Turkish-German • Türk-Alman
Energy Partnership
Enerji Ortaklığı

Gender Equality Research in the Turkish Energy Sector

Women's Employment: Global and Local Dynamics

Carried out under the bilateral energy partnership on behalf of the German Federal Ministry for Economic Affairs and Climate Action

Executive Summary

January 2024

This comprehensive study has been conducted by the German Energy Agency (dena) in collaboration with Turkish Women in Renewables and Energy and the Green Collar Women Association. It delves into topics such as the employment status of women in Türkiye's energy sector, their career development opportunities, and gender-based discrimination, and thereby reveals the current state of gender equality in the sector.

The research provides a detailed analysis of the challenges and barriers faced by women in the energy sector, while also highlighting the experiences and stories of women working in this field. It thoroughly examines issues such as the obstacles women face in terms of promotions and accessing senior management positions, gender discrimination, and the sexist attitudes encountered in the workplace.

The report presents a series of concrete recommendations for achieving gender equality in the energy sector. These recommendations include the adoption of egalitarian policies, increasing gender awareness in the sector, developing training and mentorship programmes, and supporting the activities of civil society organisations. Additionally, it outlines successful practices, policies, and strategies that can enhance gender equality in the sector.

This research offers an in-depth perspective on gender equality in the energy sector and serves as a comprehensive guide for policymakers, companies, and civil society organisations supporting egalitarian transformation in the sector. The report is a significant resource for enhancing the effectiveness of gender equality initiatives in the energy sector and for amplifying the voices of women working in this field.

Although sectoral practices, incentives, obstacles, or legislation are not the subject of this research, it has been observed that the increase in solar and wind energy equipment production in Türkiye and the formation of production and industrial ecosystems have a positive impact on increasing women's employment.

There is a need for the Sustainable Development Goals (SDGs) 4 "Quality education", 5 "Gender equality" and 7 "Affordable and clean energy" to merge to create a synergy for energy security, energy independence and energy justice.

As a result of the research (based on data from 25 Turkish companies), the number of employees in the energy sector in Türkiye is as follows:

Total number of employees: 45276

Number of male employees: 35911

Number of female employees: 9365

Number of male managers: 3813

Number of female managers: 1441

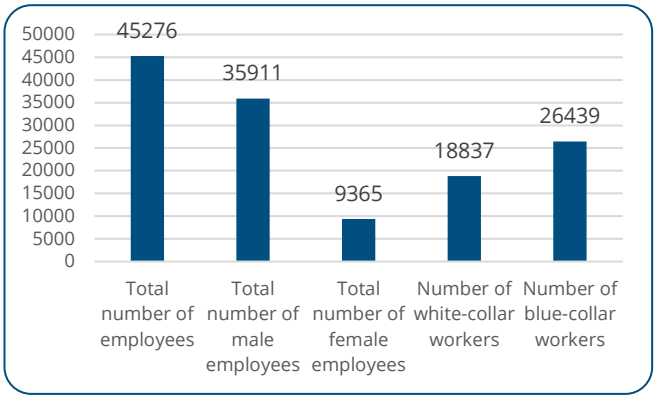

Figure A: Data on the Number of Employees

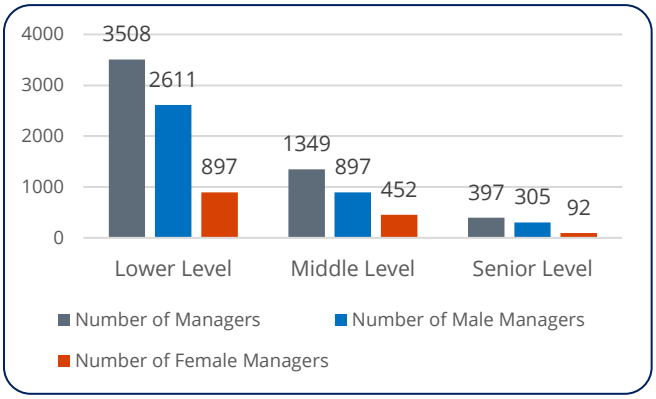

Figure B: Number of Managers According to Management Level

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Deutsche Energie-Agentur GmbH (dena)
German Energy Agency
Chausseestrasse 128 a
10115 Berlin, Germany
Tel: +49 30 66 777-0
Fax: +49 30 66 777-699
Email: info@dena.de
www.dena.de

Authors:
This comprehensive study has been conducted by the German Energy Agency (dena) in collaboration with expert representatives of Turkish Women in Renewables and Energy (TWRE) and Green Collar Women Association (GCWA):
Sedef Budak, Project Coordinator
Zafer Çakmak, Project Lead
Ruhan Cemre Uçar, Senior Expert
Bilun Elmacıoğlu, Senior Expert
Seyran Hatipoğlu, Senior Expert
Buket Teneke Oduncu, Expert
Selin İpin, Expert
Aybike Elif Akgün, Expert
Meltem Ataç, Expert
İpek Budak, Translator

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Götz Schleser

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REPUBLIC OF TÜRKİYE MINISTRY OF ENERGY AND NATURAL RESOURCES

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Implementing organisations:

dena German Energy Agency

GCWA Green Collar Women Association

twre Turkish Women in Renewables and Energy

Content

Editorial

Dear Reader,

I am very pleased to introduce this significant study on gender equality in Türkiye's energy sector. Commissioned within the framework of the Turkish-German Energy Partnership on behalf of the German Federal Ministry for Economic Affairs and Climate Action (BMWK) this study aims to shed light on gender dynamics within the Turkish energy sector and stands as a testament to the Turkish-German Energy Partnership's commitment to fostering inclusivity and equity in sustainable energy development.

