



مشروع المنار
Al-Manar Project



هيئة تنمية وتطوير المهارات المهنية والتقنية
*Technical and Vocational Skills
Development Commission*



المركز الوطني لتنمية الموارد البشرية
*National Center for Human
Resources Development*

The Gap between the Supply And Demand Sides of the Sector Electricity Supply and Renewable Energy

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Supported by *Technical and Vocational Skills Development Commission*

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Introduction

The National Center for Human Resources Development is delighted to bring to your attention the report of the supply and demand gap in the field of power supply and renewable energy sector, This Study is in-line and in harmony with the principles of Rehabilitation of Employment, Vocational and Technical Education sector which is funded by European Union (EU), The EU implementation is monitored by the Technical and Vocational Skills Development Commission along with the participation of many relevant Government institutions and the private sector.

The Study focused on the need for sectoral labor market research and the formulation of human resource development plans in these sectors in order to identify the quantitative and qualitative sectoral needs for qualifications and skills at the level of each occupation within the targeted sectors. This will undoubtedly contribute to the optimal utilization of human resources, both through the planning process and the development of strategies and decisions for effective labor market programs, especially in the areas of employment, training, vocational and technical education

The study is consisting of six main chapters.

- **Chapter 1** includes the research study theoretical framework for problem description, goals, implications, research questions, and data sources and methods used.
- **Chapter 2** contains demand analysis in the area of power supply and renewable energy.
- **Chapter 3** deals with the supply side analysis in the target sector.
- **Chapter 4** provided the estimation of the gap between supply and demand.
- **Chapter 5** presents plans developed to fill this gap and develop human resources to work in the above sectors.
- Finally, **Chapter 6** presents key findings and recommendations.

It is hoped that this study will be effectively and contribute to the Centre's efforts while also utilizing it to strengthen Jordan's pioneering and tireless efforts in the field of human resource development

**President of the National Center
for Human Resources Development
Prof. Abdalla Yousef Ababneh**

Table of Contents

1	EXECUTIVE SUMMARY.....	12
1.1	INTRODUCTION.....	16
1.2	IMPORTANCE OF THE STUDY.....	17
1.3	OBJECTIVES OF THE STUDY.....	18
1.4	LEARNING PROBLEMS.....	19
1.5	STUDY METHODOLOGY.....	20
1.5.1	THE RESEARCH AND SAMPLE.....	20
1.5.1.1 BUSINESS NEEDS SURVEY (DEMAND SIDE)	20
1.5.1.2 TRAINING PROVIDERS SURVEY (SUPPLY SIDE)	21
1.5.2	THE RESEARCH TOOLS.....	21
1.6	DATA COLLECTION AND PROCESSING.....	22
1.6.1	COMPANIES SURVEY (DEMAND SIDE).....	22
1.6.2	TRAINING PROVIDERS SURVEY (SUPPLY SIDE).....	22
1.7	STUDY LIMITATIONS.....	23
1.8	DATA TABULATION AND DISSEMINATION.....	23
2	DEMAND-SIDE ANALYSIS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	25
2.1	ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR FACILITIES.....	25
2.2	CORONA PANDEMIC AND ITS EFFECTS.....	34
2.3	QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF WORKERS IN THE ELECTRICITY AND RENEWABLE ENERGY SUPPLY SECTOR.....	34
2.4	CURRENT AND FUTURE TRAINING NEEDS OF COMPANIES IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	42
2.5	THE NEEDS OF THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR COMPANIES FOR THE QUANTITY OF EMPLOYEES AND THEIR CHARACTERISTICS.....	45
2.6	GENERAL SKILLS REQUIRED FOR WORKERS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	55
2.7	EMPLOYMENT OF WOMEN IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	59
2.8	EMPLOYMENT OF PEOPLE WITH DISABILITIES IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	61
2.9	DIFFICULTIES IN HIRING WORKERS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR AND METHODS OF RECRUITMENT.....	62
3	SUPPLY-SIDE ANALYSIS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	68
3.1	THE MOST IMPORTANT TRAINING PROVIDERS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	68
3.2	TRAINING PROGRAMS APPLIED IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	68
3.3	GENERAL SKILLS INCLUDED IN EMPLOYEE PREPARATION PROGRAMS.....	80
3.4	EFFICIENCY-RAISING PROGRAMS OFFERED IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	80
4	ESTIMATING THE SUPPLY AND DEMAND GAP IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR.....	87
4.1	THE GAP BETWEEN TRAINING NEEDS AND THE AVAILABLE TRAINING PROGRAMS.....	87
4.2	THE GAP BETWEEN SUPPLY AND DEMAND FOR FEMALE LABOR.....	87
4.3	THE GAP BETWEEN THE TRAINING NEEDS OF EACH PROFESSION AND THE TRAINING PROGRAMS AVAILABLE FOR THESE PROFESSIONS.....	88
4.4	THE GAP BETWEEN THE DEMAND FOR WORKERS WITH DISABILITIES AND THE TRAINING PROGRAMS OFFERED TO THEM.....	93

5	HUMAN RESOURCE DEVELOPMENT PLAN IN THE ENERGY SECTOR	96
6	RESULTS AND RECOMMENDATIONS.....	105
6.1	RESULTS	105
6.2	RECOMMENDATIONS	110
6.3	RENEWABLE ENERGY AND ENERGY MANAGEMENT SOCIETY (REES)	113
6.3.1	PROBLEMS OF NEGATIVE LEGISLATION AND INSTRUCTIONS AFFECTING THE RENEWABLE ENERGY SECTOR	113
6.3.2	PROPOSED SOLUTIONS TO SOLVE PROBLEMS OF LEGISLATION AND GUIDELINES.....	113

TABLES

TABLE 1	SAMPLE OF ECONOMIC ESTABLISHMENTS IN THE ELECTRICITY AND RENEWABLE ENERGY SUPPLY SECTOR BY GOVERNORATE 2021	20
TABLE 2	DISTRIBUTION OF FACILITIES IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR BY REGION / GOVERNORATE	25
TABLE 3	DISTRIBUTION OF COMPANIES ACCORDING TO THE YEAR OF SERVICE COMMENCEMENT	26
TABLE 4	DISTRIBUTION OF COMPANIES IN THE SECTOR BY LEGAL ENTITY AND REGION.....	27
TABLE 5	DISTRIBUTION OF COMPANIES IN THE SECTOR ACCORDING TO THE SIZE OF THE COMPANY AND THE REGION.....	27
TABLE 6	DISTRIBUTION OF WORKERS IN SECTOR BY COMPANY SIZE, TERRITORIES AND GENDER ...	28
TABLE 7	DISTRIBUTION OF COMPANIES AND WORKERS IN THE SECTOR ACCORDING TO THE EMPLOYERS' ASSESSMENT OF DEMAND FOR THEIR PRODUCTS FOR THE YEAR2021	32
TABLE 8	DISTRIBUTION OF COMPANIES IN THE SECTOR ACCORDING TO EMPLOYERS' EXPECTATIONS OF DEMAND FOR THEIR PRODUCTS FOR THE YEARS (2022-2024)	33
TABLE 9	DISTRIBUTION OF WORKERS IN THE SECTOR BY EDUCATIONAL QUALIFICATION AND GENDER .	35
TABLE 10	DISTRIBUTION OF WORKERS IN THE SECTOR BY EDUCATIONAL QUALIFICATION AND TERRITORY	35
TABLE 11	DISTRIBUTION OF WORKERS IN THE SECTOR BY PROFESSION, GENDER AND TERRITORY....	37
TABLE 12	DISTRIBUTION OF WORKERS IN THE SECTOR BY NATIONALITY.....	40
TABLE 13	DISTRIBUTION OF FACILITIES IN THE SECTOR BY PREFERRED TRAINING BODY	42
TABLE 14	DISTRIBUTION OF FACILITIES IN THE SECTOR ACCORDING TO THE MOST REQUESTED TRAINING PROGRAMS WITHIN REGIONS	44
TABLE 15	DISTRIBUTION OF THE DEMAND FOR EMPLOYMENT IN THE SECTOR BY EDUCATIONAL QUALIFICATION AND GENDER FOR THE YEARS (2022-2024)	45
TABLE 16	DISTRIBUTION OF LABOR DEMAND IN THE SECTOR BY PROFESSION AND REGION FOR THE PERIOD (2022-2024)	48
TABLE 17	DISTRIBUTION OF THE REQUIRED LABOR IN THE SECTOR ACCORDING TO THE REQUIRED YEARS OF EXPERIENCE AND GENDER OVER THE YEARS (2022-2024)	48
TABLE 18	DISTRIBUTION OF THE REQUIRED LABOR IN THE SECTOR ACCORDING TO (ROTATION/EXPANSION) FOR THE YEARS. (2022-2024)	49
TABLE 19	DISTRIBUTION OF EMPLOYMENT IN THE SECTOR ACCORDING TO THE PROFESSION AND THE MOST REQUIRED SKILL FOR IT, WHICH THE WORKERS DO NOT HAVE) FOR THE YEARS. (2022-2024)	50
TABLE 20	GENERAL SKILLS NECESSARY TO SUPPORT EMPLOYMENT FOR THE PROFESSIONS REQUIRED ..	55
TABLE 21	DISTRIBUTION OF ESTABLISHMENTS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR BY REASON OF NON-RECRUITMENT OF FEMALES.....	59
TABLE 22	DISTRIBUTION OF JOB OPPORTUNITIES FOR FEMALES IN THE SECTOR BY PROFESSION FOR THE YEARS (2022-2024)	60
TABLE 23	DISTRIBUTION OF WORKERS WITH DISABILITIES IN THE SECTOR BY OCCUPATION	61
TABLE 24	DISTRIBUTION OF JOB OPPORTUNITIES FOR PEOPLE WITH DISABILITIES IN THE SECTOR BY PROFESSION AND REGION	61
TABLE 25	DISTRIBUTION OF ESTABLISHMENTS IN THE SECTOR ACCORDING TO RECRUITMENT DIFFICULTIES	62
TABLE 26	DISTRIBUTION OF FACILITIES IN THE SECTOR ACCORDING TO THE METHODS OF APPOINTMENT AND REGION.....	63
TABLE 27	DISTRIBUTION OF FACILITIES IN THE SECTOR ACCORDING TO THE DIFFICULTIES FACING THE SECTOR AND THE REGION	65
TABLE 28	TRAINING PROVIDERS: ACCORDING TO THE YEAR OF STARTING THE PROVISION OF TRAINING/VOCATIONAL EDUCATION SERVICES	68
TABLE 29	THE TRAINING PROGRAMS APPLIED IN THE SECTOR FOR THE YEARS (2021-2019)	69
TABLE 30	DISTRIBUTION OF GRADUATES OF THE APPLIED TRAINING PROGRAMS IN THE SECTOR. MINIMUM ACADEMIC QUALIFICATION FOR THE YEARS:2021-2019	71

TABLE 31 DISTRIBUTION OF GRADUATES OF TRAINING PROVIDERS BY TRAINING PROVIDER FOR THE YEARS (2021-2019)	73
TABLE 32 DISTRIBUTION OF GRADUATES OF TRAINING PROGRAMS BY TRAINING PROVIDER AND GENDER FOR THE TOTAL YEARS (2021-2019)	75
TABLE 33 GRADUATES OF TRAINING PROVIDERS ACCORDING TO THE MOST PROMINENT TRAINING PROVIDERS AND TRAINING PROGRAM FOR YEARS (2021-2019)	76
TABLE 34 THE GENERAL SKILLS SUPPORTING EMPLOYMENT THAT ARE ADEQUATELY PROVIDED BY THE TRAINING PROGRAMS	80
TABLE 35 TRAINING PROVIDERS THAT PROVIDE EFFICIENCY-RAISING COURSES AND THE NUMBER OF TRAINEES IN THE PERIOD (2021-2019)	81
TABLE 36 DISTRIBUTION OF EFFICIENCY-RAISING COURSES OFFERED BY THE PROVIDERS ACCORDING TO GENDER FOR THE PERIOD (2021-2019)	82
TABLE 37 DISTRIBUTION OF TRAINEES ACCORDING TO THE EFFICIENCY-RAISING COURSES THEY RECEIVED AND THE YEAR IN WHICH THEY WERE TRAINED	83
TABLE 38 DISTRIBUTION OF TRAINEES ACCORDING TO EFFICIENCY-RISING COURSES THEY HAVE RECEIVED BY REGIONS	85
TABLE 39 THE GAP BETWEEN THE REQUIRED AND OFFERED TRAINING PROGRAMS FOR FEMALES FOR THE YEARS (2022-2024)	88
TABLE 40 DEMAND AND OFFERED TRAINING PROGRAMS IN THE SECTOR	89
TABLE 41 THE MOST REQUESTED TRAINING PROGRAMS FOR THE YEARS (2022-2024) AND NOT AVAILABLE WITH TRAINING PROVIDERS	92
TABLE 42 REQUIRED TRAINING PROGRAMS FOR THE YEARS (2022-2024) IN EACH REGION AND IS NOT AVAILABLE WITH TRAINING PROVIDERS	93
TABLE 43 JOB OPPORTUNITIES FOR PEOPLE WITH DISABILITY BY GENDER	94

CHARTS

CHART 1 DISTRIBUTION OF COMPANIES IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR BY REGION / GOVERNORATE	25
CHART 2 DISTRIBUTION OF COMPANIES ACCORDING TO THE YEAR OF SERVICE COMMENCEMENT	26
CHART 3 DISTRIBUTION OF COMPANIES IN THE SECTOR BY LEGAL ENTITY AND REGION.....	27
CHART 4 DISTRIBUTION OF COMPANIES IN THE SECTOR ACCORDING TO THE SIZE OF THE COMPANY AND THE TERRITORIES	28
CHART 5 DISTRIBUTION OF WORKERS IN THE SECTOR BY COMPANY SIZE AND GENDER.....	29
CHART 6 DISTRIBUTION OF WORKERS IN THE SECTOR BY COMPANY SIZE AND GENDER WITHIN THE TERRITORIES.....	30
CHART 7 DISTRIBUTION OF COMPANIES IN THE SECTOR BY GENDER AND TERRITORY.....	31
CHART 8 DISTRIBUTION OF COMPANIES AND WORKERS IN THE SECTOR ACCORDING TO THE EMPLOYERS' ASSESSMENT OF DEMAND FOR THEIR PRODUCTS FOR THE YEAR 2021	32
CHART 9 DISTRIBUTION OF COMPANIES IN THE SECTOR ACCORDING TO EMPLOYERS' EXPECTATIONS OF DEMAND FOR THEIR PRODUCTS FOR THE YEARS (2022-2024)	33
CHART 10 DISTRIBUTION ON COMPANIES ACCORDING TO THE IMPACT OF THE CORONA PANDEMIC.....	34
CHART 11 DISTRIBUTION OF WORKERS IN THE SECTOR BY GENDER AND EDUCATIONAL QUALIFICATIONS	34
CHART 12 DISTRIBUTION OF WORKERS IN THE SECTOR BY EDUCATIONAL QUALIFICATION AND GENDER	35
CHART 13 DISTRIBUTION OF WORKERS IN THE SECTOR ACCORDING TO EDUCATIONAL QUALIFICATIONS WITHIN TERRITORIES	36
CHART 14 DISTRIBUTION WORKERS IN THE SECTOR BY MOST OCCUPIED OCCUPATIONS.....	39
CHART 15 DISTRIBUTION OF WORKERS IN THE SECTOR BY PROFESSION AND TERRITORY	40
CHART 16 DISTRIBUTION OF WORKERS IN THE SECTOR BY NATIONALITY.....	40
CHART 17 DISTRIBUTION OF EMPLOYEES IN SECTOR ACCORDING TO THE NATIONALITY, GENDER AND THE TERRITORY	41
CHART 18 DISTRIBUTION OF FACILITIES IN THE SECTOR BY PREFERRED TRAINING BODY	42
CHART 19 DISTRIBUTION OF TRAINING PROGRAMS IN THE SECTOR BY REGIONS.....	43
CHART 20 DISTRIBUTION OF DEMAND FOR JOBS IN THE SECTOR OVER THE YEARS (2022-2024) ...	45
CHART 21 DISTRIBUTION OF THE DEMAND FOR EMPLOYMENT IN THE SECTOR BY EDUCATIONAL QUALIFICATION FOR THE YEARS (2022-2024)	46
CHART 22 DISTRIBUTION OF THE TOTAL DEMAND FOR EMPLOYMENT IN THE SECTOR BY OCCUPATION FOR THE TOTAL YEARS (2022-2024)	46
CHART 23 DISTRIBUTION OF LABOR DEMAND IN THE SECTOR BY REGION FOR THE YEARS (2022-2024)	48
CHART 24 DISTRIBUTION OF THE REQUIRED LABOR IN THE SECTOR ACCORDING TO THE YEARS OF EXPERIENCE FOR THE YEARS (2022-2024)	49
CHART 25 DISTRIBUTION OF THE REQUIRED LABOR IN THE SECTOR ACCORDING TO (ROTATION/EXPANSION) FOR THE YEARS. (2022-2024)	49
CHART 26 DISTRIBUTION OF ESTABLISHMENTS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR BY REASON OF NON-RECRUITMENT OF FEMALES.....	59
CHART 27 DISTRIBUTION OF JOB OPPORTUNITIES FOR FEMALES IN THE SECTOR BY PROFESSION FOR THE YEARS (2022-2024)	60
CHART 28 DISTRIBUTION OF ESTABLISHMENTS IN THE SECTOR ACCORDING TO THE PERCENTAGES OF RECRUITMENT DIFFICULTIES	62
CHART 29 DISTRIBUTION OF ESTABLISHMENTS IN THE SECTOR ACCORDING TO RECRUITMENT DIFFICULTIES	63
CHART 30 DISTRIBUTION OF ESTABLISHMENTS SECTOR ACCORDING TO RECRUITMENT METHODS	64
CHART 31 DISTRIBUTION OF ESTABLISHMENTS SECTOR ACCORDING TO RECRUITMENT AND REGIONAL METHODS	64
CHART 32 DISTRIBUTION OF FACILITIES IN THE SECTOR ACCORDING TO SECTOR DIFFICULTIES....	65
CHART 33 DISTRIBUTION OF FACILITIES IN THE SECTOR ACCORDING TO SECTOR DIFFICULTIES BY REGIONS	66

CHART 34 DISTRIBUTION OF THE TOTAL GRADUATES OF TRAINING PROVIDERS ACCORDING TO THE APPLIED TRAINING PROGRAMS IN THE SECTOR FOR YEARS (2021-2019)	69
CHART 35 DISTRIBUTION OF GRADUATES OF TRAINING PROVIDERS ACCORDING TO THE APPLIED TRAINING PROGRAMS IN THE SECTOR FOR YEARS (2021-2019)	69
CHART 36 DISTRIBUTION OF GRADUATES OF TRAINING PROVIDERS WITHIN THE APPLIED TRAINING PROGRAMS IN SECTOR BY GENDER FOR YEARS (2021-2019)	70
CHART 37 GRADUATES OF MALE TRAINING PROVIDERS ACCORDING TO THE MOST PROMINENT TRAINING PROGRAMS APPLIED IN THE SECTOR FOR THE YEARS (2021-2019)	70
CHART 38 DISTRIBUTION OF GRADUATES OF THE APPLIED TRAINING PROGRAMS IN THE SECTOR. MINIMUM ACADEMIC QUALIFICATION FOR THE YEARS:2021-2019	72
CHART 39 DISTRIBUTION OF GRADUATES OF TRAINING PROVIDERS BY MINIMUM EDUCATIONAL QUALIFICATION AND GENDER FOR YEARS (2021-2019)	72
CHART 40 DISTRIBUTION OF GRADUATES OF TRAINING PROVIDERS ACCORDING TO THE TRAINING PROVIDER FOR THE YEARS (2021-2019)	74
CHART 41 DISTRIBUTION OF GRADUATES OF TRAINING PROGRAMS BY TRAINING PROVIDER AND GENDER FOR THE TOTAL YEARS (2021-2019)	76
CHART 42 DISTRIBUTION OF GRADUATES OF TRAINING PROVIDERS ACCORDING TO THE MOST PROMINENT TRAINING PROVIDERS AND THE TRAINING PROGRAM FOR THE YEARS (2021-2019)	79
CHART 43 TRAINING PROVIDERS THAT PROVIDE EFFICIENCY-RAISING COURSES AND THE NUMBER OF TRAINEES IN THE PERIOD (2021-2019)	81
CHART 44 TRAINEES IN THE PROFICIENCY-RAISING COURSES BY GENDER	81
CHART 45 DISTRIBUTION OF TRAINEES ACCORDING TO EFFICIENCY- RISING COURSES FOR THE PERIOD (2021-2019) BY GENDER	84
CHART 46 DISTRIBUTION OF TRAINEES ACCORDING TO EFFICIENCY-RISING COURSES THEY HAVE RECEIVED BY REGIONS	85

1 Executive summary

This report describes the supply and demand situation that shows the gap in the electricity supply and renewable energy sectors. The sector employs more than 12,833 people, within 372 facilities across Jordan, with proportions in the North Region of (61%) Central Region (33%) and South Region (6%), approximately (56%) are individual companies based on their legal form. Companies in the electricity supply and renewable energy sector were divided into three groups based on the number of employees. 18% for small businesses (4-1 employees), 68% for medium-sized businesses (19-5 employees), 14% for large businesses (20+ employees) The number of workers in this sector is split with majority for male (90%) and female (10%), whereas 99% of the workers employed in this sector are Jordanian nationals and only 1% are non-Jordanians.

In general, the educational qualifications of male employees that have a bachelor's degree (31%), followed by a secondary degree (28%) and a high school diploma (25%). However, most of the female employees that have a bachelor's degree is (69%), followed by an intermediate diploma (13%) and a secondary school diploma (2%).

General Electrical Technician (6.41%), General Electrical Engineering (6%), General Department Clerk (64.4%), Administrative Policy Specialists (3.77%), and Electrical Technician /Other (3.18%) are the busiest occupations in the electricity and renewable energy supply.

Regarding employers' assessment of the volume of demand for their products shows that 32% of companies in this sector declared a decrease in demand for their products in 2021 and they are expecting that the demand for their products for the years (2021-2024) will decrease by 39%.

Meanwhile, 46% of the companies reported an increase in demand for their products in 2021, and about 15% said demand for their products had not changed over this period.

The study showed that the profession of electrical technician/general (6.41%), General Electrical Engineer (6%), general department clerks (4.46%), administrative policy specialists (3.77%), and electrical technician/other (3.18%) are the busiest professions in the electricity supply and renewable energy sector. In regards to the employers' assessment of the volume of demand for their products, 32% of enterprises in this sector announced a decrease in demand for their products in 2021, as well as their expectation that demand for their products will decrease in the years (2021-2024) by 39%. Meanwhile, 46% of the establishments announced a rise in demand for their production in 2021, and about 15% said that demand did not change for their production during that period.

The electricity and renewable energy supply sector focuses mainly on male employment in general; with females in a range of occupations but less percentage. And this Labor demand is more concentrated in the central region.

Overall, the demand for this sector's occupations for the years 2022-2024 is about 1,375 workers will be required, the demand for males is 853 compared to 522 females, and the demand for the years 2022-2024 will be for the occupations of general electrical engineer, mechanic/production, renewable energy engineer, electrical technician/electrical machinery maintenance.

Analysis of the collected data found that 45% of companies in the power and renewable energy utilities industry do not have an interest to employ females within this industry and the main reason was not fully understood. The second main reason is that the profession is not suitable for Female.

Regarding employment of people with disabilities in this sector, the research found that 16 out of 12,833 people were people with disabilities, but overall, 91 companies will offer (115) employment opportunities in various occupations for people with disabilities, such as General Electrical Engineers, Renewable Energy Engineers, and there are other job opportunities requested as non-industrial support professions.

In terms of the experience required in the required employment, employers did not require years of experience. In contrast, (47%) of employers said they were looking for jobs with no skill requirements, and about (18%) said the minimum required experience was that he said two years would be enough.

In terms of recruitment methods, the survey showed that face-to-face direct recruitment was the most common method. As a result of the survey, 158 companies, or 43% of all companies (372 companies), responded that they were having difficulty recruiting, one of these difficulties is the lack of workers with the necessary skills.

In Relating to the laws and regulations, more than 85% of all establishments say regulations and laws have the greatest impact on sector performance. Therefore, (53%) of the total number of establishments cited to measures that discourage investment. 40% of the total number of establishments indicates that weak fiscal incentives contribute to the sector's weakness. 31% indicated that tax increases and these decisions are the most important challenges for the industry.

In terms of training, about 33% of responding companies in this sector indicated that they prefer to train their employees in private sector training centers and hire workers that are trained in the same institutions. The Second preferred training place is Engineer Training Center (19%) and third place is international training centers (13%).

The number of training programs in this field is about 34 and the number of graduates reached 9,069 within 2019-2021. Most of them have a degree in general mechanical engineering at 19%, renewable energy engineers at 15% and electrical technician at 14%. The study also emphasizes the need for training providers to carefully offer employers and companies with the correct needed training programs.

As well as the research, found evidence of gap between supply and demand within the labor market in this sector and the process supply and demand is incompatible. In some specialties, this gap was in favor of supply (an indicator of unemployment) and another in favor of demand, and this gap demonstrates poor planning and lack of alignment between what is needed in the labor market and what Jordanian training providers are offering.

In view of the above, recommendations were made on the formulation of a sector workforce plan in coordination with relevant government agencies; cooperation with the private sector, formation of a commission to develop a sector strategic plan to cover best practices of training and employment.

CHAPTER 1

GENERAL FRAMEWORK OF THE STUDY

1.1 Introduction

Since 2001, as part of the Al Manar project, the National Center for Human Resources Development has developed technical and operational systems and tools for building human resource information systems in Jordan. It has provided a set of key international indicators for HR information systems, adapted to the Jordanian environment, and created the necessary blocks to identify challenges and opportunities in HR information systems.

Despite the significant progress and reforms made in human resource information systems to date, the subject of sectoral research is to identify quantitative labor needs and identify the specific skills required for workers in that sector are still weak, this is because of the lack of effective workforce development plans for key sectors of the labor market and lack of accurate data, which weakening the effectiveness of career guidance processes and reducing labor market efficiency and lead to imbalance within workforce market.

Therefore, the National Center for Human Resource Development, with the support of the Department of Employment, Education and Vocational Skills Training (formerly the Department of Vocational Skills Development), has conducted regular surveys on priority areas in Jordan economy. This included research on the supply and demand sides of labor. Therefore, as a first step in implementing a planned initiative, the National Center for Human Resource Board identified three priority sectors as a first step, later identify six new sectors. Those sectors are agricultural sector, Furniture industry, the apparel industry, financial intermediation and insurance sector, the food, beverage and tobacco industry, and the Power and renewable energy industry.

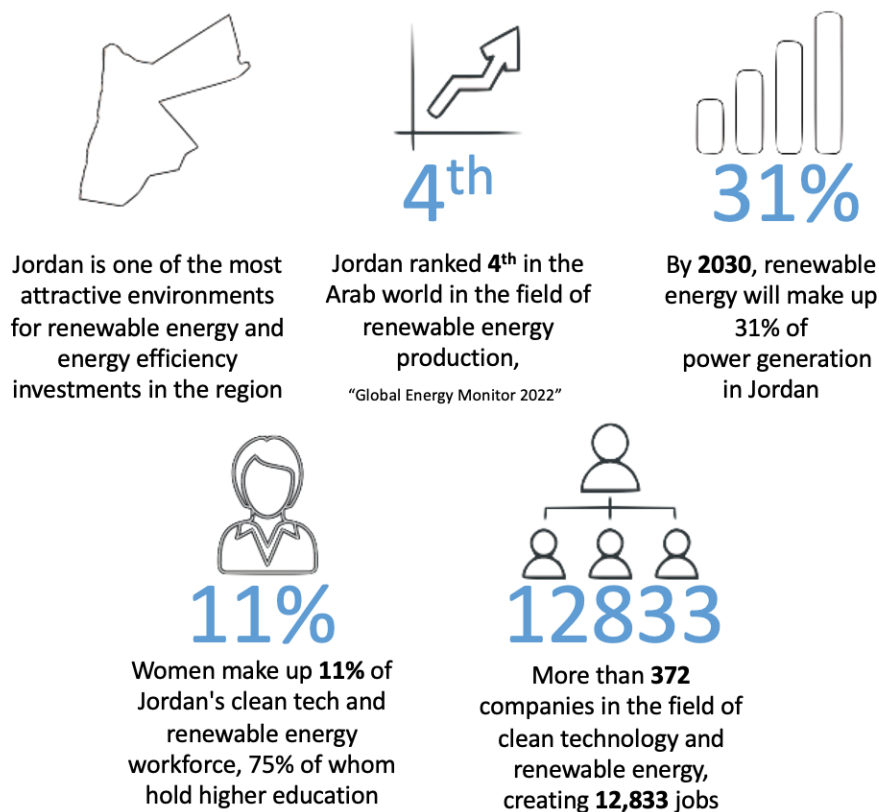
The National Center for Human Resource Development worked with the Department of Vocational and Skills Development, which works with the Department of Statistics, to develop a research plan that include all economic sectors in an annual plan of development. In addition, public and private sector representatives participate in a follow-up process and oversee these researches and reports through an advisory board which will be setup for this purpose.

These studies are in line with the National Human Resources Development Strategy, which calls for the need to align education and training outcomes with the needs of labor market. This can only be done through the existence of sectoral labor market researches and formulation of talent development plans, reveal the gaps; which such research uncovers.

This should help identify quantitative and qualitative sectoral needs for qualifications and skills, then develop potential for job seekers. This will undoubtedly contribute to the optimal utilization of human resources, especially in the areas of employment, training, vocational and technical education, through the planning process of effective labor market programs or through the development and decision-making of strategies. .

1.2 Importance of the study

The significance of this study lies in the fact that it is the first study in the Arab world to attempt to estimate the Jordanian labor market gap in the areas of electricity supply and renewable energy by analyzing the Jordanian labor landscape quantitatively, qualitatively and separately for each sector to derive the degree of homogeneity of the offering represented by the results of the education and training providers of Professional and technical, quantitative and qualitative, with the demand expressed to the needs of the labor market through field research.



On other hand, the importance of this study lies in the fact that it provides an overview of human resource development plans in the target sector and helps supply-side authorities to benefit from the findings of the study in developing academic and training programs, which will reduce imbalances in talent systems and their investments by closing gaps between supply and demand for achieving balance. That may give a positive indicator for a flexibility in education and training process and the ability to respond to labor market demands and the resulting improvement in competitiveness.

