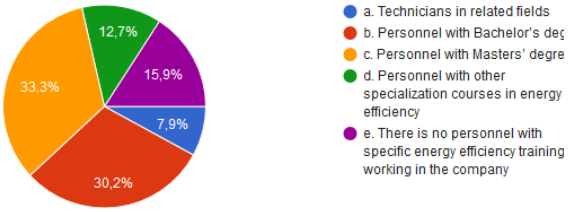
Market



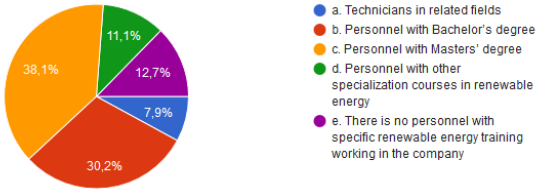
Branches



1.4 Which is the current level of education of employees in Energy Efficiency?

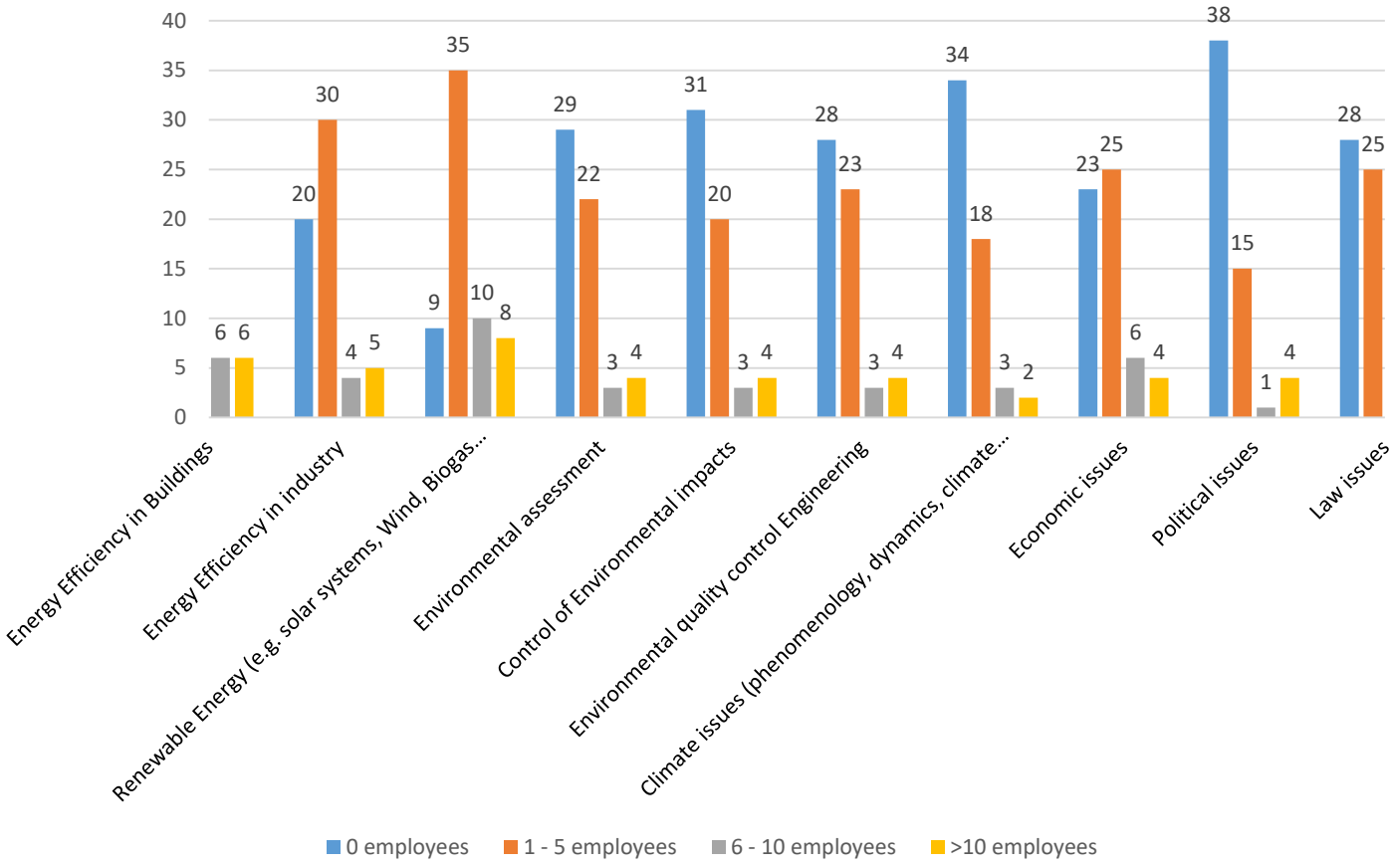


1.3 Which is the current level of education of employees in Renewable Energies?

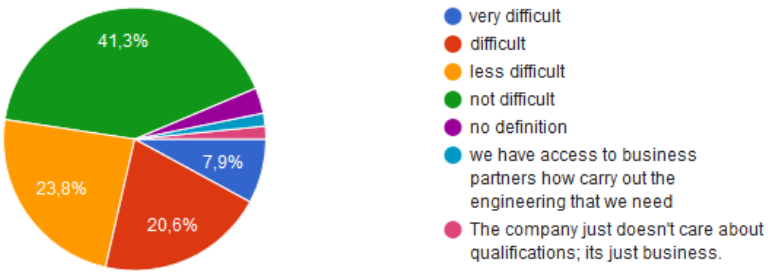


SECTION 2 COMPANY NEEDS

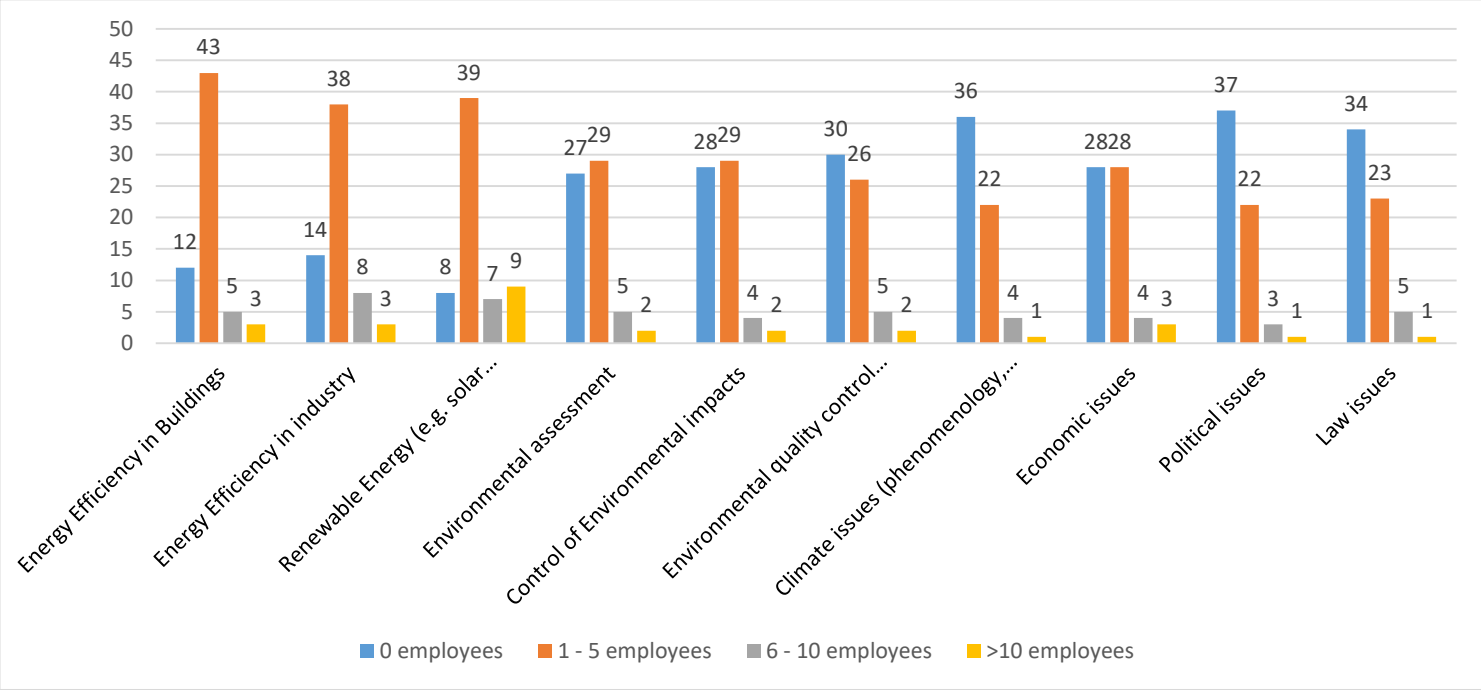
2.1 How many Employees are actually working in your Company/ Institution in the following fields



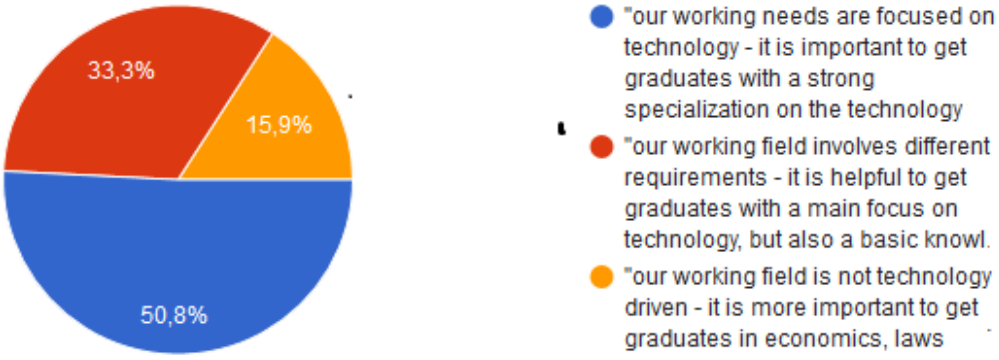
2.2 How difficult is it for your Company/ Institution at the moment to get qualified employees in the specific branches of " Energy Efficiency, Renewable Energy and Environmental Impact"?



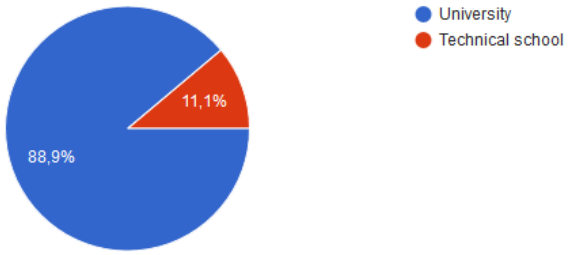
2.3 How many positions are planned to add in the next 5 years with graduates in one of the mentioned fields?



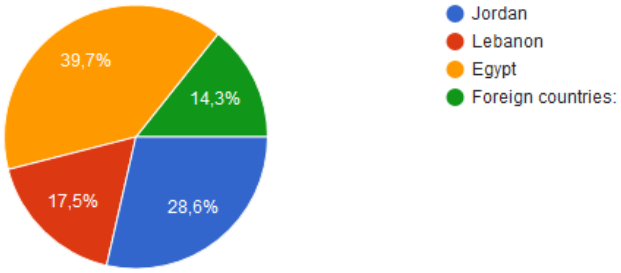
2.4 General employee requirements



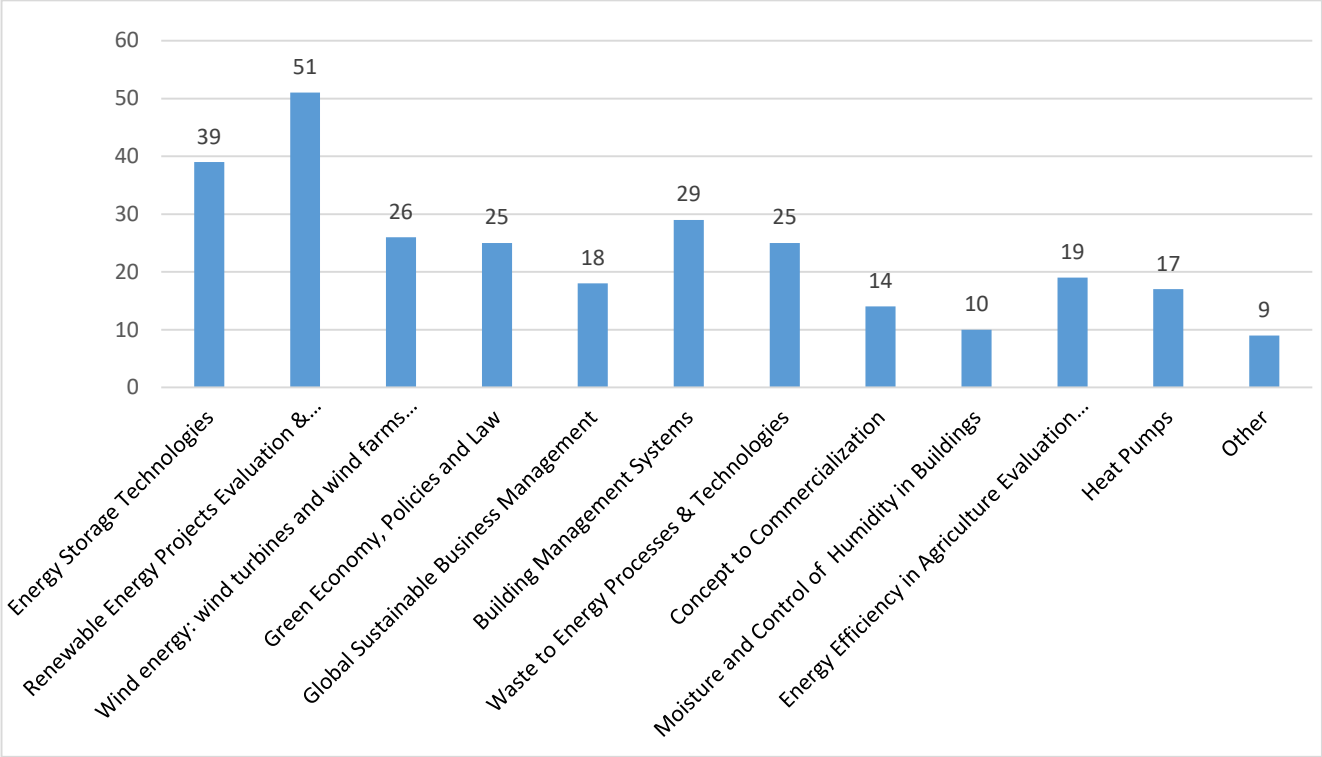
2.5 From which training institutions are your highly qualified employees mainly coming from?