As a centre for excellence in advancing the energy transition and climate protection, dena conducts comprehensive research on the complexities of establishing a climate-neutral society. Since its establishment in 2000, dena has been dedicated to crafting and executing strategies to address these challenges. Through collaborative efforts, dena works alongside governmental bodies, industry leaders, academic institutions, and diverse societal stakeholders, both domestically and internationally, to achieve shared energy and climate policy objectives.

With our partners within the Turkish-German Energy Partnership we have consistently promoted gender equality at all levels, bringing the gender topic to the table in intergovernmental dialogues as well as in practical project work. For six years we have been collaborating with the Turkish Women in Renewables and Energy (TWRE) network to implement a diverse portfolio of gender-related activities and have extended our collaboration to work also with the Green Collar Women Association (GCWA) since it was founded in 2022. One of

our standout initiatives from 2023 was the panel discussion on women in the energy sector in Türkiye, which took place during the 5th Turkish-German Energy Forum. This panel played a pivotal role in bringing the discourse on women in energy to a prestigious platform. Amidst the aftermath of the devastating earthquakes in Türkiye's Southeast region, we also worked with TWRE to organise the Women's Iftar in Adıyaman, bringing together 1,000 earthquake survivors during the fasting month of Ramadan. This event symbolised solidarity and support for those affected. Furthermore, the Turkish-German Energy Partnership supported the active participation of members of the TWRE in international women empowerment events and mentorship programmes, such as those organised by the Global Women's Network for the Energy Transition. We are now delighted to be collaborating with the GCWA and TWRE on this study. Türkiye, with its ambitious energy targets and steadfast commitment to innovation, provides a fertile ground for examining the intersection of gender dynamics and energy sector development. This report delves into the current landscape, identifying barriers and opportunities for women's participation and advancement within the energy sector.

The findings presented offer comprehensive insights into the challenges faced by women in the Turkish energy sector, from employment disparities to gender stereotypes. By leveraging a mixed-method research approach, this study provides a nuanced understanding of the complexities at play. Notably, the report underscores the importance of organisational policies and cultural shifts in fostering a more inclusive energy sector.

I extend my sincere gratitude to all those who contributed to this endeavour, from researchers at GCWA and TWRE to stakeholders who contributed their experiences through interviews and workforce data, these collective efforts have enriched our understanding of gender dynamics in the Turkish energy sector.

May the insights gleaned from this study serve as a catalyst for informed action, guiding us towards a more inclusive and sustainable energy future for Türkiye.

Kristina Haverkamp

Managing Director
German Energy Agency (dena)

Dear Reader,

The study you are holding is one of a kind and has been prepared by dedicated experts every 2 years since 2021. The first report was published in 2022 and, for the first time, a very detailed sector-specific quantitative and qualitative study was carried out.

Hundreds of women working in energy were reached, dozens of them were interviewed and it became clear that the phenomenon of "equality" was not given any importance in the sector, which is very elite and educated from boss to employee.

The same methodology is applied to this report confirming that, exactly six years after the establishment of Turkish Women in Renewables and Energy (TWRE), we have started to take a step forward in terms of women and inclusion in the energy sector. We have become an association, thanks to the efforts of our volunteers and supporters.

Data from 25 Turkish energy companies showed that the employment rate of white-collar female workers is 34%, while it is 12% for blue-collar workers. These figures will be binding once we continue the same analysis over the years.

The International Renewable Energy Agency (IRENA) has been at the forefront of research on this issue. In its latest report, it says that the total workforce, calculated at **12.7 million** in **2022**, will rise to **13.8 million** by **2023**.

The **women in the solar industry will maintain their lead with 40% of the workforce.**

When we look at the solar energy sector of Türkiye, this very much aligns with the world standard. With the increase in solar panel production facilities, women are being given preference in the material arrangement and finishing of solar panels, which we call fine touch, where women's hands are more susceptible.

In the wind energy sector, the situation is different, although female engineers are working in the office, unfortunately, the number of women working in installation and operation in the field is not more than the fingers of one hand. Considering that 2 years ago there was only "1" female operation manager in the whole country, the situation is relatively positive. The growing number of women in wind energy is evident at networking events, on social media and in the gender quotas of the major turbine manufacturers.

At this point, considering the National Energy Action Plan and the **2030** targets, it is obvious that the work, intelligence, and engineering power required to increase the installed capacity of renewable energy from the current 53% to **80%** cannot be done only in a male-dominated sector.

If we look at the number of engineers and architects affiliated with professional chambers in 2023, 24% of members are women which is promising. A significant number of new abilities, capabilities, and jobs /titles will be created for the areas of climate action, energy transition and digitalisation. We strongly believe in the importance of ensuring women's participation in the workforce.

Women will contribute to the Turkish economy if companies pay attention to the issue of "gender washing" and consider the intelligence and suggestions of women at different levels, not only in terms of numbers but also in important decisions affecting the company and the sector.

Sedef Budak

Founder President
Turkish Women in Renewables and Energy (TWRE) and the Green Collar Women Association (GCWA)

1 An Overview of the Energy Sector´s Transformation and Women´s Employment

Defined as the ability to do work, the word "energy" captures many forms and types of energy. Traditionally, mankind preliminarily tends to get energy needed for economic activities from exhaustible resources i.e., fossil fuels, in fact, the emergence of the renewable energy concept dates back much further. Renewable energy first appeared in around 200 BC in the usage of water wheels, mimicking today's hydropower. Later on, it showed up as windmills in the 1500's, as the most widely used mechanism to mill grains. Lastly, the primitive journey of all types of renewable energy ended up with the invention of the first solar system in France, in 1860. These three pioneering inventions have inspired today's renewable energy production systems. While the water wheel structure can be associated with hydroelectricity, windmills can be considered the pioneer of wind turbines, and the system in France paved the way for the use of solar energy.