1.3 Objectives of the study

This research seeks to achieve a number of objectives, which can be summarized as follows:

1. Identify the required job opportunities/ businesses within the industry.
2. Get an Assessment of current and future demand in the sector.
3. Identify quantitative future employment needs for each occupation in the industry.
4. Identify the current and future training needs of each occupation as required by the industry.
5. Identify the needs of companies operating in this sector by training programs that increase worker efficiency.
6. Examine the tendency of employers to benefit and cooperate with public and private training providers in the preparation and training of workers within the sector.
7. Clarify employers' attitudes and willingness to hire women in their companies.
8. Clarify the attitudes and willingness of employers to employ people with disabilities in their companies.
9. Consider the willingness of public and private training providers to prepare and train the necessary talents and skills.
10. Identify the extent of the gap between demand and supply in the labor market and coordinate with stakeholders to close this gap.
11. Develop human resource development plans and programs in this sector to create efficient and effective human capital.

1.4 Learning problems

This survey will attempt to achieve the above objectives by answering the following questions:

1. What are the characteristics of current electricity and renewable energy workers by occupation, gender, and educational background?
2. What are the characteristics of the programs offered for the electricity and renewable energy sector in terms of length of enrollment and level of education, training institutions and number of graduates?
3. The quantitative and qualitative labor market needs in the electricity supply and renewable energy sector in 2019-2021?
4. What eligibility talents and skills requirements do power and renewable energy sector?
5. What competencies does the training providers offer in each course of study for the electricity and renewable energy sector?
6. What are the current and future employment opportunities for women in power and renewable energy sector?
7. What are the current and future opportunities for training and empowering women in electricity and renewable energy Sector?
8. What are the current and future employment opportunities for persons with disabilities in the electricity and renewable energy sector?
9. What are the current and future options for training persons with disabilities to enter the electricity and renewable energy sector?
10. What challenges do companies face when hiring in the electricity and renewable sector?
11. What are the most important benefits that companies offer their employees in the area of electricity supply and renewable sector?

1.5 Study Methodology

The study covers the demand side of companies working in the electricity and renewable energy sector, by examining current and future staffing and training needs for 2022-2024. As well the study also cover the supply side that training programs providers offer, by surveying their current and future training capabilities within the sector.

1.5.1 The Research and Sample

1.5.1.1 Business needs survey (demand side)

The survey sample is designed to obtain reliable estimates of key survey variables at regional and territory level. The sample survey was designed under the framework of the 2021 General Business Survey conducted by the Department of Statistics Office and classified by the United Nations International Industrial Classification IV (ISIC4 United Nations).

There are many semi-economic activities within this sector.

- ✓ Power generation, transmission and distribution.
- ✓ Manufacturing of solar panels and their parts.
- ✓ Supply, Install, maintenance and design of solar energy systems.
- ✓ Contracting - Renewable Energy Branch.
- ✓ Energy Auditing and Energy Efficiency.
- ✓ Comprehensive public State activities.
- ✓ Efficient organization and participation activities for businesses

For the purposes of this study, the importance of the professions practiced in this field was evaluated by dividing the research into classes to determine the homogeneity and appropriateness of the community according to territories, professions, and worker categories. Table 1 shows the distribution of the establishment as to Governorate category from the 2021 General Business Survey data.

Governorate	No. of Establishment
Amman	212
Balqa	3
Zarqa	9
Madaba	4
Irbid	95
Al Mafrq	14
Jerash	11
Ajlon	3
Kerak	6
Al Tafilah	4
Ma'an	4
Aqaba	7

Table 1 Sample of economic establishments in the electricity and renewable energy supply sector by governorate 2021

1.5.1.2 Training Providers survey (supply side)

The research for this study is made up of the Jordan's main providers of training, vocational and technical education, including:

- 1 Al-Balqa` Applied universities/community colleges in the public and private sector.
- 2 Ministry of Education/Department of Vocational Education.
- 3 Vocational Training Corporation.
- 4 Public and private universities in Jordan.
- 5 Training Center/UNRWA.
- 6 Engineers Training Center.
- 7 Some private training providers.

1.5.2 The Research Tools

Two questionnaires were designed to achieve the survey objectives. The first questionnaire targets the demand side (employers), it provides mainly; information of employee preparation and training, the needs for quantitative employment in various occupations, and the need of talents and skills in various occupations. Provides data on technical and general (employment support) skills. Data on employment of persons with disabilities and types of occupation; data on employment of women in all occupations; data on difficulties employers face, recruitment methods and benefits awarded to employees;

The second questionnaire covers the supply side (training providers), mainly providing data on the training programs available by training providers to the targeted sector occupations, the preparation of enrollees and graduates and their characteristics, courses to enhance the competence of practitioners, training opportunities for persons with disabilities and women, and the orientation of the institution for future expansion of both raining programs and training target groups.

The two questionnaires were developed by researchers at the National Center for Human Resources Development, and were subsequently presented to experts from the Department of Statistics and to members of Advisory Committee. The proposed amendments were considered based on the research objectives; were as amendments/observations, changes/comments that were unanimously approved by the committee. Appropriate adjustments were made in light of their observations.

1.6 Data collection and processing

1.6.1 Companies survey (demand side)

The survey data collection from establishments was carried out according to the following procedures:

- Creation of a guideline for field researchers (data collectors) to complete questionnaires. It contains the necessary descriptions for all questionnaire questions.
- Creation of a guideline that describes the conditions for inputting survey data and information obtained from questionnaires.
- Selection and training of field research teams (male and female) to collect data, managed by a group of supervisors trained at the Statistics Training Center to conduct survey and complete questionnaires.
- Filling out survey questionnaires through a personal interview by field researchers (data collectors) with concerned people in the institutions/companies covered by the survey.
- Checking the filled-out questionnaires and coding them by the team assigned from Department of Statistics.
- Entering data into the computer, and create data tables for analytics.

1.6.2 Training Providers survey (supply side)

Training provider survey data collection was carried out in accordance with the following procedures:

- Assigning a working team whom are representative of the main vocational, technical education and training agencies in Jordan to collect the necessary survey data.
- Holding a session for team members at the National Center for Human Resources Development, during which participants were introduced to the survey tool and the requirements for filling it out, and trained on the mechanism for filling out the questionnaires.
- A session held for team members at the National Center for Human Resources Development, during which participants were introduced to the survey tool and the requirements for filling, and trained them on the mechanism for filling out the questionnaires.
- Fill out the questionnaires via Personal interviews (data collectors) with the relevant employees of the training bodies covered by the survey.
- Checking the filled-out questionnaires and coding them by the team assigned from National Center for Human Resources Development.
- Entering data into the computer, and create data tables for analytics.

1.7 Study limitations

Data were collected in (2021) which preceded the global political developments, that affected the economic aspects globally, regionally and locally, as well as the amendments that occurred on the pricing of the electricity bill and new electricity and renewable energy regulations.

1.8 Data tabulation and dissemination

The intersections, recurrent tables and graphs necessary for the presentation of the study were identified after approval by the members of the Advisory Committee. The raw data tables were processed by the programming specialists for appropriate extraction and presentation and are included in the present report, which also contains a summary of the main findings and recommendations of the study.

CHAPTER 2

DEMAND-SIDE ANALYSIS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR

2 Demand-side analysis in the electricity supply and renewable energy sector

2.1 Electricity supply and renewable energy sector facilities

Number of establishments in the electricity and renewable energy supply sector has reached (372) company by 2021; based on the survey conducted by the Department of Statistics, distributed (61%) in the Central Territory, about (33%) in the North Territory, and (6%) in the South Territory.

Province/ Territory	Number of Establishments
Central Territory	228
Amman	212
Balqa	3
Zarqa	9
Madaba	4
North Territory	123
Irbid	95
Mafraq	14
Jerash	11
Ajloun	3
South Territory	21
Kerak	6
Tafila	4
Maan	4
Aqaba	7
TOTAL	372

Table 2 Distribution of facilities in the electricity supply and renewable energy sector by region / governorate

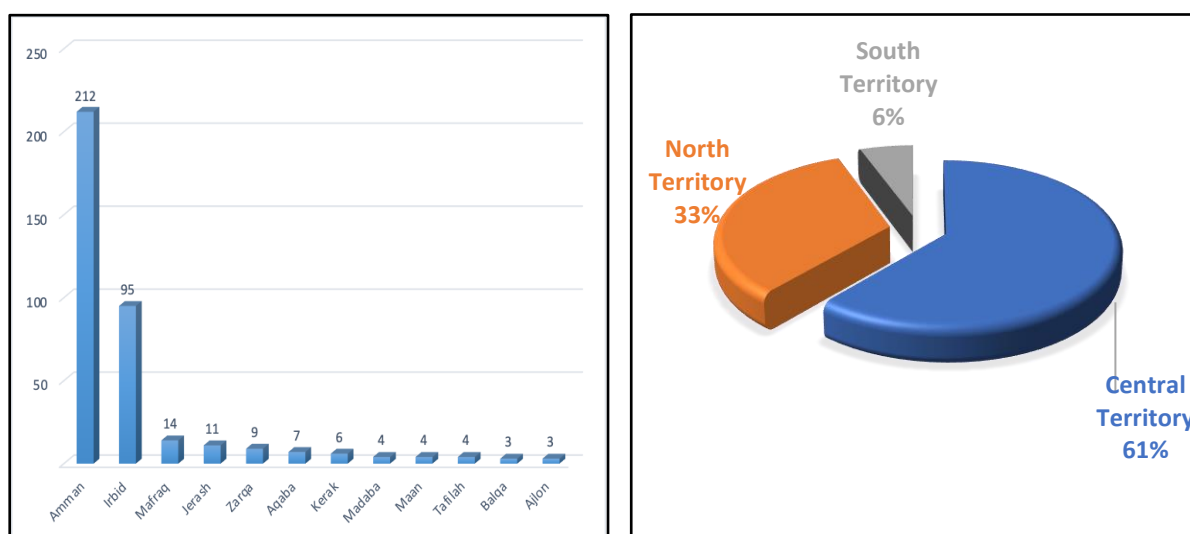


Chart 1 Distribution of Companies in the electricity supply and renewable energy sector by region / governorate

The study showed that the number of companies working in Electricity and Renewable Energy Sector varied in terms of their establishment between 1950 - 2021, employ about (12,833) male and female workers.

The Study indicated that the majority of the companies covered by the survey which is about (87%) of the companies began providing their service in 2013, This is due to the issuance of Renewable Energy and Energy Efficiency Regulation and Law No. (13) and its amendments in the year 2012, This Law formed the first legal basis specifically for renewable energy.

start year	Number of Companies	start year	Number of Companies
1950	1	2007	4
1957	1	2008	3
1978	3	2009	1
1984	1	2010	1
1989	1	2011	5
1991	3	2012	7
1995	1	2013	20
1996	1	2014	24
1997	1	2015	22
1998	1	2016	25
2001	2	2017	39
2002	3	2018	44
2003	2	2019	59
2004	1	2020	69
2006	5	2021	23
Total Companies		372	

Table 3 Distribution of Companies according to the year of service commencement

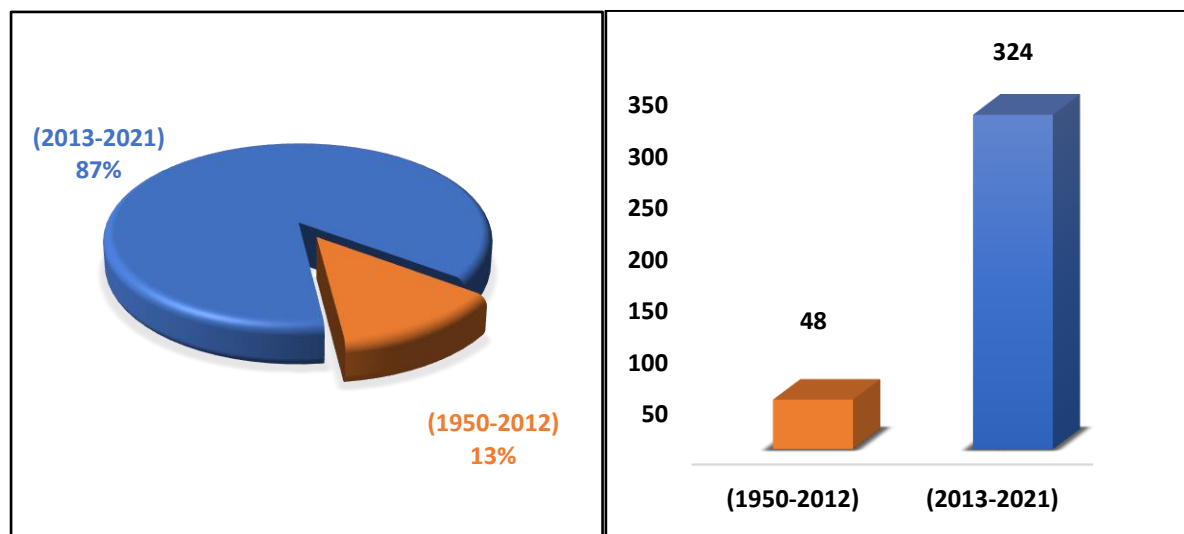


Chart 2 Distribution of Companies according to the year of service commencement

The table below indicates that the vast majority of facilities operating this sector are individual establishments, as approximately (56%) according to their legal entity, solidarity enterprises constitute (5%), and about (34%) are enterprises with limited liability.

The Legal Entity of The Companies	TOTAL
Individual Establishments	208
Solidarity Company	18
A Limited Liability Company	125
Simple Recommendation Company	3
Public Shareholding Company	11
Foreign	5
Governmental	2
TOTAL	372

Table 4 Distribution of companies in the sector by legal entity and region

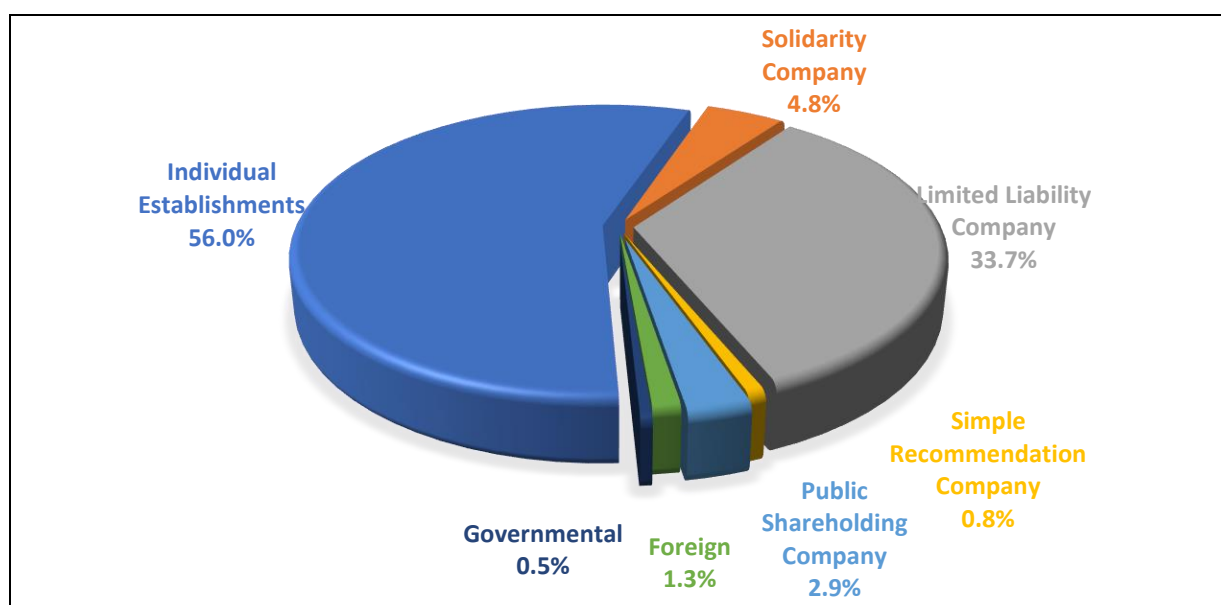


Chart 3 Distribution of companies in the sector by legal entity and region

Based on the survey results, companies in the Electricity and renewable energy supply sector can be divided into three main groups:

- Small businesses (1-4 employees) (18%);
- Medium-Sized businesses (5 -19 employees) are highly spread across all regions (68%);
- Large businesses (20-100+ employees) (14%)

Business Size	Central Territory	North Territory	South Territory	TOTAL
Small	53	10	5	68
Medium	128	110	13	251
Large	47	3	3	53
TOTAL	228	123	21	372

Table 5 Distribution of Companies in the sector according to the size of the Company and the region

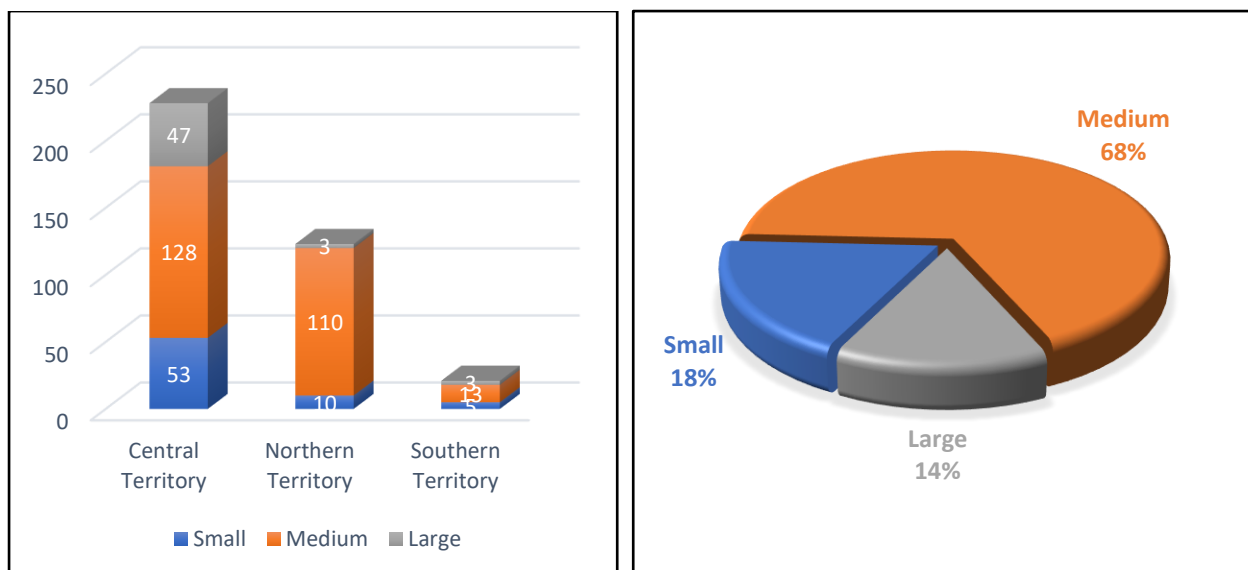


Chart 4 Distribution of Companies in the sector according to the Size of the Company and the Territories

Table (6) shows the distribution of companies in the electricity and renewable energy sector by company size, territory and gender. It is also noted that the vast majority of company in the north and south are small-sized businesses.

Company size	Central Territory			North Territory			South Territory		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Small	126	16	142	38	0	38	13	0	13
Medium	1002	167	1,061	791	93	884	90	13	103
Large	8,128	974	9,102	1150	103	1252	127	3	130
TOTAL	9,256	1,157	10,413	1,979	196	2,175	229	16	245

Table 6 Distribution of workers in sector by Company Size, Territories and Gender

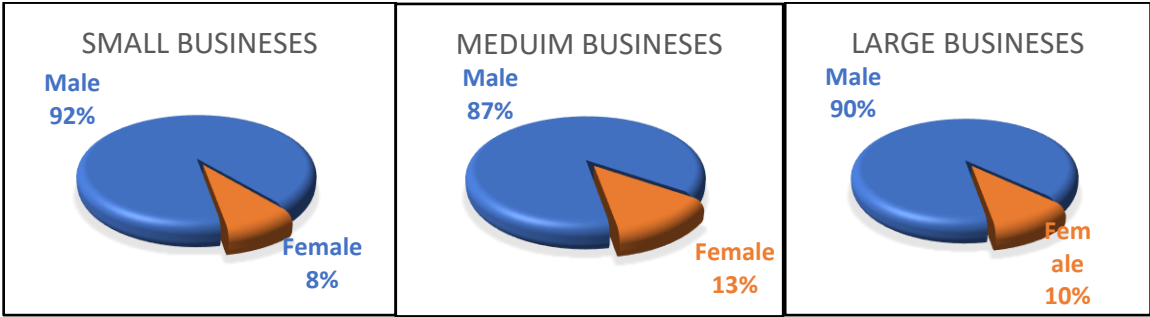
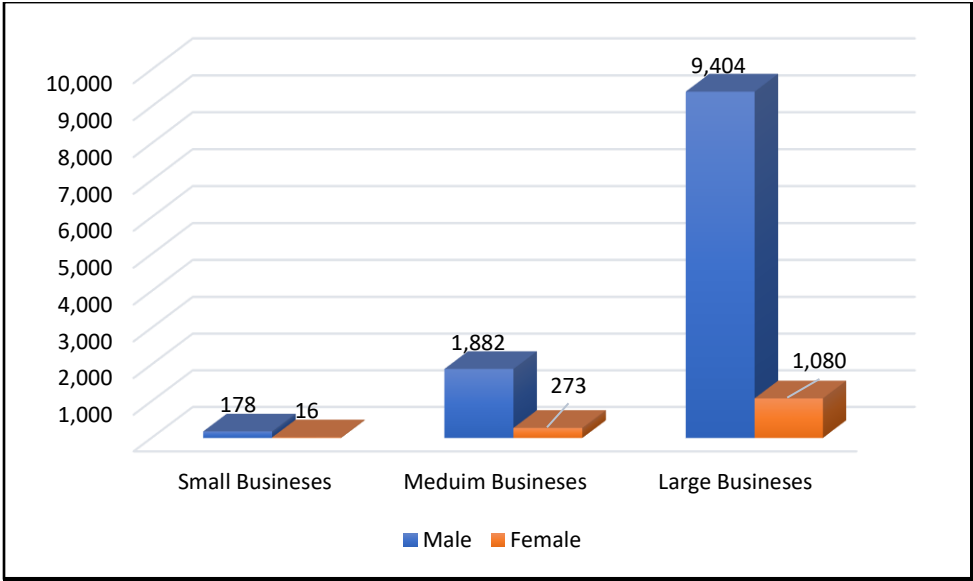


Chart 5 Distribution of workers in the sector by company Size and Gender

Chart.5 shows that male workers outnumber female workers in small, medium and large companies, accounting for 89% of all employees. Similarly, the number of male workers is much higher in all regions compared to female workers.

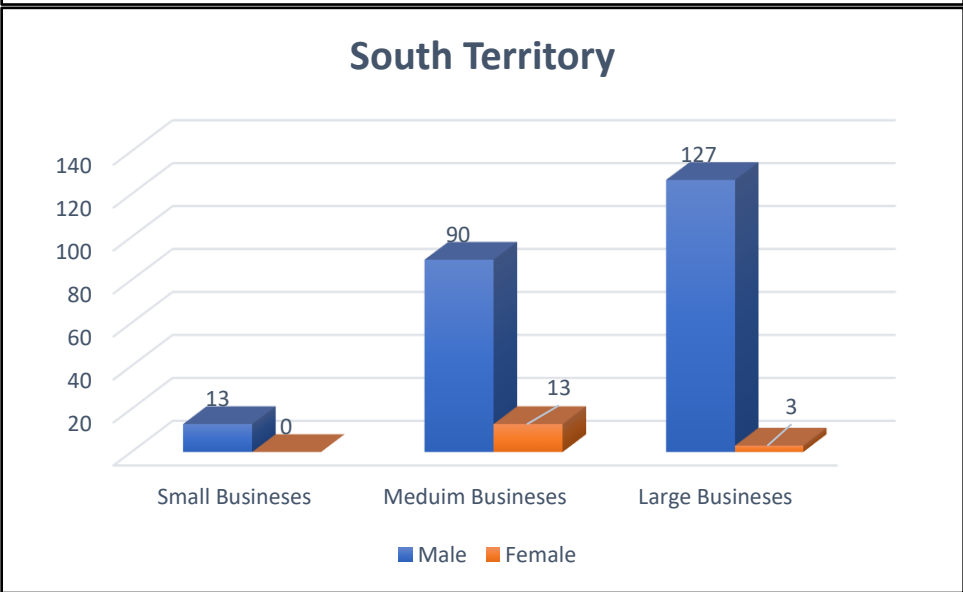
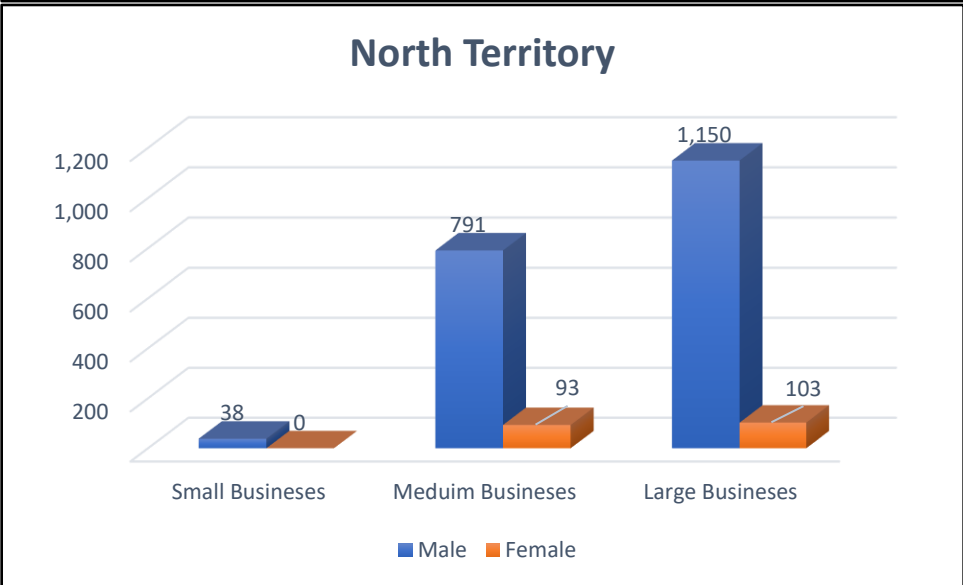
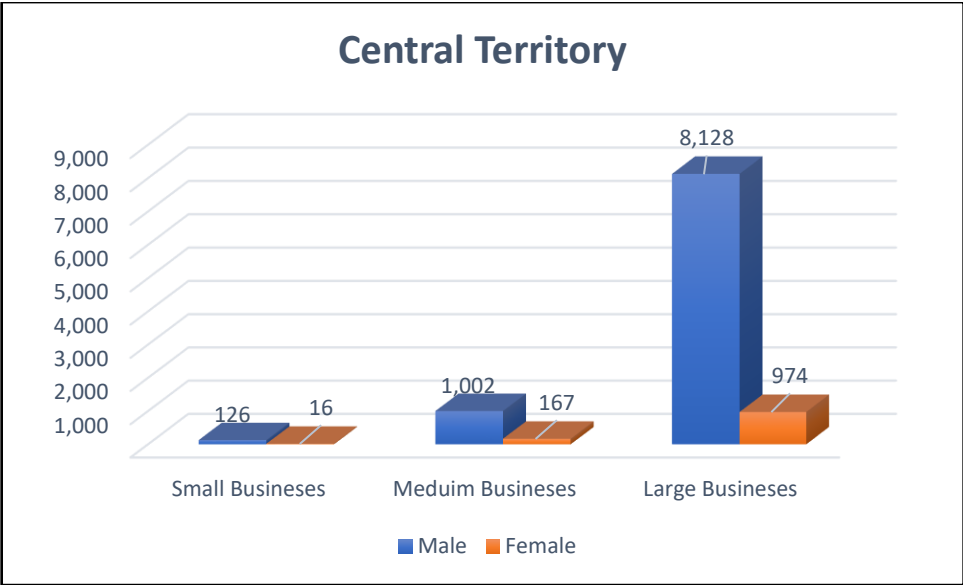


Chart 6 Distribution of workers in the sector by company Size and Gender within the Territories

The study showed that that workers (Male and Female) are centered in the central territory than in the north and south territories.

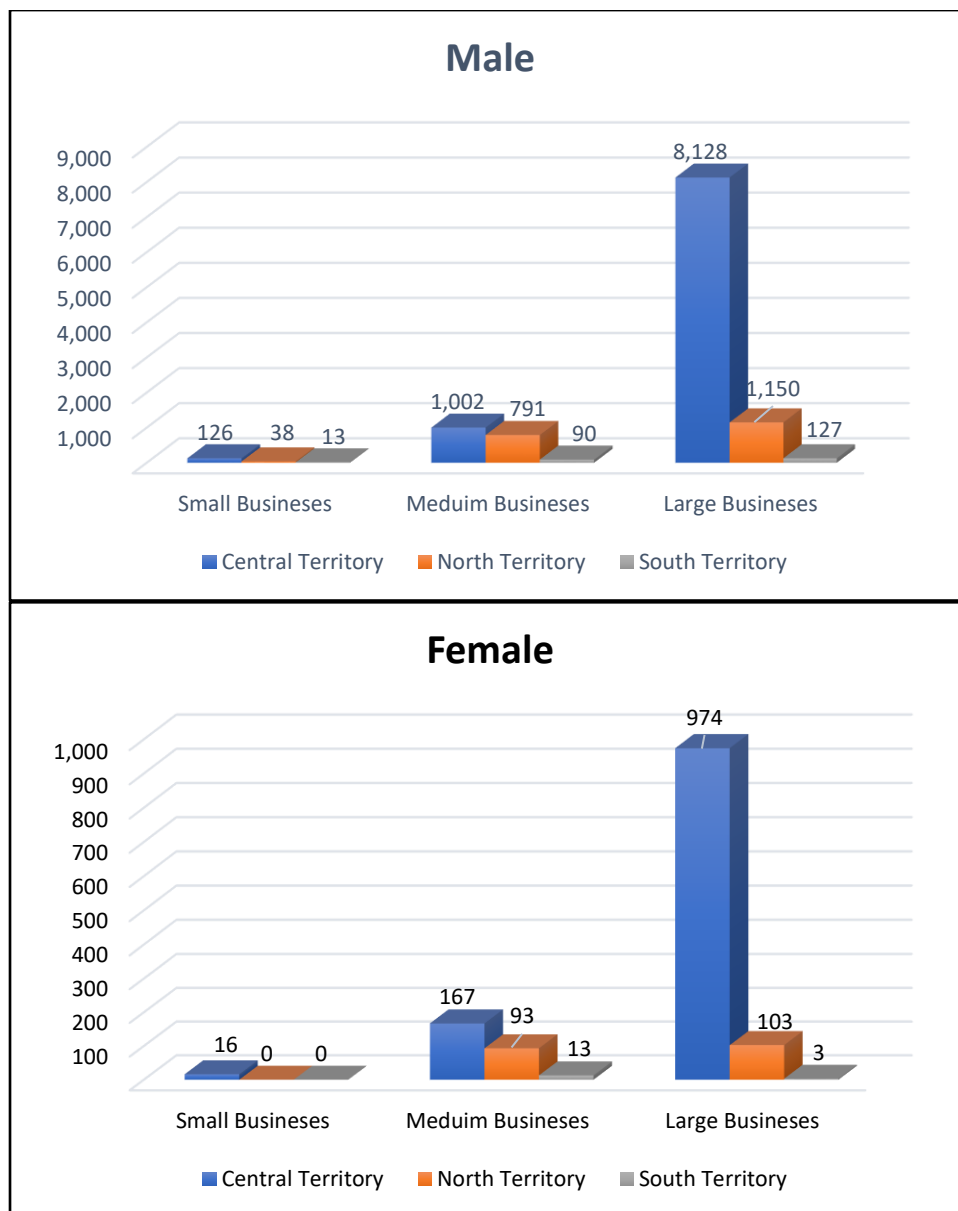


Chart 7 Distribution of companies in the sector by Gender and Territory

Regarding the employer's assessment of their performance, (32%) of the companies in this sector reported a decrease in the demand for their products in the year 2021, and also expected more decrease in demand for their products in years (2021-2024). On the other hand, (46%) of the companies said demand for products was high over the same period, and about (15%) firms said demand for products had not changed over the same period. As for the future demand forecasts for the period (2022-2024), the majority of companies' expectations were downward in demand for their products.