2.6 From which Countries are your highly qualified employees mainly coming from?

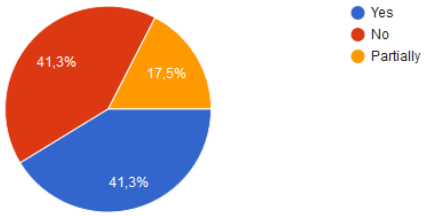


2.7 Which course topics would be more suitable for your staff/company needs?

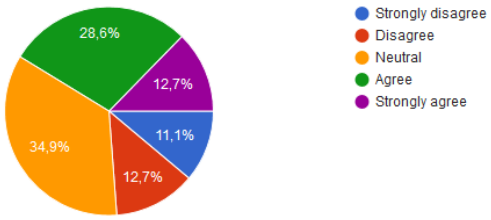


SECTION 3 REGULATORY ASPECTS

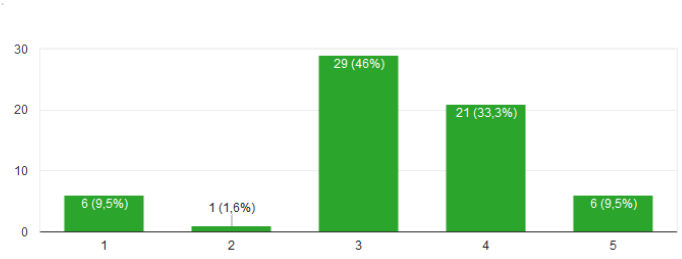
3.1 Do you know the policies and legislations applicable to Renewable technologies in your Country?



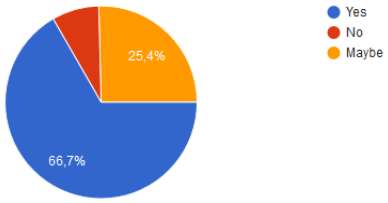
3.2 Do you think that energy international, national and regional strategies fit the real needs of research and industry?



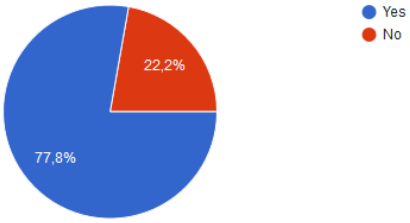
3.3 How relevant are regulatory issues concerning the scientific / technological activity that you carry out?



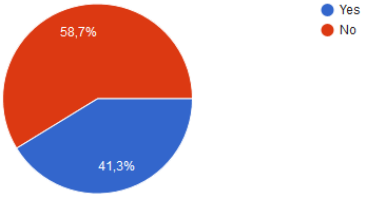
3.4 Does your company/institution take regulatory issues into account?



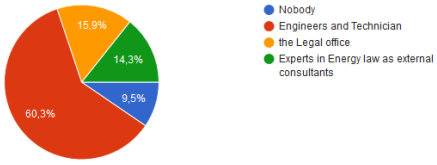
3.5 Do you think national or internal regulation could in any way either promote or hinder the development of new technology solutions?



3.6 During the implementation of your activities, have you had problems related to technical standards or regulation for construction, installation and use of RE technologies? (e.g. rules for permits, construction and testing, analyzes risks, taxation etc.)



3.7 Who usually deal with this kind of regulatory aspects in your company?



3.2 Analysis of the survey on Industry needs in Lebanon

SECTION 1: GENERAL INFORMATION RESULTS

Information about yourself

Current Job Title
BIM manager, Chief MEP, LEED AP , PQP, CEM, PMP
GM and Chief Engineer
Site Manager
Electrical Engineer

Deputy General Manager
COO
Senior Electrical Engineer
Director
Owner
Energy Services Department
Manager
General Manager

Gender		
Answer	Count	Percentage
Male	10	91%
Female	1	9%

Age Group		
Answer	Count	Percentage
21-30	2	18%
31-40	3	27%
41-50	5	45%
Over 60	1	9%

City/ Town		
Answer	Count	Percentage
Beirut	4	37%
Mount Lebanon	4	37%
North Lebanon	1	9%
South Lebanon	1	9%
Beqaa	1	9%

Information about the companies

Name of company/organization
Design and Construction Engineering
Nicolas Electric
EKT Electronics
ISSA ELECTRIC
Benta Power Tech

Earth Technologies
Arina Energy
Contracom International
Manalco
NEEDS
Green Essence Lebanon

Type of Institution		
Answer	Count	Percentage
Engineering Consultant	2	18%
Industrial Production (Energy Systems)	4	36%
Trade Industry	3	27%
Other	2	18%

Overall Employees		
Answer	Count	Percentage
1-5	0	0%
6-10	1	9%
11-20	3	27%
21-50	2	18%
51-100	1	9%
101-200	1	9%
>201	0	0%

Market		
Answer	Count	Percentage
Local	1	9%
National	4	36%
Regional	4	36%
International	2	18%

Which is the current level of education of employees in Renewable Energies?

Answer	Count	Percentage

Technicians in related fields	0	0%
Personnel with Bachelors' degree	4	36%
Personnel with Masters' degree	4	36%
Personnel with other specialization courses in renewable energy	2	18%
There is no personnel with specific renewable energy training working in the company	1	9%

Which is the current level of education of employees in Energy Efficiency?

Answer	Count	Percentage
Technicians in related fields	0	0%
Personnel with Bachelors' degree	4	36%
Personnel with Masters' degree	2	18%
Personnel with other specialization courses in energy efficiency	3	27%
There is no personnel with specific energy efficiency training working in the company	2	18%

SECTION 2: RESULTS OF COMPANY NEEDS

2.1 How many employees are actually working in your company/ institution in the following fields? [Energy Efficiency in Buildings]

	0	1-5 employees	6-10 employees	>10 employees
Energy Efficiency in Buildings	18%	64%	9%	9%
Energy Efficiency in Industry	18%	55%	18%	9%
Renewable Energy (e.g. solar systems, wind, biogas...)	0%	55%	36%	9%
Environmental Assessment	82%	18%	0%	0%
Control of Environmental Impacts	82%	18%	0%	0%
Environmental Quality Control Engineering	82%	18%	0%	0%
Climate Issues (phenomenology, dynamics, climate change, sustainability)	80%	20%	0%	0%
Economic Issues	55%	45%	0%	0%
Political Issues	73%	27%	0%	0%
Law Issues	82%	18%	0%	0%

2.2 How difficult is it for your company/institution at the moment to get qualified employees in the specific branches of 'Energy Efficiency, Renewable Energy and Environmental Impact?'

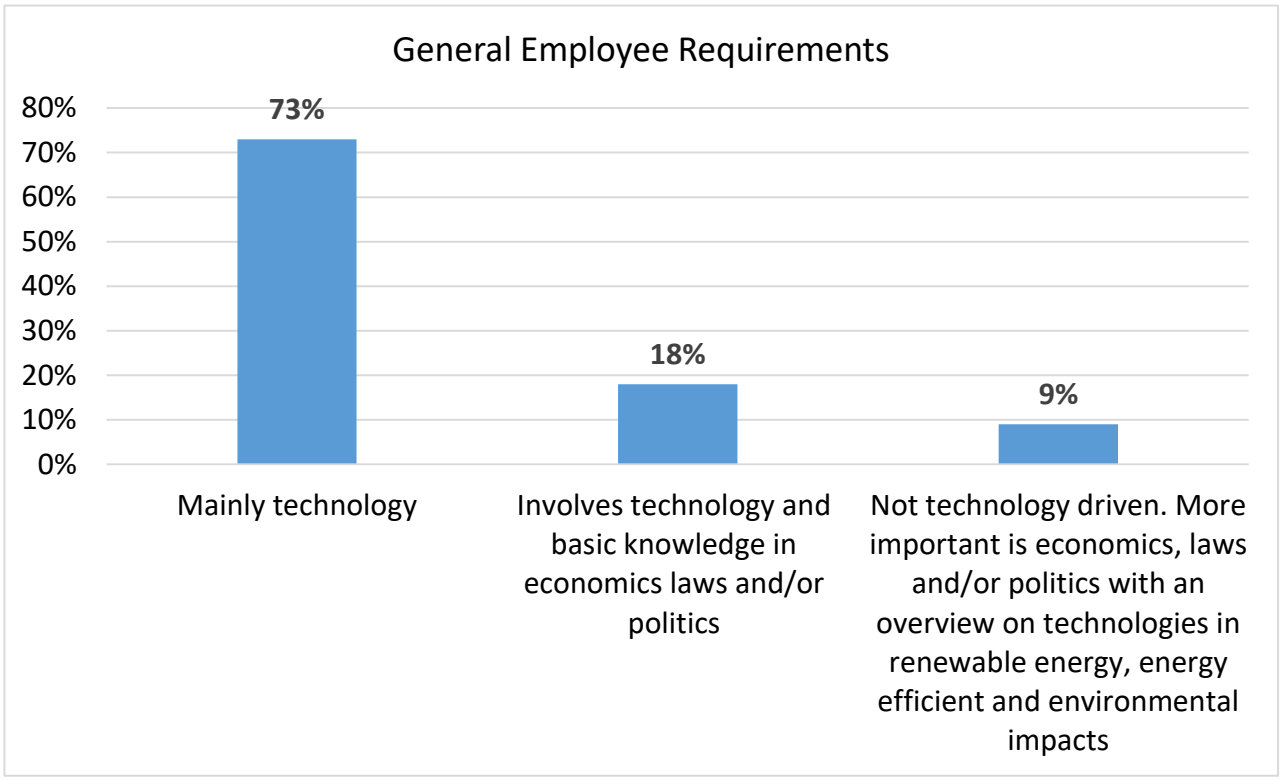
Answer	Count	Percentage
Very Difficult	0	0%
Difficult	2	18%
Less Difficult	5	45%
Not Difficult	4	36%
No Definition	0	0%

2.3 How many positions are planned to add in the next 5 years with graduates in one of the mentioned fields?

	0	1-5 employees	6-10 employees	>10 employees
Energy Efficiency in Buildings	0%	82%	18%	0%
Energy Efficiency in Industry	0%	64%	27%	9%
Renewable Energy (e.g. solar systems, wind, biogas...)	0%	64%	9%	27%
Environmental Assessment	45%	36%	9%	0%
Control of Environmental Impacts	55%	36%	9%	0%
Environmental Quality Control Engineering	64%	27%	9%	0%
Climate Issues (phenomenology, dynamics, climate change, sustainability)	64%	27%	9%	0%
Economic Issues	64%	27%	9%	0%
Political Issues	82%	9%	9%	0%
Law Issues	82%	9%	9%	0%

2.4 General Employee Requirements

Answer	Count	Percentage
Our working needs are focused on technology - it is important to get graduates with a strong specialization on the technology field"	8	73%
Our working field involves different requirements - it is helpful to get graduates with a main focus on technology, but also a basic knowledge in economics laws and/or politics	2	18%
Our working field is not technology driven - it is more important to get graduates in economics, laws and/or politics with an overview on technologies in Renewable energy, Energy Efficiency and Environmental Impacts	1	9%



2.5 From which training Institutions are your highly qualified employees mainly coming from?

Answer	Count	Percentage
University	11	100%
Technical School	0	0%

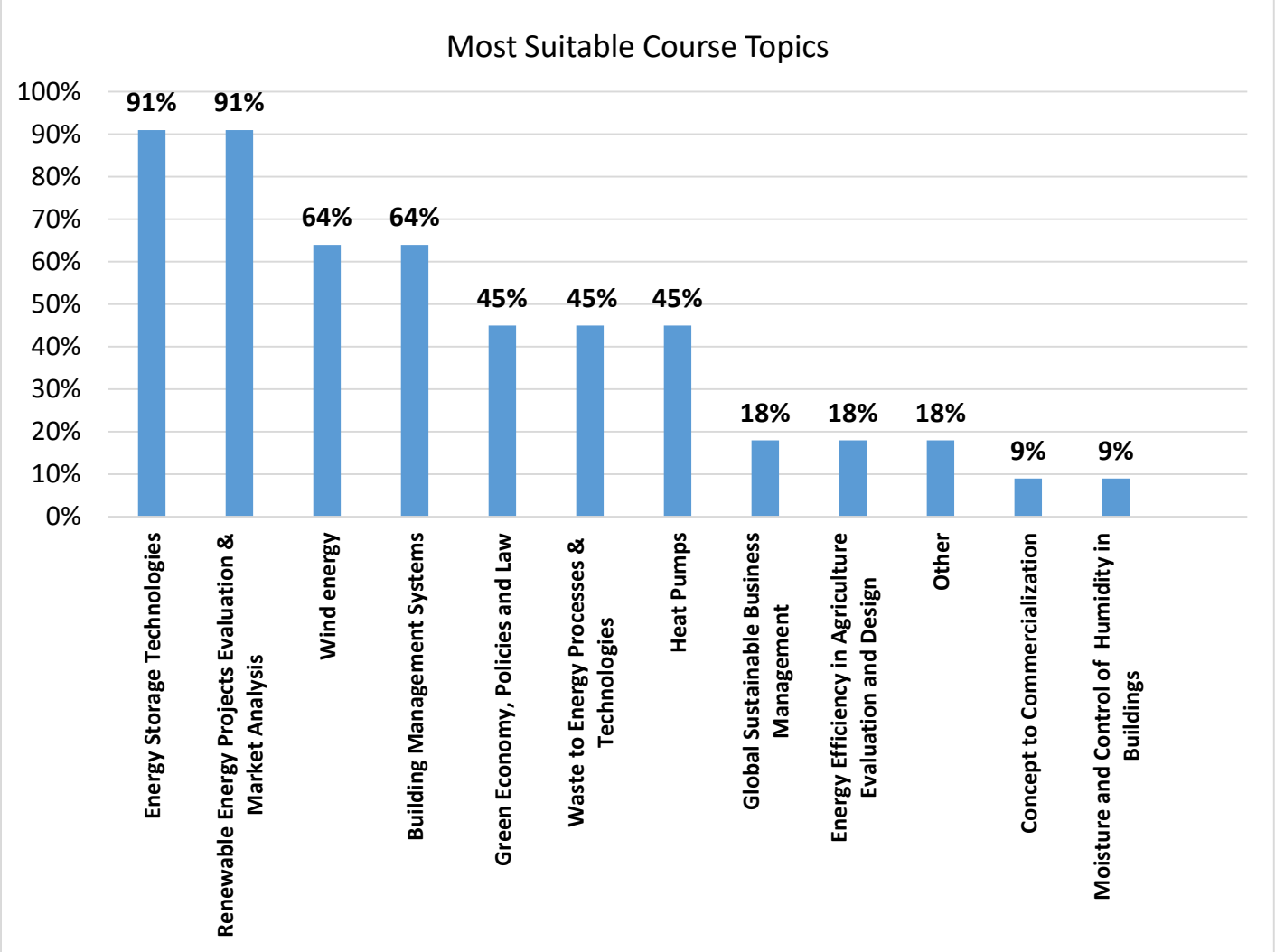
2.6 From which countries are your highly qualified employees mainly coming from?