Although energy is needed for a wide range of economic and household activities, the emergence of a real energy demand in the world coincides with the Industrial Revolution period. With the mechanisation trend that started in this period and gained momentum in a short time, the energy that enables these machines to operate has evolved into a need and started to carry an economic value. During this period, coal began to replace wood, which was the main source of fuel needed in the past. Substitution of wood with coal enabled various methods of production, improving the quantity of the output, and more importantly, it reduced the effects of the Europe-centred wood shortage, the first known energy crisis, as much as possible. When this process is evaluated, it is evident that the transition of energy into an economic value lays the foundations of the most basic production-consumption understandings and economic approaches.

Approximately 200 years after the Industrial Revolution, it was noticed that, as the famous saying goes, everything comes with a price, and 15 years later it was confirmed that a hole had formed in the ozone layer above Antarctica. This crisis, which was clearly defined in 1985 and has led to the emergence of the concept of climate change until today, appears as the most important result of humanity's transition to an energy economy. As stated by the United Nations (UN) Women and United Nations Industrial Development Organization (UNIDO), renewable energy is seen as the key to the solution of this crisis because fossil fuels, such as coal, oil, and gas, are by far the largest contributor to global climate change, accounting for over 75 percent of global greenhouse gas emissions and nearly 90 percent of all carbon dioxide emissions.

In order to understand the importance given to the issue over the years, when we look at the total capacity graph published by the International Energy Agency (IEA), which expresses the actual data for the years 2000-2022 and the predictions for the years 2023-2027, visible capacity increases have been observed in all years compared to the previous one and the momentum has increased.

In addition, when the investment amounts made in renewable resources, defined as clean energy, between 2015 and 2023 are evaluated, the obvious decrease in investment amounts in fossil fuels, especially in recent years, and the increase in clean energy investments year by year can be considered as the best indicators that the issue is clearly understood. At this point, there is no doubt that clean energy investments will increase even more aggressively with new technologies such as electric vehicles and renewables.

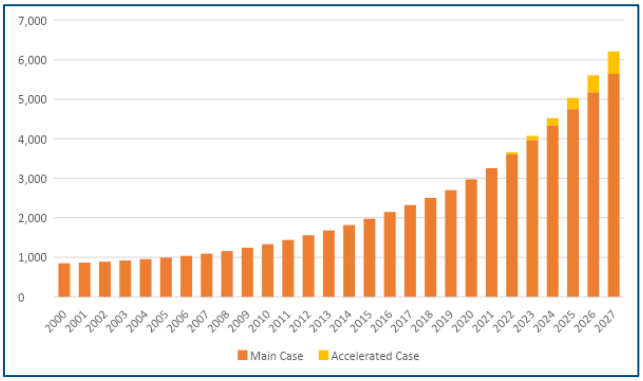

Figure 1: Renewable Energy Total Capacity Status of 2000-2022 and Total Capacity Forecast of 2023-2027 (GW)

Source: International Energy Agency (2022)

When observed today, the concept of environment, which has become a part of the global agenda through the above-mentioned climate crisis, maintains its currency and increases its importance by taking on new companions in the changing and transforming world of today. Currently, social issues are seen as the most important complement and accompaniment of environmental issues, and energy investments are also addressed from these aspects. Sustainability, a phrase heard often in the context of daily life, has become a key concept of the modern world and includes both environmental and social concerns.

The most important social benefit provided by the increasing momentum of renewable energy can be

considered as increasing job opportunities and thus providing employment opportunities to more people. With the increasing number of renewable energy power plants - most of which are in rural areas - many people living in rural areas have been able to benefit from the job opportunities offered by these projects. The importance of this situation emerges especially when considering the scarcity of job opportunities in rural areas.

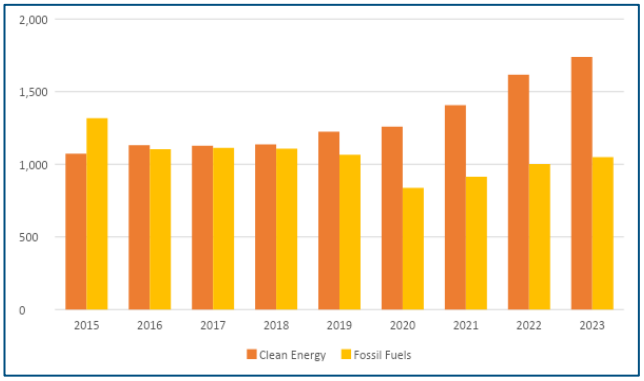

Figure 2: **Global Energy Investment in Clean Energy and in Fossil Fuels, 2015-2023 (billion USD)**

Source: International Energy Agency (2023)

Employment in green energy already accounts for half of global energy employment, while the International Labour Organisation (ILO) estimates that by 2030 the transition to sustainable energy will create almost 20 million jobs. In terms of positive impacts of employment increase, on one hand the energy, especially renewable energy sector is explicitly growing and expanding but on the other hand the employment needs to be increased and expanded for both men and women. While it is expanding, it also needs to be in control in terms of gender equality. Because most of those new jobs are men-dominated, major investments are required to create equal opportunities for all genders.

Since the Beijing Conference on Women 1995, there have been several attempts to integrate gender issues specially into employment and working environment, but it still needed to be redesigned in many sectors including energy as well. There will be more employment needed and the energy sector has its own capacity to develop, to grow up and expand. In this respect, the economic advantage of renewable energy shall be demonstrated equally as regards to gender which is stated in UN Goals to achieve gender equality and empower women and girls both as being a basic human right and as a necessity of the modern world. However, progress in gender equality in the world, like in the energy sector, continues with baby steps.