Employers' assessment of the volume of demand for their products varies by facility size, as the majority of medium-sized businesses report demand for their products will decline in 2023 (65%), as is the case for medium-sized companies (54%), while large companies expect demand to increase (39%)

Assessment	No. of Companies	No. Workers	Small Business	Medium Business	Large Business
Rise	171	6,088	32	108	31
No Changes	57	5,668	10	29	19
Drop	118	913	19	95	4
Undefined	26	164	6	19	0
Total	372	12,833	68	251	54

Table 7 Distribution of companies and workers in the sector according to the employers' assessment of demand for their products for the year 2021

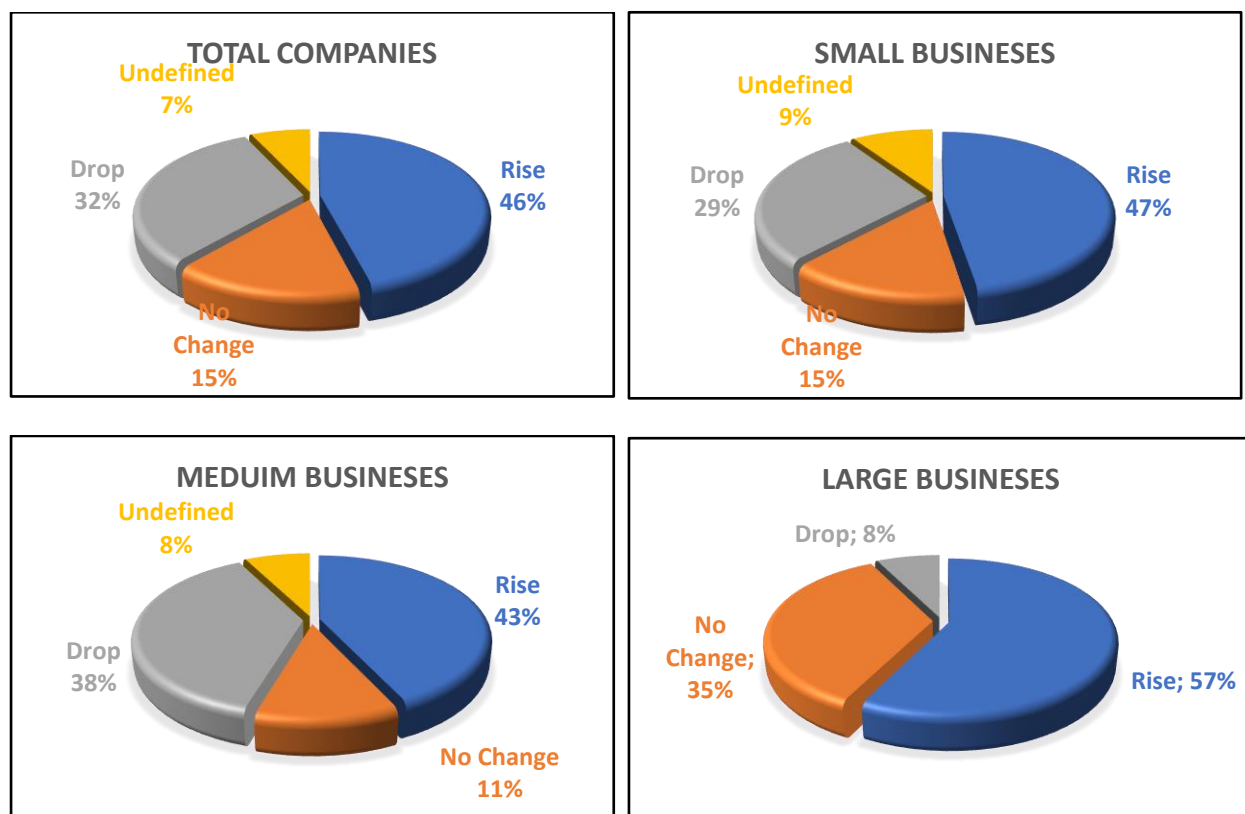


Chart 8 Distribution of companies and workers in the sector according to the employers' assessment of demand for their products for the year 2021

Assessment	2022	2023	2024
Rise	174	171	169
No Changes	72	57	48
Drop	119	118	120
Undefined	6	26	35

Table 8 Distribution of companies in the sector according to employers' expectations of demand for their products for the years(2022-2024)

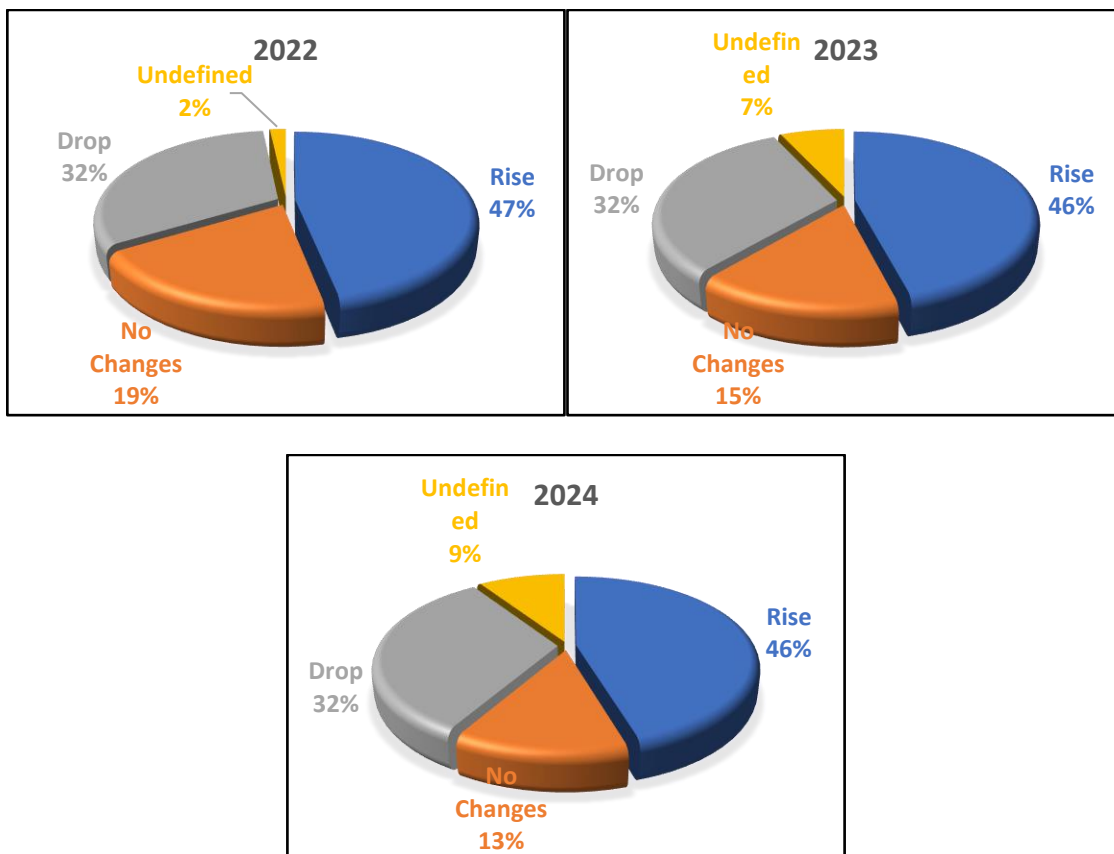


Chart 9 Distribution of companies in the sector according to employers' expectations of demand for their products for the years(2022-2024)

It should be taken into account the reflection of current political and economic changes, as well as directives and legislation for the years (2022-2024) on the employers' negative future projections.

2.2 Corona Pandemic and its effects

The corona pandemic started slowly in early 2020, then accelerated, leading to widespread shutdowns in various sectors, including the electricity and renewable energy sector. (82%) of the companies confirmed its negative impact on their businesses, (15%) were not affected by this pandemic. Only (3%) showed a positive effect.

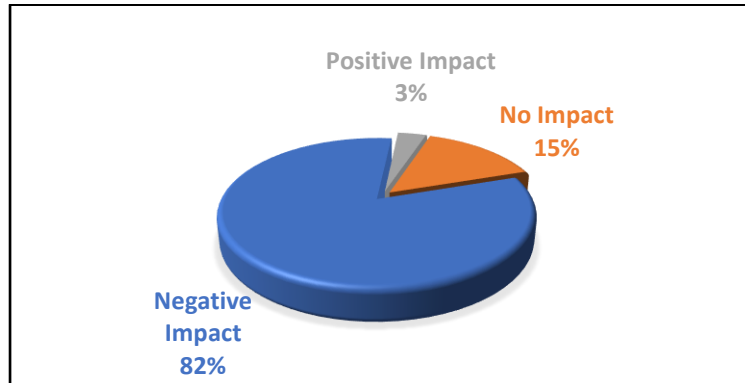


Chart 10 Distribution on companies according to the impact of the Corona pandemic

2.3 Quantitative and Qualitative characteristics of workers in the Electricity and Renewable Energy Supply sector

Data analysis showed that the number of workers in the Electricity and Renewable Energy sector is (12,833) workers in 2021, distributed among a majority of (89%) for Male, compared to only (11%) Female.

Identifying the general educational background qualifications of workers, the data showed that the majority of working males hold a bachelor's degree, at a rate (31%), followed by an intermediate diploma (28%) and approximately (25%) for high school certification. On the other side; the majority of females have a bachelor's degree qualification, with a percentage of (69%), then Intermediate diploma (13%) and about (2%) for high school certification.

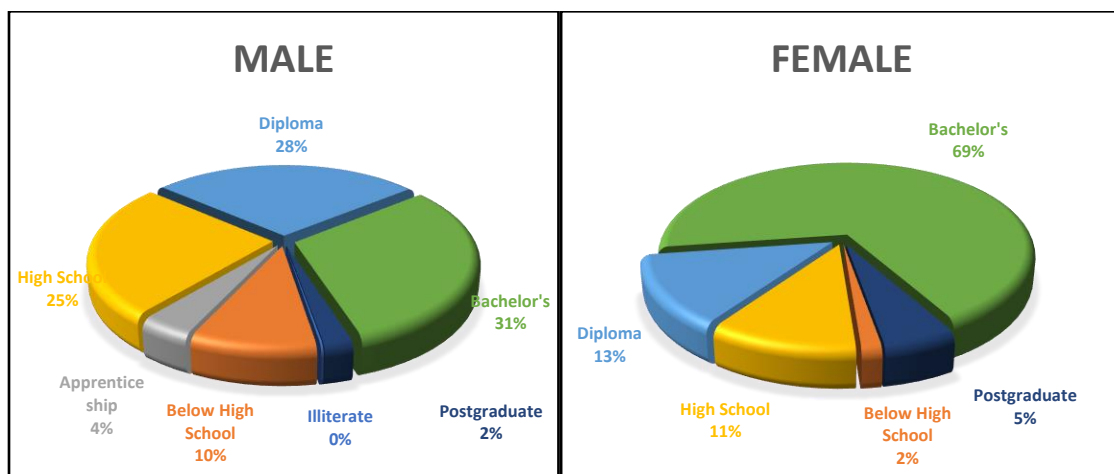


Chart 11 Distribution of workers in the sector by Gender and Educational qualifications

Educational Qualification	Male	Female	Total
Illiterate	20	0	20
Below High School	1104	21	1125
Apprenticeship	469	0	469
High School	2887	151	3039
Intermediate Diploma	3198	178	3376
Bachelor's	3532	945	4477
Postgraduate	253	75	328
TOTAL	11464	1370	12833

Table 9 Distribution of workers in the sector by Educational Qualification and Gender

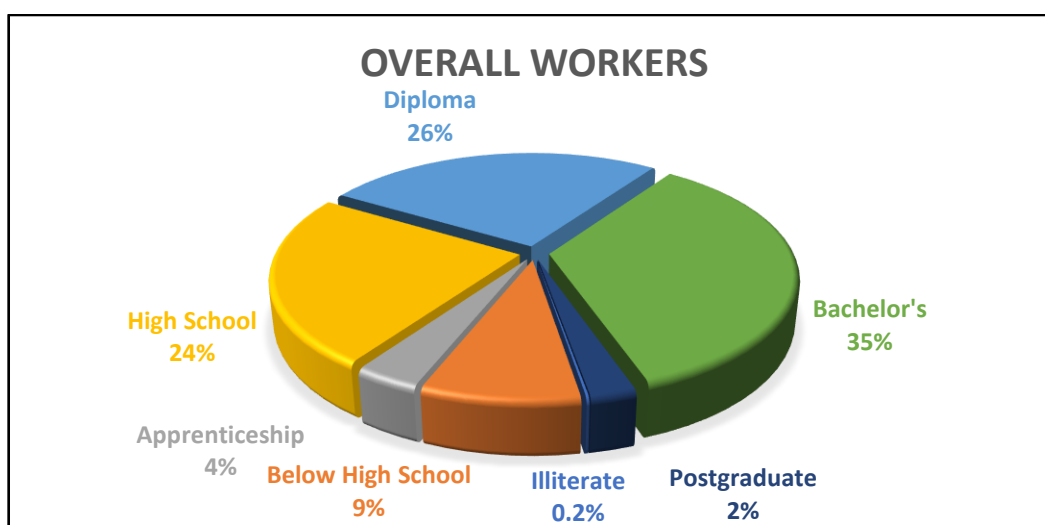


Chart 12 Distribution of workers in the sector by Educational Qualification and Gender

At the territorial level, data shows that in the Central Territory (35%) of workers hold a bachelor's degree, followed by those with a high school diploma at the rate (26%). Whereas In the North Territory, the proportion of holders of an intermediate diploma is (54%), followed by holders of a bachelor's degree (32%). For the South Territory, (56%) hold a bachelor's degree and about (19%) have a high school certification.

Educational Qualification	Central Territory	North Territory	South Territory	Total
Illiterate	20	0	0	20
Below High School	1,112	3	10	1,125
Apprenticeship	460	0	9	469
High School	2,696	296	46	3,039
Intermediate Diploma	2,167	1,168	41	3,376
Bachelor's	3,636	702	139	4,477
Postgraduate	322	6	0	328
TOTAL	10,413	2,175	245	12,833

Table 10 Distribution of workers in the sector by Educational Qualification and Territory

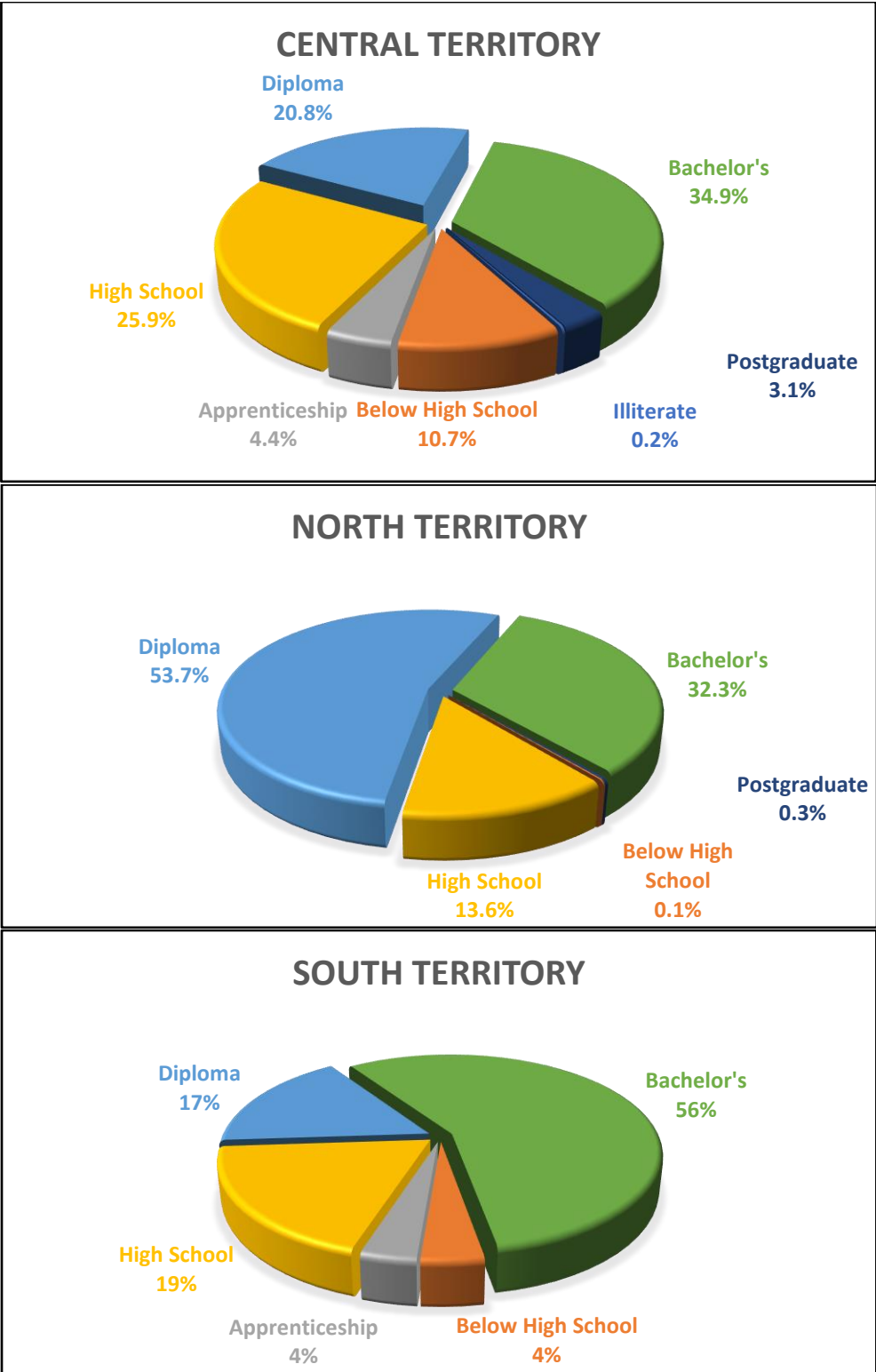


Chart 13 Distribution of workers in the sector according to educational qualifications within territories

Referring to Table (10), the busiest occupation in the field of electricity supply and renewable energy were; Electrical Technician/General (6.41%), General Electrical Engineer (6%), General Service Clerk (4.4 %), administrative policy specialist (3.77%) and electrical technician / other (3.18%).

On Territory level; central territory, the occupations of general electrical engineer, programmer, general departments clerks, and administrative policy specialists) were the most occupied. While in the North, occupations (electrical technician/ general, electrical/general engineer, mechanical technician, electrical technician) are the most popular occupations of workers in this field. In the South territory, occupations (general electrical engineer, solar panel cleaning technician, Solar power system operator, renewable energy engineer) are the busiest occupations.

Occupation	Central Territory		Northern Territory		Southern Territory		TOTAL
	Male	Female	Male	Female	Male	Female	
Electrical Technician/General	378		433		12		823
Electrical Engineer/General	448	88	153	44	30	5	768
Electrical Technician/Other	309		98				407
Solar power system operator	299		44		20		363
Renewable energy engineer	280	32	27	5	16	3	363
Electrical assistant / wiring	351						351
Electricity Meter Readers	151		177				328
General Mechanical Engineer	189	17	70	1	6		283
Electrical Engineer/ Other (specify).	248	18	7		1		274
Mechanical Technician / Production	110		155		5		270
Electrical Power / Monitoring Engineer	134	26	86	1	9		256
Mechanical Technician / Maintenance	190	1	9		1		201
Electrical Technician / General	196						196
Electrical Engineer / Maintenance	128	52	2		3		185
Electrical Technician / General Residential and Industrial	182						182
Electrical Technician/Maintenance of Electrical Machines	61	10	74		16		161
Solar panel cleaning technician	111	2			32		145
Electrician / winding electrical machines	144						144
Electrical/Electromechanical Technician	118	2					120
Electrical Engineer /Distribution	25	40	35				100
Communications engineering technicians	99						99
Electrical/maintenance of machines and general switches	89						89
Electrical Technician/Electrical Protection Systems	76		7				83
Electrical/transformation station installation	78						78
Electrician / installation and maintenance of overhead lines - distribution	67						67
Electrician / installation and maintenance of overhead lines - public transport	64						64
Mechanical Engineer /Maintenance	23	4	2	8	12		49

Occupation	Central Territory		Northern Territory		Southern Territory		TOTAL
	Male	Female	Male	Female	Male	Female	
Electronic Technician/General	49						49
Electrician / Electric Lines - Distribution	24		23				47
Electrical Technician /Precision Instrumentation	1		45				46
Project Manager	34	1	1		5		41
Electrical Engineer / Electromechanical	33	2	1		1		37
Mechanical Engineer / HVAC	32	1	1				34
Electrical engineer/autotronics	32	1					33
Telecom Engineers	24	5		1			30
Electrical Engineer /Extension	21		9	1			31
Electrical Engineer /Protection	24	2		1	2		29
Renewable Power plant operator	23		6				29
Systems administrators	17	10					27
Mechanical Engineer / Production	12	12					24
Electrician / operation, installation and maintenance of generating stations	23						23
Electronic engineer /computer	14	2	3	3			22
Electronic engineer /computer	18	3					21
Power plant operators	19						19
IT technician	17						17
Mechanical Engineer/ Other	12	2	2				16
Electronic technician /computer	11	3					14
Operations Manager (Aluminium, Iron, Metals)	9	2					11
Electrician / electric lines - transmission	7						7
Application software programmers	5	1	1				7
Graphics Designer	5	2					7
Research and development managers	4	2					6
Assembly worker/ electrical distribution boards	5						5
Electrical Engineer /Transportation	1	4					5
Network Engineer			5				5
Electronic engineer / General	1	2	1				4
Marketing Supervisor/ Administrator	1						1
Electrician/ other	1						1
Electrician /Precision Equipment Maintenance	1						1
Computer and systems manager	1						1
Other support professions	4227	808	500	130	59	9	5733
TOTAL	9,256	1,157	1,979	196	229	16	12,833

Table 11 Distribution of workers in the sector by profession, gender and Territory

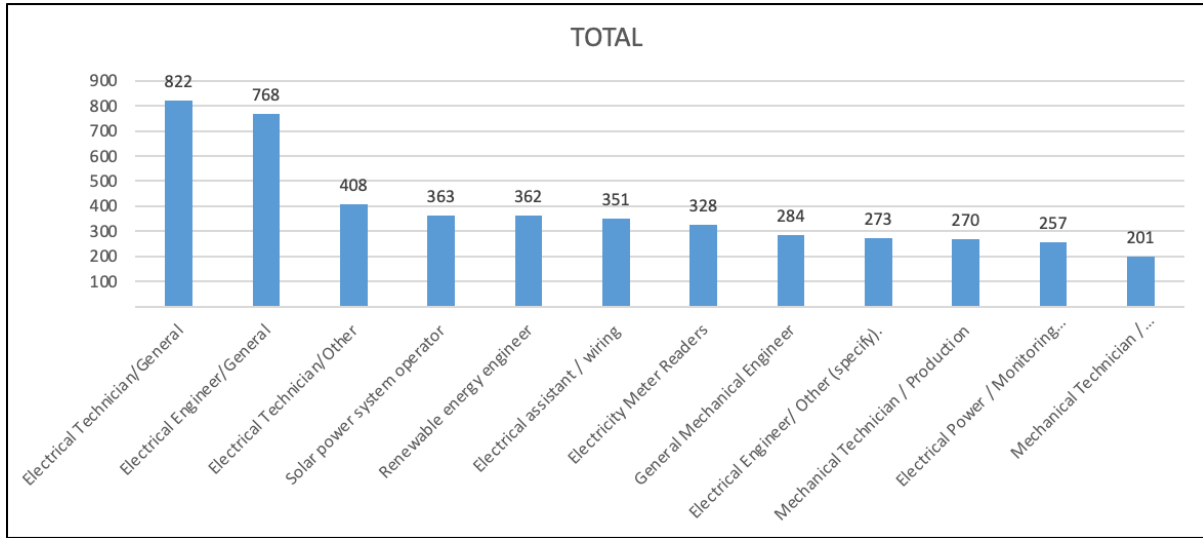
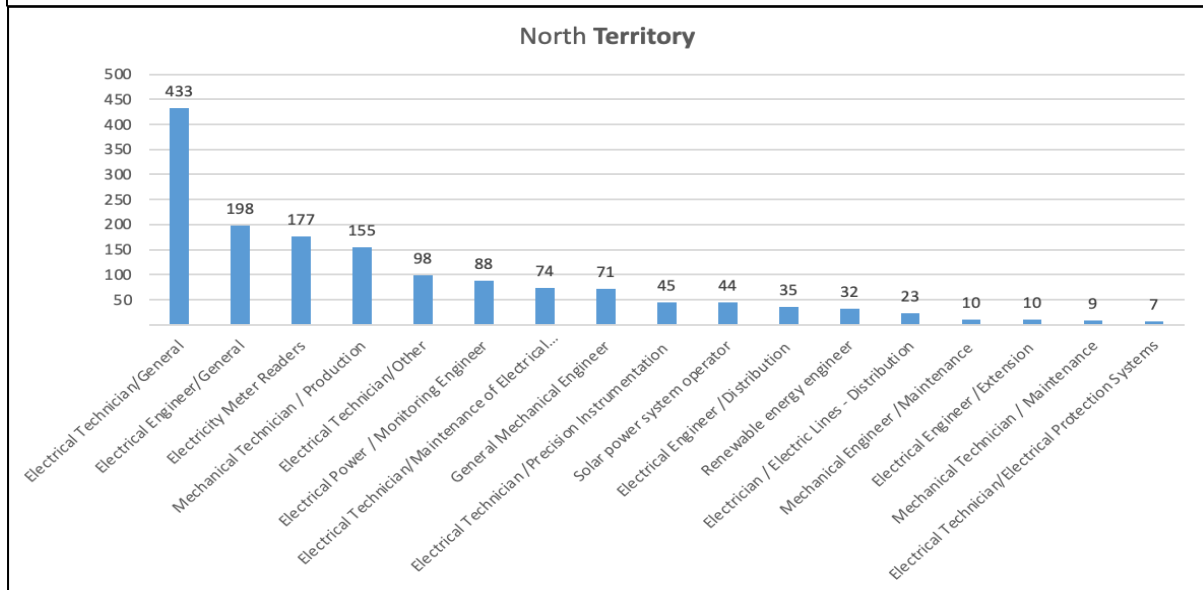
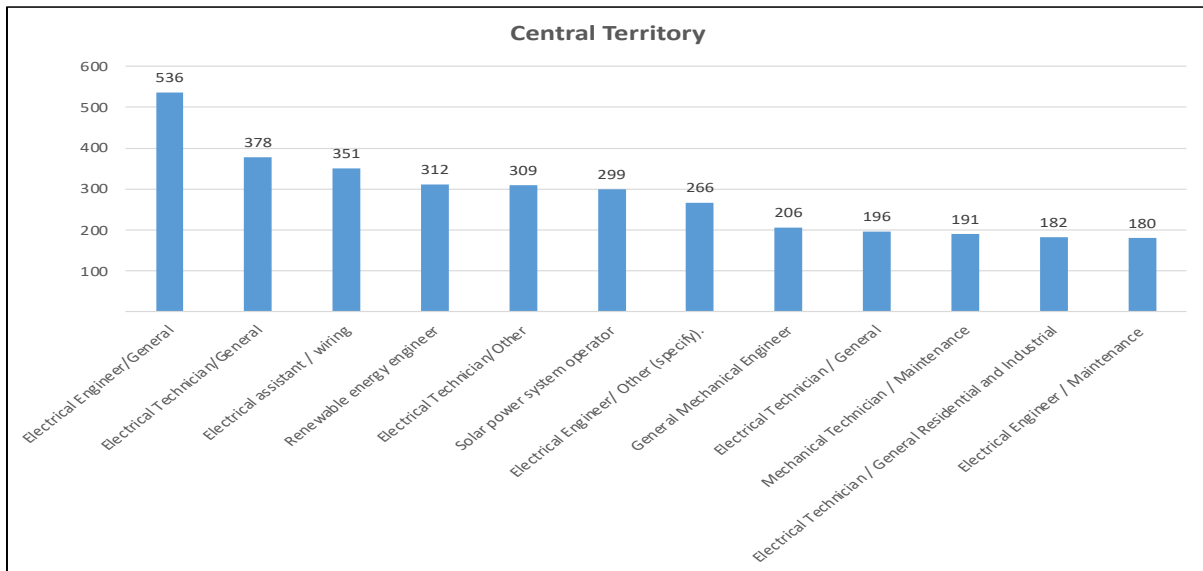


Chart 14 Distribution workers In the sector by most occupied Occupations



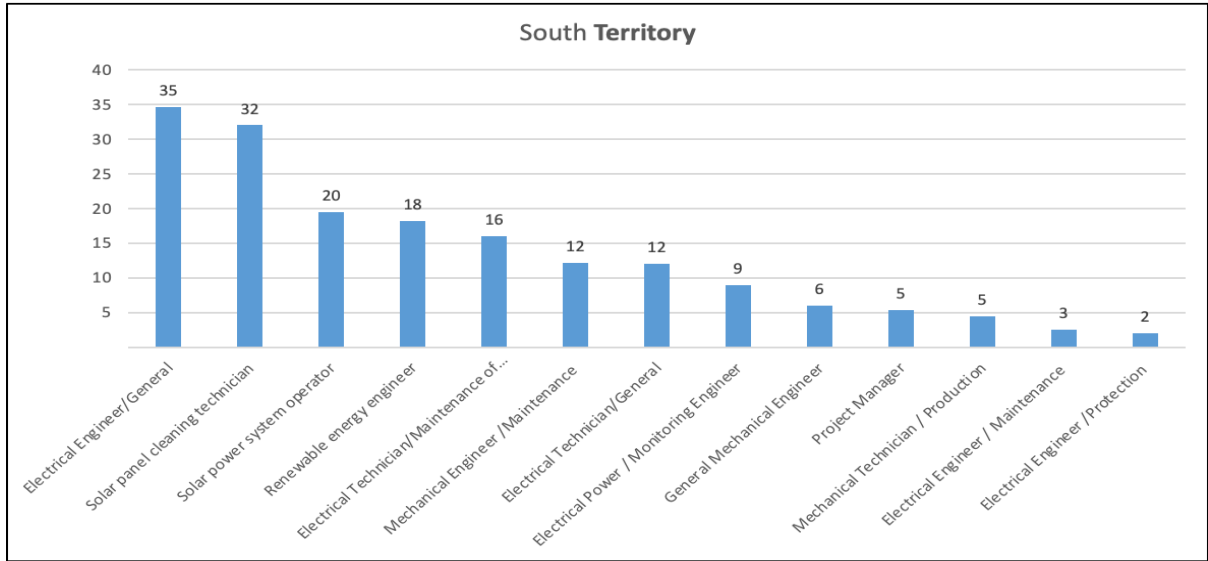


Chart 15 Distribution of workers in the sector by profession and Territory

In general, with regard the nationality of employee in this sector, (99%) are Jordanian compared to only non-Jordanians (1%), The ratios are as to territories North, Central and South (97%, 94% and 91%) respectively