Answer	Count	Percentage
Lebanon	11	100%

2.7 Which course topics would be more suitable for your staff/company needs?

Answer	Count	Percentage
Energy Storage Technologies	10	91%
Renewable Energy Projects Evaluation & Market Analysis	10	91%
Wind energy: wind turbines and wind farms and siting	7	64%
Green Economy, Policies and Law	5	45%
Global Sustainable Business Management	2	18%
Building Management Systems	7	64%
Waste to Energy Processes & Technologies	5	45%
Concept to Commercialization	1	9%
Moisture and Control of Humidity in Buildings	1	9%
Energy Efficiency in Agriculture Evaluation and Design	2	18%
Heat Pumps	5	45%
Other	2	18%

SECTION 3: RESULTS OF REGULATORY ASPECTS



3.1 Do you know the policies and legislations applicable to renewable technologies in your country?

Answer	Count	Percentage
Yes	7	64%
No	3	27%
Partially	1	9%

If 'Yes' or 'Partially', please list the most important ones

Answer	Count	Percentage
Net metering	5	45%
NEEREA	4	36%
Supported Loans	3	27%
Environmental Impact	1	9%
No customs	1	9%
PPA law which awaits the regulatory authority	1	9%
Green building classification	1	9%

Various opinions on the most important policies and legislations were submitted but overall the most important policies are net metering and NEEREA followed by supported loans and finally environmental impact, no customs, PPA law, and green building classification.

3.2 Do you think that energy international, national and regional strategies fit the real needs of research and industry?

Answer	Count	Percentage
Strongly Disagree	1	9%
Disagree	1	9%
Neutral	5	45%
Agree	4	36%
Strongly Agree	0	0%

3.3 How relevant are regulatory issues concerning the scientific / technological activity that you carry out? (1= Not relevant at all and 5= Very relevant)

Answer	Count	Percentage
1	1	9%
2	0	0%
3	4	36%
4	4	36%
5	2	18%

3.4 Does your company/institution take regulatory issues into account?

Answer	Count	Percentage
Yes	9	82%
No	2	18%

3.5 Do you think national or internal regulation could in any way either promote or hinder the development of new technology solutions?

Answer	Count	Percentage
Yes	11	100%
No	0	0%

If you answered 'Yes', please explain how; if you answered 'No', please explain why:

For sure yes, if there is any regulation so sure the client will obligatory to use new technology solutions because usually the client don't want to pay more
The regulation will help in expanding the knowledge needed in our country with everything that concerns with power consumption guidance thus new technology solutions field will increase in terms of new projects and raise the awareness in decreasing the pollution rates
for facility and approval
Internal regulation definitely affects the development of new solutions, example The net metering (if there is reliable power grid in Lebanon) will be very attractive for people to install RE solutions. Also the development of electric vehicles without proper regulation, this new technology might not be able to be properly promoted.
Regulations should encourage the use and installing of renewable energy systems. For example, make it easier to use roofs for RE systems
Regulation is the first way forward for any new technology
more incentives from the government for renewable and clean energy
Example: Forbidding by law the import / installation of incandescent bulbs in Lebanon helped save energy and promote the EE and RE trades
By taking into consideration all the complications in the implementation of new technologies and different standards set by the governments.
National regulation could promote the development of new technology solutions by decreasing prices (less taxes and Duane) on the related products
Subsidies and support from governments encourage people and businesses to be involved in this domain

3.6 During the implementation of your activities, have you had problems related to technical standards or regulation for construction, installation and use of RE Technologies? (E.g. rules for permits, construction and testing, analyzes risks, taxation etc.)

Answer	Count	Percentage
Yes	5	45%
No	6	55%

If 'Yes', please explain what kind of problem.

Usually no
Permits for installing solar panels on rooftops
No have
No
There is no licensing for using the roof of a building for a PV system which causes Internal Security Forces intervention from time to time
No
Laws for utility scale wind projects, grid code for solar projects
PV mounting structures should be exempted from Building Permits.
No
No problem
Regulatory: PV Panels not allowed to be installed on high level with a clearance beneath them. If it was allowed, customers will make better use of this space. Also some of the inverters don't meet the national THD requirements so other inverters had to be chosen.

Please mention at least one obstacle and one advantage resulting from legislation.

One obstacle if it is very hard to achieve (very strict), one advantage it promote to spread the Energy efficiency and renewable energy knowledge
The advantages of such permits will increase the number of households or companies that have a will in installing renewable energy systems
No have
Advantage: Allows the promotion of the RE in a clear standard, and uniform manner throughout the country.
Advantage is the financial support for RE system
Import duties
Political debates, advantage could be on the economy and environment
Obstacle: the long lead time needed for the approval of NEEREA Loans.
No
One obstacle is increasing processes time and one advantage is respecting the rules

The advantage is with the subsidized loan from the Central Bank of Liban. When it stopped for several months, people couldn't pay for the projects anymore.

3.7 Who usually deals with this kind of regulatory aspects in your company?

Answer	Count	Percentage
The Legal Office	5	45%
Engineers and Technicians	5	45%
Experts in Energy law as external consultants	1	9%

3.2 Analysis of the survey on Industry needs in Jordan

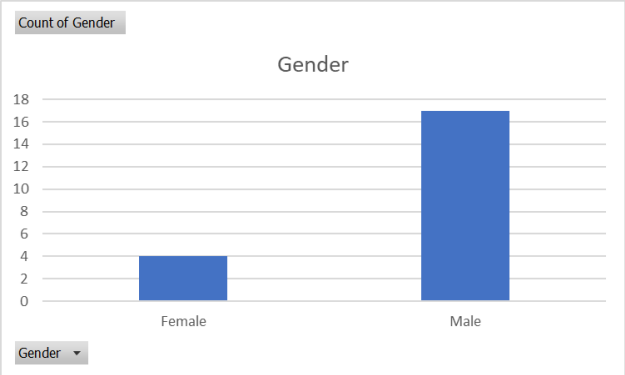


Figure 2: Gender of Contact Person

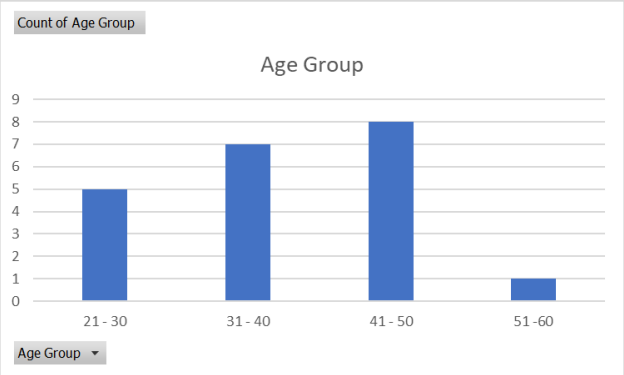


Figure 2: Contact Person Age Group

Company Profiles:

The vast majority of facilities are in Amman As Amman has 2/3 of the total industrial facilities in Jordan. Next comes Zarqa and then Irbid closely behind. Facilities are mostly local and national. Few facilities expand to the gulf. And those who do often also expand internationally

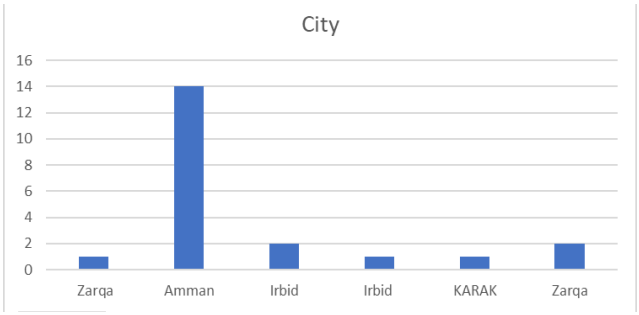


Figure 4: Facility location

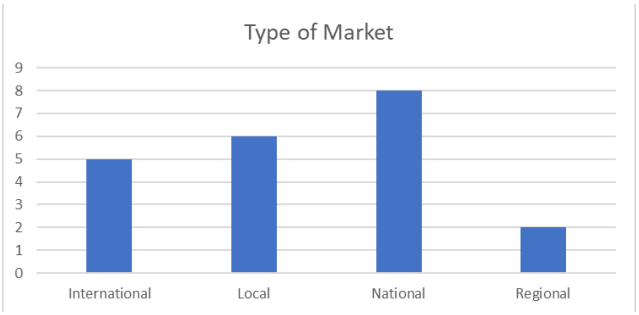


Figure 4: Market Domain

About half of the surveyed facilities are big companies employing more than 200 employee, other surveyed facilities varied from small to medium enterprises, this make since because Heba project seeks the point of view of the industrial employers.

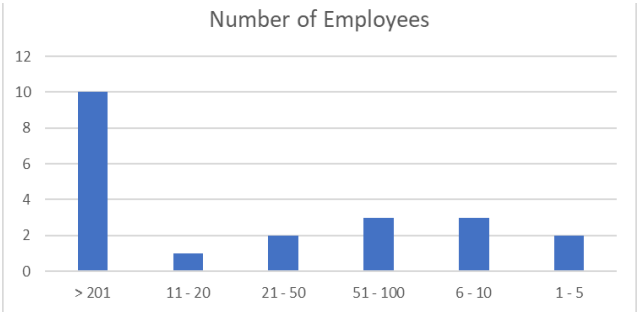


Figure 5: Facility Size

Companies commonly have 1 – 5 employees working on Energy Efficiency in Buildings with a similar number of positions planned. Many facilities don't have emplyees working on this and many don't plan to.

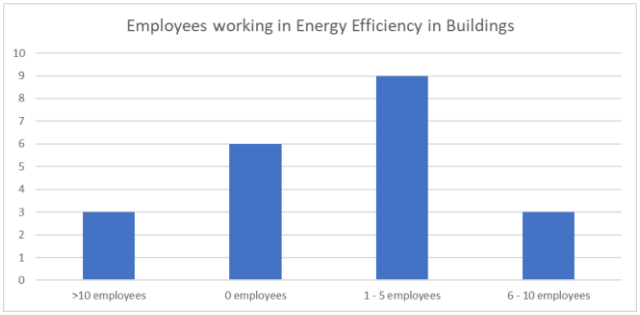


Figure 7: Current Employees - Energy Efficiency in Buildings

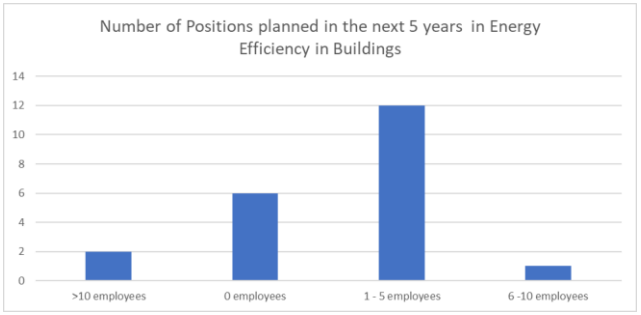


Figure 7: Planned Positions - Energy Efficiency in Buildings

Most companies have no employees working on Industrial Energy Efficiency, but many plan to have 1 – 5 employees in the near future. None of the facilities surveyed reported more than 5 current employees

Most facilities have little to no investment in environmental positions. This is due to lack of legal

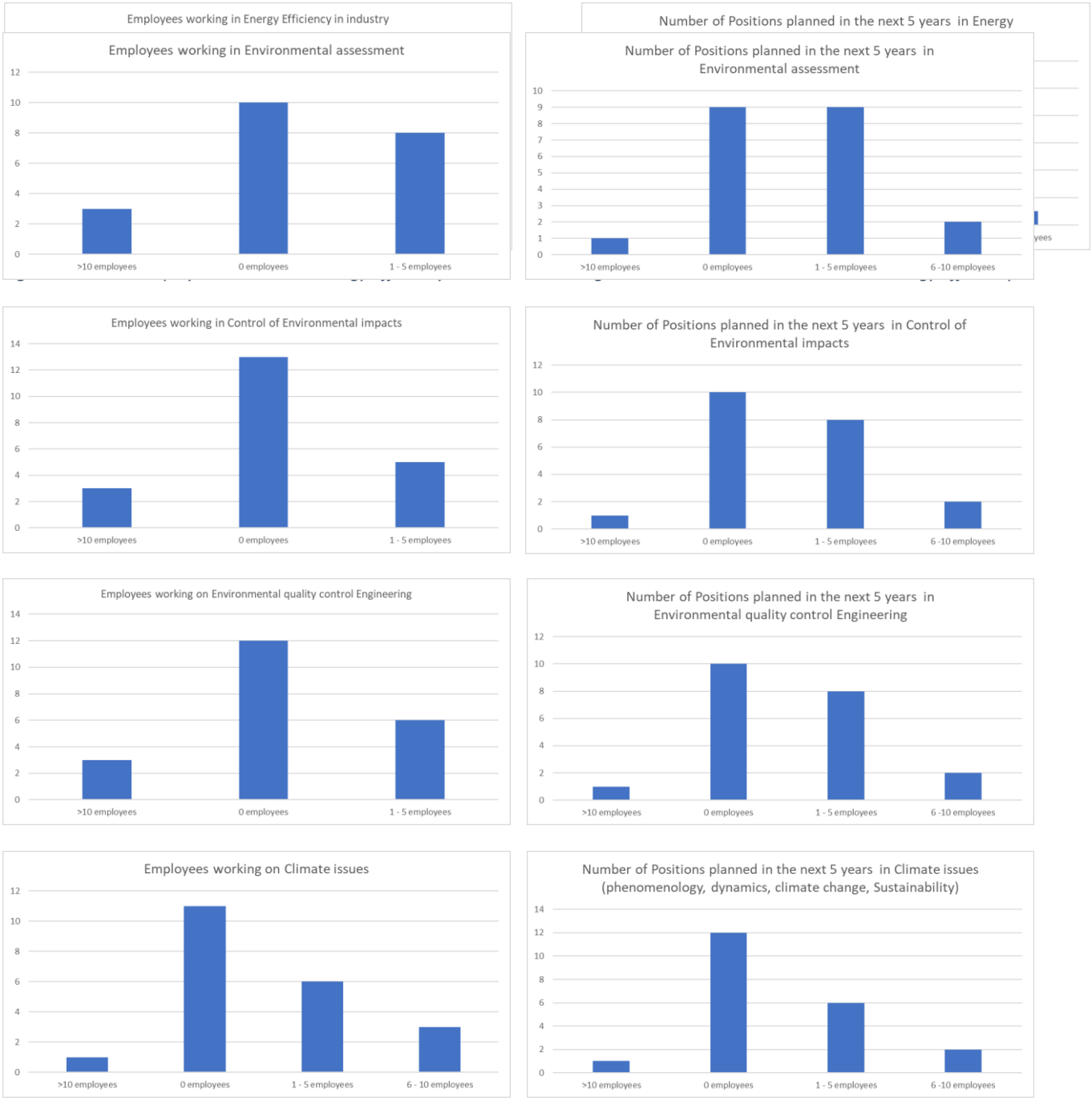


Figure 10: Employees and positions planned related to climate and invironment issues

enforcement and to local facilities not seeing the return on investment on environment care.

Most companies have few employees working on renewable energy and plan to have more in the near future with some companies reporting more than 10 current employees/planned positions. Renewable energy has been trending in Jordan now for several years so far. This is why it receives more attention than energy efficiency.