The sustainable energy sector continues to be dominated by men, more broadly assumed to be valid for the whole energy sector. According to UN Women and UNIDO (United Nations Industrial Development Organization), women's employment in renewable energy is higher than in the fossil fuel sector while renewables account for 32%, and fossils are 22% per share, demonstrating the renewable energy sector is becoming more inclusive and gender-responsive. However, there is much to do to ensure equality between women and men. Because there is an apparent imbalance of women between high-skilled and low-skilled jobs. Firstly, women are underrepresented in technical and Science, Technology, Engineering and Mathematics (STEM) jobs. They are similarly underrepresented in senior management positions. The basis for this is that the rate of women in senior management positions in energy utilities is significantly below the average. According to IEA's research (2018), only 14% of the senior managers and only 5% of the top posts such as CEO, board members and presidents are held by women. On the contrary, women are overrepresented in low-qualified jobs as well as administrative roles.

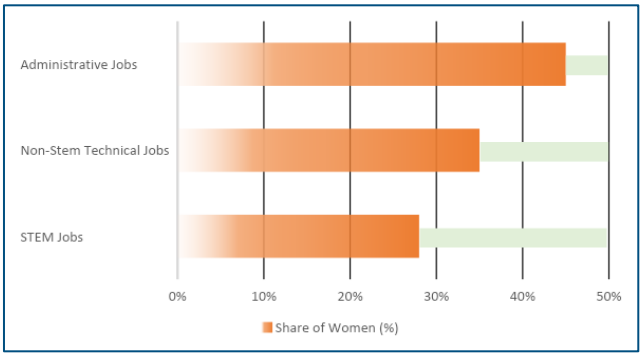

Figure 3: **Shares of Women in STEM, non-STEM and Administrative Jobs in Renewable Energy**

Source: IRENA online gender survey, 2019 (gathered from UN Women and UNIDO, 2023)

Another significant problem that women are facing in the energy sector is the gender pay gap. A UN report (2018) suggests that this situation originates from the low participation of girls In STEM studies. Generally, discriminatory social norms and exclusionary learning environments cause girls not to choose STEM studies, withdrawing from 35% of women in higher STEM education globally.

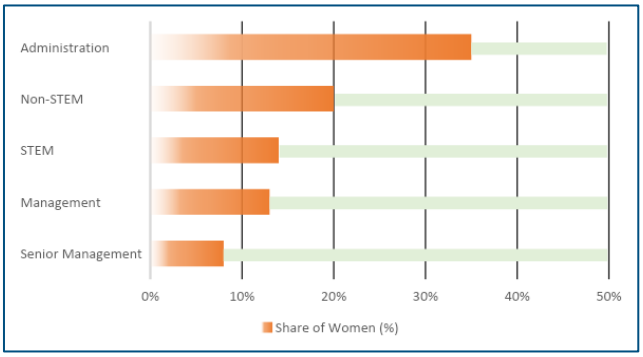

Figure 4: Shares of Women by Role in the Wind Energy Sector

Source: IRENA online gender survey, 2019 (gathered from UN Women and UNIDO, 2023)

Consequently, there are barriers to keep women from entering the renewable energy sector especially in STEM studies. The most prevalent barriers can be considered as discriminatory social norms and gender stereotypes that affect all phases of the professional life of women. As in all sectors, the energy sector also benefits from equal participation of women, ensuring potential increases in managerial and financial performance of the companies by empowering women in the senior management, top post, and corporate board positions. As a starting point to ensure gender equality, the first action may be collecting, publishing, and comparing actual data about the issue. According to United States National Renewable Energy Laboratories (NREL), research and reports on renewable energy generally do not include gender disaggregated information and just like development and energy policy issues, women activities in renewable energy are also ignored. Gender equality and related issues constitute the main subject of this report and have the following objectives:

- To analyse the employment status of the women in Turkish energy sector,
- To break down women's career development and promotion opportunities in the energy sector,
- To identify gender-based discrimination, inequality and obstacles faced by women in the energy sector,
- To evaluate the impact of gender inequality and discrimination on business efficiency and renewable energy targets in the energy sector,
- To develop policy and practice recommendations to reduce gender inequality in the energy sector,
- To examine potential job opportunities in order to encourage female employees / students in the renewable energy sector,
- To include previously implemented and successful practices in the energy sector on the basis of gender equality and to examine the relevant actors,
- To create data that will form the basis for subsequent research.

To achieve the above goals, this report consists of ten sections, named Definitions, Legal Framework, Research, Interpretation of the Results, Macro Data Sets, Job Potentials in Renewable Energy, Best Practices, Recommendations, Result, and References respectively.

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2 Legal Arrangements regarding Gender Equality in the Energy Sector

The minimum labour standards determined in working life are determined within the limits set by laws at national level and international agreements at international level. For this reason, to evaluate the issue of gender equality in the energy sector, in addition to evaluating the current situation in practice, it is extremely valuable to address the legal regulations on the subject. In order to evaluate the current situation in Türkiye, binding texts for Türkiye should be mentioned. For this reason, firstly national laws are mentioned. Subsequently, it is planned to include the ILO conventions which are binding for Türkiye and try to provide a standard across the world. Finally, although not directly binding for Türkiye, this report briefly mentions EU legislation, with which Türkiye is under the obligation to harmonise its legislation due to its status as a candidate country for the EU.

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2.1 National Regulations

In Turkish national legislation, regulations on employment are included in the Labour Law No. 4875, Civil Servants Law No. 657, Social Security and General Health Insurance Law No. 5510. Although there are provisions on non-discrimination within the scope of the legislation that serve to ensure gender equality, these provisions are mainly related to general and maternity status and there is no direct provision on non-discrimination based on sex. In addition, labour life is regulated by special laws such as the Maritime Labour Law and the Press Labour Law.