Nationality	Central Territory		North Territory		South Territory		TOTAL
	Male	Female	Male	Female	Male	Female	
Jordanian	9,156	1,147	1,960	196	228	16	12,703
Non-Jordanian	100	10	18		2		130
TOTAL	9,256	1,157	1,979	196	229	16	12,833

Table 12 Distribution of workers in the sector by Nationality

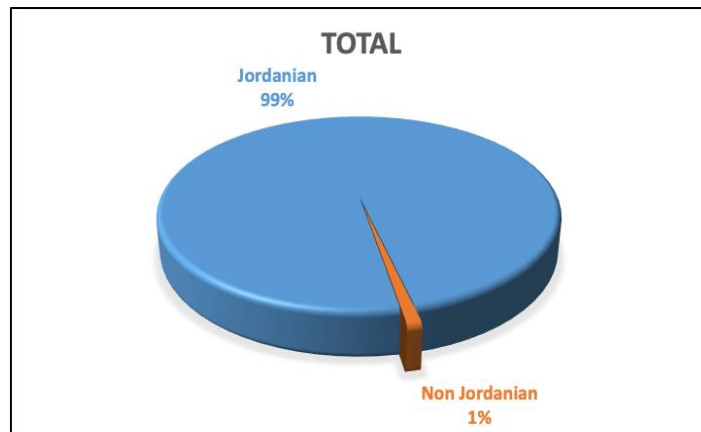


Chart 16 Distribution of workers in the sector by Nationality

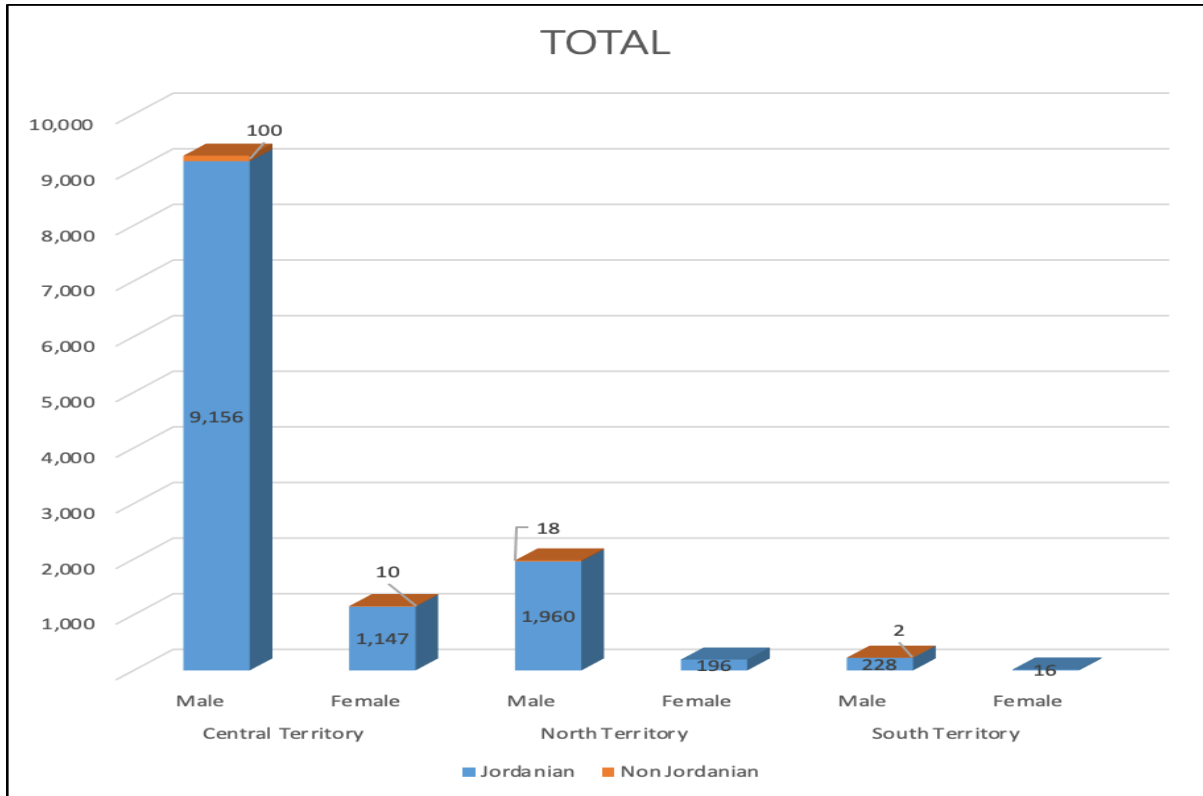


Chart 17 Distribution of employees in sector according to the Nationality, Gender and the Territory

2.4 Current and Future training needs of Companies in the electricity supply and renewable energy sector.

The results of the analysis of the collected data show that many facilities operating in the field of electricity supply and renewable energy do not have training or service facilities. And (about 33%) of industry respondents said they prefer to train their workers at private sector training centers and prefer to hire trained workers in the same facility. Engineering Training Centers ranked second preferable with the rate (19%), followed by oversea International global training centers with (13%).

Training Body	Number of Companies
Vocational Training Corporation	8
National Company for Employment and Vocational Training	34
Training centers/private sector	271
Abroad	91
Engineers Training Center	135
Jordan University of Science and Technology	11
Al al-Bayt University	3
University of Irbid	3
Balqa Applied University	4
Yarmouk University	25
Tafila Technical University	3
Pioneers Training Academy and consulting	3
Other	130
TOTAL	723

Table 13 Distribution of facilities in the sector by Preferred Training Body

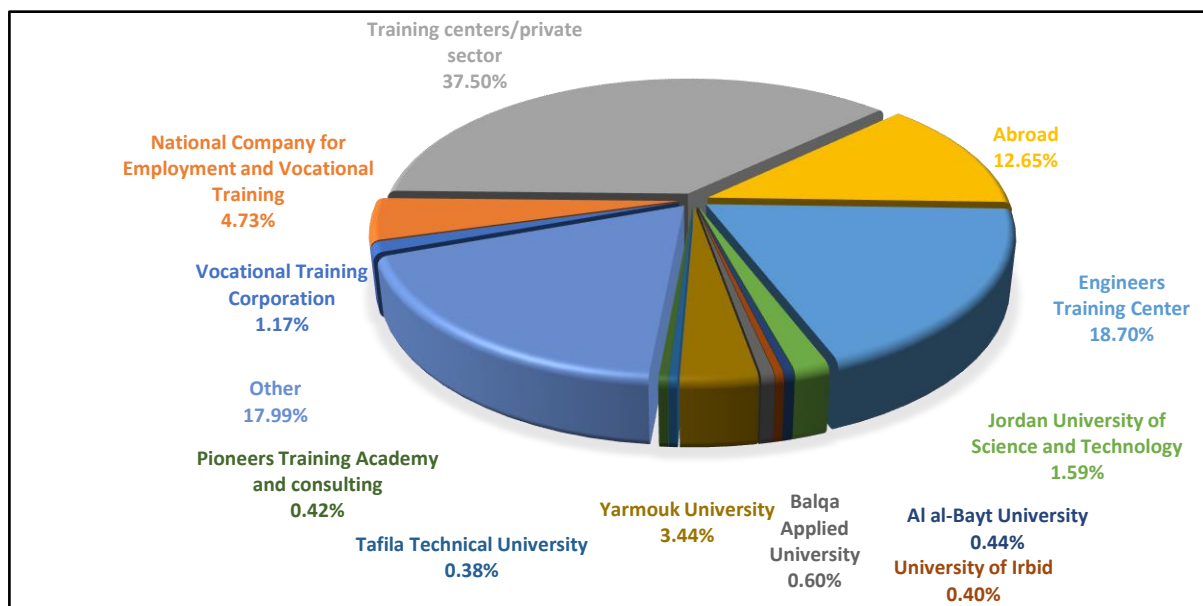


Chart 18 Distribution of facilities in the sector by Preferred Training Body

The study results show that the years (2022-2024) are planned for training workers in the training programs indicated in the three regions of the Kingdom, and the training rate in the Central Territory is high (85%), the southern region is the least popular (3%).

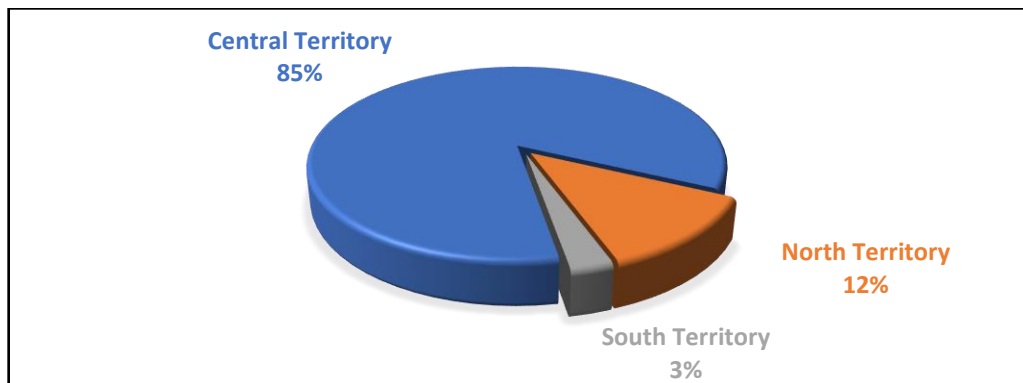


Chart 19 Distribution of training programs in the sector by Regions

South Territory	North Territory	Central Territory
Preparing preventive and curative maintenance programs	Energy Audit and Energy Efficiency	Preparing preventive and curative maintenance programs
Energy Audit and Energy Efficiency	Preparing preventive and curative maintenance programs	Energy Audit and Energy Efficiency
Preparation of operating and maintenance programs for electrical equipment	Preparing designs for renewable energy systems	Preparing designs for renewable energy systems
Interior and exterior lighting design for buildings and control rooms	Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	Prepare and design the distribution network of heating, cooling and sewage systems for projects and buildings
Preparing designs for renewable energy systems	Diagnosing electrical faults in the operating circuits of electrical devices and equipment of all kinds	Preparing designs for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects
Testing of insulation, grounding, rotation, cooling systems, etc. for control machines.	Studying electrical diagrams of devices and equipment in industrial and engineering projects	Installation and operation of protection systems for measuring devices

South Territory	North Territory	Central Territory
Diagnose mechanical faults on different production lines	Preparation of operating and maintenance programs for electrical equipment	Studying the executive fees for welding work requests, estimating the quantities of necessary work materials, providing them and matching their specifications
Preparing plans to reduce the cost of purchasing energy Defining reduction measures wastage	Installation cost analysis	Study diagrams of drive and control machines and electrical machines of alternating and direct current, such as: conveyors, winches and industrial machines
Operation and control of solar energy modules Maintaining the acid level in electric energy storage batteries	Designing electrical protection and protection systems for transformers and generators according to their capabilities and types	Preparing designs and blueprints for mechanical systems
Preparing designs of single-line diagram for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects	Inspect equipment after maintenance procedures and lose it	Defining control systems in engineering projects
Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	Implementation of welding operations in different welding positions ground, vertical, horizontal and over the head	Conducting economic feasibility studies, reports and studies
Designing electrical protection and protection systems for transformers and generators according to their capabilities and types	Studying the executive fees for welding work requests, estimating the quantities of necessary work materials, providing them and matching their specifications	Implementation of welding operations in different welding positions ground, vertical and horizontal and above the head

Table 14 Distribution of facilities in the sector according to the most requested Training Programs within Regions

2.5 The needs of the electricity supply and renewable energy sector companies for the Quantity of employees and their characteristics.

The electricity supply and renewable energy industry focuses mainly on male employment where in which Female join a lower proportion of occupations and job demand is more concentrated in the Central Territory, the demand in this field for the years (2022-2024) is approximately (1,375 workers, in which the demand for Male is (853) compared to (522) for Female. in 2023 will be approximately 33% below demand compared to 2022, while a greater decline is expected in the year 2024 of approximately (8%) compared with 2023.

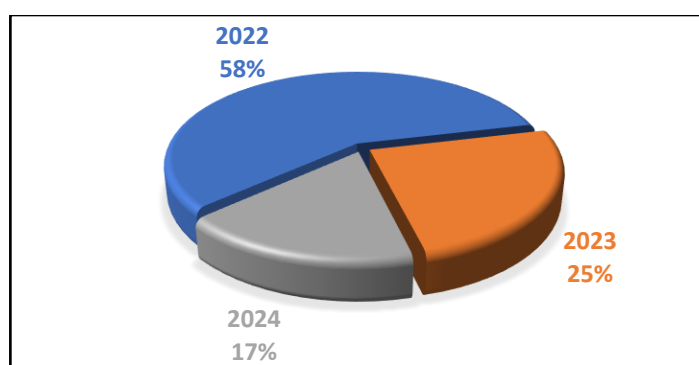


Chart 20 Distribution of demand for jobs in the sector over the years (2022-2024)

Looking at table (15), It's clearly seen the degree of qualification required for the years (2022-2024), as it turns out that bachelor's degrees are most demanded degree, followed by intermediate diplomas, that seems reasonable since the electricity supply and renewable energy industry requires a higher level of educational qualifications.

Educational qualification	No of opportunities 2022			No of opportunities 2023			No. of opportunities 2024		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Bachelor	191	319	510	82	99	181	69	44	112
Intermediate	188	33	221	119	7	125	90	3	94
High School	38	6	45	24	2	26	24	2	26
Below High	12	1	14	5	1	6	5		5
Illiterate	3		3						
Postgraduate		2	2		2	2			
apprenticeshi	2		2	2		2			
TOTAL	434	362	796	231	111	342	187	49	236

Table 15 Distribution of the demand for employment in the sector by educational qualification and gender for the years (2022-2024)

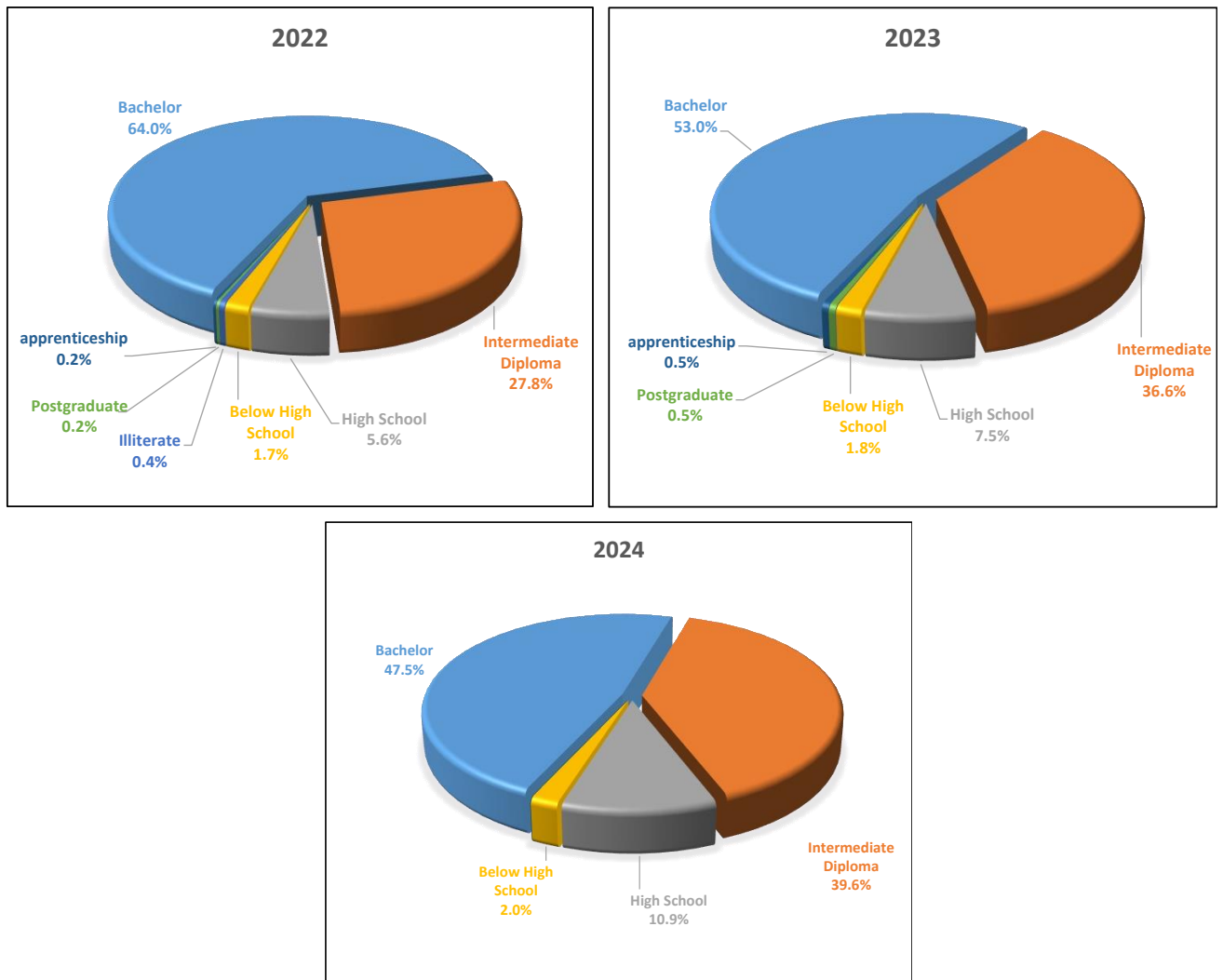


Chart 21 Distribution of the demand for employment in the sector by Educational Qualification for the years(2022-2024)

Overall, demand over the years (2022-2024) were on professions specialist General Electrical Engineer, Mechanical / Production Technician, Renewable Energy Engineer, Electrical Technician/Maintenance of Electrical Machines.

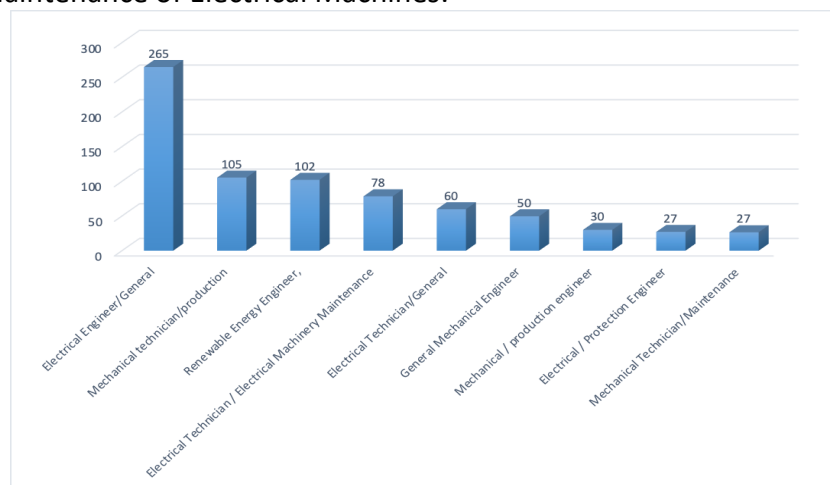


Chart 22 Distribution of the total demand for employment in the sector by Occupation for the total years(2022-2024)

In detailing the volume of demand in each territory with the different occupations, the strength of employment demand in this sector for the period (2022-2024) becomes clear.

South Territory			North Territory		Central Territory	
16	Electrical Engineer/General	108	Electrical Engineer/General	141	Electrical Engineer/General	
10	Renewable energy engineer	43	Electrical Technician/General	78	Electrical Technician/Maintenance of Electrical Machines	
5	Electronic/computer engineer	29	Renewable energy engineer	77	Mechanical Technician / Production	
3	Electrical Power / Monitoring Engineer	29	Mechanical Technician / Production	63	Renewable energy engineer	
		24	Electrical Technician/Electrical Protection Systems	37	General Mechanical Engineer	
		13	General Mechanical Engineer	30	Mechanical / Production Engineer	
		4	Operator/solar units to generate electricity	27	Electrical/Protection Engineer	
		4	Mechanical/Maintenance Engineer	27	Mechanical Technician/Maintenance	
		3	General electric engineer	17	Electrical Technician/General	
		3	Mechatronics engineer	15th	pan clerks circles	
		2	Electrical Engineer/ Other (specify).	15th	Electrical/Electromechanical Technician	
		2	Electrical/Extension Engineer	14	Electrical/Maintenance Engineer	
		2	Electrical/Maintenance Engineer	13	Operator/solar units to generate electricity	
		1	Mechanical Engineer/ Other	11	Electrical Engineer/ Other (specify).	
		1	Quality control engineer	6	Electronic/computer engineer	
		105	Other support professions	5	Mechanical Technician/Other	
				4	Mechanical Engineer/ Other	
				3	Mechanical/Strength Engineer	
				3	graphic designer (Graphics Designer)	
				3	Electronic Technician/General	
				3	Electronic/control engineer	

South Territory			North Territory			Central Territory		
					2	Quality control engineer		
					2	Electricity / operation, installation and maintenance of generating stations		
					2	Project Manager		
					1	Mechanical/Maintenance Engineer		
					369	Other support professions		
34	Total	374	Total		967	Total		

Table 16 Distribution of labor demand in the sector by Profession and Region for the period (2022-2024)

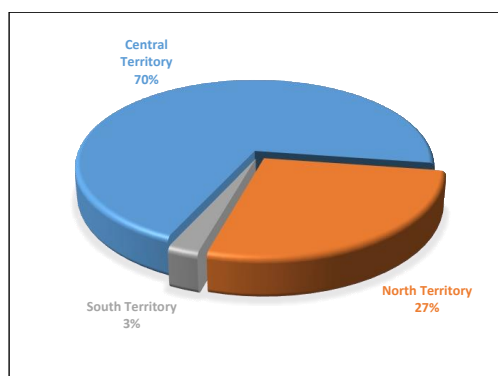


Chart 23 Distribution of labor demand in the sector by Region For the years (2022-2024)

For the required experience in the required workforce, employers did not ask for years of experience, (47%) employers said they were looking for workers without experience available, and about (18%) employers request minimum required experience (two years), as this period is sufficient time to complete job requirements in this field “from the employer's point of view” , whereas (5%) of employers requested three years, as shown in Table (17).

Years of Experience	Opportunities 2022		Opportunities 2023		Opportunities 2024	
	Male	Female	Male	Female	Male	Female
0	224	128	127	41	103	22
1	78	135	44	34	35	13
2	73	78	33	28	26	14
3	29	13	11	3	9	
4	9		6		4	
5	17	7	11	3	11	1
8	1		1			
10	2	2		2		
TOTAL	434	362	231	111	187	49

Table 17 Distribution of the required labor in the sector according to the required years of Experience and gender over the years (2022-2024)

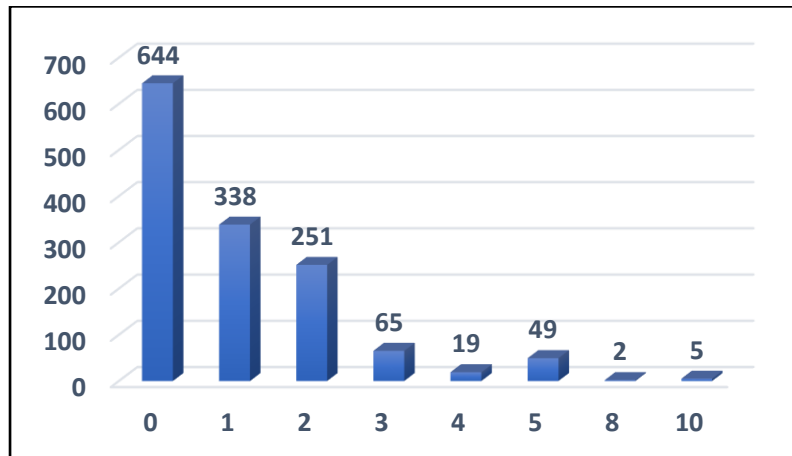


Chart 24 Distribution of the required labor in the sector according to the years of experience for the years (2022-2024)

Table (18) shows the demand for new labor on an expansion basis is more than demands of business rotation, which means the creation of new job opportunities. Demand on the basis of expansion reached (78%), while the percentage of demand on the basis of business rotation is about (17%).

	Opportunities 2022	Opportunities 2023	Opportunities 2024
Business Rotation	134	71	50
Expansion	625	241	153
Both	38	30	33
TOTAL	796	342	236

Table 18 Distribution of the required labor in the sector according to (Rotation/Expansion) for the years. (2022-2024)

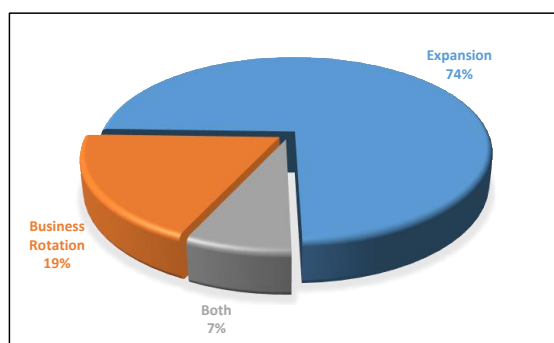


Chart 25 Distribution of the required labor in the sector according to (Rotation/Expansion) for the years. (2022-2024)

The results of the study also revealed by asking employers about the most sought-after skills for the electricity supply and renewable energy sectors, there was no direct answer and that the skill is not required. But In general, the most important skills for preparing designs for renewable energy systems are - Determining the type of insulators used, - preparing

preventive and curative maintenance programs, - installing of electrical devices, distribution panels, monitoring and warning panels according to the plan.

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
Preparing designs for renewable energy systems.	57	14	5	76
Preparing preventive and curative maintenance programs.	22	7	3	32
Installation cost analysis.	22	2		24
Determine the type of insulator used.	20	20	20	61
energy audit Energy Audit and Energy Efficiency.	18	10	2	29
Preparing programs for assembling mechanical equipment in industrial projects and installed.	16	1	1	18
Connecting control systems with power systems Renewable and design Protection systems and identification of issues related to the sustainability of the project.	13	5	2	20
Installation of electrical devices, distribution panels, monitoring and alarm panels according to the plan	13	11	5	29
Preparing designs of single-schemes for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects.	13	2		15th
Doing economic feasibility studies work Reports and Studies.	12			12
Preparing designs for distribution networks for heating, cooling and sewage systems for projects and buildings.	8	4	1	13
Studying engineering drawings for business Mechanical in buildings, facilities and factories.	7	1		8
Preparation of operating and maintenance programs for electrical equipment.	6	1	1	9
Prepare plans to run the system Electricity and to introduce new equipment into the electrical system.	5	2	2	10
Operation and control of solar energy modules Maintaining the	5	3	4	12

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
acid level in electric energy storage batteries.				
Preparing designs and blueprints for mechanical systems.	5	2		7
Studying architectural plans for buildings and facilities.	5	1		6
Estimating quantities of work materials, providing them and matching their specifications.	5	2	2	8
Preparing studies for the development and modernization of protection systems and counting and measuring devices	5	2		6
Preparation of operating and maintenance programs for welding machines and equipment.	4	3	3	11
Inspection of secondary and primary current and voltage of current transformers Voltage transformers.	4	4	3	11
Download drivers and applications for programmed and automated machines.	4			4
Design of suitable overhead and ground electrical distribution networks.	4			4
Adjust the protection devices by comparing them with the accuracy of the standard protection devices and according to the manufacturer's manuals.	4	2		6
Diagnose mechanical faults on different production lines.	4			4
Preparing electrical wiring diagrams and alarm circuits for industrial and commercial projects and household.	3	3	3	10
Determining the technical equipment needed for the welding operator, their specifications and quantities, and preparing their installation plan.	3	2		5

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
Trace electrical control diagrams for equipment and devices hydraulic Pneumatics, control and protection, checking them, diagnosing their malfunctions using inspection and measuring devices, and following up on their repair procedures..	3	3	3	10
systems design Electrical protection and protection for transformers and generators according to their capabilities and types.	3	1		4
Determining the technical equipment necessary for general mechanical maintenance, their specifications, quantities and cadastral needs, and preparing their distribution plan.	3	2		5
Dismantling, cleaning and reassembling the solar collectors.	3			3
Studying electrical diagrams for devices and equipment in industrial and engineering projects.	3			3
Preparing plans and executive work programs for the installation and operation of electromechanical equipment, with civil and mechanical works.	3	1		4
processing and operation Lathes and Fries Conventional scrapers, scrapers, arc welding machines, shielded gas and oxy-acetylene welding equipment.	3	3	3	9
Preparation of operating and maintenance programs for equipment in industrial projects.	3			3
Prepare installation and commissioning plans and maintenance For protection systems and counting and measuring devices	3			3
Preparation of technical specifications for pneumatic systems and hydraulic Programmable logic controllers, electronic sensors, microprocessor, transmissions and robots.	2			2

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
Preparing programs for the installation and maintenance of technical equipment necessary for the general mechanical maintenance operator.	2	2	2	6
Drawing architectural plans manually or using software on a computer, and drawing structural drawings manually or using the computer.	2			2
electrical system case study.	2			2
Inspect and inspect equipment after maintenance procedures.	2			2
Engine fault diagnosis for generators, excitation systems, relays and circuit breakers, analysis of results and follow-up of repair procedures.	2	2	2	5
Supplying and operating lathes, mills, conventional and computerized spark-drilling machines, scrapers, standing and rotary automatic drills, and flat and cylindrical grinding machines..	2	2		3
Diagnosing electrical faults in the operating circuits of electrical devices and equipment of all kinds.	1	1		3
Maintenance of protection systems for counting devices.	1			1
Carry out remedial maintenance of electrical faults for the operating circuits of electrical devices and equipment.	1	3		4
Defining control systems in engineering projects.	1			1
Study of geological maps and aerial photographs to advise on site selection.	1			1
Inspections of various welds of welding lines and joints using bending tests of weld joints, and checking loading tensile stress. Take the necessary measures for restoration.	1			1
Study of various electronic circuit diagrams.	1	1		3
lighting design Interior and exterior of buildings and control rooms.	1	1	1	4

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
Supervising the implementation of electrical works for electrical installations.	1			1
Installation of hydraulic and pneumatic systems devices and equipment (plastic injection and blowing machines, packaging machines for pharmaceutical and food materials, mechanical structures and cams and arms Propulsion, control and protection devices, and their operation according to installation and operation manuals.	1			1
Inspect and adjust current, voltage, vibration, pressure, level, temperature, velocity and vibration transmitters..	1	1	1	3
Preparing plans and plans for installation and commissioning of devices and equipment	1			1
Calibration of main and secondary protection devices.	1	1	1	3
Preparing and installing plans for computers, peripherals and digital machines	1			1
Load generating units into the electrical system.	1			1
Other.	37	20	20	76
Unskilled.	416	191	146	753
TOTAL	796	342	236	1,375

Table 19 Distribution of employment in the sector according to the profession and the most required skill for it, which the workers do not have) for the years. (2022-2024)

2.6 General skills required for workers in the electricity supply and renewable energy sector

Table (20) was extracted as a result of analyzing data including eight tables showing the importance of each skill that support employment in each occupation in the electric power business and renewable energy fields, giving find common skills needed for each profession. Training providers should also incorporate these skills into their training programs.