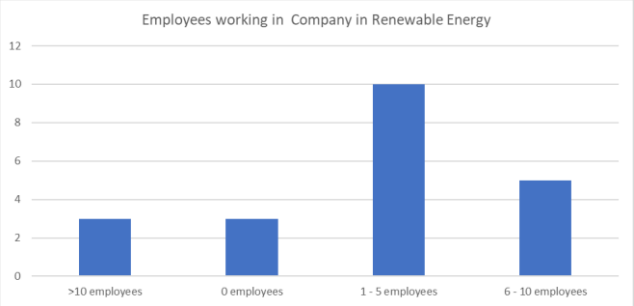


Figure 13: Current Employees - Renewable Energy

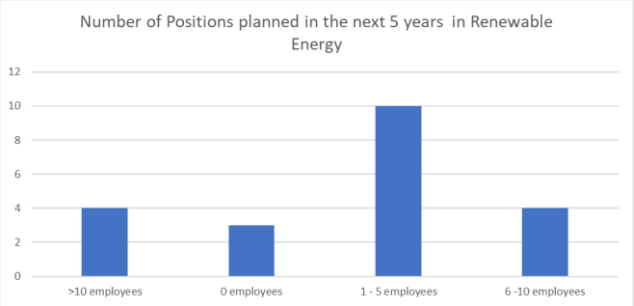


Figure 13: Planned Positions - Renewable Energy

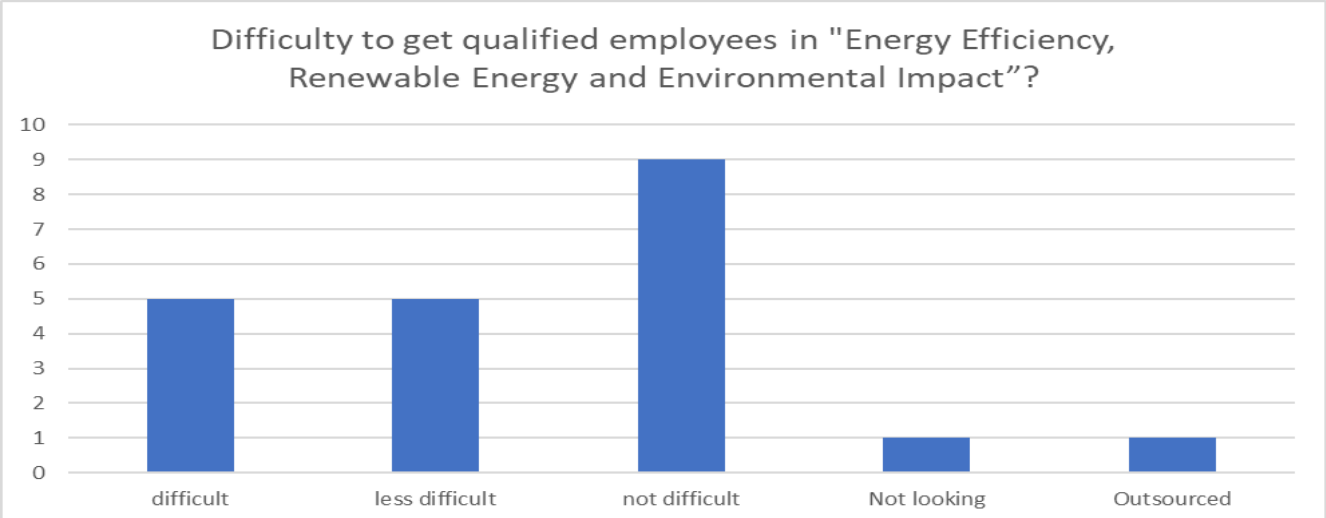


Figure 11: Difficulty and interest in specialized employees

Some companies do report some difficulty in sourcing talent in the fields of Energy Efficiency, Renewable Energy and Environmental Impact. While the majority report no problems faced.

Companies have shown little interest in Economic, Political and Law issues showing a focus on technical aspects on their fields.

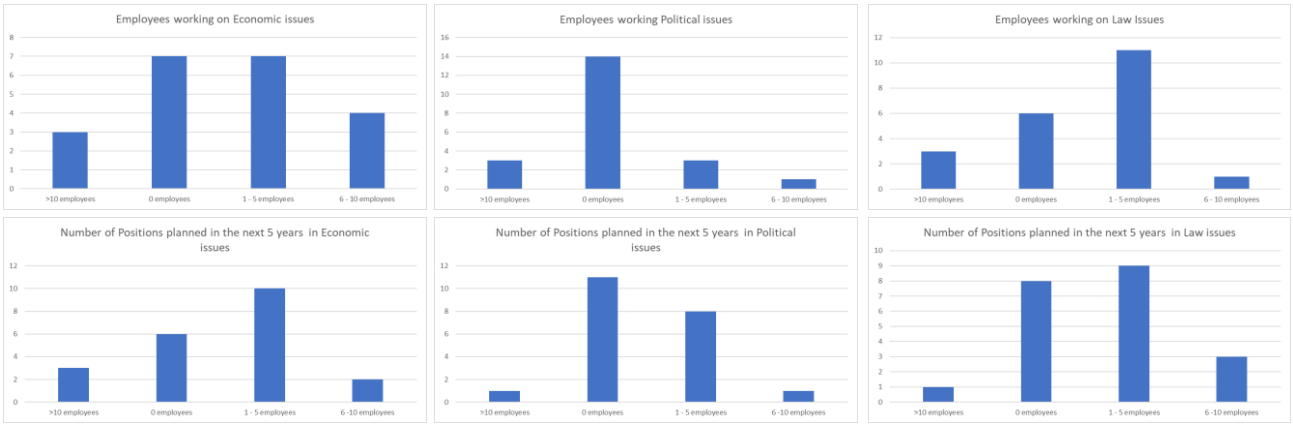


Figure 14: Interest in Economic, Political and Law issues

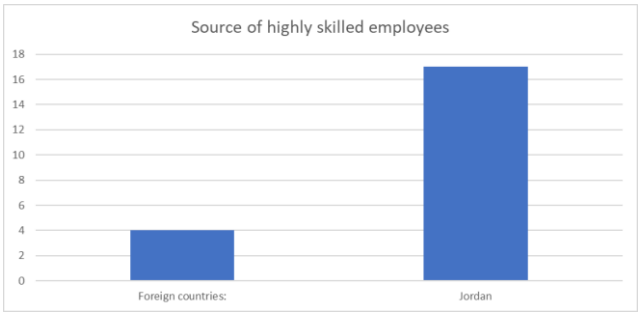


Figure 15: Source of highly Skilled Employees

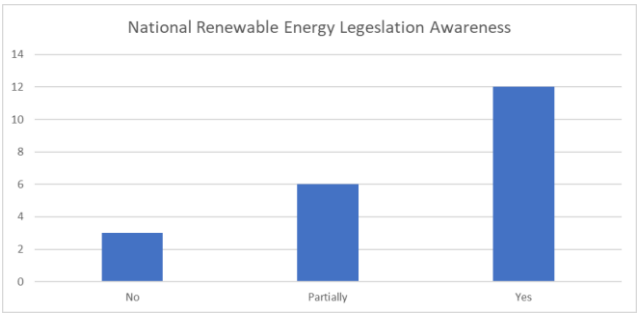
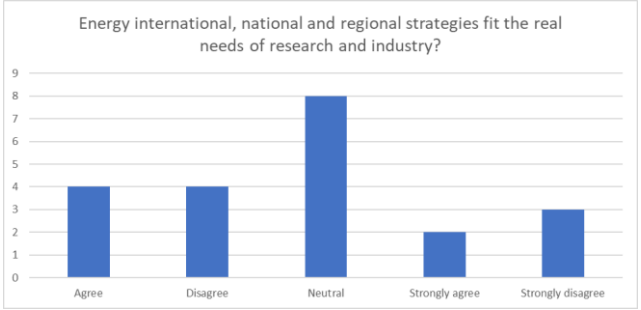


Figure 16: Legislation Awareness

As shown in Figure 15, most facilities (81%) source their employees from within Jordan. About half of facility contact persons reported good knowledge of the local and international Renewable Energy Laws with about 15% denied such knowledge and the rest reporting partial knowledge of legislations.



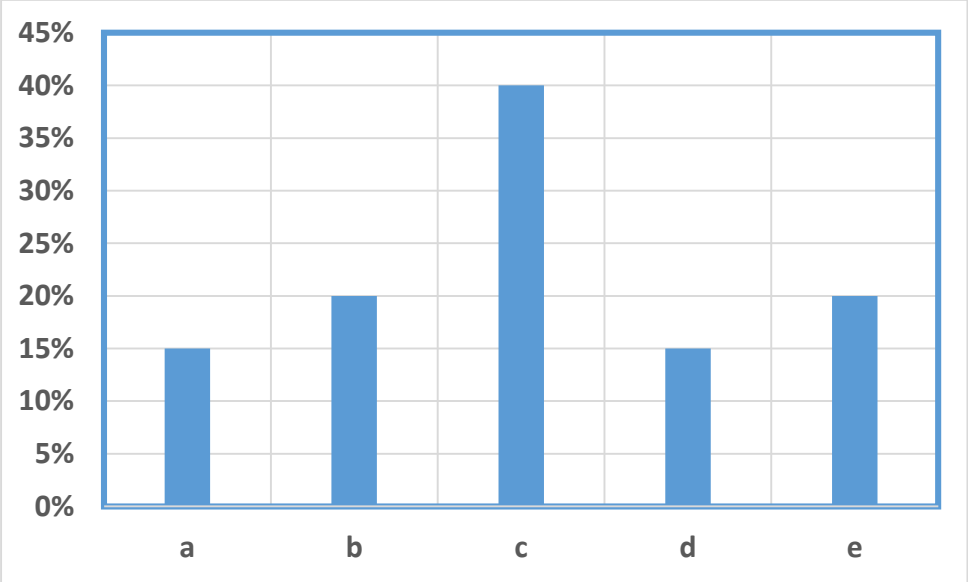
3.3 Analysis of Survey on Industry needs in Egypt

General information

The majority of companies/organizations who participated in the survey are dealing with national market. Only about 20% of the companies have international activities. The number of employees in the governmental organizations is high, exceeds 200 employees, as compared to private companies with less than 50 employees. Also universities, represent a major percentage of survey participants.

Current level of education of employees in Renewable Energies

Analysis of current level of education in renewable energies fields is shown in Fig. 2.1. The majority of personnel specialized in renewable energy have or working on their master degree. The analysis shows that renewable energy education is of interest at high level postgraduate programs. This represents a sort of an inverted triangle and draws the attention to the necessity to direct more efforts to increase renewable energy education at both the Bachelor`s and technical level.

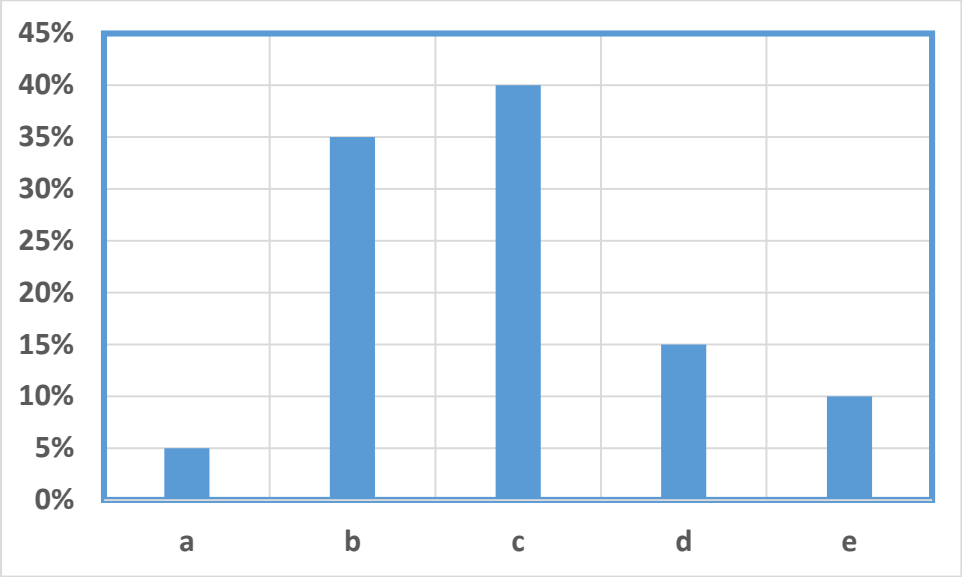


a. Technicians in related fields
b. Personnel with Bachelor's degree
c. Personnel with Masters' degree
d. Personnel with other specialization courses in renewable energy
e. There is no personnel with specific renewable energy training

Figure 2.1: Analysis of current level of education in renewable energies

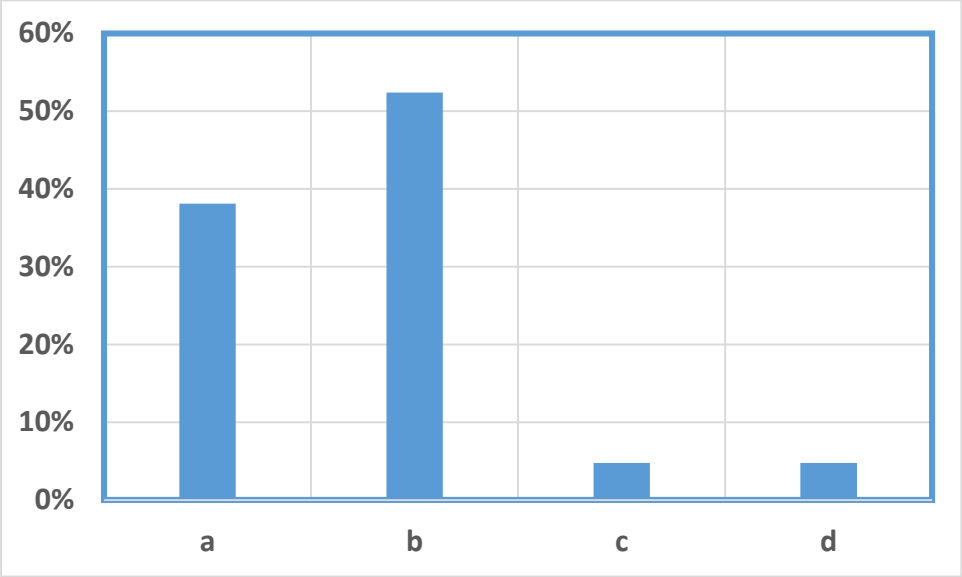
Current level of education of employees in Energy Efficiency

Analysis of current level of education in energy efficiency fields is shown in Fig. 2.2. The results of this analysis again confirms the necessity to direct more efforts to increase energy efficiency education materials at both the Bachelor`s and technical level. Also, it should be noted that, this analysis results do not give an idea about the type and level and adequacy of skills and knowledge adopted by the existing education programs.