Although various special laws have been enacted in Turkish legislation to regulate certain areas of employment such as the press and the maritime sector, the lack of a law that serves to regulate the working conditions and needs of those working in the energy sector, especially women, stands out as a deficiency. This is because the energy sector is an area that requires a lot of field work, has its own specific working conditions, and creates work within the scope of hazardous conditions, and especially with the transition to green energy, the service area is expanding, and the number of people employed in this field is increasing. For this reason, it would be meaningful to enact a special law that meets the qualifications of the work like other special laws.

2.1.1 4875 Numbered Turkish Labour Law

The Labour Law No. 4875 is the legislation that regulates provisions for the private sector and contains the most general regulations on labour life. Article 5 of the Law is related to the prohibition of discrimination and gender discrimination is explicitly prohibited in the text of the article. In addition, the principle of equal pay for equal and equivalent work is regulated in the 4th paragraph of the article. In addition, it is clearly stated in the text of the law that the application of special measures due to the gender of the worker will not justify inequality between wages and positive discrimination practices will not violate the prohibition of discrimination. To establish a work-life balance, Article 70 of the Law regulates maternity leave, and Article 51 clearly stipulates that the periods that women cannot work due to maternity leave shall be deemed to have been worked. However, as mentioned, Law No. 4875 is a general law and there is no provision directly targeting women in the energy sector.

2.1.2 657 Numbered Turkish Civil Servants Law

Law No. 657 on Civil Servants (Civil Servants Law) is the law containing general provisions on the working life of civil servants and is one of the two main laws regulating working life with the Labour Law No. 4875. Unlike the Labour Law No. 4875, this law does not directly include a provision on the prohibition of discrimination. However, Article 10 which is titled "Duties and responsibilities of civil servants who are supervisors" prohibits discrimination among civil servants by stipulating that supervisors must treat their subordinates in fairness and equality. The provisions on gender equality within the scope of the Law, like Law No. 4875, are mainly aimed at ensuring work and life balance and targeting maternity. However, these provisions are of a general nature and are not sufficient to meet the special needs of employees serving as civil servants in the energy sector.

2.1.3 5510 Numbered Social Security and General Health Insurance Law

In line with other conventions on labour life, the provisions in the 5510 Social Security and General Health Insurance Law are mainly general provisions to regulate the state of maternity and the requirements of the state of maternity.

2.2 ILO Conventions

The ILO, a specialised agency of the United Nations (UN), aims to establish lasting world peace, since universal peace can only be based on social justice. The legal basis for the objectives and activities of the Organisation, which is a specialised agency of the UN, is the ILO Constitution and the Philadelphia Declaration. The basic texts of the organisation, which aims to establish social rights and justice in working conditions, are the ILO Constitution and the Philadelphia Declaration annexed to the Constitution, and with the Philadelphia Declaration, with the aim of ensuring the possibility for all human beings, regardless of their beliefs and sex, to pursue their material progress and spiritual development in freedom and dignity, under economic security and on equal terms; to ensure the equal enjoyment by all of the results of the progress made in wages, hours of work and all conditions of labour, to ensure that those who have work and those in need of protection are paid a wage which will provide them with a minimum living standard, and to extend social security measures.

In line with these objectives, numerous conventions have been drafted and Türkiye has become a party to many of them. ILO conventions to which Türkiye is a party are binding for Türkiye. It is also seen that these conventions are general conventions like Türkiye's national legislation. In addition, many texts have been written by the ILO to ensure gender equality in employment and work-life balance. Since they are international conventions, the conventions to which Türkiye is a party, are directly binding for Türkiye. However, it is difficult to say that Türkiye's national legislation is within the standards set by the ILO. In that sense, it would be valuable to make the necessary legal arrangements and amendments and to ensure harmonisation in the field of national and international law. The texts to which Türkiye is a party and which aim to ensure gender equality in employment; Convention No. 100 on Equality of Remuneration between Men and Women Workers for Equivalent Work, Convention No. 111 on Discrimination in Respect of Employment and Occupation, Revised Convention No. 103 on Protection of Maternity and Convention No. 183 on Protection of Maternity, Convention No. 156 on Equal Treatment and Equal Opportunities for Women and Men Workers with Family Responsibilities, It is possible to list them as Convention No. 45 on the Non-employment of Women in Underground Work in Mines of All Kinds, Revised Convention No. 171 on Night Work (Women) and Convention No. 171 on Night Work, Convention No. 155 on Occupational Health and Safety and the Working Environment, Convention No. 175 on Part-Time Work and Convention No. 177 on Working from Home. However, it is seen that there is no convention that directly targets the energy sector and especially women working in the sector.

2.3 Directives on Gender Equality in the Energy Sector in the EU Acquis

EU directives are not directly binding texts for Türkiye, which is not yet a member of the Union. However, as a candidate country, Türkiye is under the responsibility of harmonising its national legislation with EU law and EU legislation. For this reason, it is considered valuable to address whether there is a separate text on gender equality in the energy sector within the scope of EU legislation.

In the EU acquis, many directives have been issued targeting the energy sector. There are many directives on the transition to renewable energy in line with the Green Europe objective. At the same time, the goal of achieving gender equality is one of the main objectives of the EU and achieving gender equality, especially in employment, is one of the goals set for the Union. For this reason, many directives have also been drafted to ensure gender equality in employment. However, a directive directly targeting gender equality in the energy sector could not be found in the EUR-Lex database.