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
Preparing designs for renewable energy systems.	57	14	5	76
Preparing preventive and curative maintenance programs.	22	7	3	32
Installation cost analysis.	22	2		24
Determine the type of insulator used.	20	20	20	61
energy audit Energy Audit and Energy Efficiency.	18	10	2	29
Preparing programs for assembling mechanical equipment in industrial projects and installed.	16	1	1	18
Connecting control systems with power systems Renewable and design Protection systems and identification of issues related to the sustainability of the project.	13	5	2	20
Installation of electrical devices, distribution panels, monitoring and alarm panels according to the plan	13	11	5	29
Preparing designs of single-schemes for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects.	13	2		15th
Doing economic feasibility studies work Reports and Studies.	12			12
Preparing designs for distribution networks for heating, cooling and sewage systems for projects and buildings.	8	4	1	13
Studying engineering drawings for business Mechanical in buildings, facilities and factories.	7	1		8
Preparation of operating and maintenance programs for electrical equipment.	6	1	1	9
Prepare plans to run the system Electricity and to introduce new equipment into the electrical system.	5	2	2	10

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
Operation and control of solar energy modules Maintaining the acid level in electric energy storage batteries.	5	3	4	12
Preparing designs and blueprints for mechanical systems.	5	2		7
Studying architectural plans for buildings and facilities.	5	1		6
Estimating quantities of work materials, providing them and matching their specifications.	5	2	2	8
Preparing studies for the development and modernization of protection systems and counting and measuring devices	5	2		6
Preparation of operating and maintenance programs for welding machines and equipment.	4	3	3	11
Inspection of secondary and primary current and voltage of current transformers Voltage transformers.	4	4	3	11
Download drivers and applications for programmed and automated machines.	4			4
Design of suitable overhead and ground electrical distribution networks.	4			4
Adjust the protection devices by comparing them with the accuracy of the standard protection devices and according to the manufacturer's manuals.	4	2		6
Diagnose mechanical faults on different production lines.	4			4
Preparing electrical wiring diagrams and alarm circuits for industrial and commercial projects and household.	3	3	3	10
Determining the technical equipment needed for the welding operator, their specifications and quantities, and preparing their installation plan.	3	2		5
Trace electrical control diagrams for equipment and devices hydraulic Pneumatics, control and protection, checking them, diagnosing their malfunctions using inspection and measuring devices, and following up on their repair procedures..	3	3	3	10
systems design Electrical protection and protection for transformers and generators according to their capabilities and types.	3	1		4
Determining the technical equipment necessary for general mechanical maintenance, their specifications,	3	2		5

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
quantities and cadastral needs, and preparing their distribution plan.				
Dismantling, cleaning and reassembling the solar collectors.	3			3
Studying electrical diagrams for devices and equipment in industrial and engineering projects.	3			3
Preparing plans and executive work programs for the installation and operation of electromechanical equipment, with civil and mechanical works.	3	1		4
processing and operation Lathes and Fries Conventional scrapers, scrapers, arc welding machines, shielded gas and oxy-acetylene welding equipment.	3	3	3	9
Preparation of operating and maintenance programs for equipment in industrial projects.	3			3
Prepare installation and commissioning plans and maintenance For protection systems and counting and measuring devices	3			3
Preparation of technical specifications for pneumatic systems and hydraulic Programmable logic controllers, electronic sensors, microprocessor, transmissions and robots.	2			2
Preparing programs for the installation and maintenance of technical equipment necessary for the general mechanical maintenance operator.	2	2	2	6
Drawing architectural plans manually or using software on a computer, and drawing structural drawings manually or using the computer.	2			2
electrical system case study.	2			2
Inspect and inspect equipment after maintenance procedures.	2			2
Engine fault diagnosis for generators, excitation systems, relays and circuit breakers, analysis of results and follow-up of repair procedures.	2	2	2	5
Supplying and operating lathes, mills, conventional and computerized spark-drilling machines, scrapers, standing and rotary automatic drills, and flat and cylindrical grinding machines..	2	2		3

Occupation	Opportunities 2022	Opportunities 2023	Opportunities 2024	Total chances
Diagnosing electrical faults in the operating circuits of electrical devices and equipment of all kinds.	1	1		3
Maintenance of protection systems for counting devices.	1			1
Carry out remedial maintenance of electrical faults for the operating circuits of electrical devices and equipment.	1	3		4
Defining control systems in engineering projects.	1			1
Study of geological maps and aerial photographs to advise on site selection.	1			1
Inspections of various welds of welding lines and joints using bending tests of weld joints, and checking loading tensile stress. Take the necessary measures for restoration.	1			1
Study of various electronic circuit diagrams.	1	1		3
lighting design Interior and exterior of buildings and control rooms.	1	1	1	4
Supervising the implementation of electrical works for electrical installations.	1			1
Installation of hydraulic and pneumatic systems devices and equipment (plastic injection and blowing machines, packaging machines for pharmaceutical and food materials, mechanical structures and cams and arms Propulsion, control and protection devices, and their operation according to installation and operation manuals.	1			1
Inspect and adjust current, voltage, vibration, pressure, level, temperature, velocity and vibration transmitters..	1	1	1	3
Preparing plans and plans for installation and commissioning of devices and equipment	1			1
Calibration of main and secondary protection devices.	1	1	1	3
Preparing and installing plans for computers, peripherals and digital machines	1			1
Load generating units into the electrical system.	1			1
Other.	37	20	20	76
Unskilled.	416	191	146	753
TOTAL	796	342	236	1,375

Table 20 General skills necessary to support employment for the professions required

2.7 Employment of women in the electricity supply and renewable energy sector

Analysis of the collected data shows that companies operating in the electricity supply and renewable energy sector are unwilling to employ female in this sector (45%), as shown in Table (21) %58.4 of unwilling to hire female didn't clear the reason and it was not fully defined. On the other hand, other reason for not hiring was the nature of work which is not suitable for female. But in general, there is still female employment in this sector, at a rate of more than 55%.

Reasons for not appointing females	Number of establishments
The nature of the work is not suitable for Female	83
Not needed	79
High operational cost (salaries)	1
Stop hiring through Al-Diwan	2
Undefined*	204
Establishment shutdown	3
TOTAL	372

Table 21 Distribution of establishments in the electricity supply and renewable energy sector by reason of non-recruitment of females

* The reasons were not provided by the establishments during data collection

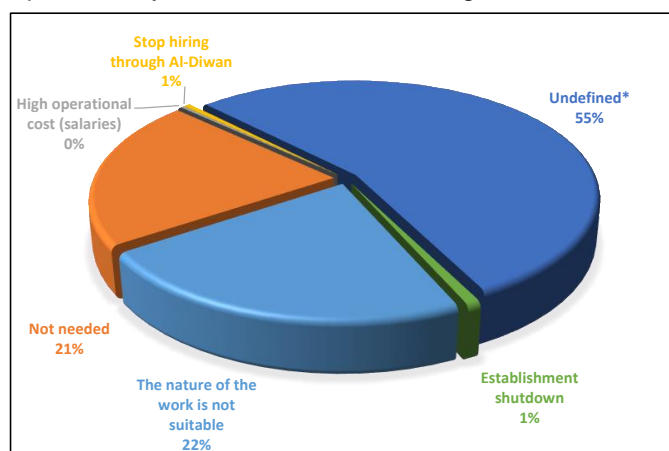


Chart 26 Distribution of establishments in the electricity supply and renewable energy sector by reason of non-recruitment of females

A look at the jobs women work in this sector reveals that the most important jobs with job opportunities for the year (2022-2024) are General Electrical Engineer, Renewable Energy Engineer, and Mechanical Engineer/General. A total demand is reached (522) employment opportunities for female are distributed in the coming years (2022-2024).

Occupation	2022	2023	2024	TOTAL
Electrical engineer/general	127	39	13	179
Renewable energy engineer	45	10	3	58
Mechanical Engineer/general	12	7	4	22
Electrical Engineer/Other(Locate).	5	3	3	10
Industrial Engineer	3	1	1	5
Mechanical Engineer/maintenance	2			2
Electrical Engineer/Extension	2			2
Electrical engineer/maintenance	1	1	1	3
Mechanical engineer/Other	1			1
Electrical engineer/protection		2		2
Other support professions	163	49	24	237
TOTAL	362	111	49	522

Table 22 Distribution of job opportunities for females in the sector by profession for the years (2022-2024)

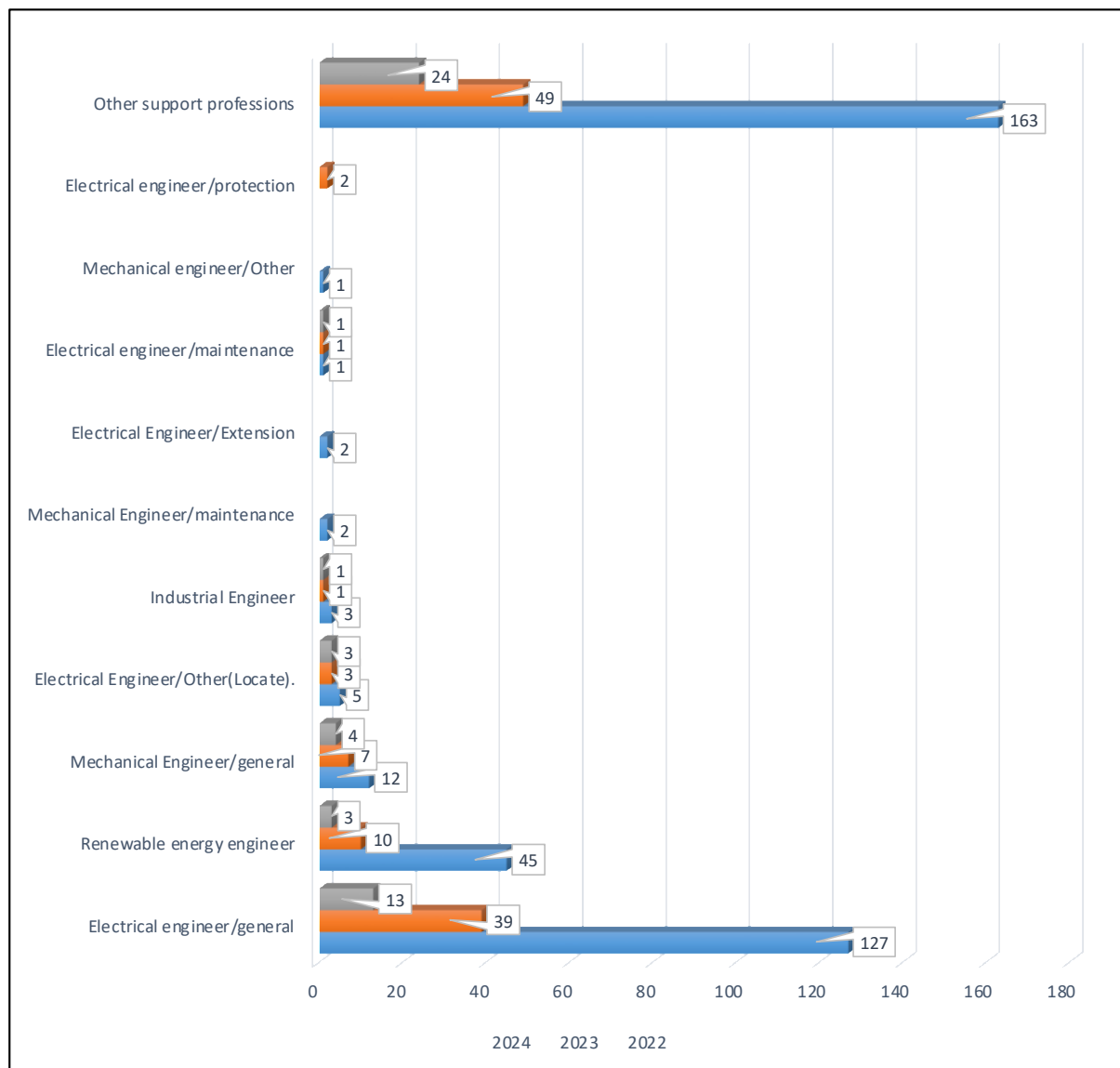


Chart 27 Distribution of job opportunities for females in the sector by profession for the years (2022-2024)

2.8 Employment of people with disabilities in the electricity supply and renewable energy sector

Table (23) shows that the number of workers with disabilities reaches (16) out of (12,833) workers in the industry, they only make up (0.12%). They work in various professions in the same industry, but their most concentrated jobs are accountants and mechanics/manufacturing. Workers with disabilities were placed only in the Central and North Territory. Only a few companies (24%) announced that they would hire people with disabilities in the future.

Occupation	Number of employees with Disabilities
Accountants	3
Mechanical technician/Produce	3
Electrician/Other	2
Telephone exchange operators	2
Executive Secretaries and administrators	2
Management Policy Specialists	1
Waiters	1
Electrical Engineer/Other (Locate).	1
Mechanical technician/maintenance	1
TOTAL	16

Table 23 Distribution of workers with disabilities in the sector by occupation

Studies show that, in practice, establishments in the power and renewable energy sector do not employ persons with disabilities due to the lack of jobs, although generally (91) establishments have report that they will provide (115) variety of vocational opportunities, mostly are electrical technician /general and renewable energy engineers as well other support professionals outside the industry are also sought after. As a highlight demand is mainly concentrated in the central territory.

Occupation	Central Territory	Northern Territory	TOTAL
Electrical engineer/general	18	19	36
Electrical engineer/protection	2		2
Electrical/Maintenance of machines and general keys	2		2
Electrician/electromechanical	2		2
Renewable energy engineer	1	3	4
Mechanical Engineer/general	1		1
Other support professions	36	32	68
TOTAL	61	54	115

Table 24 Distribution of job opportunities for people with disabilities in the sector by Profession and Region

2.9 Difficulties in hiring workers in the electricity supply and renewable energy sector and methods of recruitment

The results of the study revealed that 158 establishments, or (43%) of the total establishments (372) indicated that they face difficulties in recruitment. (one choice for each establishment within the survey), these difficulties are attributed to the shortage of workers who have the skills that are basically required, and then the shortage of labor those who have positive values and attitudes towards work and supportive skills for employment, as well as the shortage of academically qualified workers. (Table 25).

Recruitment Difficulties	Central Territory	North Territory	South Territory	TOTAL
Shortage of workers with the required skills	38	3	5	46
Shortage of workers who have positive values and attitudes towards work and skills Supportive to run	34	4	3	41
Shortage of academically qualified workers	22	5	1	28
High Salaries	3	15		18
No-Commitment to work time		7		7
Intolerance to work pressure/work nature		1		1
Shortage of specialized competencies	1			1
Other	16			16
TOTAL	115	34	9	158

Table 25 Distribution of establishments in the sector according to Recruitment Difficulties

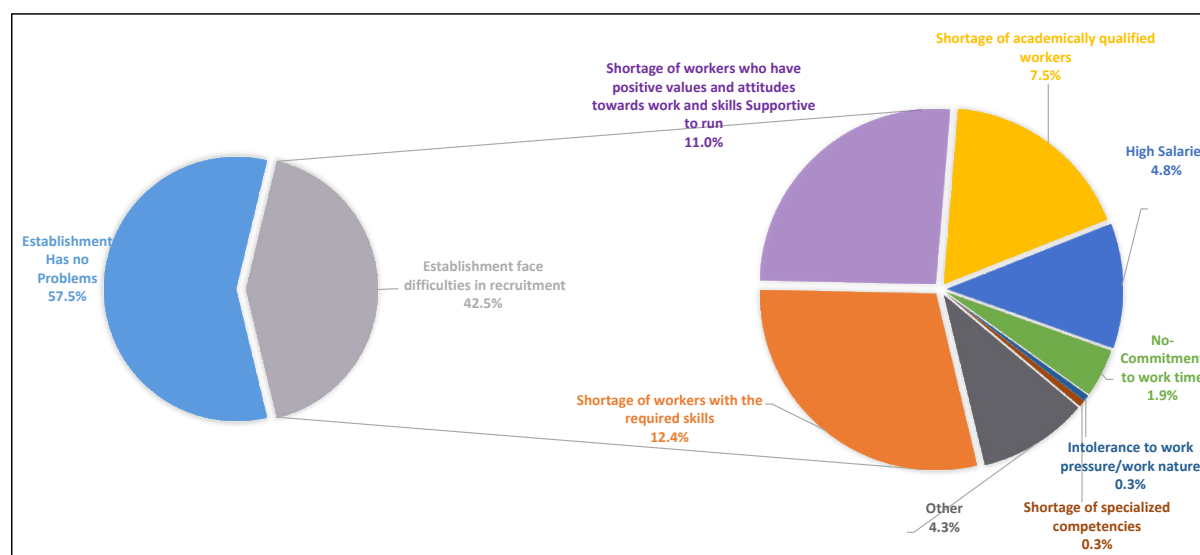


Chart 28 Distribution of establishments in the sector according to the percentages of Recruitment Difficulties

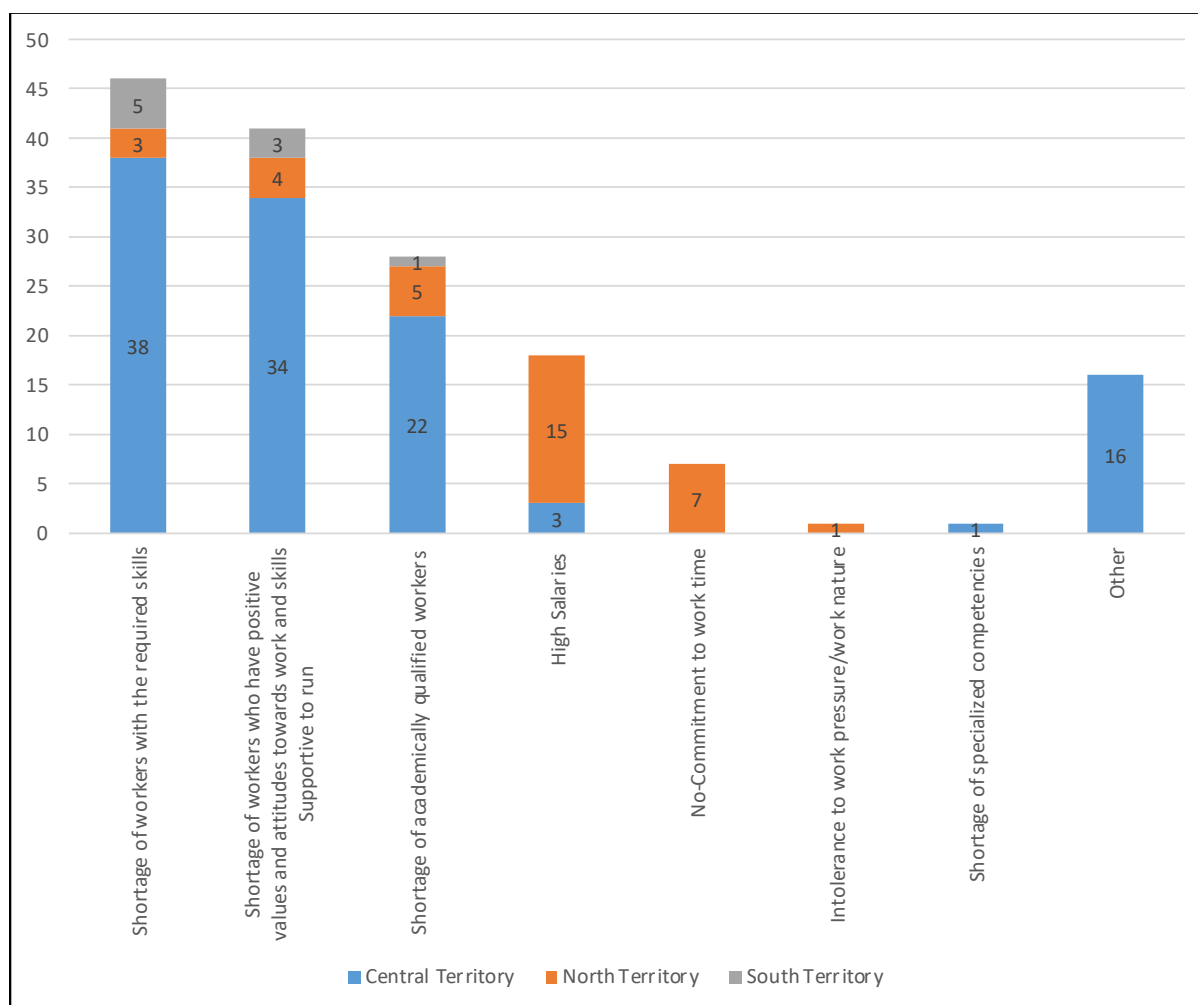


Chart 29 Distribution of establishments in the sector according to Recruitment Difficulties

For hiring methods used, the study shows the order of the appointment methods in the establishment according to importance shown in Table (26), that direct appointment through personal contact is used the most, (66.1%) of establishments chose this method as the best hiring method, followed by appointment through newspaper and website advertising, with the rate (62.5%).

Assignment methods	Central Territory	North Territory	South Territory	TOTAL
Directly through personal contacts	139	87	20	246
Newspapers and websites	157	67	8	233
Guilds	34	3		37
National Employment Campaigns	5	6		11
The Job days held by the Ministry of Labor	10	1		11
Recruitments offices	7	1	2	10
Civil Service Bureau	9	1		10
Ministry of Labor	1	1		3
Vocational Training Centers	1			1

Table 26 Distribution of facilities in the sector According to the methods of appointment and region

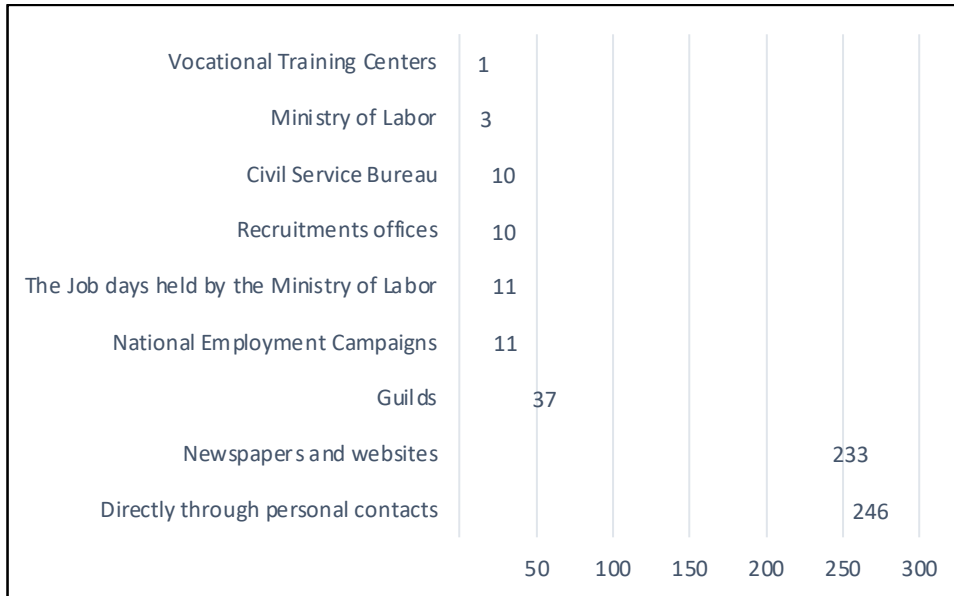


Chart 30 Distribution of establishments sector according to recruitment methods



Chart 31 Distribution of establishments sector according to recruitment and regional methods

Employers were also asked about the difficulties and challenges facing the electricity supply and renewable energy sector, and their arrangement in terms of impact on the sector, and more than (85%) of the total (372) establishments respondents cited regulatory directives and legislation regulating work are the main influence on the sector's performance. As a second choice, (53%) indicated the procedures that impeding investment, (40%) indicated that weak incentives played a role as well in the weakness of the sector, and (31%) responded to the high taxes, these choices were the most important challenges facing the sector.

Difficulties facing the sector	Central Territory	North Territory	South Territory	TOTAL
Regulatory directives and legislation	180	116	21	317
Actions that impeding investment	170	23	5	198
Weak incentives	126	18	4	148
High taxes	82	30	6	118
weak investment promotion	98	9	3	110
Brain Drain	77	8	1	86
Weak marketing capabilities	74	6	4	84
Strong competition in the market	12	3		15
Economic stagnation, inflation and lack of projects	2	5		7
The shortage of qualified local labor versus the increase in expatriate labor	4			4
High costs of production inputs (rent, workers' wages, water, electricity, fuel, raw materials)	3			3
High customs	2			2

Table 27 Distribution of facilities in the sector according to the difficulties facing the sector and the region

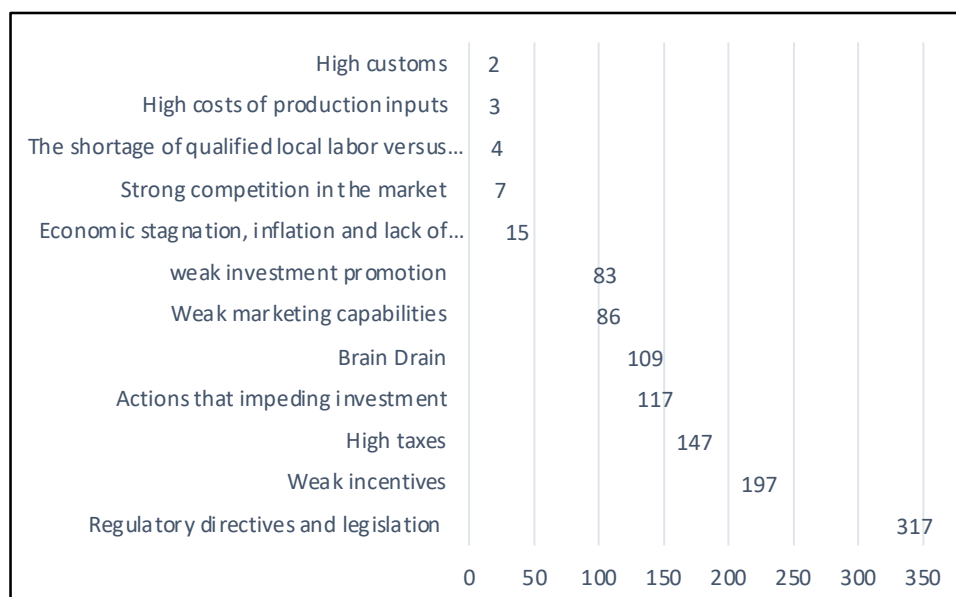


Chart 32 Distribution of facilities in the sector according to Sector Difficulties

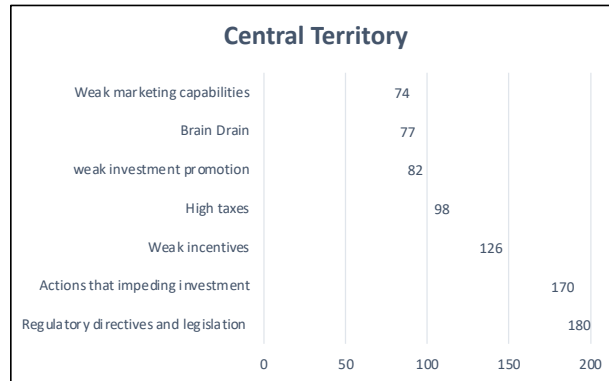
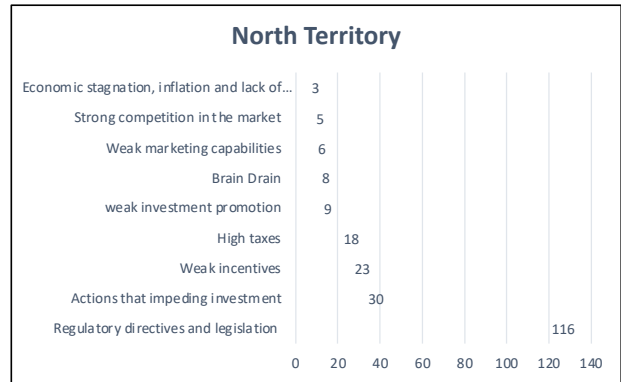
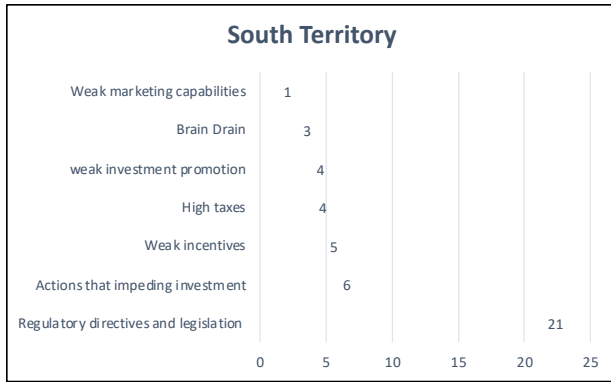


Chart 33 Distribution of facilities in the sector according to sector difficulties by Regions

CHAPTER 3

SUPPLY-SIDE ANALYSIS IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR

3 Supply-side analysis in the electricity supply and renewable energy sector

3.1 The most important training providers in the electricity supply and renewable energy sector

The most prominent training providers in Jordan are limited to the following main bodies: community colleges affiliated with Al-Balqa Applied University, vocational education centers affiliated with the Ministry of Education, the Vocational Training Corporation, a number of public and private Jordanian universities, in addition to the Amman Chamber of Commerce, and UNRWA training centers and private sector training centers. Table (28) shows the distribution of these entities by year of service provision.