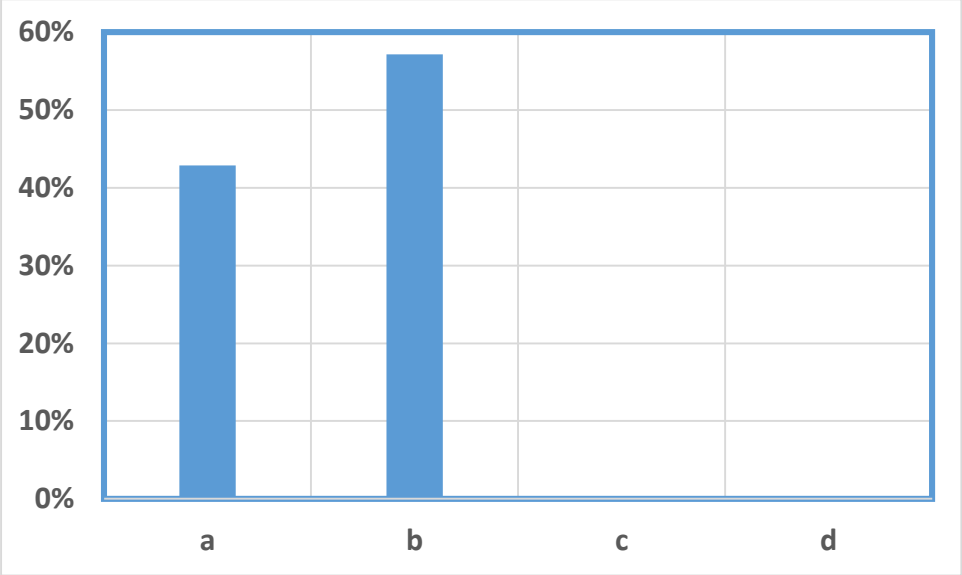
a. Technicians in related fields
b. Personnel with Bachelor's degree
c. Personnel with Masters' degree
d. Personnel with other specialization courses in energy efficiency
e. There is no personnel with specific energy efficiency training
Figure 2.2: Analysis of current level of education in energy efficiency

Company needs
Classification of actual working employees
This survey section is devoted to classify the number of employees working in renewable energy, energy efficiency, and other related fields. These fields include energy efficiency in buildings, energy efficiency in industry, renewable Energy, environmental assessment, control of environmental impacts, environmental quality control Engineering, climate issues, economic issues, political issues, and law issues. The survey results are shown in Figs 2.3 to 2.12. In view of the large number of employees of each organization, it has been observed that the number of employees working in these critical fields is very few. More than 35% of organization do not have specialized employees in energy efficiency in buildings and industry.



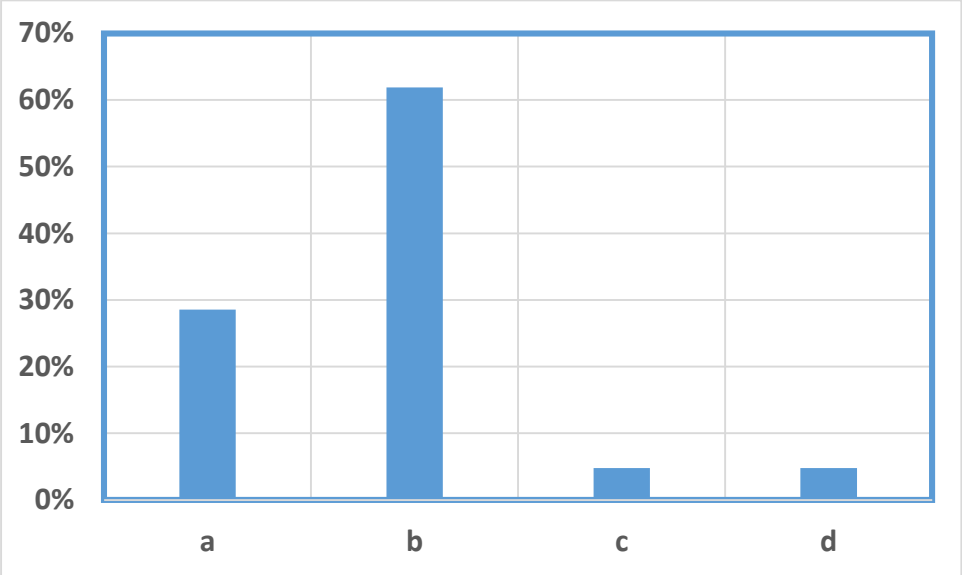
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.3: Classification of number of employees working in energy efficiency in buildings



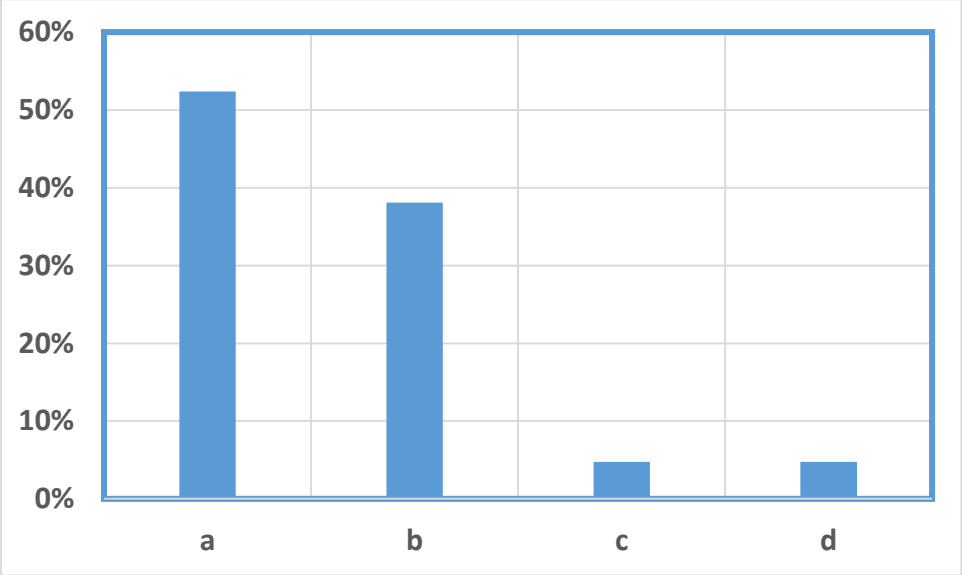
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.4: Classification of number of employees working in energy efficiency in industry



(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

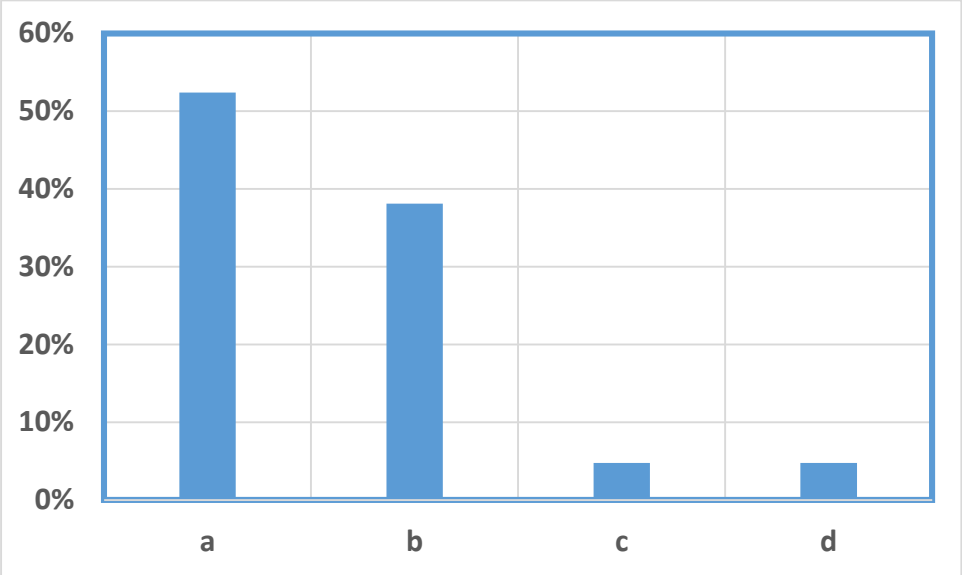
Figure 2.5: Classification of number of employees working in renewable energy



(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

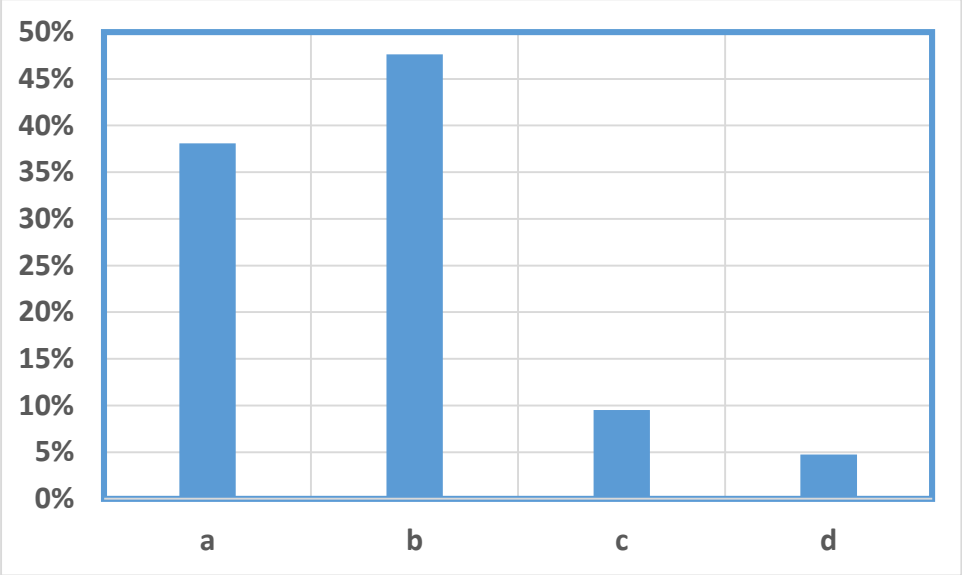
Figure 2.6: Classification of number of employees working in environmental assessment

The percentage of organizations that do not have employees working in the field of environmental assessment, impacts, climate issues, economic issues, and law issues is very high and exceeds about 50% of organizations. This highlights the need to equip graduates with knowledge and skills required to work and manage these important issues in buildings and industrial organizations.



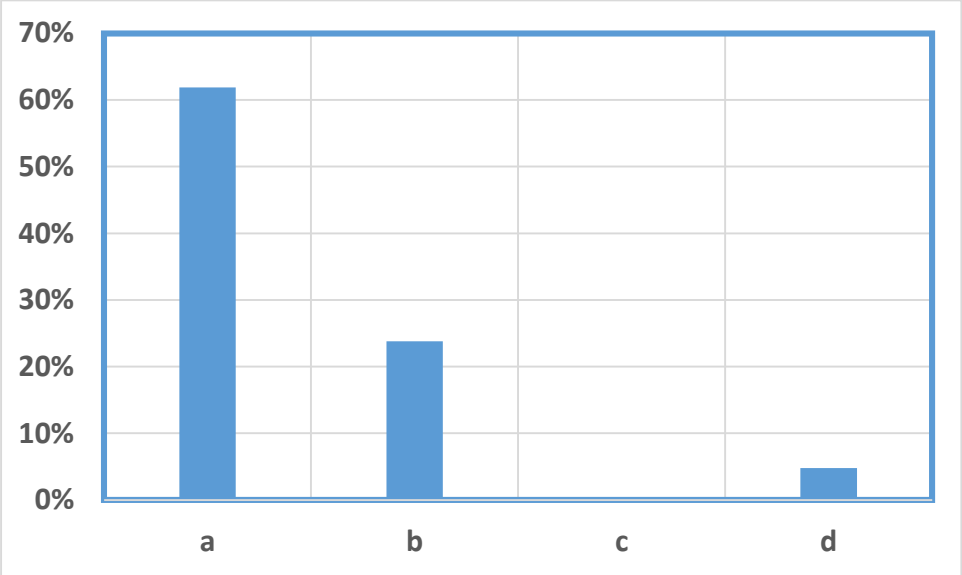
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.7: Classification of number of employees working in control of environmental impacts



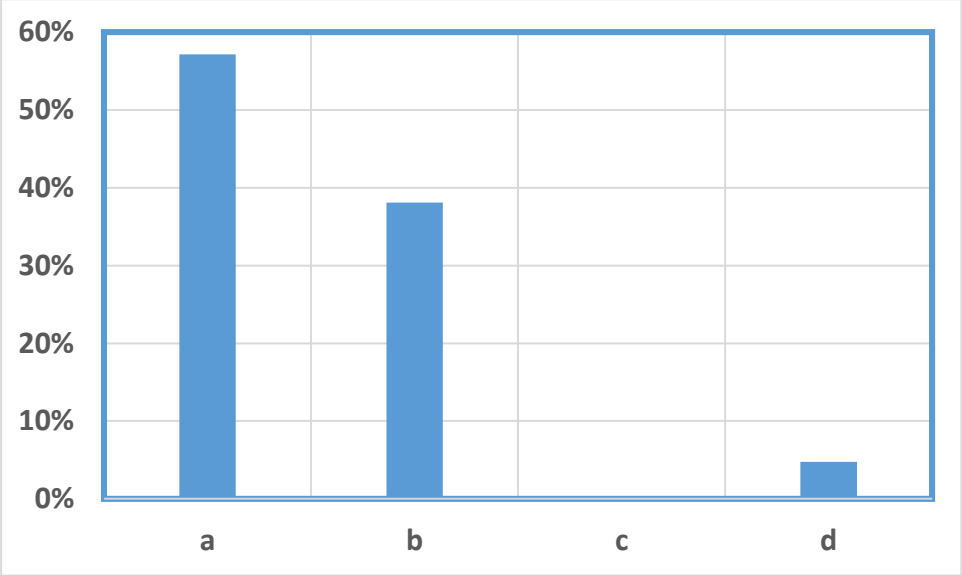
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.8: Classification of number of employees working in environmental quality control engineering



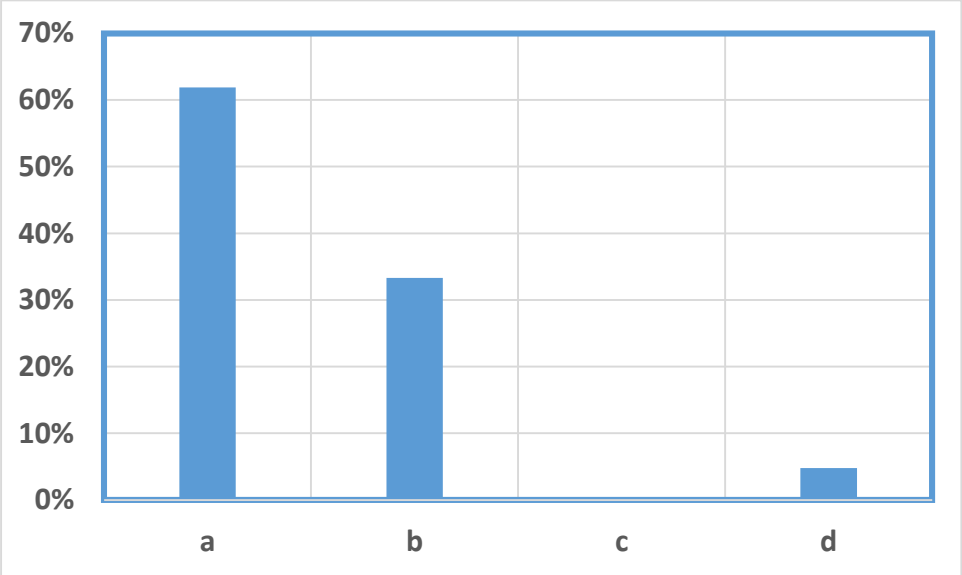
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.9: Classification of number of employees working in climate issues