2.4 Evaluation of EU Labour Laws

The European Union (EU) is a supranational organization, which in the traditional sense is somewhere between a state and an international organization. Although EU law is closely related to international law, it is a supranational legal system that is independent of international law, supranational and sui generis. The member states have delegated some of their sovereign powers to the EU organs and EU law is directly applicable and has legal effect in the member states. For this reason, in the event of a provision in the national legislation of the member states in conflict with Union law, Union law is applied, and the member states are under the obligation to harmonize their national legislation with Union law. For this reason, the laws, and legislations of the member states of the Union have not been dealt with individually, and the directives directly corresponding to the Turkish laws on labour in the EU legislation have been included.

Within the scope of European Union Law, there are many directives on energy. However, it has been observed that these directives mainly target technical working areas in the energy sector and aim to set standards. During the research process, a regulation that directly regulates the energy sector within the scope of labour law could not be found. As in the case of energy, there are many directives within the scope of EU

law on employment, which is among the limitations of this study. It is possible to categorize these directives under four groups: Directives on the Obligations of the Employer Arising from the Employment Contract, Directives Aiming to Protect the Worker against Structural Changes in the Workplace, Directives on Social Security Law, and Directives on Occupational Safety.

The first heading, Directives on Types of Employment Contracts, can be listed as Directive 97/81/EC on the Framework Agreement on Part-Time Work and Directive 99/70/EC on the Framework Agreement on Fixed-Term Work.

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Although there are many directives on occupational health and safety, there is no directive directly related to the energy sector. Among these directives, the ones that can find an application area related to the field of this study; Directive 89/391/EEC of 12 June 1989 on the Promotion of Improved Measures for the Health and Safety of Workers at Work, Directive 89/654/EEC of 30 November 1989 on Minimum Health and Safety Requirements at Work, Directive 89/655 of 30 November 1989 on Minimum Safety and Health Requirements for the Use of Work Tools and Equipment by Workers at Work and Directives 95/63/EC and 2001/45/EC amending this directive, Directive 90/270/EEC of 29 May 1990 on Minimum Health and Safety Requirements for Work with Display Screen Devices, Directive 89/656/EEC of 30 November 1989 on Minimum Safety and Health Requirements for the Use of Personal Protective Equipment by Workers at Work, Directive 91/383/EEC of 25 June 1991 on Measures to Promote the Improvement of the Health and Safety at Work of Workers in Fixed-Term or Temporary Employment Relationships, Directive 2002/44/EC of 25 June 2002 on Minimum Health and Safety Requirements for Workers' Exposure to Risks Arising from Physical Agents, Directive 90/269/EEC of 29 May 1990 on the Minimum Health and Safety Requirements for Manual Loading and Unloading Work, which may cause back injuries in particular, Directive 92/58 EEC of 24 June 1992 on Minimum Requirements for Safety and/or Health Signs at Work, Directive 92/85/EEC of 19 October 1992 on Minimum Measures to Improve the Health and Safety at Work of Pregnant, Labouring or Breastfeeding Women Workers, Directive 96/82/EC of 9 December 1996 on the Control of Industrial Accidents, Directive 96/29/ Euroatom of 13 May 1996 on the Establishment of Basic Safety Standards for the Protection of Workers and the Public against Damage from Ionizing Radiation, Directive 90/641/Euroatom of 4 December 1990 on the Outdoor Protection of Workers Exposed to Ionizing Radiation during Work in Controlled Areas, Directive 92/57/EEC of 24 June 1992 on the Implementation of Minimum Safety and Health Requirements on Temporary and Mobile Construction Sites.

The Directives on the Obligations of the Employer Arising from the Employment Contract are closely related to the obligations of employers to inform employees about their employment contracts, to ensure their participation in management and to treat them equally. These Directives are Directive 91/533/EEC on the Employer's Obligation to Notify Employees of Conditions Applicable to an Employment Contract or Employment Relationship, Directive 94/45/EC on the Establishment of the European Works Council and on the Information and Consultation of Employees (European Works Councils), Directive 2001/86/EC on the Participation of Employees in the Management of European Enterprises, Directive 2002/14/EC on the Operation of an Information and Consultation Process for Employees in Enterprises, Directive 2003/72/EC on the Participation of Employees under the European Co-operative Society Act, Directive 75/117/EEC on the approximation of the laws of the Member States relating to the application of the principle of equal remuneration for women and men, Directive 76/2007/EEC and amending Directive 2002/73/EEC on the application of the principle of equal treatment for women and men in recruitment, vocational training and promotion and working conditions, Directive 97/80/EC on the burden of proof in cases of discrimination on grounds of sex, Directive 96/34/EEC on the Framework Convention on Parental Leave, Directive 2006/54/EC on the Application of the Principle of Equal Treatment and Equal Opportunities for Women and Men in Employment and Working Conditions, Directive 2000/43/EC on the Application of the Principle of Equal Treatment of Persons irrespective of Racial and Ethnic Origin and Directive 2000/78/EEC establishing a General Framework for Equal Treatment in Employment and Work, Directive (EU) 2023/970 of the European

Parliament and of the Council of 10 May 2023 on strengthening the implementation of the principle of equal pay for equal work or work of equal value between men and women through pay transparency and enforcement mechanisms.

Finally, the main EU directive on social security law is Council Directive 79/7/EEC on the Application of the Principle of Equal Treatment of Men and Women in the Field of Social Security.

After analyzing these directives, it can be said that there are many legal texts on employment within the scope of EU law. Among these texts, there are also many directives aiming to achieve gender equality. However, the above-mentioned directives on labour law are mainly general and inclusive texts. They aim to ensure gender equality in all areas of business life and to create a general standard regarding working conditions. However, it has been observed that there is no directive that directly aims to determine the working conditions of the energy sector and to ensure gender equality in the sector. As such, it can be considered that this area will be regulated by the national legislation of the Member States.