Training provider	Start year
National Company for Employment and Vocational Training	2007
Engineers Training Center	1997
Pioneers Training Academy and consulting	1993
Al-Balqa Applied University Counseling Center	2003
German University Counseling Center	2010
University of Jordan Counseling Center	1981
Middle East University Counseling Center	2014
Professional Model High Center	1987
Gold Medal Academy for Business and Informatics Training	2008
Consultation, Studies and Training Center / Tafila Technical University	2007
Green building council / Jordan Green Building Council	2009

Table 28 Training Providers: According to the year of starting the provision of training/vocational education services

3.2 Training programs applied in the Electricity Supply and Renewable Energy Sector

The number of training programs for this sector reached about (34) training program, the number of its graduates is approximately (9069) Alumni during the years (2019-2021). The largest percentage graduated from the program of a general mechanical engineer (19%), then renewable energy engineer (15%), followed by an electrical technician program (14%).

Training Program	2019	2020	2021	TOTAL
General Mechanical Engineer	639	568	497	1704
Renewable energy engineer	467	488	428	1383
Electrical Engineer/General	364	367	357	1088
Electrical Power / Monitoring Engineer	225	234	255	714
General electric engineer	13	14	5	32
Electrical Technician/General	497	287	471	1255
power plant operators	88	76	100	264
Wind power plant/operator	0	0	150	150
Operator/solar units to generate electricity	669	188	274	1131
Renewable power plant operator	521	204	247	972
electrical assistant wiring	135	12	10	157

Training Program	2019	2020	2021	TOTAL
Electrician / installation and maintenance of overhead lines - public transport	0	0	19	19
Electrician / installation and maintenance of overhead lines - distribution	33	54	75	162
Electrical/transformation station installation	13	12	13	38
TOTAL				9069

Table 29 The training programs applied in the sector for the years (2021-2019)

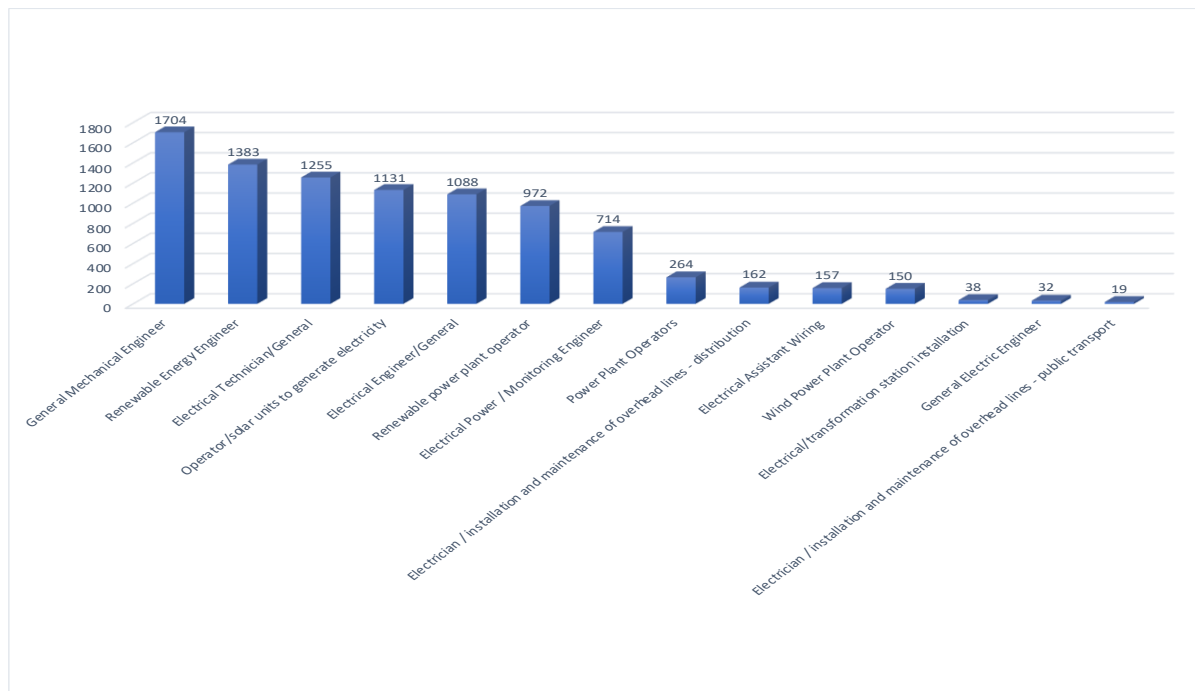


Chart 34 Distribution of the total graduates of training providers according to the applied training programs in the sector for years (2021-2019)

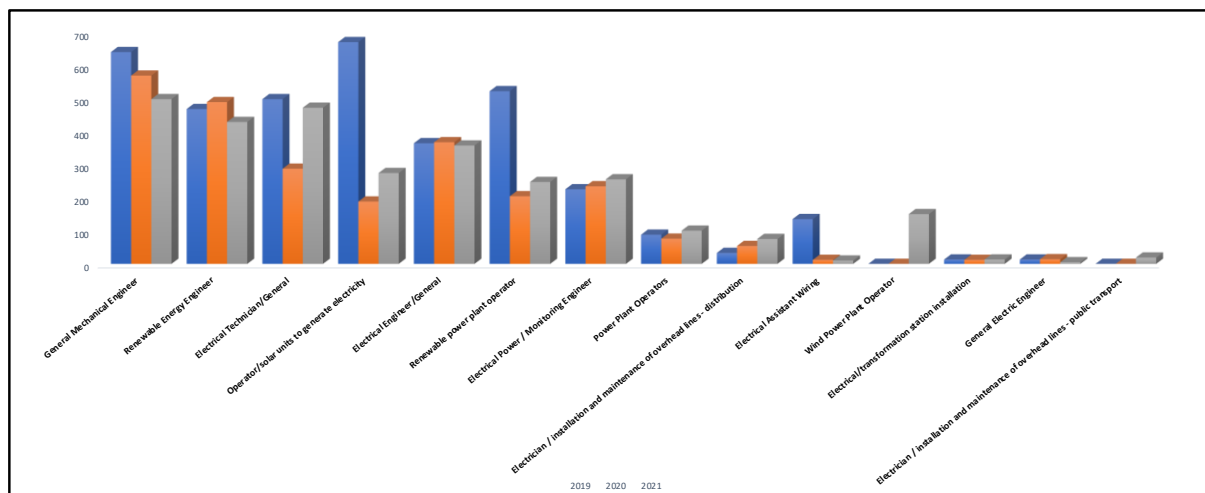


Chart 35 Distribution of graduates of training providers according to the applied training programs in the sector for years (2021-2019)

On the other hand, the number of male graduates of training programs for this sector reached about (7,808) Graduate between (2019-2021) with a percentage of 86% of total graduates.

The majority of them graduated from the general mechanical engineer program, (21.16%), then an electrical technician program (15.2%).

On the other hand, the number of female graduates of training programs in the electricity supply and renewable energy sector reached approximately (1,261) Graduated between (2019-2021) Mainly in renewable energy engineer program (26.8%), then the renewable power plant operator program (21%).

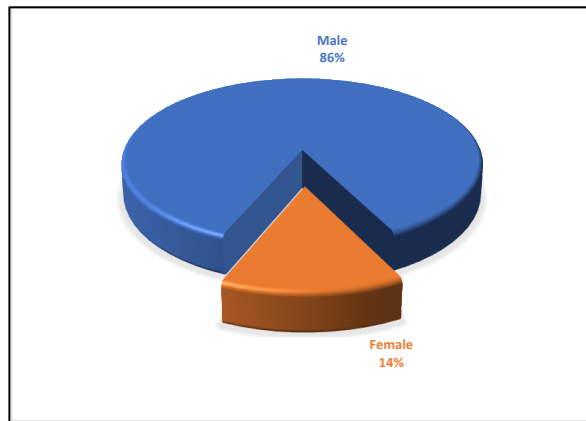


Chart 36 Distribution of graduates of training providers within the applied training programs in sector by gender for years (2021-2019)

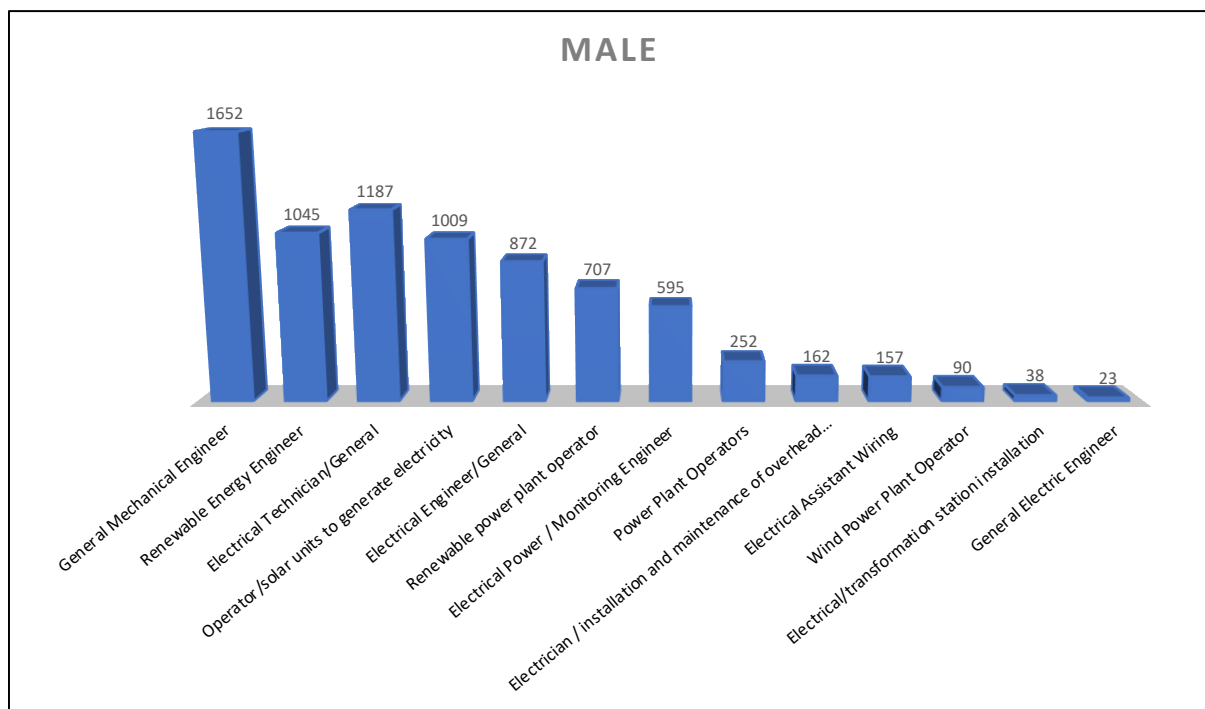
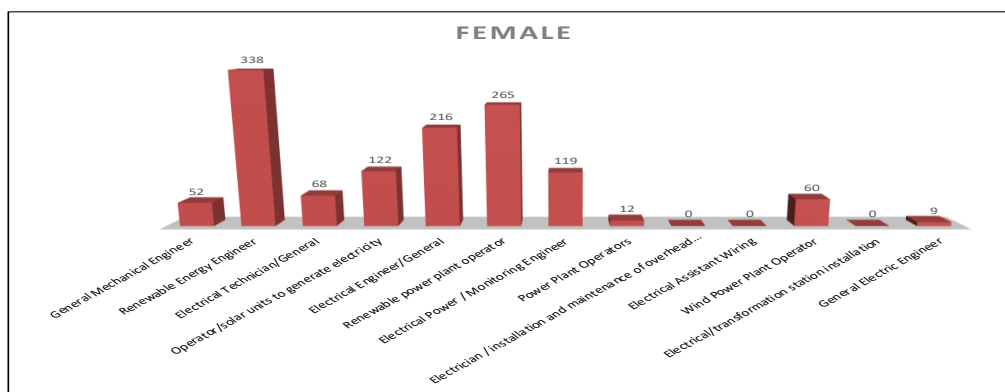


Chart 37 Graduates of Male training providers according to the most prominent training programs applied in the sector for the years (2021-2019)



With regard to the scientific level of graduates of training programs in the field of electricity supply and renewable energy, the research results show that the minimum educational level of those admitted to these programs is vary, between (intermediate diploma), (bachelor) (Basic level),(secondary) and (High School). Table (30) shows the lowest educational attainment of graduates for years (2019-2021) and for each training program. Overall, the number of graduates with a basic degree amounts to (1298) graduates in the years (2019-2021), and about (1554) graduates with a high school science degree, in when the vast majority (6054) have a high school level. , whereas; diplomas and bachelor degrees are (26) and (137) respectively. Looking at each year separately, the high school level rate is the highest among other qualifications, as is the gender breakdown.

Training Program	Diploma	BA	Basic	Secondary	High School	TOTAL
General Mechanical Engineer					1704	1704
Renewable Energy Engineer					1383	1383
Electrical Engineer/General					1088	1088
Electrical Power / Monitoring Engineer					714	714
General Electric Engineer					32	32
Electrical Technician/General	12		393	449	401	1255
Power Plant Operators					264	264
Wind Power Plant/Operator				150		150
Operator/Solar Units To Generate Electricity	14	137	450	411	119	1131
Renewable Power Plant Operator			79	544	349	972
Electrical Assistant Wiring			157			157
Electrician / installation and maintenance of overhead lines - public transport			19			19
Electrician / installation and maintenance of overhead lines - distribution			162			162
Electrical/transformation station installation			38			38
TOTAL	26	137	1298	1554	6054	9069

Table 30 Distribution of graduates of the applied training programs in the sector. Minimum academic qualification for the years:2021-2019

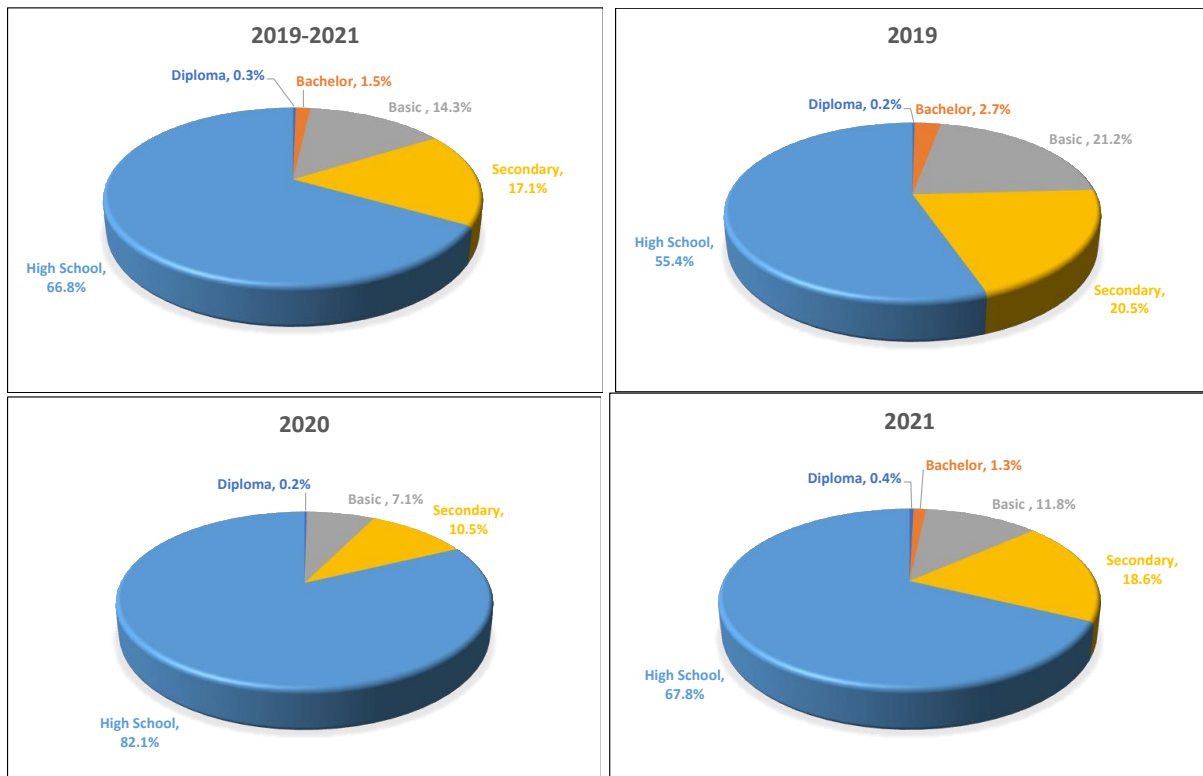


Chart 38 Distribution of graduates of the applied training programs in the sector. Minimum academic qualification for the years:2021-2019

Table (30) shows the number of graduates in the years 2019-2021 from training programs for the electricity supply and renewable energy industries, distributed by the minimum required education. It was noted that the number of graduates with basic level education stage reached (450) in the Operator/Solar Units To Generate Electricity program and then (393) in the Electrical Technician/General Program. As for Secondary qualification level the number of graduates reached (544) graduates from the Renewable Power Plant Operator program and then (449) graduates from the Electrical Technician/General program. Graduates who achieved the minimum High School qualification level, the number of graduates achieved (1704) in the General Mechanical Engineer program, then (1383) in the Renewable Energy Engineer program, and (1255) in Electrical Technician/General program.

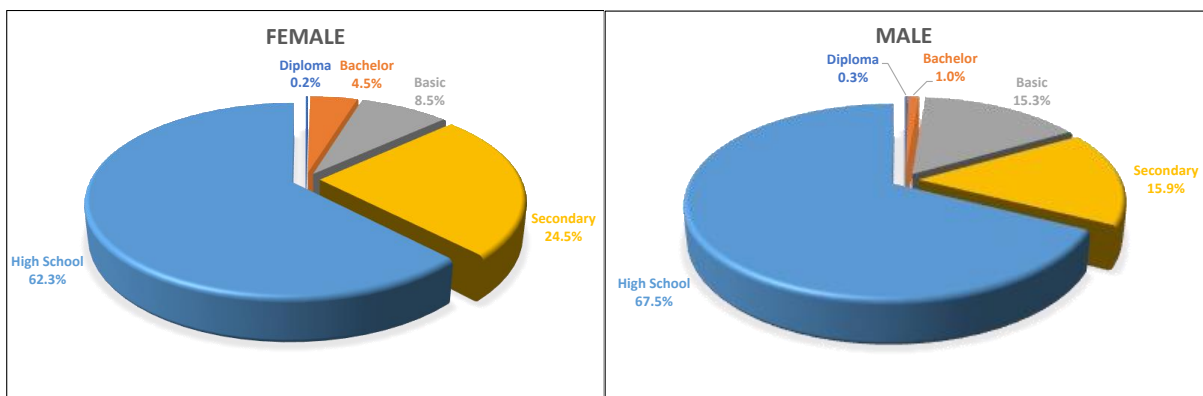


Chart 39 Distribution of graduates of training providers by minimum educational qualification and gender for years (2021-2019)

The study also showed, Table (31 majority of graduates of training providers for the years (2019-2021) were from the National Company for Training and Employment (14.1%), then graduates of AlBalqa Applied University / Community Colleges (11%), and then the university Jordan with a percentage of (9.3%), and about (8.2%) from the Hashemite University.

Training Providers	2019	2020	2021	Total
National Company for Training and Employment	557	325	393	1275
AlBalqa Applied University / Community Colleges	282	348	370	1000
The University of Jordan	315	323	203	841
The Hashemite University	309	217	216	742
AlBalqa Applied University	276	245	154	675
Jordan University of Science and Technology	246	197	175	618
BAU/Consulatation & Training Center	350	0	159	509
Vocational Training Corporation	279	78	130	487
Yarmouk University	117	100	109	326
Al-Zaytoonah University	38	116	130	284
Al-Hussein Bin Talal University	55	91	108	254
JU/ Center of consulatation & Training	100	0	150	250
Tafila Technical University	54	63	59	176
UNRWA Training Centers	54	56	51	161
Mutah University	48	49	61	158
Princess Sumaya University for Technology	48	52	50	150
Al al-Bayt University	57	40	38	135
German Jordanian University	41	50	42	133
JORDANBITS	110	0	21	131
Applied Science University	30	36	38	104
TTU/ Consulatation & Training Center	79	0	0	79
Philadelphia University	28	22	28	78
YU /Consulatation & Training Center	40	11	23	74
Al-Ahliyya Amman University	13	14	35	62
Middle East University	11	31	19	61
PRAVO Academy	30	15	15	60
HU / Consulatation & Training Center	30	0	20	50
Khawarizmi University Technical College	0	6	40	46
Zarqa University	11	9	14	34
Pioneers Academy	15	0	15	30
Al-Isra University	1	6	20	27
GJU / Consulatation & Training Center	10	0	12	22
MEU / Consulatation & Training Center	20	0	0	20
American University of Madaba	10	4	3	17
	3664	2504	2901	9069

Table 31 Distribution of graduates of training providers by training provider for the years(2021-2019)

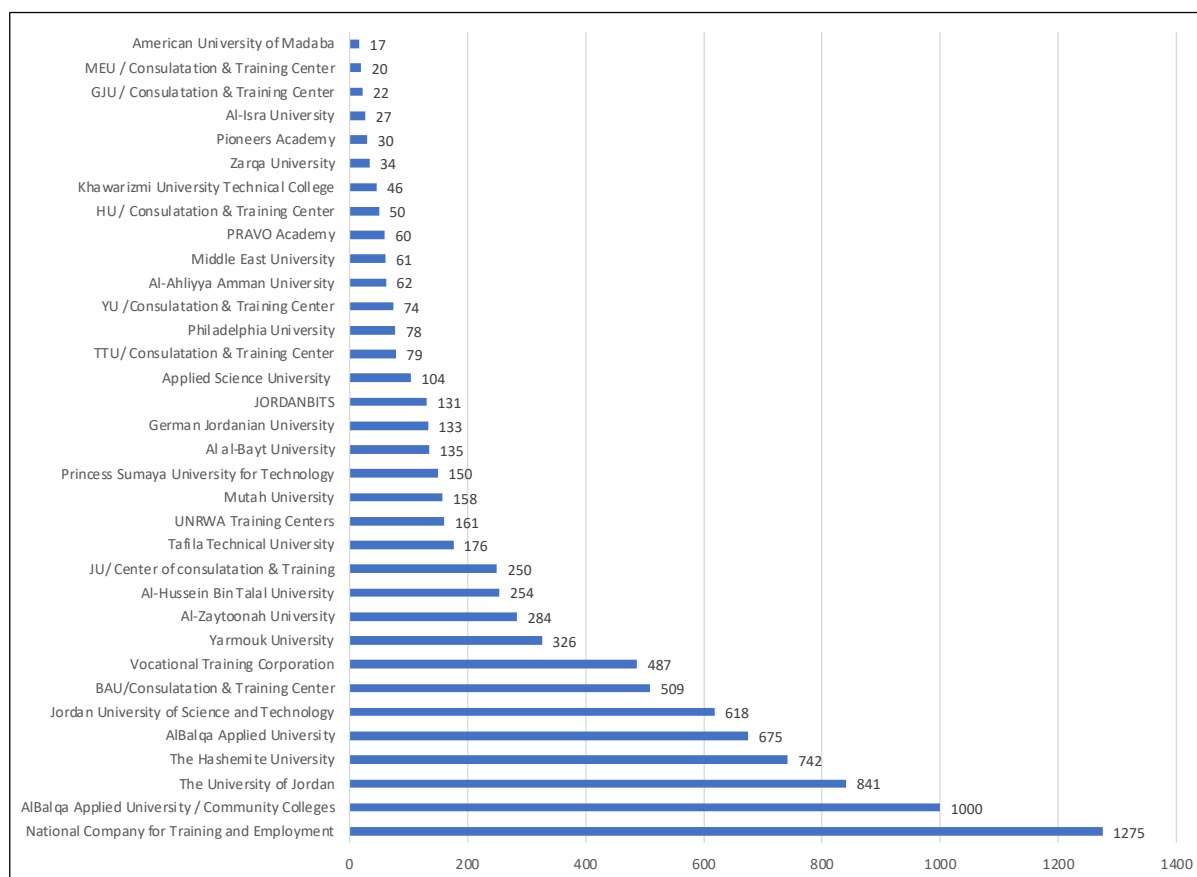
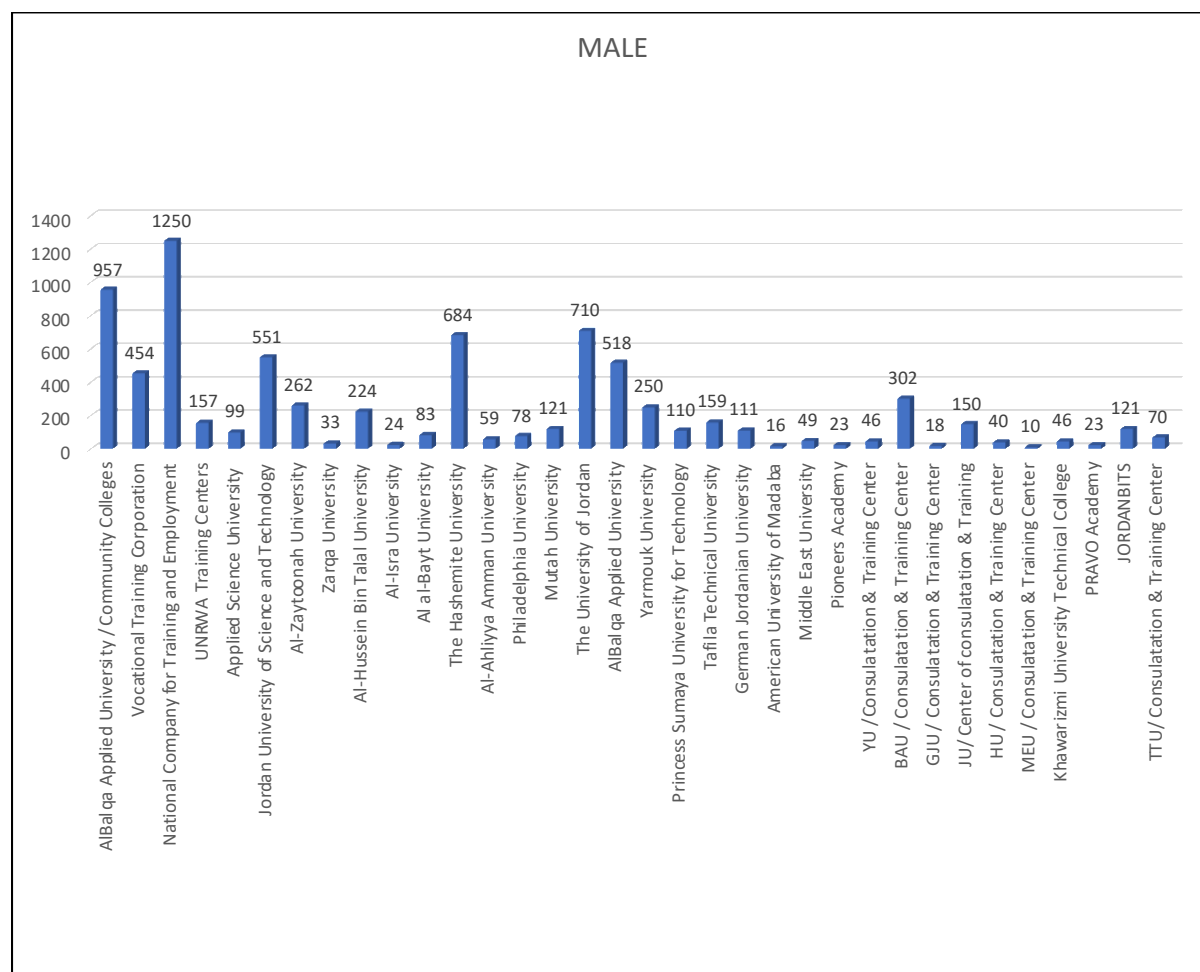


Chart 40 Distribution of graduates of training providers according to the training provider for the years(2021-2019)

Training Providers	FEMALE	MALE	TOTAL
AlBalqa Applied University / Community Colleges	43	957	1000
Vocational Training Corporation	33	454	487
National Company for Training and Employment	25	1250	1275
UNRWA Training Centers	4	157	161
Applied Science University	5	99	104
Jordan University of Science and Technology	67	551	618
Al-Zaytoonah University	22	262	284
Zarqa University	1	33	34
Al-Hussein Bin Talal University	30	224	254
Al-Isra University	3	24	27
Al al-Bayt University	52	83	135
The Hashemite University	58	684	742
Al-Ahliyya Amman University	3	59	62
Philadelphia University	0	78	78
Mutah University	37	121	158
The University of Jordan	131	710	841
AlBalqa Applied University	157	518	675
Yarmouk University	76	250	326

Training Providers	FEMALE	MALE	TOTAL
Princess Sumaya University for Technology	40	110	150
Tafila Technical University	17	159	176
German Jordanian University	22	111	133
American University of Madaba	1	16	17
Middle East University	12	49	61
Pioneers Academy	7	23	30
YU /Consulatation & Training Center	28	46	74
BAU / Consulatation & Training Center	207	302	509
GJU / Consulatation & Training Center	4	18	22
JU/ Center of consulatation & Training	100	150	250
HU / Consulatation & Training Center	10	40	50
MEU / Consulatation & Training Center	10	10	20
Khawarizmi University Technical College	0	46	46
PRAVO Academy	37	23	60
JORDANBITS	10	121	131
TTU/ Consulatation & Training Center	9	70	79
TOTAL	1261	7808	9069

Table 32 Distribution of graduates of training programs by training provider and gender for the total years (2021-2019)



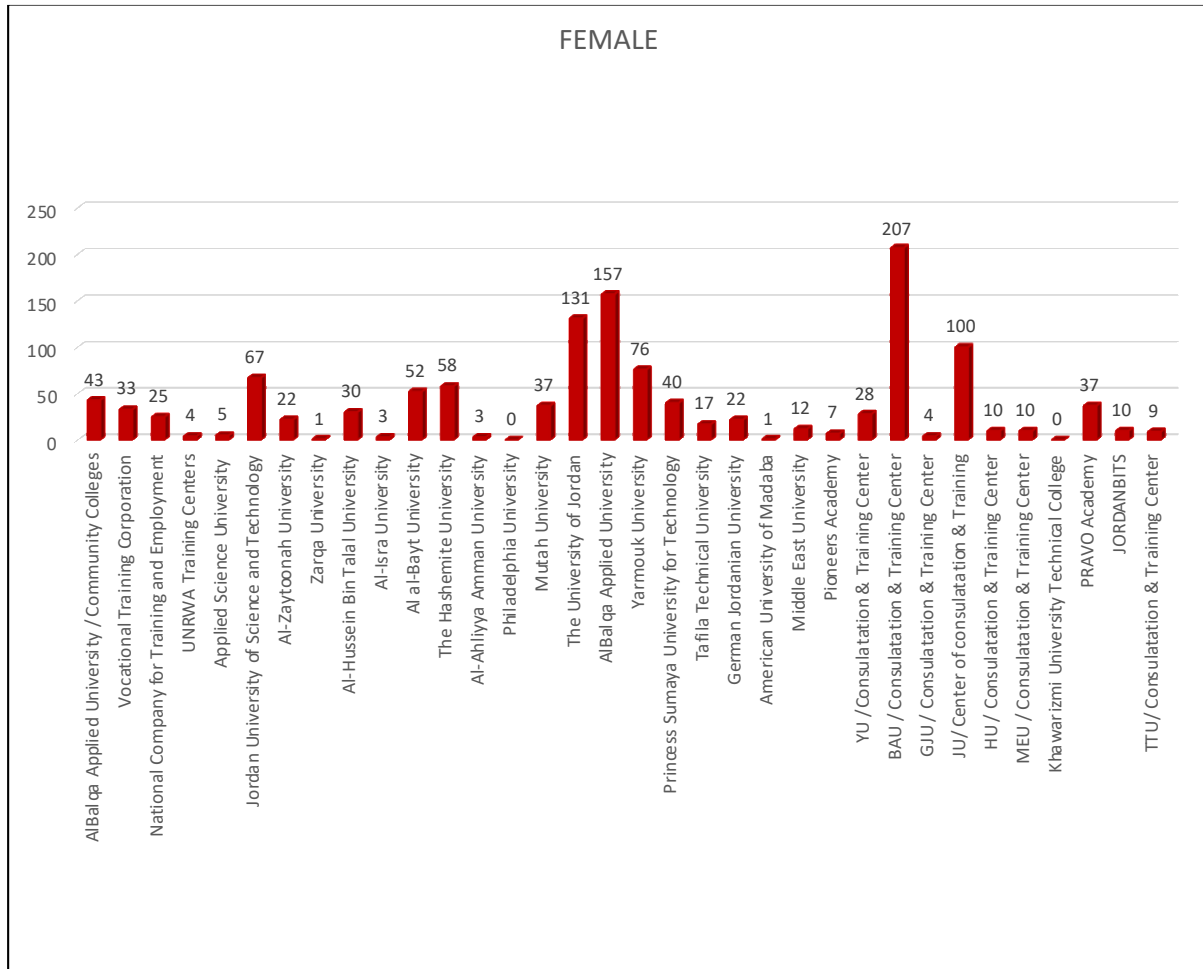


Chart 41 Distribution of graduates of training programs by training provider and gender for the total years (2021-2019)

And by analyzing the training programs which is offered by training providers, Table (33) shows number of graduates of each program, which shows that the General Electrical Technician Program got the highest percentage enrollment in the National Company for Training and Employment and Vocational Training Corporation. Whereas; Renewable Energy Engineer Program has the highest enrollment at Al-Balqa Applied University. And Renewable Energy Plant Operator Program has the highest enrollment at AlBalqa Applied University / Community Colleges, and General Mechanical Engineer Program has the highest enrollment in The University of Jordan and the Hashemite University.