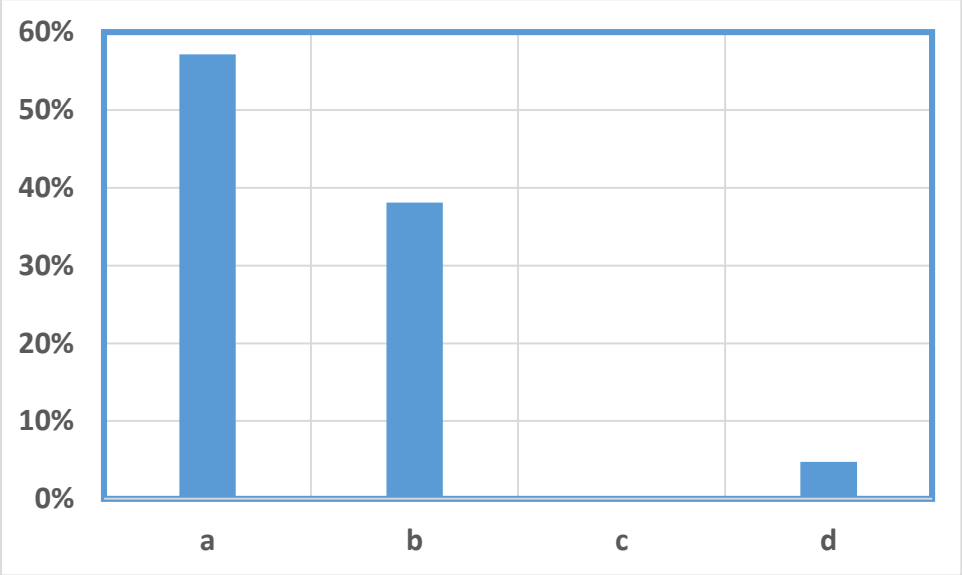
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.10: Classification of number of employees working in economic issues



(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.11: Classification of number of employees working in political issues

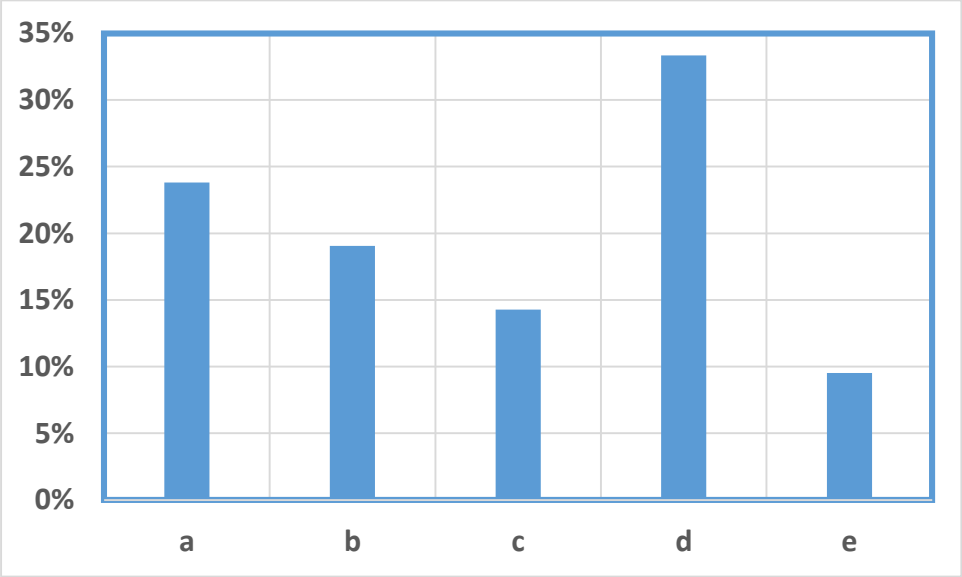


(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.12: Classification of number of employees working in law issues

Difficulty to get qualified employees in the specific branches of energy efficiency, renewable energy and environmental impact

The results of survey analysis concerning the difficulty of getting qualified employees in the field energy efficiency, renewable energy, and environmental impact are shown in Fig. 2.13. More than 60% of the organizations find difficulty in obtaining qualified employees in these fields.

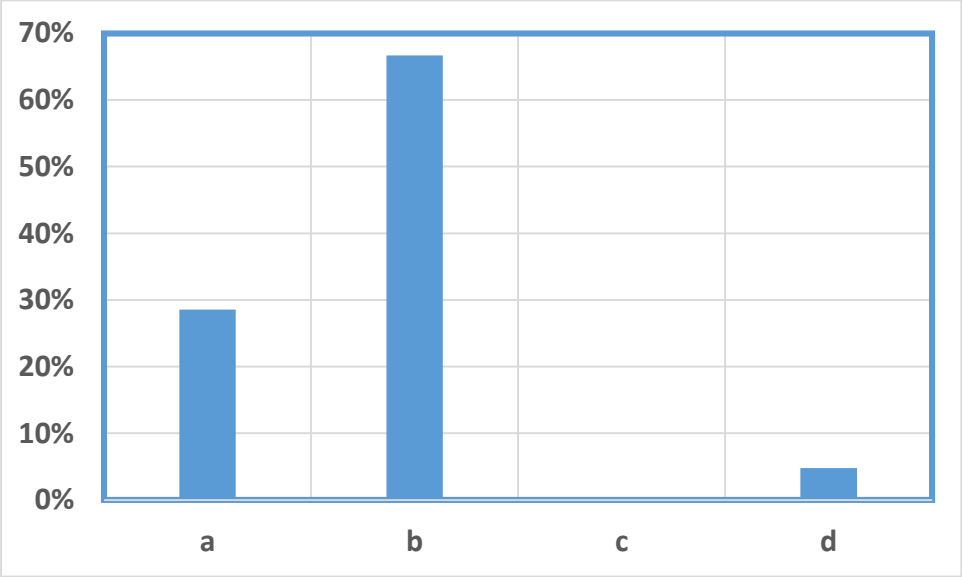


(a) Very difficult, (b) difficult, (c) less difficult, (d) not difficult, (e) no definition

Figure 2.13: Difficulty in getting qualified employees

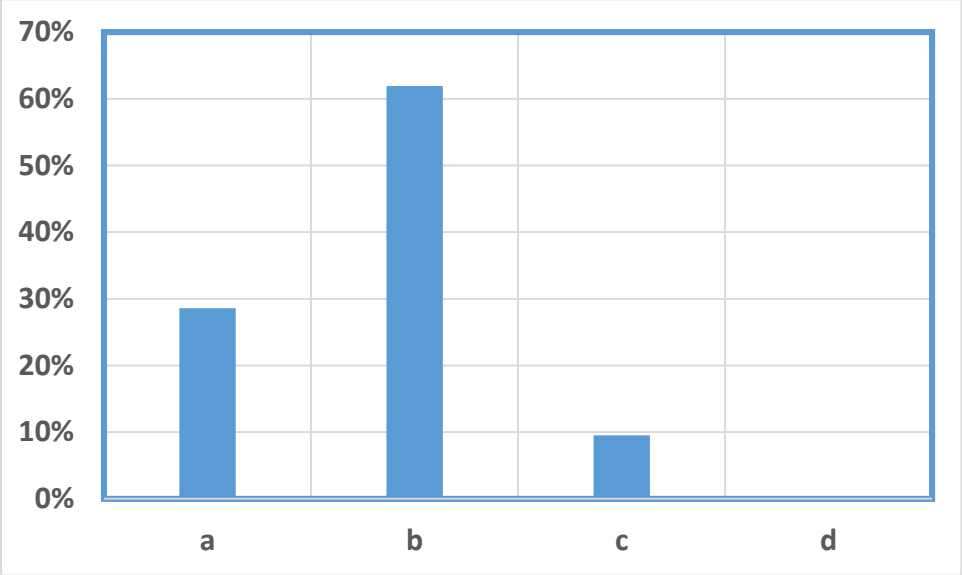
Planned positions in the next five years

The survey results of planned positions in the next five years are shown in Figs. 2.14 to 2.23. The results show that about 65 to 70 % of organizations are planning to employ 1 to 5 graduates in the field of energy efficiency in buildings, industry, and renewable energy. This percentage is relatively small and reaches about 40 to 50% as it concerns environmental assessment, control of environmental impacts, and environmental quality control engineering. This reflects the impression that the interest of these organizations is more oriented to conserve energy and use renewable energy driven by their economic advantages with relatively little concern about their environmental benefits and sustainability. More awareness should be directed to correct this understanding. The planned position in economic, policy and law issues are much smaller. Only about 30% of the organizations are planning to employ employees to deal with the policy, economic, and law issues. This percentage is logic when compared with the required number of technical personnel.



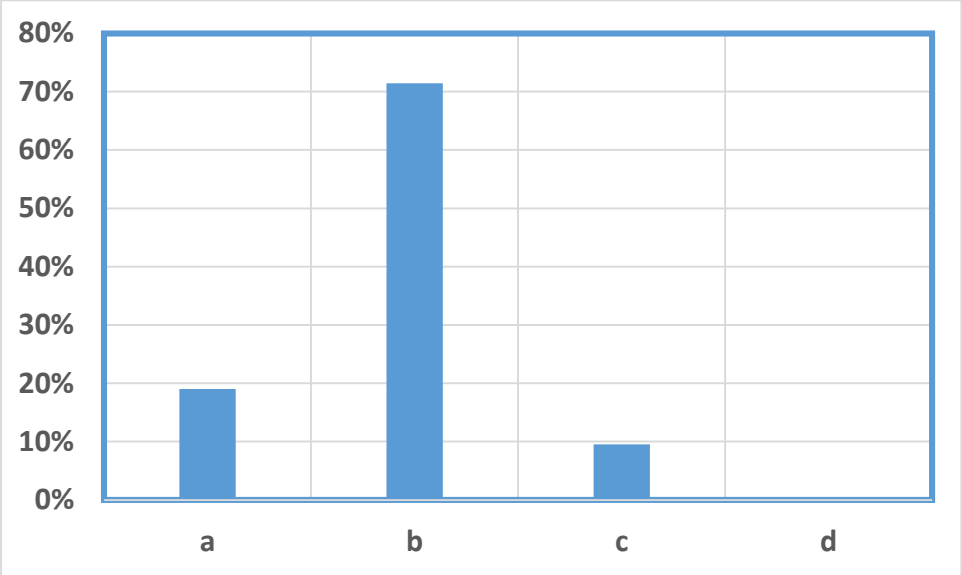
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.14: Planned positions in the next 5 years in the field of energy efficiency in buildings



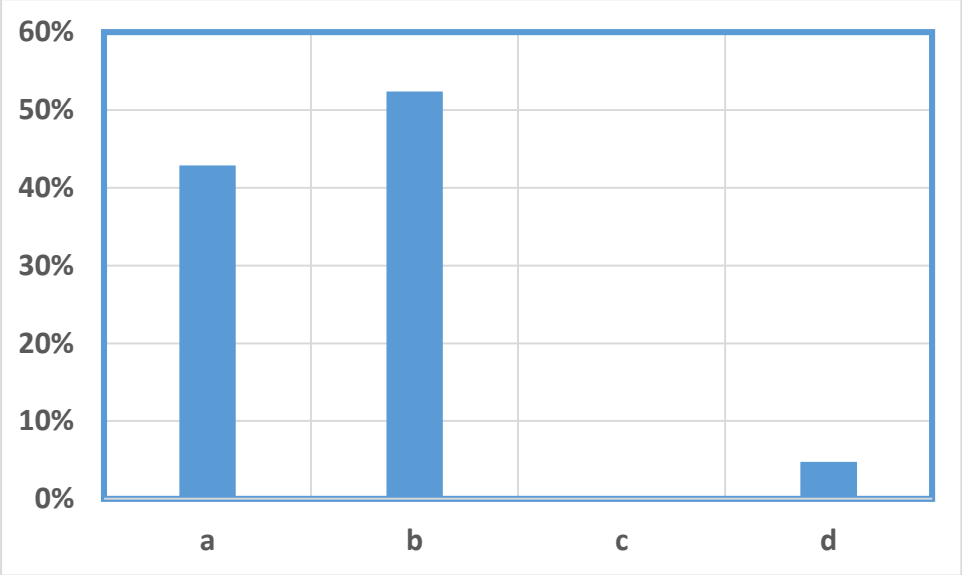
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.15: Planned positions in the next 5 years in the field of energy efficiency in industry



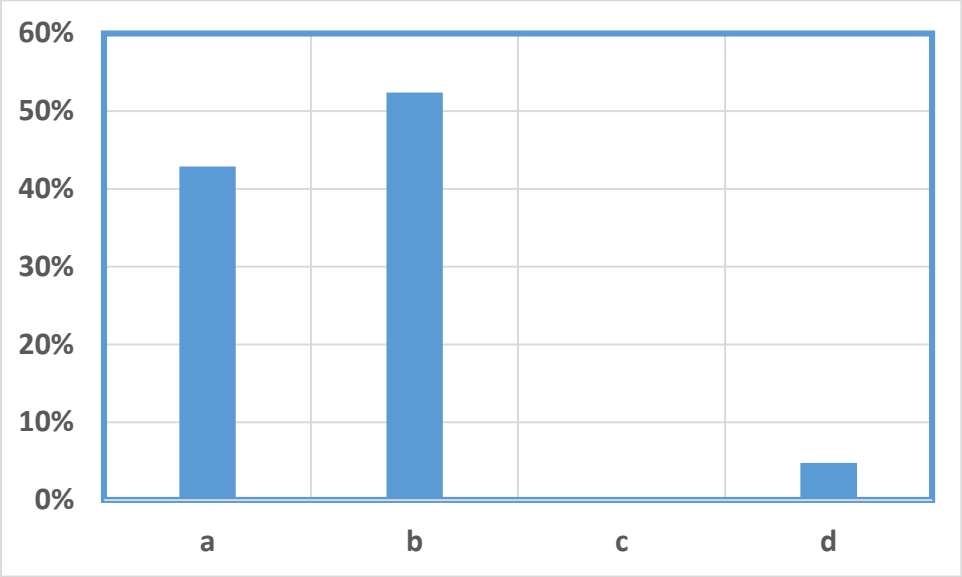
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.16: Planned positions in the next 5 years in the field of renewable energy