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3 Macro Data and Female Labour: Analyzing the Relationship Between Macro Data and Female Employement

The participation of women in the workforce plays a significant role in achieving sustainable economic growth and development. To achieve this, an increase in the participation of women in the workforce, constituting approximately half of the population in Türkiye, is crucial. The leading role of women as unpaid laborers in household chores, caregiving responsibilities, or in subsistence production has been entrenched in societal understanding, contributing to reasons why women are not integrated into the labour market. Decisions made by businesses not to prefer female labour contribute to hindering women's participation in employment, even if they are within the labour force.

Thematically, the literature has been structured into four main categories: the effects of employment on economic growth and development, the impact of women's labour force on Gross Domestic Product (GDP), the relationship between macroeconomic variables and women's employment, factors influencing the relationship between gender equality and employment, and redefining participation.

3.1 The Effects of Women's Employment on Economic Growth and Development

The relationship between macroeconomic variables and female employment has been extensively studied in the literature since the 1980s. Generally, the relationship between female employment and economic development is debated in the literature with different effects in developing and developed economies.

The studies conducted in the literature broadly cover the impact of women's employment on economic growth. An increase in women's labour force participation is associated with positive effects on long-term economic growth and productivity potential. For instance, the World Bank's World Development Report (2012) emphasizes that increases in gender equality enhance economic efficiency worldwide and argues that gender equality is not only important in its own right but is also 'smart economics' correlated with economic growth.

BETAM (2010) emphasizes the importance of women's labour force participation in Türkiye's development. It suggested that women's high savings rates could alleviate the country's current account problems by increasing household savings and contributing to economic growth.

Cuberes (2012) draws attention to gender inequalities in employment and wages, especially in developing countries. These studies suggest that addressing gender disparities in employment and promoting women's participation in the workforce are crucial for sustainable economic growth and development.

The relationship between macro data, economy, development, and female employment is complex and multifaceted. Anderson (2016) highlights the gender-differentiated nature of the growth-employment relationship, revealing that specific policies and structures have different impacts on employment intensity concerning men and women.

In developed countries, the marketization of household chores encourages increased female labour force participation. Specifically, the impact of increased female labour force participation on growth targets in 2023 is emphasized. To understand the impact of the increase in women's employment rates on economic growth, the relationship between employment, unemployment, and economic growth is being examined. Low female labour force participation may diminish the efficiency of the labour market, thereby weakening national competitiveness.

Studies have documented the positive effects of increased female labour force participation on long-term economic growth for both developed and developing economies. Serel and Özdemir (2017) demonstrated in their research that women's unpaid household contributions could increase a country's GDP by 20-60%. It has been emphasized that female employment is not only crucial for economic development but also linked to the development of human capital, emphasizing the importance of both the quantity of the workforce and the development of human capital. The same study found that increasing women's labour force participation positively affects international competitiveness and economic growth.

Algan and Oktay's (2021) study highlights the positive relationship between female labour force participation rates and economic growth in transition economies. The analysis findings indicate that reducing gender inequality and increasing female labour force

participation positively affected economic growth, income inequality, and social welfare.

3.2 Impact of Women's Labour Force on Gross Domestic Product (GDP)

According to the World Bank (2022) data portal, women's labour force is associated with development through the process of economic transformation. Levels of women's labour force participation are generally high in the poorest countries, where agriculture is the dominant sector and women are typically involved in small-scale agricultural work. Women's labor force participation has been shown to be lower in middle-income countries where agricultural activities are much less prevalent. Among high-income countries, women's participation in the labour force is high; however, there is a shift towards an economy based on the service sector and higher levels of education among women.

Esen and Şeren (2021) examined the empirical impact of gender-based inequalities in education and employment on economic performance using Türkiye's dataset from 1975 to 2018. They employed Johansen cointegration tests to analyze the presence of a long-term relationship among variables. The findings confirmed the existence of a long-term cointegration relationship between the variables. Additionally, the DOLS and FMOLS results demonstrated that improvements in gender equality in education and employment have a significant and robust long-term impact on real Gross Domestic Product (GDP) per capita.

3.3 The Relationship Between Macroeconomic Variables and Women's Employment

The key findings indicate that economic growth affects women's workforce participation, and conversely, the reverse is also true. The impact of women's employment on economic growth and development is defined both directly and indirectly, highlighting those macroeconomic variables, such as economic data, have a positive effect on economic development.

Women's employment has been associated with economic growth and development, suggesting that female labour force participation could be a potential driving force for long-term economic growth and productivity. Studies suggest that increased female labour force participation can bring improvements in economic efficiency and production. Gender equality, including equal employment opportunities, has been linked to positive macroeconomic outcomes by increasing growth rates. The impact of women's employment on economic growth is primarily transmitted through factors related to the supply side, such as labour productivity, and demand side factors like business expenditures and exports. However, the relationship can be complex; structural factors like sectoral composition, inter-occupational discrimination, and societal norms can influence outcomes.

3.4 The Factors Influencing the Relationship Between Gender Equality and Employment

Analyzing macroeconomics through a gender lens is a significant subject investigated by numerous researchers. In this context, Lechman and Kaur (2015) examined the relationship between the economic use of information and communication technology (ICT), women's workforce participation, and economic growth in Central and Eastern European countries between 1990 and 2017. Their study revealed that the economic activities of women significantly increased and contributed to economic growth. Using data from the World Bank Development Indicators, World Development Reports, and the World Telecommunication/Information and Communication Technologies Database within a methodological framework, their findings demonstrated significant connections between ICT and women's economic activities.

It is noted that in Türkiye, the number of illiterate women is five times higher than men. Serel and Özdemir (2017) found that education, as a crucial factor, not only increases female employment but also holds the potential for creating long-term economic impacts.