Training Providers	Training Program	No. Graduates
AlBalqa Applied University / Community Colleges	Electrical Technician/General	333
	Power Plant Operators	264
	Operator/solar units to generate electricity	54
	Renewable power plant operator	349
Vocational Training Corporation	Electrical Technician/General	17
	Operator/solar units to generate electricity	94
	Electrical Assistant Wiring	157

Training Providers	Training Program	No. Graduates
	Electrician / installation and maintenance of overhead lines - public transport	19
	Electrician / installation and maintenance of overhead lines - distribution	162
	Electrical/transformation station installation	38
National Company for Training and Employment	Electrical Technician/General	687
	Operator/solar units to generate electricity	588
UNRWA Training Centers	Electrical Technician/General	43
	Operator/solar units to generate electricity	43
	Renewable power plant operator	75
Applied Science University	General Mechanical Engineer	61
	General Electrical Engineer	20
	Electrical Power / Monitoring Engineer	23
Al-Zaytoonah University	General Mechanical Engineer	97
	Renewable Energy Engineer	115
	General Electrical Engineer	16
	Electrical Power / Monitoring Engineer	56
Zarqa University	General Electrical Engineer	34
Al-Isra University	Renewable Energy Engineer	27
The Hashemite University	General Mechanical Engineer	457
	Renewable Energy Engineer	4
	General Electrical Engineer	281
Al-Ahliyya Amman University	General Electrical Engineer	62
The University of Jordan	General Mechanical Engineer	498
	Renewable Energy Engineer	58
	General Electrical Engineer	275
	Electrical Power / Monitoring Engineer	10
AlBalqa Applied University	Renewable Energy Engineer	675
Princess Sumaya University for Technology	Renewable Energy Engineer	94
	General Electrical Engineer	24
	General Electronic Engineer	32
German Jordanian University	Renewable Energy Engineer	133
American University of Madaba	General Mechanical Engineer	15
	General Electrical Engineer	2
Middle East University	Renewable Energy Engineer	61
Pioneers Academy	Renewable power plant operator	30
BAU / Consulataion & Training Center	Electrical Technician/General	140
	Operator/solar units to generate electricity	199
	Renewable power plant operator	170
	Wind Power Plant Operator	150

Training Providers	Training Program	No. Graduates
JU/ Center of consultation & Training	Renewable power plant operator	100
MEU / Consultation & Training Center	Renewable power plant operator	20
PRAVO Academy	Electrical Technician/General	15
	Renewable power plant operator	45
JORDANBITS	Operator/solar units to generate electricity	131
GJU / Consultation & Training Center	Operator/solar units to generate electricity	22
HU / Consultation & Training Center	Renewable power plant operator	50
Khawarizmi University Technical College	General Mechanical Engineer	46
Jordan University of Science and Technology	General Mechanical Engineer	418
	General Electrical Engineer	200
Al al-Bayt University	Renewable Energy Engineer	135
Philadelphia University	Renewable Energy Engineer	21
	General Electrical Engineer	57
Yarmouk University	Electrical Power / Monitoring Engineer	326
YU /Consultation & Training Center	Renewable power plant operator	74
Al-Hussein Bin Talal University	General Mechanical Engineer	112
	Renewable Energy Engineer	25
	General Electrical Engineer	117
Mutah University	Renewable Energy Engineer	35
	Electrical Power / Monitoring Engineer	123
Tafila Technical University	Electrical Power / Monitoring Engineer	176
TTU/ Consultation & Training Center	Electrical Technician/General	20
	Renewable power plant operator	59
TOTAL		9069

Table 33 Graduates of training providers according to the most prominent training providers and training program for years (2021-2019)

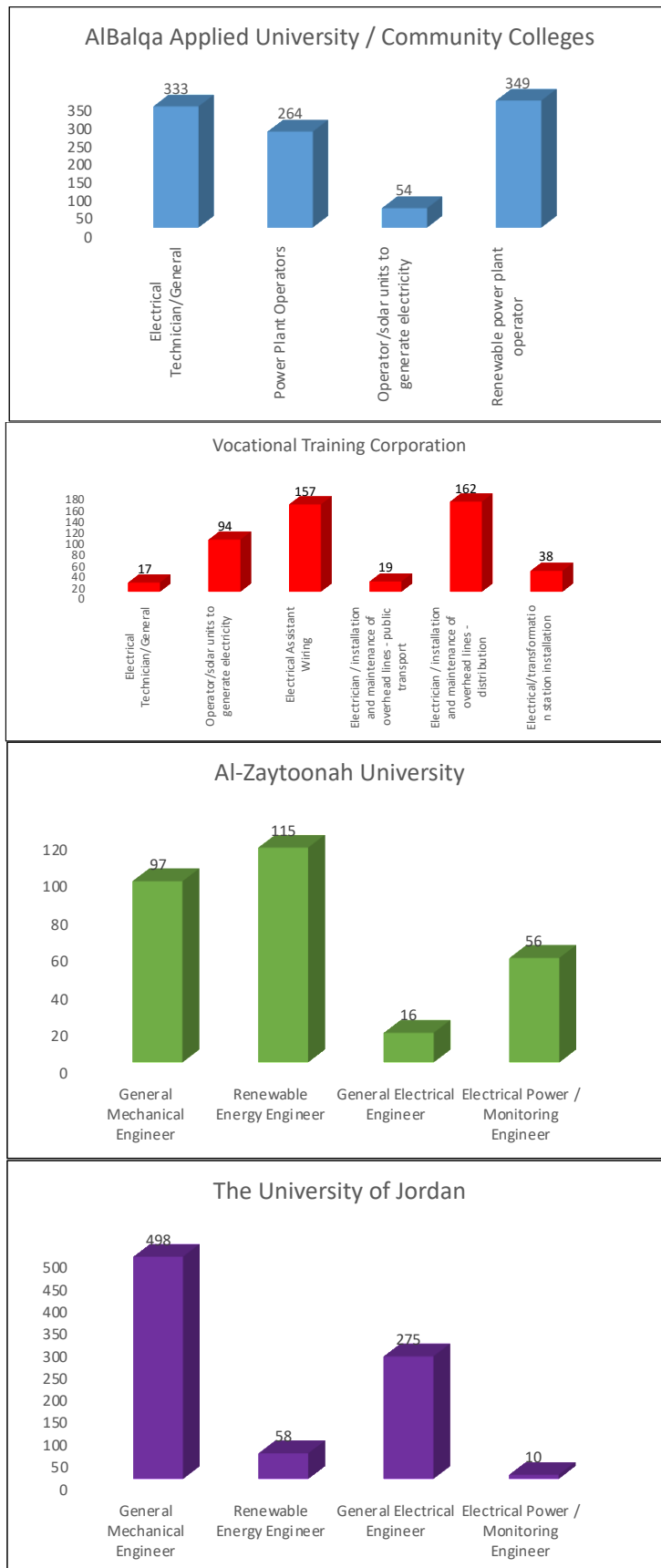


Chart 42 Distribution of graduates of training providers according to the most prominent training providers and the training program for the years (2021-2019)

3.3 General Skills included in employee preparation programs

The table (34) below presents general skills that is support employment and available within training programs adopted by training institutions. It seems that communication, planning, and time management skills are essential for all programs in general, while other programs vary in job-support skills.

Program name	Computer skills	Creativity and innovation skills	Communication skills	Analytical and problem-solving skills	Planning and time management skills	English communication skills	Numerical skills
General Mechanical Engineer	X	X	X	X	X	X	X
Electrical Power / Monitoring Engineer	X	X	X		X	X	X
General Electrical Engineer	X	X	X	X	X	X	X
Renewable Energy Engineer	X	X	X	X	X	X	X
Renewable Power Plant Operator	X	X	X	X	X	X	X
General Electric Engineer	X	X	X	X	X	X	X
Power Plant Operators	X	X	X	X	X	X	X
Electrical Assistant Wiring			X	X	X		
Electrician / installation and maintenance of overhead lines - distribution	X	X	X	X	X	X	
Electrician / installation and maintenance of overhead lines - public transport	X	X	X	X	X	X	
Electrical/transformation station installation	X		X	X	X	X	
Electrical Technician/General	X		X	X	X		X
Operator/solar units to generate electricity	X		X	X	X		X
Wind Power Plant Operator	X		X	X	X	X	X

Table 34 The general skills supporting employment that are adequately provided by the training programs

3.4 Efficiency-raising programs offered in the electricity supply and renewable energy sector

Among the most prominent providers of efficiency-raising (Performance enhancement) courses in Jordan are: the National Company for Employment and Vocational Training, and Counseling Center affiliated with several public and private universities in Jordan, in addition to a number of private academies and training centers within the private sector. Table (35) shows some providers and number of trainees in years (2019-2021).

Providers	2019	2020	2021
National Company for Training and Employment	18	25	42
Engineers Training Center	32	35	37
Pioneers Academy	0	0	27
BAU/Consulation & Training Center	300	0	54
GJU / Consulation & Training Center	12	0	0
JU/ Center of consulation & Training	0	0	17
MEU / Consulation & Training Center	0	0	25
Academy of the Higher Center for Vocational Training	14	0	10
JORDANBITS	0	0	8
TTU/ Consulation & Training Center	0	0	94
Green building council / Jordan Green Building Council	0	16	0
TOTAL	376	76	314

Table 35 Training Providers that provide efficiency-raising courses and the number of trainees in the period (2021-2019)

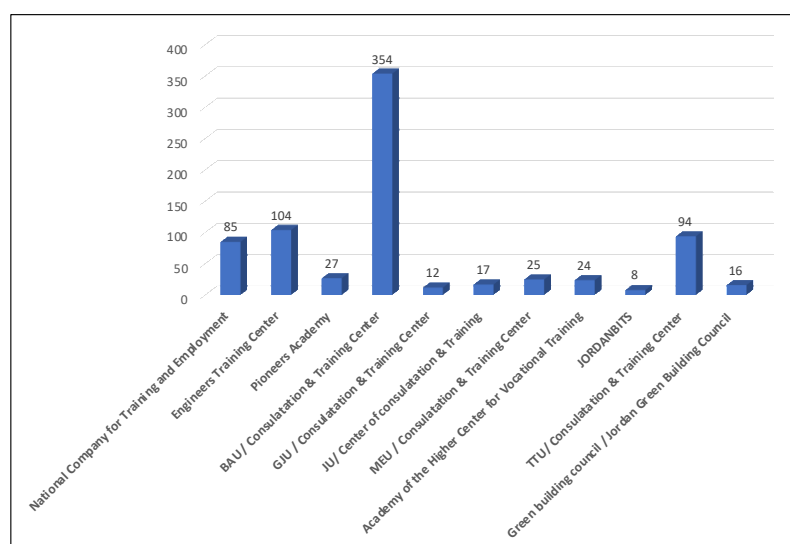


Chart 43 Training Providers that provide efficiency-raising courses and the number of trainees in the period (2021-2019)

On the other hand, the number of male trainees receiving Performance Enhancement training reached (515) in the years (2019-2021) which is 67% of the total number of trainees. While the number of female students participating in same training has reached about (251) in the years (2019-2021) which is equivalent to 33% of the total number of trainers.

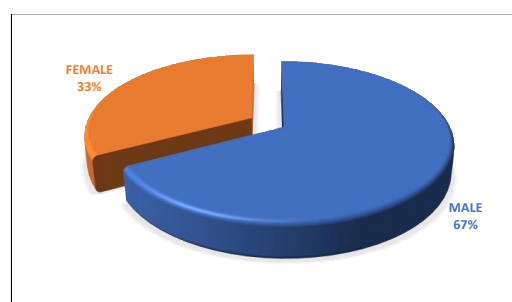


Chart 44 trainees in the proficiency-raising courses by gender

Efficiency-raising courses offered by training providers vary, and in general, Linking control systems with renewable energy systems, designing security systems, and determining issues related to projects sustainability courses; ranked first in terms of the number of trainees for the period (2019-2021) by (404) trainer. followed by Operation of solar energy modules, monitoring and conservatiee of the acid level in electric energy storage batteries courses by (96) trainers, and then Preparing electrical wiring diagrams and alarm circuits for industrial, commercial and household projects course by (75) trainers.

In general, the percentage of males trained in these courses was the highest, reaching (67%) compared to (33%) for females. The courses of linking control systems with renewable energy systems, designing protection systems and determining issues related to projects sustainability courses received the highest percentage of male and female (49%) and (60%) respectively.

Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries courses was in the favor of males, while preparing electrical wiring schemes, and alarm circuits for industrial, commercial and household projects courses was in the favor of females.

Efficiency raising courses according to the training provider	Male	Female
National Company for Training and Employment	70	15
Supervising the implementation of electrical works for electrical installations	32	15
Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	38	0
Engineers Training Center	64	40
Preparing designs of single-schemes for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects	11	9
Preparing designs and plans for domestic, industrial and commercial electrical wiring, light signaling systems and street lighting..etc.	19	10
Preparing designs for renewable energy systems	22	15
energy auditEnergy Audit and Energy Efficiency	12	6
Pioneers Academy	9	18
Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	9	18
BAU/Consulatation & Training Center	230	124
Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	223	120
Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	7	4
GJU / Consulatation & Training Center	11	1
Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	11	1
JU/ Center of consulatation & Training	13	4
Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	13	4

MEU / Consulatation & Training Center	12	13
Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	8	7
Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	4	6
Academy of the Higher Center for Vocational Training	22	2
Supervising the implementation of electrical works for electrical installations	22	2
JORDANBITS	8	0
Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	8	0
TTU/ Consulatation & Training Center	68	26
Preparing electrical wiring diagrams and alarm circuits for industrial, commercial and domestic projects	55	20
Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	13	6
Green building council / Jordan Green Building Council	8	8
energy auditEnergy Audit and Energy Efficiency	8	8
TOTAL	515	251

Table 36 Distribution of efficiency-raising courses offered by the providers according to gender for the period (2021-2019)

Training Course	2019	2020	2021
Preparing designs of single-line-diagram for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects	0	10	10
Preparing designs and plans for domestic, industrial and commercial electrical wiring, light signaling systems, street lighting, etc.	15	5	9
Supervising the implementation of electrical works for electrical installations	24	7	40
Preparing electrical wiring diagrams and alarm circuits for industrial, commercial and domestic projects	0	0	75
Preparing designs for renewable energy systems	17	12	8
Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	300	0	104
Energy Audit and Energy Efficiency	0	24	10
Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	20	18	58
TOTAL	376	76	314

Table 37 Distribution of trainees according to the efficiency-raising courses they received and the year in which they were trained

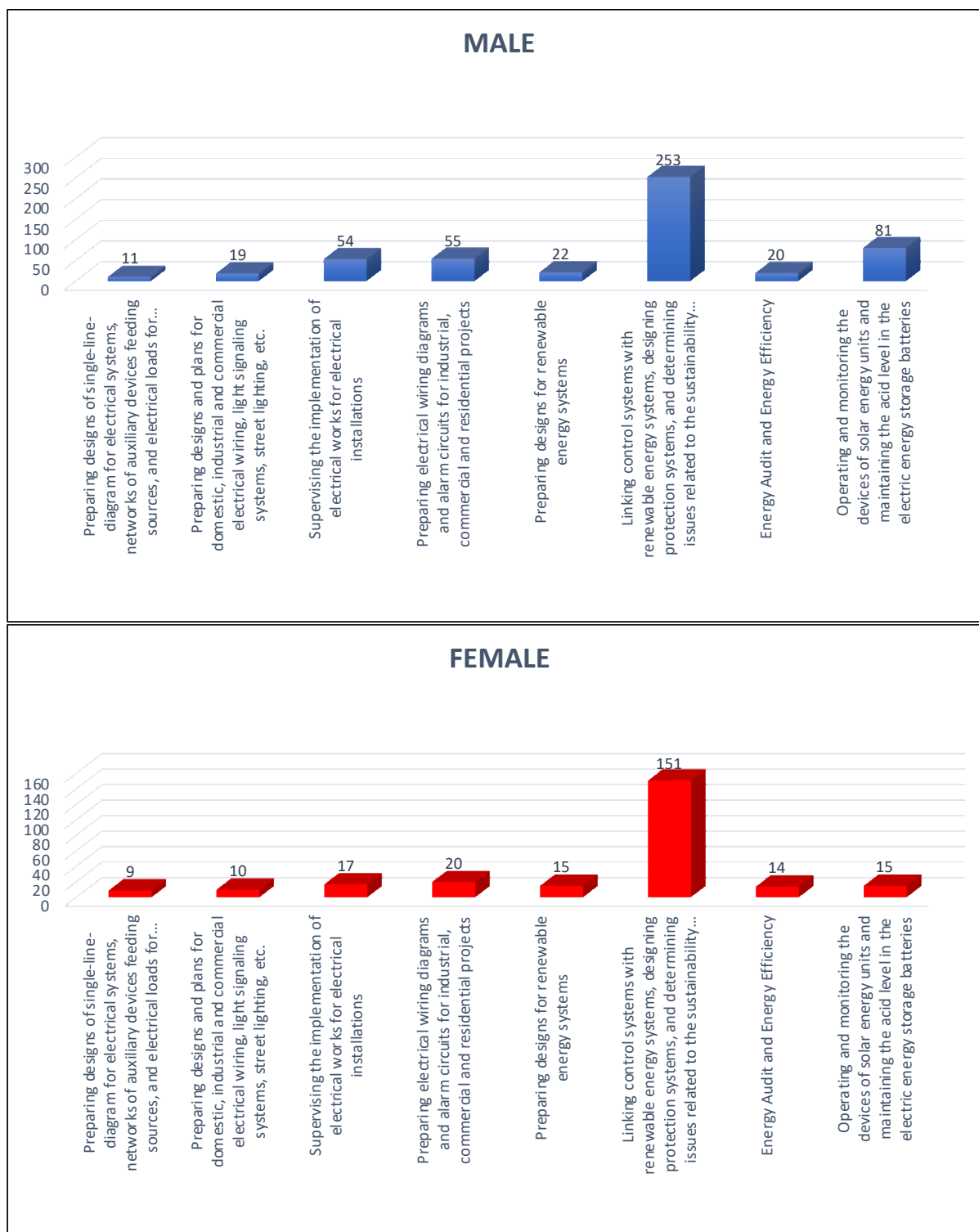


Chart 45 Distribution of trainees according to Efficiency- rising courses for the period(2021-2019) by gender

Table (38) below show further analysis at regional level, this study shows that the majority of providers of Efficiency- rising courses are located in the Central Territory (602) trainees, while in the North Territory (32) trainees, and in the South Territory (132) trainees during the period (2019-2021).

Territories	Courses	The number of trainees
Central Territory	Preparing designs of single-schemes for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects	20
	Preparing designs and plans for domestic, industrial and commercial electrical wiring, light signaling systems, street lighting, etc.	29
	Supervising the implementation of electrical works for electrical installations	30
	Preparing designs for renewable energy systems	37
	Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	385
	energy auditEnergy Audit and Energy Efficiency	34
	Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	67
North Territory	Supervising the implementation of electrical works for electrical installations	14
	Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	18
South Territory	Supervising the implementation of electrical works for electrical installations	27
	Preparing electrical wiring diagrams and alarm circuits for industrial, commercial and domestic projects	75
	Linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project	19
	Operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries	11
TOTAL		766

Table 38 Distribution of trainees according to Efficiency-Rising courses they have received by regions

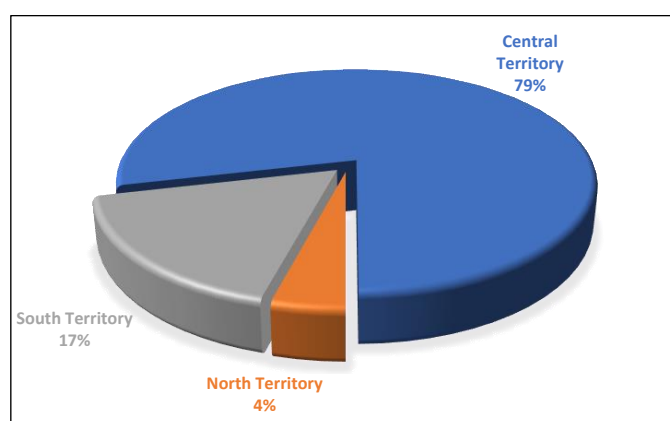


Chart 46 Distribution of trainees according to Efficiency-Rising courses they have received by regions

CHAPTER 4

ESTIMATING THE SUPPLY AND DEMAND GAP IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR

4 ESTIMATING THE SUPPLY AND DEMAND GAP IN THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR

4.1 The gap between training needs and the available training programs.

This chapter of the study focuses on comparing the training programs required by employers in the field of electricity supply and renewable energy over the years (2022-2024), with training programs offered by training institutions over the years (2019-2021), with the aim of knowing the degree of convergence or gap between what is needed and what is provided.

The high unemployment rate in general and in Jordan in particular is an indicator of an imbalance in the labor market force, and what is obvious at first glance is the existence of a gap between supply and demand. Based on this study, the gap between supply and demand in electricity supply and renewable energy and its different sectors was studied and analyzed. The results revealed the following: The number of establishments operating in this sector is (372) establishments, with a total employment volume of (12,833) employees male and female. Overall, the aggregate demand for the years (2021-2024) amounted to (1,375) job opportunities in this sector, while the total supply reached (9,069) for the years (2019-2021), indicating existence. of a very large numerical gap is estimated to be (7694) oversupply, meaning that the market cannot absorb (100%) of the supply, and there will be an oversupply in the market of 85% of the total demand.

4.2 The gap between supply and demand for female labor

The results revealed that the majority of establishments operating in the electricity supply and renewable energy sectors expressed their unwillingness to hire females. However, there is a future demand for females to work in this sector, estimated at only (522) job opportunities for the years (2022-2024), this demand is distributed within the specialization of General Electrical Engineer and Renewable Energy Engineer.

We also find that there is an oversupply of females, as survey data indicates that (1,261) female students graduated during the years (2019-2021), a large proportion of them graduates from the Renewable Energy Engineer program (27%), then the Renewable Energy Plant Operator program (21%), then the General Electrical Engineer program (17%). Hereby, we note the numerical gap between what is provided and what is required (739 female) oversupply in the electricity supply and renewable energy sectors.

Table (39) details the required occupations and specializations of graduates as it shows that there is a clear and distinct imbalance in the labor market of this sector. It can be seen that there is no match between supply and demand, and that there is a gap in certain sectors in favor of supply (unemployment indicator), and another gap in favor of demand which refers to the disciplines capable of creating job opportunities in the electricity supply and renewable energy sector for females in the years (2022-2024), and this gap is calculated in the table by

comparing the employment gap from the supply-side. Since the gap in the past indicates the existence of oversupply, this means and indicates poor planning and a lack of alignment with what is required in the market and programs offered by training providers in Jordan.

Demand	No. Demand	Offer	No. Offer	Gap
General Electrical Engineer	179	General Electrical Engineer	216	Oversupply
Renewable energy engineer	58	Renewable energy engineer	338	Oversupply
General Mechanical Engineer	22	General Mechanical Engineer	52	Oversupply
Electrical Engineer/Other	10	Electrical Power / Monitoring Engineer	119	Oversupply
Graphic Designer	3			Excess Demand
Electrical Engineer/Maintenance	3			Excess Demand
Electrical Engineer/Computer	3			Excess Demand
Electronic Engineer/General	3			Excess Demand
Mechanical Engineer/Maintenance	2			Excess Demand
Electrical Engineer/Extension	2			Excess Demand
Electrical Engineer/Protection	2			Excess Demand
Operator/Solar Modules to Generate Electricity	2			Excess Demand
Quality Control Engineer	2			Excess Demand
Project Manager	2			Excess Demand
Mechanical Engineer/Other	1			Excess Demand
Systems Administrators	1			Excess Demand
Computer Network Specialists	1			Excess Demand
Electronic Engineer/Computer	1			Excess Demand

Table 39 The gap between the required and offered training programs for females for the years(2022-2024)

4.3 The gap between the training needs of each profession and the training programs available for these professions

For the supply and demand aspects of training programs, see Table (40), which shows a number of training programs required by employers and corresponding training programs offered by training providers.

The Demand	No. Of Demand	The Offer	No. Of Offer	Gap	Gap Ratio
Electrical Engineer/General	265	Electrical Engineer/General	1088	788	72.40%
Electrical/Maintenance Engineer	16				
Electrical Engineer/ Other (Specify).	14				
Electrical/Extension Engineer	2				
Quality Control Engineer	3				
Systems Administrators	1				
Electrical Technician/Maintenance of Electrical Machines	78	Electrical Technician/General	1255	1068	85.10%
Electrical Technician/General	60				
Electrical/Electromechanical Technician	15				
Electrical/Maintenance of Machines and General Switches	3				
Electronic Technician/General	3				
Help Desk Technician (Help Desk Technician)	3				
Electrical Technician/Electrical Protection Systems	24				
Mechanical Technician / Production	105	Power Plant Operators	264	122	46.30%
Mechanical Technician/Maintenance	27				
Industrial Engineer	5				
Mechanical/Maintenance Engineer	5				
Renewable Energy Engineer	102	Renewable Energy Engineer	1383	1208	87.40%
Advertising And Marketing Specialists	53				
Management Policy Specialists	9				
Public Relations Specialists	9				
Project Manager	2				
Electrical/Protection Engineer	27	Operator/Solar Units to Generate Electricity	1131	1086	96.10%
Operator/Solar Units to Generate Electricity	18				
Electricity / Operation, Installation and Maintenance of Generating Stations	2	Renewable Power Plant Operator	972	970	99.80%
Stock Monitor	1	Electrical Assistant Wiring	157	156	99.10%
Electrical Power / Monitoring Engineer	3	Electrical/Transformation Station Installation	38	35	92.10%
General Mechanical Engineer	50	General Mechanical Engineer	1704	1616	94.8%*
Mechanical / Production Engineer	30				
Mechanical Engineer/ Other	5				
Mechanical/Strength Engineer	3				
Electronic/Computer Engineer	11	General Electric Engineer	32	11	33.6%*
Electronic/Control Engineer	3				
General Electric Engineer	3				
Mechatronics Engineer	3				
Computer Network Specialists	1				
Electronic/Computer Engineer	1				

The Demand	No. Of Demand	The Offer	No. Of Offer	Gap	Gap Ratio
		Electrical Power / Monitoring Engineer	714	714	100.00%
		Electrician / Installation and Maintenance of Overhead Lines - Distribution	162	162	100.00%
		Wind Power Plant/Operator	150	150	100.00%
		Electrician / Installation and Maintenance of Overhead Lines - Public Transport	19	19	100.00%
Support Professions	412				
Total	1375		9069	8106	

Table 40 Demand and offered training programs in the sector

* note that graduates of electronic engineering and mechanical engineering do not only work in this sector, which reduces the gap for these professions relatively.

The table above shows that the training programs required by employers are more specific and personalized. While the training programs offered by the training providers are mostly generic. This plus the demand for the expertise, professions and skills offered outside of the electricity and renewable energy sector, reaches to 412 occupations and jobs needed in this sector.

The study highlights the need for training providers to pay attention to this need and ensure delivery of training programs required by employers, as shown in Table (41) below.