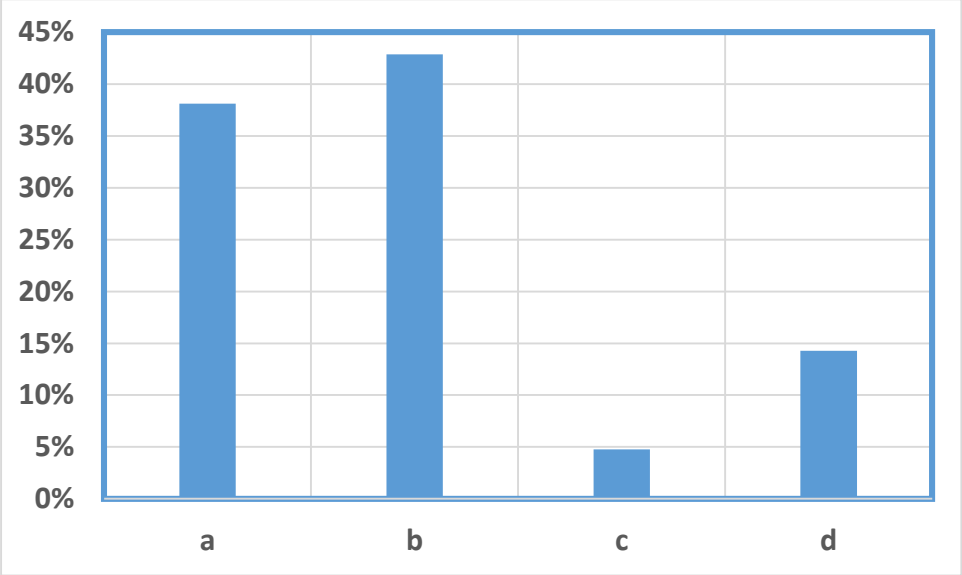
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.17 Planned positions in the next 5 years in the field of environmental assessment



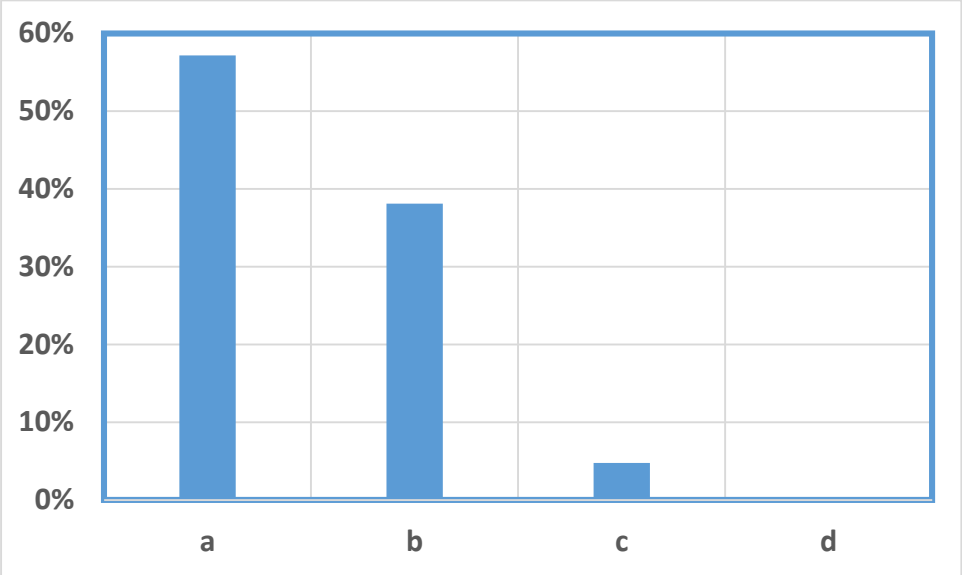
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.18: Planned positions in the next 5 years in the field of control of environmental impacts



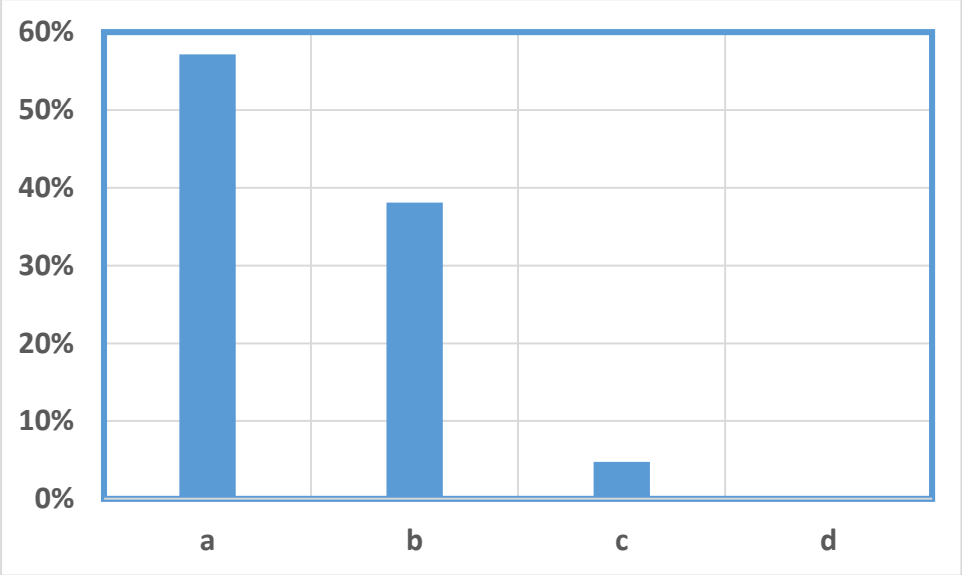
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.19: Planned positions in the next 5 years in the field of environmental quality control engineering



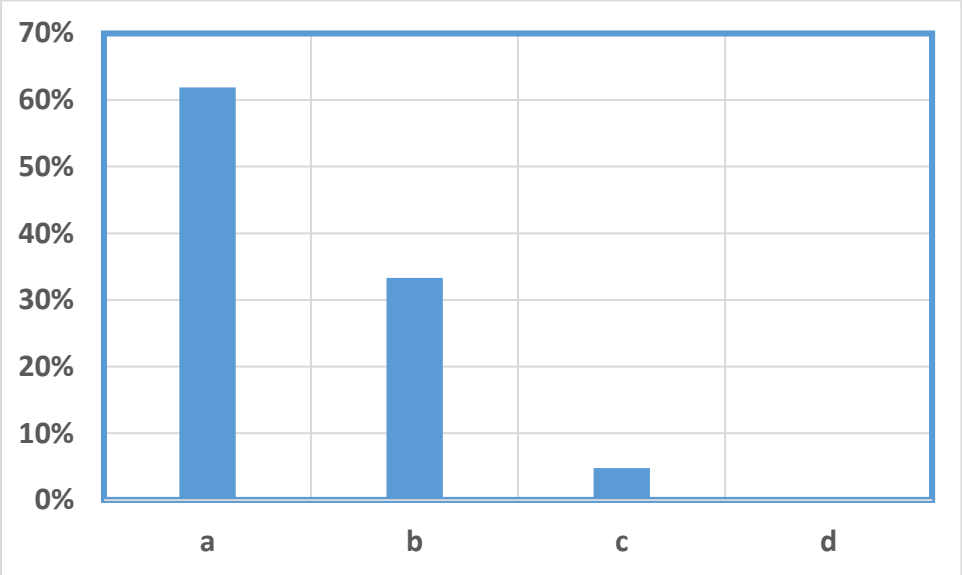
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.20: Planned positions in the next 5 years in the field of climate issues



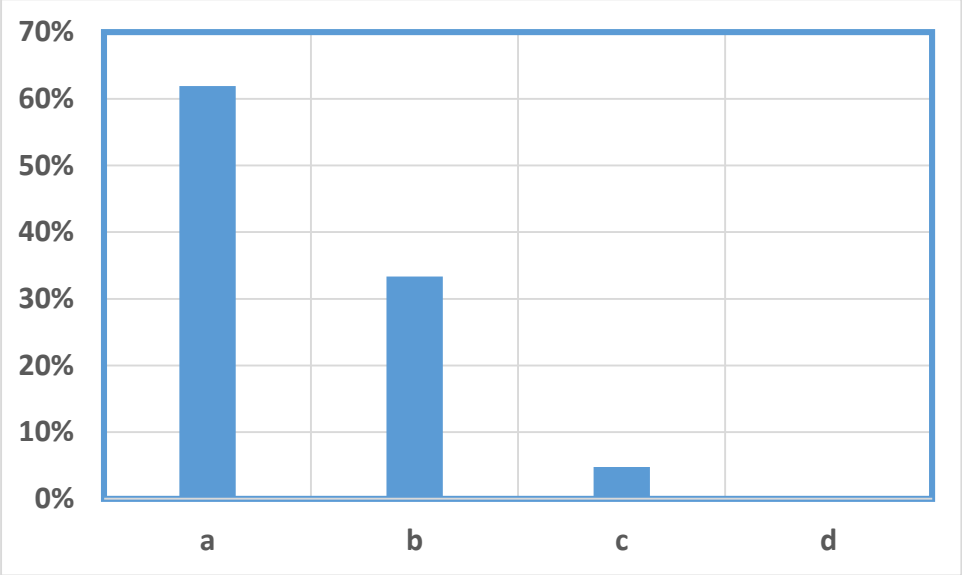
(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.21: Planned positions in the next 5 years in the field of economic issues



(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.22: Planned positions in the next 5 years in the field of political issues

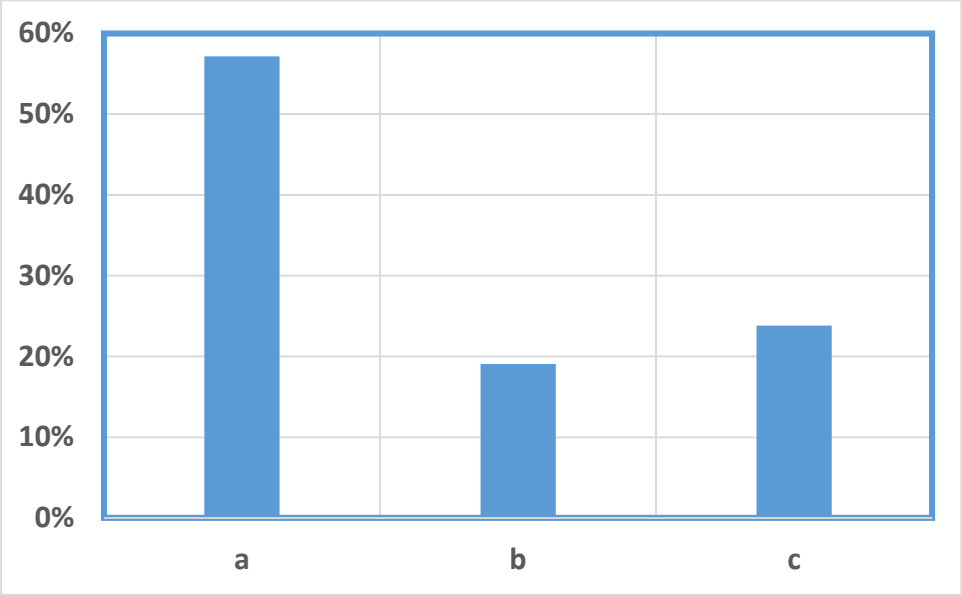


(a) 0 (b) 1 – 5 (c) 6-10 (d) >10

Figure 2.23: Planned positions in the next 5 years in the field of law issues

General employee requirements

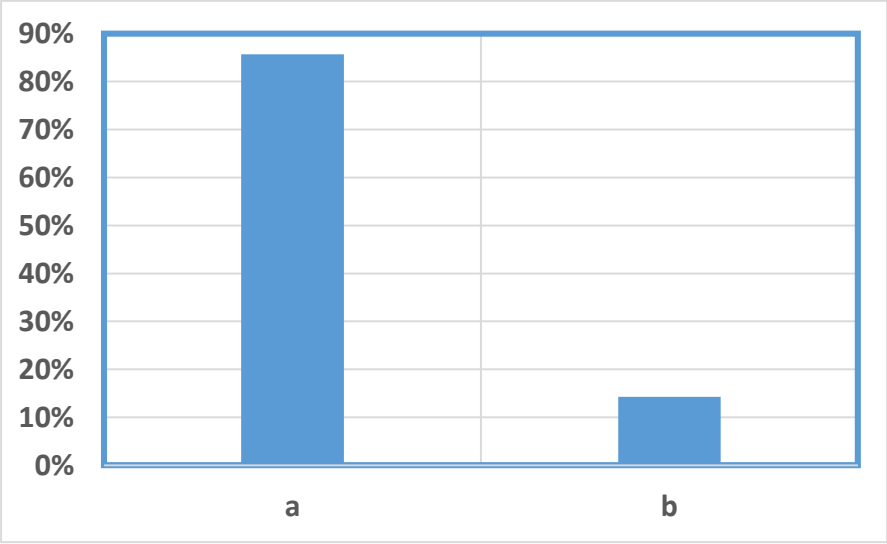
The survey results of general employee requirements are shown in Figs. 2.24. These results are in tandem with the planned positions survey results. About 60% of the organizations consider that it is important to get graduates with a strong specialization in the technology field. While about 20% of organizations see the importance of getting graduates with knowledge in economics, politics, and laws related to energy efficiency and environmental impacts.



(a) It is important to get graduates with a strong specialization in the technology field
(b) It is helpful to get graduates with a main focus on technology, but also a basic knowledge in economics laws and/or politics"
(c) It is more important to get graduates in economics, laws and/or politics with an overview on technologies in Renewable energy, Energy Efficiency and Environmental Impacts
Figure 2.24: General employee requirements

Training institutions for highly qualified employees

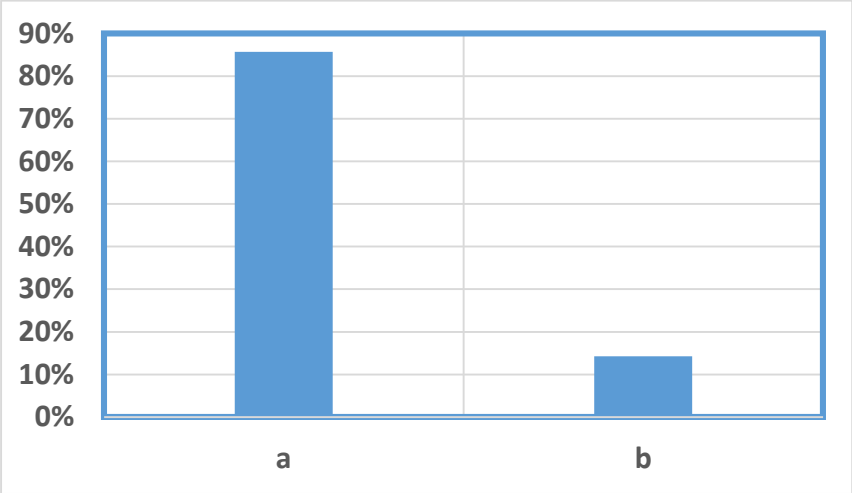
Survey results for the training institutions for higly-qualified employees are shown in Fig. 2.25. More than 85% of highly-qualified employees in the energy field are graduated from universities. The role of technical schools is minor and represents about 20%. This highlights the need to improve education programs in the technical schools to offer high quality training in the field of energy efficiency and renewable energy.



(a) University, (b) Technical school
Figure 2.25: Training institutions for highly qualified employees

Countries of highly qualified employees

As shown in Fig. 2.26, More than 85% of highly-qualified employees in the energy field are graduated from Egyptian institutions. Only about 15% have the chance for training in foreign countries. This calls for more efforts for the internationalization and modernization of high level energy efficiency and renewable energy education programs in cooperation with foreign universities and institutions. This represents one of the important objectives of HEBA project.