Number of people to be trained	Required training program
76	Preparing designs for renewable energy systems
32	Preparing preventive and curative maintenance programs
24	Installation cost analysis
61	Determine the type of insulator used
29	Energy Audit and raise energy efficiency
18	Preparing programs for assembling and installing mechanical equipment in industrial projects
20	Connecting control systems with power systems Renewable and design protection systems and identification of issues related to the sustainability of the project
29	Installation of electrical devices, distribution panels, monitoring and alarm panels according to the plan
15th	Preparing designs of single-schemes for electrical systems, networks of auxiliary devices feeding sources, and electrical loads for power plants and engineering projects
12	Doing economic feasibility studies work Reports and Studies
13	Preparing designs for distribution networks for heating, cooling and sewage systems for projects and buildings

Number of people to be trained	Required training program
8	Studying engineering drawings for business Mechanical in buildings, facilities and factories
9	Preparation of operating and maintenance programs for electrical equipment
10	Prepare plans to run the system Electricity and to introduce new equipment into the electrical system
12	Operation of solar energy modules and monitored and conservative The acid level in electric energy storage batteries
7	Preparing designs and blueprints for mechanical systems
6	Studying architectural plans for buildings and facilities
8	Estimating quantities of work materials, providing them and matching their specifications
6	Preparing studies for the development and modernization of protection systems and counting and measuring devices
11	Preparation of operating and maintenance programs for welding machines and equipment
11	Inspection of secondary and primary current and voltage of current transformers Voltage transformers
4	Download drivers and applications for programmed and automated machines
4	Design of suitable overhead and ground electrical distribution networks
6	Adjust the protection devices by comparing them with the accuracy of the standard protection devices and according to the manufacturer's manuals
4	Diagnose mechanical faults on different production lines
10	Preparing electrical wiring diagrams and alarm circuits for industrial and commercial projects and household
5	Determining the technical equipment needed for the welding operator, their specifications and quantities, and preparing their installation plan
10	Tracking electrical control schemes for hydraulic, pneumatic, control and protection equipment and devices, examining them, diagnosing their malfunctions using inspection and measuring devices, and following up on repair procedures
4	Electrical systems design and protection for transformers and generators according to their capabilities and types
5	Determining the technical equipment necessary for general mechanical maintenance, their specifications, quantities and cadastral needs, and preparing their distribution plan
3	Dismantling, cleaning and reassembling the solar collectors
3	Studying electrical diagrams for devices and equipment in industrial and engineering projects
4	Preparing plans and executive work programs for the installation and operation of electromechanical equipment, with civil and mechanical works
9	processing and operation Lathes and Fries traditional, and scrapers, ordinary arc welding machines, shielded gas and oxy-acetylene welding equipment
3	Preparation of operating and maintenance programs for equipment in industrial projects
3	Prepare installation and commissioning plans and maintenance For protection systems and counting and measuring devices
2	Preparation of technical specifications for pneumatic systems and hydraulic and programmed logic controllers
6	Preparing programs for the installation and maintenance of technical equipment necessary for the general mechanical maintenance operator

Number of people to be trained	Required training program
2	Hand drawn architectural plans Or by using software on a computer, and drawing the structural drawings manually or using the computer
2	electrical system case study
2	Inspect and inspect equipment after maintenance procedures
5	Diagnose engine malfunctions, generators, excitation systems, relays and circuit breakers, analyze results and follow up on repair procedures
3	Supplying and operating lathes, mills, conventional and computerized spark-drilling machines, scrapers, standing and rotary automatic drills, and flat and cylindrical grinding machines.
3	Diagnosing electrical faults in the operating circuits of electrical devices and equipment of all kinds
1	Maintenance of protection systems for counting devices
4	Carry out remedial maintenance of electrical faults for the operating circuits of electrical devices and equipment
1	Defining control systems in engineering projects
1	Study of geological maps and aerial photographs to advise on site selection
1	Examination of the various welds of welding lines and joints using bending tests of weld joints, and checking the load tensile stress. Take the necessary measures for restoration
3	Study of various electronic circuit diagrams
4	lighting design Interior and exterior of buildings and control rooms
1	Supervising the implementation of electrical works for electrical installations
1	Installation of devices and equipment for hydraulic and pneumatic systems (Plastic injection and blowing machines
3	Inspect and adjust current, voltage, vibration, pressure, level, temperature, velocity and vibration transmitters.
1	Preparing plans and plans for installation and commissioning of devices and equipment
3	Calibration of main and secondary protection devices
1	Preparing and installing plans for computers, peripherals and digital machines
1	Load generating units into the electrical system

Table 41 The most requested training programs for the years (2022-2024) and not available with training providers

South Territory	North Territory	Central Territory
Energy Audit And Energy Efficiency	General Electric Engineer	Wind Power Plant/Operator
General Electric Engineer	Power Plant Operators	Mechanical Technician/Machinery Operator
Power Plant Operators	Electrical Assistant Wiring	Network Engineer (Network Engineer
Electrical Assistant Wiring	Electrician / Installation and Maintenance Of Overhead Lines - Distribution	Mechanical Technician / Welder
Electrician / Installation and Maintenance Of Overhead Lines - Distribution	Electrician / Installation and Maintenance Of Overhead Lines - Public Transport	
Electrician / Installation and Maintenance Of Overhead Lines - Public Transport	Electrical/Transformation Station Installation	
Electrical/Transformation Station Installation	Electrical Technician/General	
Operator/Solar Units to Generate Electricity	Operator/Solar Units to Generate Electricity	
Wind Power Plant/Operator	Wind Power Plant/Operator	
Connecting Control Systems with Renewable Energy Systems	Energy Audit and Energy Efficiency	
Preparing Designs For Renewable Energy Systems		
Preparing Electrical Wiring Designs and Plans		

Table 42 Required training programs for the years (2022-2024) in each Region and is not available with training providers

4.4 The gap between the demand for workers with disabilities and the training programs offered to them

In Chapter Three, the study did not show the indicators for people with disabilities in terms of supply, as the answers of the establishments did not include this aspect. As for the demand side, the study showed that there are (91) establishments operating in the electricity supply and renewable energy sector that are ready to provide (115) opportunities. Jobs are mainly focused on: General Electrical Engineer, Renewable Energy Engineer, Electrical / Electromechanical Technician.

Job opportunities for people with disabilities	Male	Female	TOTAL
General Mechanical Engineer	1		1
Quality Control Engineer	1		1
Electrical/Protection Engineer		2	2
Electrical/Maintenance of Machines and General Switches	2		2
Electrical/Electromechanical Technician	2		2
Renewable Energy Engineer	1	3	4
General Electrical Engineer	14	23	37
Other Support Professions	33	33	66
TOTAL	54	61	115

Table 43 Job opportunities for people with Disability by Gender

Therefore, the study concludes that it is possible to provide training programs for people with disabilities which are commensurate with the sector's future needs, with the need to provide training programs tailored for this category of society.

CHAPTER 5

HUMAN RESOURCE DEVELOPMENT PLAN FOR THE ELECTRICITY SUPPLY AND RENEWABLE ENERGY SECTOR

Methodology for preparing a human resource plan for the electricity supply and renewable energy sector (2022-2024)

5 Human Resource Development Plan in the Energy sector

First: Forming an advisory committee Board for the electricity supply and renewable energy sector

The Advisory Committee for the Electricity Supply and Renewable Energy Sector was formed according to the letter of the National Center for Human Resources Development and in coordination with the Ministry of Labor. The committee includes members from both the public and private sectors, in addition to representatives from civil society institutions. The committee's missions and goals included studying the sector's concerns and issues at the level of policies and strategies, participating in all stages of preparation for the study and providing consultations and studying the approval of the sector's professional standards.

Second: Preparing a study by the National Center for the gap between the supply and demand sides in the electricity supply and renewable energy sector

The Sector Committee, in cooperation with the National Center for Human Resources Development, developed the methodology, objectives and sample of the analytical study of the gap between the supply and demand sides in the electricity supply and renewable energy sector. A field survey was conducted in cooperation with the Department of Statistics, included establishments representing the sector, and forms were filled out by the institutions providing training in the sector. The committee also followed up the work with the National Center in the various stages of the study.

Third: Develop a human resource development plan for the electricity supply and renewable energy industry based on the research results of the National Center on the supply-demand gap in the field of electricity supply and renewable energy.

Based on the research results of the National Center on the supply-demand gap in the field of electricity supply and renewable energy, the results are:

- Participation in the formulation of recommendations or policies note that serves the electricity supply and renewable energy sector.
- Present a draft human resources sectoral plan for the electricity supply and renewable energy sector to the advisory committee for the study and taking their comments and include it in the plan.
- Approving the sectoral human resources development plan for the electricity supply and renewable energy sector in its final form.

Human resources development plan for the electricity supply and renewable energy sector (2022-2024)
(This plan was developed based on the results of the study of the National Center for Human Resources Development)

<p>1. Strategist Goal (1): Upgrade With vocational training and education services specific to the sector, to produces a qualified workforce to meet the current and future needs of the labor market in the sector.</p> <p>2. Strategist Goal (2): Improve Work environment and job creation within electricity supply and renewable energy sector.</p>					
Activity	The relevant authorities	Implementation responsibility	Time frame	Performance Index	The main focus of the activity
Formation of a permanent committee Sector advisory Alignment between education and market outcomes.	<ul style="list-style-type: none"> • Training Provider (universities, colleges, centers training...) • Private sector companies • Ministry of Energy mineral resources • Energy and Minerals Regulatory Authority • Sector Associations • Commission for Accreditation of Higher Education Institutions and Quality Assurance • The Ministry of Education • Ministry of Labor • National Center for Human Resource Development 	Ministry of Labor	One meeting every two months	<ul style="list-style-type: none"> • Report on the results of the harmonization study and recommendations of committee members· • A quarterly report to follow up on the implementation of the agreed recommendations and plans. • Advisory Committee formation letter 	<ol style="list-style-type: none"> 1. Preparing a plan with the latest training courses required in the training market to train the trainers to deliver these courses. 2. Preparing a plan with the latest technical training courses required in the labor market to train the trainees. 3. Determining the specializations required in the labor market 4. Establishing partnerships between the public and private sectors in the field of implementing and evaluating training programs. 5- Preparing a plan to train the trainers on the skills required in the labor market (example: communication skills, English language)

1. Strategist Goal (1): Upgrade With vocational training and education services specific to the sector, to produces a qualified workforce to meet the current and future needs of the labor market in the sector.

2. Strategist Goal (2): Improve Work environment and job creation within electricity supply and renewable energy sector.

Activity	The relevant authorities	Implementation responsibility	Time frame	Performance Index	The main focus of the activity
	<ul style="list-style-type: none"> • Professional and Technical Skills Development Authority • Sectoral Skills Council for the Water and Energy Sector. • Jordanian Engineers Association 				<p>6. Launching new initiatives in the field of training, employment or consulting and evaluating the current ones in cooperation with donors, the most important of which is the Professional and Technical Skills Development Authority</p> <p>7. Appointing an executive committee from all relevant authorities to follow up on the implementation of the agreed plans</p> <p>8. All training plans should be feasible for people with disabilities.</p>
Raising the efficiency of workers in the sector of renewable energy graduates	<ul style="list-style-type: none"> • Private sector companies • Ministry of Energy and Mineral Resources • Energy and Minerals Regulatory Authority 	<p>National Center for Human Resource Development</p> <p>Traingin Providers</p> <p>Jordanian Engineers Association</p>	4th quarter of 2022 and the 1st quarter of 2023	Hold one training session	<p>1. Plan the latest specialized technical training according to the requirements of the labor market to train workers for establishments in the industry.</p> <p>2. Prepare a study to assess the wages of workers in the field and</p>

1. Strategist Goal (1): Upgrade With vocational training and education services specific to the sector, to produces a qualified workforce to meet the current and future needs of the labor market in the sector.
2. Strategist Goal (2): Improve Work environment and job creation within electricity supply and renewable energy sector.

Activity	The relevant authorities	Implementation responsibility	Time frame	Performance Index	The main focus of the activity
	<ul style="list-style-type: none"> • Training providers • Commission for Accreditation of Higher Education Institutions and Quality Assurance • Sector Associations • Ministry of Labor • National Center for Human Resource Development • Jordanian Engineers Association 				<p>plans to retain and benefit from the experience</p> <p>3. Establish partnerships between the public and private sectors in the implementation and evaluation of training programmes.</p> <p>4. Launch cooperation initiatives with sponsors in the field of training and consulting.</p> <p>5. Designate an executive committee consisting of all competent authorities to oversee the implementation of the agreed plans</p>

1. Strategist Goal (1): Upgrade With vocational training and education services specific to the sector, to produces a qualified workforce to meet the current and future needs of the labor market in the sector.
2. Strategist Goal (2): Improve Work environment and job creation within electricity supply and renewable energy sector.

Activity	The relevant authorities	Implementation responsibility	Time frame	Performance Index	The main focus of the activity
<p>Providing a web page that includes the most important and latest required courses for the labor market.</p>	<ul style="list-style-type: none"> • Training Providers (universities, colleges, training centers....) • Private sector companies • Ministry of Energy and Mineral Resources • Sector Associations • Energy and Minerals Regulatory Authority • Engineers Association • Commission for Accreditation of Higher Education Institutions and Quality Assurance • The Ministry of Education • Ministry of Labor • National Center for Human Resource Development • Professional and Technical Skills Development Authority 	<p>Energy and Minerals Regulatory Authority</p> <p>Engineers Association</p>	<p>3rd quarter of the year 2022</p>	<p>Number of Page visits</p> <p>quarterly and annual follow-up and evaluation reports showing the preparation of the beneficiaries of the web page</p>	<ol style="list-style-type: none"> 1. Create an interactive web page specifically Indicate the most important required training courses And the latest labor market updates, And how to get those trainings if it is available locally or globally 2. Broadcast Educational videos about the required training course Entrepreneurs Businesses in Jordan 3. broadcast messages publicity via the web page to promote the electricity supply and renewable energy sector 4. The Web page should have Accessibility of the page for people with disabilities

1. Strategist Goal (1): Upgrade With vocational training and education services specific to the sector, to produces a qualified workforce to meet the current and future needs of the labor market in the sector.
2. Strategist Goal (2): Improve Work environment and job creation within electricity supply and renewable energy sector.

Activity	The relevant authorities	Implementation responsibility	Time frame	Performance Index	The main focus of the activity
Sector Promotion & Marketing	<ul style="list-style-type: none"> • Ministry of Industry and Trade • Sector Associations • The Ministry of Investment • Ministry of Energy and Mineral Resources • Energy and Minerals Regulatory Authority • Ministry of Foreign Affairs and Expatriate Affairs • Donors 	<ul style="list-style-type: none"> • Ministry of Industry and Trade • Sector Associations • Ministry of Energy and Mineral Resources • Energy and Minerals Regulatory Authority 	4th quarter of the year2022	<ol style="list-style-type: none"> 1. Holding the exhibition for the sector 2. Advertising and promotional materials on the website 	<ol style="list-style-type: none"> 1. Hold one exhibition (at least) to promote the sector - Locally or Internationally 2. Broadcast promotion messages via web page to promote the electricity supply and renewable energy sector

1. Strategist Goal (1): Upgrade With vocational training and education services specific to the sector, to produces a qualified workforce to meet the current and future needs of the labor market in the sector.
2. Strategist Goal (2): Improve Work environment and job creation within electricity supply and renewable energy sector.

Activity	The relevant authorities	Implementation responsibility	Time frame	Performance Index	The main focus of the activity
Increasing number of beneficiaries of financing programs supporting small and medium projects and startups (Entrepreneurial)	<ul style="list-style-type: none"> • The Ministry of Planning and International Cooperation • Ministry of Industry and Trade • Funds such as (Development and Employment Fund). • Jordan Corporation for the Development of Economic Projects. • Sector Associations • Ministry of Energy and Mineral Resources • International donors. 	<p>The Ministry of Planning and International Cooperation</p> <ul style="list-style-type: none"> • Business incubators (zinc, big, tank) 	3rd & 4th quarter of year 2022	<ul style="list-style-type: none"> • Submitting two work proposals to the funding bodies to increase the sector's benefit from their financing programs and projects in the field of: <ul style="list-style-type: none"> • Creation of small projects • Expansion works for existing facilities 	Coordination with the bodies and institutions concerned with financing to increase the sector's benefit from an entrepreneurs and startups from Funding programs and projects

CHAPTER 6

RESULTS AND RECOMMENDATIONS

6 Results and Recommendations

6.1 RESULTS

The number of establishments operating in the electricity supply and renewable energy sector has reached (372) establishments, and they employ about (12,833) male and female workers, distributed by (61%) in the central territory, about (33%) in the north territory, and (6%) in the South territory. The majority of establishments operating in the sector are considered individual establishments (56%) according to their legal entity, solidarity company (5%), and about (34%) are establishments with limited liability.

Establishments in the field of electricity supply and renewable energy are classified into: small enterprises (1-4 employees) with the proportion (65%), followed by medium enterprises (5-19 employees) with percentage (30%), followed by large companies (20 workers or more) (5%), and it should be noted that the majority of establishments claim that the volume of demand for their products has decrease in the years (2019-2021), 32%. , while (46%) of establishments reported an increase in their product demand during the period mentioned, and approximately (15%) stated that their production demand remained unchanged over the period.

workers in this sector are split (89%) for males, compared with just (11%) for females. The study found that the majority of working males have a bachelor's degree (31%) and then an intermediate diploma (28%) and about (20%) are secondar. the majority of females have a bachelor's degree (69%), then an intermediate diploma (13%) and (2%) for high school. On the other hand, (99%) of the workers in this sector are Jordanians, compared to (1%) of non-Jordanians, and the percentage is very close in the North, Central and South regions, but it is the highest in the Central region.

The study showed that the most popular profession in the electricity supply and renewable energy sector of general electrical technician (6.41%), general electrical engineer (6%), electrical technician / other (3.18%), operator of solar energy units to generate electricity (2.83%), renewable energy engineer (2.82%).

The electricity supply and renewable energy sector mainly focuses on male employment in general, with females in a range of professions, but in a lesser percentage. Job demand is more concentrated in the central territory. In general, the volume of demand for professions in this sector for the years (2022-2024) has reached approximately (1,375) workers are in demand, with a demand for males of (853) compared to (522) for females. In general, it is expected that employment in the year 2023 will be lower by about 33% below in demand compared to 2022, while a more-than-expected decrease in 2024 of about (8%) compared with 2023.

Overall demand in the years (2022-2024) for the professions of specialist general electrical engineer, mechanical technician / production, renewable energy engineer, electrical technician / maintenance of electrical machines.

While the demand for females is concentrated in the professions of general electrical engineer, renewable energy engineer, general mechanical engineer, electrical engineer/others and graphic designer.

It should be worth noting the need for new workers on the basis of expansion works, which gives cause for optimism that there are opportunities to create new jobs, as the percentage of demand on the basis of expansion reached (78%), while the percentage of demand on the basis of turnover reached (17%).

As for the skills required in the field, research indicates that the most in-demand skills in this sector's occupations are: preparing designs for renewable energy systems, determining the type of insulators used, preparing preventive and curative maintenance programs, installing electrical devices, distribution panels, monitoring and warning panels according to the scheme and Energy Audit and Energy Efficiency.

For the required experience in the required workforce, employers did not ask for years of experience, but conversely, 48% of employers said they were looking for work with no prior experience required. , and about (18 %) employers require a minimum of two years of experience, as this is enough time to complete the requirements of working in this field from the employer's point of view.

Regarding the employment of female in the sector, the analysis of collected data shows that the majority of establishments operating in the sector do not want to hire female (45%) and the main reasons are not fully identified. Another reason is that the nature of the job is not suitable for female. But overall, there will be female jobs in this sector, with a higher percentage (55%). The future demand for women has reached (522) job opportunities, concentrated in the central territory.

On the other hand, the number of workers with disabilities reached (16) workers, or (0.12 %) only. They are concentrated in the category of accountants and mechanical technician / production, workers with disabilities are distributed in the central and north territory only.

The results of the study also indicate that establishments in the electricity supply and renewable energy sector do not prioritize employment for people with disabilities, but in general a number of establishments announced that they will provide (115) job opportunities in different professions, the most important of which are general electrical engineer, renewable energy engineer and electrical/electromechanical technician. This is in addition to supporting professions such as: advertising and marketing specialists, executive and administrative secretaries.

The results of the study revealed that (42%) of the establishments have difficulties in recruiting, and these difficulties are due to a general lack of workers with the required skills, and subsequently a lack of valuable labor and positive attitude towards jobs and job-friendly skills that supportive of employment, and then the shortage of academically qualified workers.

Regarding the methods used in the hiring, the study showed that direct appointment from personal contacts is the most used (66%). Employers were asked about the difficulties and challenges facing the electricity supply and renewable energy sector, and (85%) of them answered that the instructions and legislation regulating work affect the sector's performance, while (53%) indicated the procedures that hinder investment.

The number of training programs for this sector reached approximately (34), and the number of its graduates reached about (9069) in the years (2019-2021). The largest percentage of them graduated from general mechanical engineer program (19%), followed by renewable energy engineer program (15%), then electrical technician program (14%).

On the other hand, the number of male students graduating from training programs for this sector reached (7,808) in the years (2021-2019), representing 86% of the total number of graduates. The majority of them graduated from the general mechanical engineer program (21.16%), followed by the electrical technician program (15.2%). On the other hand, the number of female students graduating from training programs in the electricity supply and renewable energy sector reached (1,261) in the years (2019-2021), a large proportion of them graduated from the renewable energy engineer program at a rate of (26.8%), then the renewable energy plant operator program (21%).

Graduates of training institutions in the electricity supply and renewable energy sector are distributed region with approximately (79%) in the central territory, and (14%) (7%) in the North and South territories, respectively. In contrast, graduates from institutions training in this field are disaggregated by gender (86%) male and approximately (14%) female.

At the regional level, it can be seen that the majority of the providers of efficiency-raising courses in the central territory are (602) trainees. The number of graduates of training programs providers for the years (2019-2021) in the North territory reached about (32) graduates, distributed between the supervision program for the implementation of electrical works for electrical installations, and then the operation and control of solar energy units' devices program. In the south territory, the number of graduates reached (132), most of them from the program of preparing electrical wiring plans and alarm circuits for projects, followed by the program for supervising the implementation of electrical works for electrical installations. Here, a special recommendation should be made to reduce the training gap at the regional level, especially in the south territory, where there are not enough training providers for all skills needed.

With regard to the scientific level of graduates of training programs in the field of electricity supply and renewable energy, the research results show that the minimum educational level of those admitted to these programs is different, between (intermediate diploma), (bachelor) (Basic level) ,(secondary) and (High School. Overall, the number of graduates with a basic degree amounts to (1298) graduates in the years (2021-2019), and about (1554) graduates with a high school science degree, in when the vast majority (6054) have a high school level. , whereas; diplomas and bachelor degrees are (26) and (137). Looking at each year separately, the high school level rate is the highest among other qualifications, same as the gender breakdown.

The majority of training providers graduates for the years (2019-2021) were from the National Company for Employment and Vocational Training (14.1%), then graduates of community colleges / Al-Balqa Applied University (11%), then the University of Jordan (9.3%), and nearly (8.2%) from the Hashemite University.

As for people with disabilities and the role of training providers in training them and raising their efficiency and effectiveness, the results of the study did not show any specialized programs for this category.

For efficiency-raising courses offered by training providers, the number of male trainees in efficiency-raising courses from 2019 to 2021 about (515) which is almost 67% of all trainees. The number of female trainees, on the other hand, within the same courses from 2019 to 2021 about 251, reaching 33% of all trainees.

The efficiency-raising courses offered by the training providers vary, but generally, the courses of linking control systems with renewable energy systems, designing protection systems and determining issues related to the sustainability of the project had the highest number of trainees for the period (2019-2021) by (404) trainees, followed by courses Operating and monitoring the devices of solar energy units and maintaining the acid level in electrical energy storage batteries by (96) trainees, and then preparing electrical wiring plans and alarm circuits for industrial, commercial and household projects by (75) trainees.

In general, the highest percentage of males trained in these courses reaching (67%) compared to (33%) for females. The courses of linking control systems with renewable energy systems, designing protection systems, and determining issues related to the sustainability of the project received the largest percentage of male and female trainees alike with reached (49%) and (60%) respectively. While the second place differed between the sexes, it was in favor of male in the operating and monitoring the devices of solar energy units and maintaining the acid level in the electric energy storage batteries programs; while it was in favor of female for preparing electrical wiring schemes and alarm circuits for industrial, commercial and household projects program.

From the above we conclude that there is a very large numerical gap estimated at (7694) as oversupply. This means that the market cannot absorb (100%) the supply and there is an oversupply in the market of 85% of total demand.

The research highlight and emphasizes that training providers need to pay attention on the existing demand for training programs than can be expanding and diversifying the efficiency-raising courses that are more dedicated and specific requirements and to ensure that the required training programs are provided by the needs of employers and for each region. These are programs that can be integrated into existing programs or implemented in the form of courses/programs for efficiency-raising.

With regard to the technical skill that employers emphasized the necessity of having it within their enterprise employees and for whom they are intended to be appointed, but those skills are mostly not included in the training programs offered. Therefore, in light of the results of this study, it should be recommended to have training programs that provide these required technical skills that can be summarized in: STAAD PRO Sketchup Pvsyst AUTODESK 3D Max Autodesk 3D Max.

With regard to the nature of the general skills that support employment in both the supply and demand sides, it became clear that the training institutions provide the sufficient skills to support employment sufficiently in the training programs applied to them. It was found that communication and teamwork skills, planning, organization and time management skills are considered essential skills for all programs in general, while other programs vary in skills that support other employment assistance.

The analysis of the gap between supply and demand for females shows that there is a first numerical gap between supply and demand, estimated to be (739) oversupply in the electricity supply and renewable energy sector. As for the gap of supply and demand for people with disabilities, the study did not show the supply side. Accordingly, the gap for this category cannot be emphasized; even though (91) establishments have announced that they will provide (115) job opportunities in different professions, the most important of which are: General Electrical Engineer, Renewable Energy Engineer and Electromechanical Technician.

6.2 RECOMMENDATIONS

Based on the foregoing, the study emphasizes the need to adopt the following recommendations:

1. Adopting the executive action plan that was prepared based on the national strategy for human resources development, including all employees in the industry and each person's duties, and send periodic monitoring reports include achievement percentages in each axis.
2. Develop a strategy for the electricity supply and renewable energy sector in the coming years.
3. That the Professional and Technical Skills Development Authority, in collaboration with relevant agencies, shall form national teams responsible for formulating sector policies in the field of training and employment of Jordanian workers in electricity supply and renewable energy sectors.
4. . The necessity of universities to develop curricula for electricity supply and renewable energy majors, especially applied content, according to industry needs and to adjust content and level of these programs based on industry forecasts and sectoral predictive studies.
5. Employment policy makers should pay attention to the negative impact of current economic and political conditions on future expectations of employers.
6. That the training providers undertake the following:
 - Reviewing the required training programs in the electricity supply and renewable energy sector and developing them periodically and in line with market needs, especially since the electricity supply and renewable energy sector is a dynamic sector, and therefore its needs are constantly changing and at an accelerating pace.
 - Integrating life, leadership, and employment skills as a mandatory portfolio in training programs.
 - Canceling any training programs not required for the labor market in the sector of electricity supply and renewable energy.
 - Conducting periodic follow-up studies with the provision of annual financial incentives to finance such studies at the level of the regions to reduce the training gap between the regions.
7. Follow-up and communication with the Ministry of Labor to implement the policy of gradual replacement of Jordanian workers in the place of expatriate workers.
8. Evaluate and study instructions and legislation; that gives job security for technicians and engineers working in the electricity supply and renewable energy sector.

9. Policymakers should involve the private sector broadly in formulating policies related to this sector in order to develop it and increase employment and training opportunities by communicating through joint implementation plans.
10. Strengthen employer outreach efforts to enable women's employment in electricity supply and renewable energy, in partnership with the Ministry of Labor, chambers of industry and chambers of commerce. especially after the introduction of a flexible working system, this will make a significant contribution to improving women's participation in the labor market in general and in Power supply and renewable energy sector in particular.
11. Activate legislation that regulates the need for obligations of institutions employing persons with disabilities at least (4%) and the necessary training for them in cooperation with the Ministry of Labor, Chamber of Industry and Chamber of Commerce.
12. Coordination with non-profit organizations to provide financial and technical support to implement appropriate training programs required by employers in the industry, in addition to training programs offered by educational institutions and training providers
13. Conduct periodic studies to update industry data at a rate of every three years; Monitor industry developments in terms of jobs, their characteristics and their required skills, and ensure that the implementation of the human resource development plan is reflected in the industry.
14. There should be joint coordination between the parties to diversify training programs according to labor market needs and avoid repeating similar programs.
15. Carry out impact studies on training programs conducted by government agencies, international organizations and local community organizations in the sector of electricity supply and renewable energy, in particular are employment-related programs, to determine the effectiveness of these programs and their impact in addressing the problem of unemployment.
16. Review the training and employment programs offered in the industry to ensure that the North and South territories are more involved in the implementation of these programs and reduce the existence gaps between regions.
17. Development of existing electronic employment platforms, such as: national online employment system, opportunity program and national program to create job opportunities for Jordanian youth, as it is not limited to only showing quantitative job openings, but also extends to include the qualitative skills required for each opportunity, allowing space to categorize Recurring and Sorting these skills and compare them at the local level.

18. Create interactive social media pages, including ongoing conversations between graduates, the labor market and training professionals about the skills needed in the sector.
19. Deepen the concept of innovation and creativity, as it is one of the most important methods to reduce the problem of unemployment, and coordinate efforts in this field for graduates in the electricity and renewable energy supply sector under one roof, with the need to find curricula in universities that involve teaching creativity and innovation in a scientific and up-to-date manner, and coordinating with suppliers of initiatives geared towards entrepreneurship
20. Encourage universities and research centers to establish business incubators, especially in the areas of renewable energy, and connect it with business specialties; To enable students to acquire the necessary skills to implement micro-projects with the ability to connect with funding agencies to carry out these projects.
21. Prepare salary assessment studies for sector workers and plans to maintain and enhance expertise and skills for retaining and benefiting.
22. Establish public-private sector partnerships in the implementation and evaluation of training programs offered in the sector.

6.3 RENEWABLE ENERGY AND ENERGY MANAGEMENT SOCIETY (REES)

REES is a non-profit association established in 2014 and registered under the jurisdiction of the Ministry of Environment to provide an umbrella for renewable energy services and energy management companies concerned with the environment and environmental sustainability, it includes more than 50 major companies working in the field of energy, it also provides and delivers courses in energy and energy auditing and efficiency.

6.3.1 Problems of negative legislation and instructions affecting the renewable energy sector

From the point of view of REES a number of laws and guidelines have had a negative role and reason for the performance of companies operating in this sector such as laying off some workers and stopping recruitment processes, including:

1. Decision to impose a fee of two dinars per month per kilowatt of capacity for domestic systems. This decision led to people's reluctance to install renewable systems, and many of them even canceled their contracts because of this law.
2. Diversity of official agencies interfere with the sector regulation, negatively affecting the stability of management decisions.
3. The presence of technical restrictions on the power network (Electricity grid) , as explained by the electricity distribution companies, limits the issuance of approvals to the requirements of residents and investors.
4. Slow-down process of distribution companies in issuing approvals and studying the impact of coupling and system operation processes due to lack of executive staff, which negatively affects cash flow of companies within the sector.
5. Legalization of approvals for the establishment of power plants and renewable energy systems because of the old grid which is no longer absorbing renewable systems.

6.3.2 Proposed solutions to solve problems of legislation and guidelines

REES had addressed some solutions that can solve some of the obstacles affecting employment and reducing unemployment in the sector, including:

1. Modernize and develop the power grid into a smart grid.
2. Replacing existing meters with smart meters helps to reduce the impact of technical limitations.
3. Endorsement organizational procedures that allow the use of partial storage systems.
4. Allow the use of devices that do not output excess power to the network (Zero Export Inverters)
5. Accelerate employment process to keep pace with industry demand.