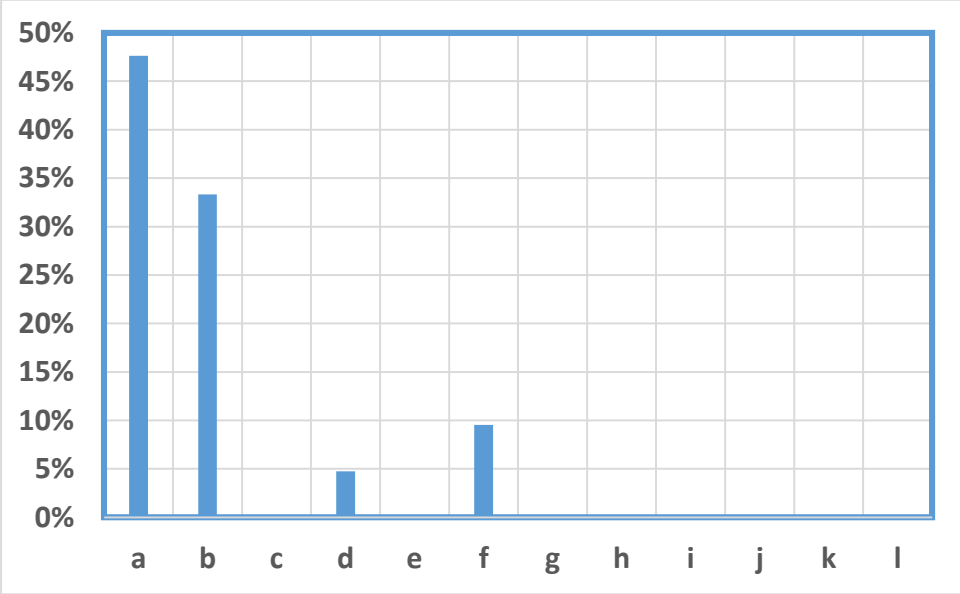


(a) Egypt, (b) Foreign Countries

Figure 2.26: Countries for highly qualified employees

Course topics suitable for company needs

The survey results in Fig. 2.27 show that the companies and organizations are in need for high level courses in the field of energy efficiency, storage, renewable energy, and energy management in buildings.



(a) Energy Storage Technologies; (b) Renewable Energy Projects Evaluation & Market Analysis; (c) Wind energy: wind turbines, wind farms, and siting; (d) Green Economy, Policies and Law; (e) Global Sustainable Business Management; (f) Building Management Systems; (g) Waste to Energy Processes & Technologies; (h) Concept to Commercialization; (i) Moisture and Control of Humidity in Buildings; (j) Energy Efficiency in Agriculture Evaluation and Design; (k) Heat Pumps; (l) Other

Figure 2.27: Course topics suitable for company needs

Regulatory aspects

Policies and legislations applicable to Renewable technologies in your Country

Survey results represented in Fig. 2.28 show that more than 70% of the organizations are not aware about the policies and legislations applicable to renewable energy technologies in the country. Of course, this can be related to the results above that, show little needs for topics in law and regulations related to energy efficiency and renewable energy. Again much more awareness is needed to clarify the importance of these legislations.

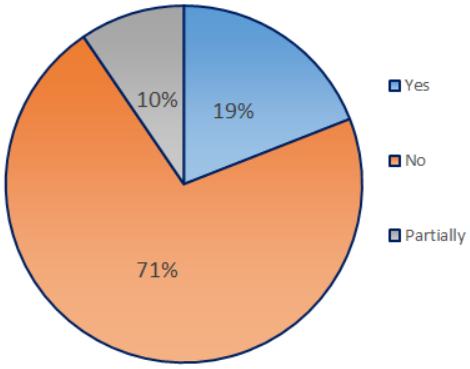


Figure 2.28: Do you know the policies and legislations applicable to Renewable technologies in your Country?

Energy International, national and regional strategies and the real needs of research and industry

Survey results shown in Fig. 2.29 show that about 50% of the organization think that energy international, national and regional strategies fit the real needs of research and industry. More efforts are needed to establish strategies capable of satisfying the remaining 50%.

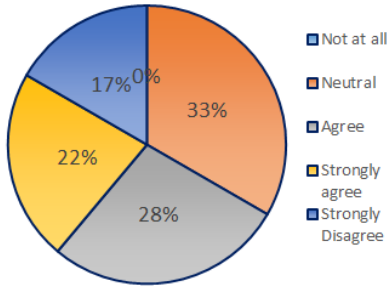


Figure 2.29: Do you think that energy international, national and regional strategies fit the real needs of research and industry?

Relevance of regulatory issues concerning the scientific / technological activity

Survey results shown in Fig. 2.30 show that about 67% are neutral about the relevance of regulatory issues to the scientific / technological activity that they carry out.

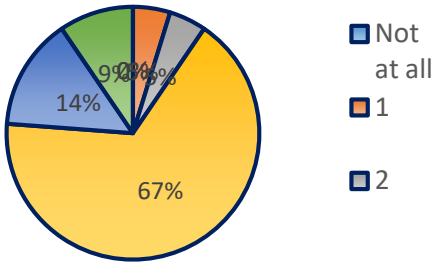


Figure 2.30: How relevant are regulatory issues concerning the scientific / technological activity that you carry out?

Does your Company/Institution take regulatory issues into account?

Survey results shown in Fig. 2.31 show that about 38% of the organizations consider regulatory issues.

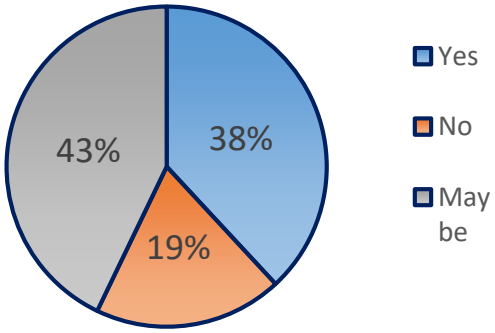


Figure 2.31: Does your company/institution consider regulatory issues?

Do you think national or internal regulation could in any way either promote or hinder the development of new technology solutions?

Survey results shown in Fig. 2.32 show that about 67% of the organizations think national or internal regulation could in any way either promote or hinder the development of new technology solutions.

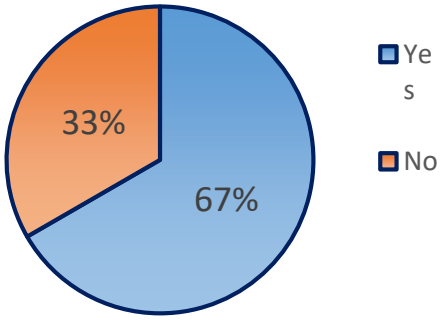


Figure 2.32: Do you think national or internal regulation could in any way either promote or hinder the development of new technology solutions?

During the implementation of your activities, have you had problems related to technical standards or regulation for construction, installation and use of RE technologies?
Survey results shown in Fig. 2.33 show that about 19% of the organizations have had problems related to technical standards or regulation for construction, installation and use of RE technologies.

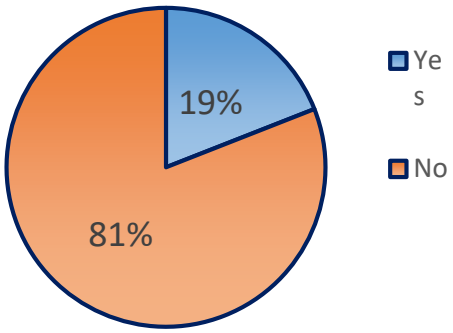


Figure 2.33: During the implementation of your activities, have you had problems related to technical standards or regulation for construction, installation and use of RE technologies? (e.g. rules for permits, construction and testing, analyzes risks, taxation etc.)

Who usually deal with this kind of regulatory aspects in your company?
Survey results shown in Fig. 2.34 show that in about 60% of the organizations, engineers deal with regulatory aspects. This highlight the need to equip engineering graduates with knowledge and skills sufficient to carry out these tasks in cooperation with the law office.

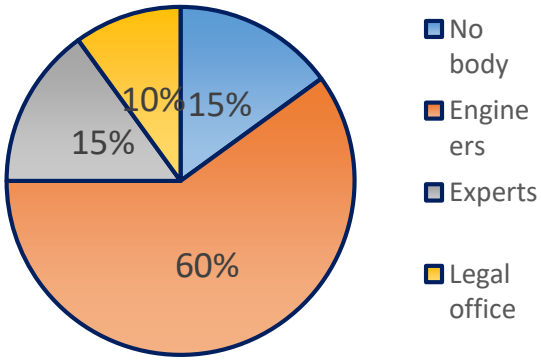


Figure 2.34: Who usually deal with this kind of regulatory aspects in your company?

Annexes: List of Questions

SECTION 1 GENERAL INFORMATION

1.1 INFORMATION ABOUT YOURSELF

Full Name:

Email Address:

Your position/ job title in the company:

Gender:

□ Male

□ Female

Age Group

□ 21-30

□ 31-40

□ 41-50

□ 51-60

□ Older than 60

Country _____

City/ Town _____

1.2 INFORMATION ABOUT THE COMPANY

Name of Company/Organization:

Telephone:

Address:

Website:

e-mail:

……

Type of Institution (one option)

□ Governmental Institution (Ministry,…)

□ University, Educational service

□ Research lab / research institution

□ Industrial production (Energy systems)

□ Trade Industry

□ Engineering Consultant

□ Economic Consultant, Business Administration

□ Lawyers or law sector

□ Policy consultancy

□ Other: _____

Branch (several options)

□ Civil Engineering/ Architecture/

□ Building (construction, investment and operation)

□ Heating, Ventilation and Air Conditioning

□ Building equipment (window fixtures, lighting, etc)

□ Environmental/ Biotechnical Engineering (Air Pollution, Soil Treatment)

□ Power plant Engineering

□ Plant engineering and construction

□ Manufacture Industry (food, textiles, metal, electrical equipment)

□ Communal supplier (Energy, Water, Waste management)

□ Automotive developer

□ Transportation and Warehousing

□ Agriculture

□ Food production

□ Wood industries

□ Traffic, Mobility

□ Others: _____

Overall Employees

□ 1 - 5

□ 6 - 10

□ 11 - 20

□ 21 - 50

□ 51 - 100

□ 101 - 200

□ > 201

Market

□ Local

□ National

□ Regional

□ International

1.3 Which is the current level of education of employees in Renewable Energies?

a. Technicians in related fields

□

b. Personnel with Bachelor's degree

□

c. Personnel with Masters' degree □

d. Personnel with other specialization courses in renewable energy

□

e. There is no personnel with specific renewable energy training working in the company

□

1.4 Which is the current level of education of employees in Energy Efficiency?

a. Technicians in related fields
□

b. Personnel with Bachelor's degree
□

c. Personnel with Masters' degree □

d. Personnel with other specialization courses in energy efficiency
□

e. There is no personnel with specific energy efficiency training working in the company

□

SECTION 2 COMPANY NEEDS

2. 1 How many Employees are actually working in your Company/ Institution in the following fields

		0	1 - 5	610	>10 employees
□	Energy Efficiency in Buildings	Overall□	□	□	□
□	Energy Efficiency in industry	Overall□	□	□	□
□	Renewable Energy (e.g. solar systems, Wind, Biogas ..)	Overall□	□	□	□
□	Environmental assessment	Overall□	□	□	□
□	Control of Environmental impacts	Overall□	□	□	□
□	Environmental quality control Engineering	Overall□	□	□	□

□	Climate issues (phenomenology, dynamics, climate change, Sustainability)	Overall	□	□	□	□
□	Economic issues	Overall	□	□	□	□
□	Political issues	Overall	□	□	□	□
□	Law issues	Overall	□	□	□	□

2. 2 How difficult is it for your Company/ Institution at the moment to get qualified employees in the specific branches of ” Energy Efficiency, Renewable Energy and Environmental Impact”?

□ very difficult

□ difficult

□ less difficult

□ not difficult

□ no definition

Supplementary statement

2. 3"How many positions are planned to add in the next 5 years with graduates in one of the mentioned fields"

			0	1 - 5	6 -10	>10	employees
□	Energy Efficiency in Buildings	Overall	□	□	□	□	
□	Energy Efficiency in industry	Overall	□	□	□	□	

□ Renewable Energy Overall□ □ □ □
(e.g. solar systems, Wind, Biogas ..)

□ Environmental assessment Overall□ □ □ □

□ Control of Environmental impacts Overall□ □ □ □

□ Environmental quality control Engineering Overall□ □ □ □

□ Climate issues Overall□ □ □ □
(phenomenology, dynamics, climate change, Sustainability)

□ Economic issues Overall□ □ □ □

□ Political issues Overall□ □ □ □

□ Law issues Overall□ □ □ □

Other fields:

2. 4 General employee requirements

□"our working needs are focused on technology - it is important to get graduates with a strong specialization on the technology field"

□"our working field involves different requirements - it is helpful to get graduates with a main focus on technology, but also a basic knowledge in economics laws and/or politics"

□"our working field is not technology driven - it is more important to get graduates in economics, laws and/or politics with an overview on technologies in Renewable energy, Energy Efficiency and Environmental Impacts

Supplementary statement

2. 5 From which training Institutions are your highly qualified employees mainly coming from?

□ University □ Jordan

□ Technical school □ Lebanon

□ Egypt

□ Foreign countries:

2. 6 From which Countries are your highly qualified employees mainly coming from?

□ Jordan

□ Lebanon

□ Egypt

□ Foreign countries:

2. 7 "Which course topics would be more suitable for your staff/company needs?"

□ Energy Storage Technologies

□ Renewable Energy Projects Evaluation & Market Analysis

□ Wind energy: wind turbines and wind farms and siting

□ Green Economy, Policies and Law

□ Global Sustainable Business Management

□ Building Management Systems

□ Waste to Energy Processes & Technologies

□ Concept to Commercialization

□ Moisture and Control of Humidity in Buildings

□ Energy Efficiency in Agriculture Evaluation and Design

□ Heat Pumps

□ Other

SECTION 3 REGULATORY ASPECTS

3.1 Do you know the policies and legislations applicable to Renewable technologies in your Country?

YES

NO

Partially

If Yes or Partially, please list the most important ones

3.2 Do you think that Energy International, national and regional strategies fit the real needs of research and industry?

Not at all

1

2

3

4

5

Completely

3.3 How relevant are regulatory issues concerning the scientific / technological activity that you carry out?

Not relevant at all

1

2

3

4

5

Very relevant

3.4 Does your Company/Institution take regulatory issues into account?

Yes

No

3.5 Do you think national or internal regulation could in any way either promote or hinder the development of new technology solutions?

Yes

No

If you answered Yes, please explain how; if you answered No, please explain why

3.6 During the implementation of your activities, have you had problems related to technical standards or regulation for construction, installation and use of RE Technologies? (e.g. rules for permits, construction and testing, analyzes risks, taxation etc.)

Yes

No

If Yes, please explain what kind of problem

Please mention at least one obstacle and one advantage resulting from legislation

3.7 Who usually deal with this kind of regulatory aspects in your company?

□ Nobody

□ Engineers and Technician

□ the Legal office

□ Experts in Energy law as external consultants