Gammage, Joshi, and Rodgers (2019) found the connection between employment and fertility to be complex and simultaneous, closely intertwined with women's economic empowerment, the choice of working conditions, and when and where they will work, all closely linked to the empowerment of reproduction and birth-related decisions. Factors such as women's economic empowerment, job choice, and job quality are closely linked to reproductive power and outcomes. Simplistic approaches in developmental policies related to girls' education and women's labour force participation may not achieve their goals unless attention is given to women's reproductive health and rights.

In Seguino's study (2020), it is demonstrated that gender disparities in education, health, unpaid labour, employment, and wages have broader consequences on the economy and affect the pace of growth. This review clearly emphasizes that incorporating gender into macro models enhances the relevance of macroeconomic theory and can yield better policy outcomes.

When examining the factors influencing female labour force participation, decisions regarding women's entry into the labour market are determined not only by economic development but also by current and future

labour market conditions, as well as household and individual characteristics of women. Algan and Oktay (2021) suggest that one of the key factors influencing female labour force participation is the level of education, closely associated with economic development, attributing the increase in the active participation of women in the labour force to the level of education. They have also found that as women attain higher levels of education, the decision-making regarding marriage and childbearing tends to be delayed, making fertility rates, similar to education, another significant factor influencing women's labour force participation rates.

Onaran, Oyvat, and Fotopoulou (2022) suggest in their study that gendered structural characteristics such as the gendered sectoral composition of employment, occupational discrimination, social norms related to gendered consumption behaviors, and the distribution of unpaid household care work impact growth, productivity, and employment. Their research indicates that women's economic empowerment is closely linked to their preferences regarding where and when they work, as well as their preferences for working conditions, which are closely associated with reproductive capacity and outcomes.

3.5 Redefining Participation: Women's Labour Force Engagement Amidst Economic Evolution

The economic development of countries depends on many factors independent of factors like the workforce; for instance, technological advancements can increase productivity even without an increase in employment, which can affect the workforce. The positive relationship between economic growth and capital stock indicates that resources enhance productivity.

Contrary to expectations, the World Bank's (2021) report indicates that anticipated increases in women's labour force participation have not been realized despite structural changes, declining fertility rates, and enhanced female education in numerous regions. This discrepancy is attributed to the influence of entrenched historical, economic, and social structures alongside established norms, which impede notable advancements in female labour force engagement. The report accentuates the inhibiting effect of inflexible historical, economic, and social frameworks, underscoring their role in limiting significant growth in female labour force participation. For instance, a case study involving Chile illustrates this pattern - when the country's GDP per capita surged to $12,954, female labour force participation concurrently increased to approximately 45%. Aslim, Panovska, and Taş (2021) substantiate this observation in their research, proposing a robust, nonlinear relationship between economic development, policy-making, and female labour force participation, notably in countries transitioning to higher income brackets. Despite prevailing literature's focus on advanced OECD nations and low-income countries, theories posit a compelling nexus between economic development, policy formulation, and female labour force engagement, particularly within emerging financial markets.

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4 Job Opportunities and Women´s Employment in Green Energy

Green energy refers to energy derived from natural sources such as the sun, wind, and water, and is considered renewable because these resources are naturally renewable. Unlike non-renewable energy sources such as fossil fuels, they do not run out so long as the Sun continues to exist. The importance of green energy lies in its ability to reduce environmental damage, reduce greenhouse gas emissions and combat climate change, while providing clean air and protecting the environment. Green energy is essential for a sustainable world.

Green energy has become an important topic on the global agenda, especially with the tangible effects of climate change over the last decade and its negative impact on the economy. As shown in Figure 5, in the World Economic Forum's annual report, six of the top ten risks that threaten and will most affect the business world are purely environmental. At the top of these risks are weather phenomena such as climate crises, water crises, drought, and excessive rainfall. Some of the other issues, such as migration and livelihood issues, are also directly affected by climate change. At this point, the rapid growth of clean energy has become a necessary condition for countries. Climate and sustainable development are now integrated concepts. The first to embrace and implement the transition to green and clean energy will be the first to maintain their economic power. On the other hand, under the heading of gender equality, one of the United Nations Sustainable Development Goals agreed by 193 countries in January 2016, there are responsibilities such as women's contribution to the economy and the proportion of women in leadership positions. Gender equality in green energy, which falls under the umbrella of sustainability, is also an issue that needs to be worked on.

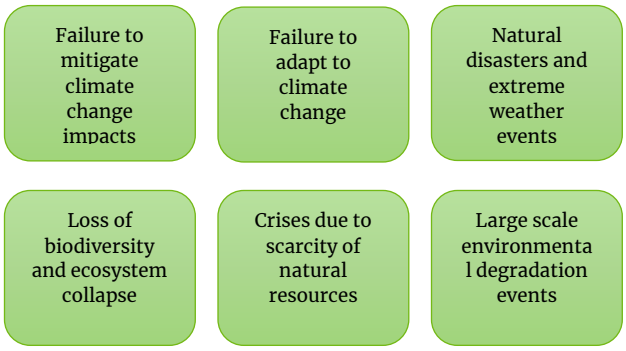

Figure 5: Environmental risks among the top global risks
Source: (Heading, 2023)

4.1 Green Energy and Employment

The priorities of the real sector are also changing depending on economic and political data in order to be protected from the risks mentioned in Figure 5 and to realize more sustainable growth. Many companies are beginning to expand into the energy sector alongside their core business. Businesspeople put the transition to green energy at the top of their agenda. The transition to green, clean energy increases the brand value of companies and offers them the opportunity to become a player in the global league.

According to the International Renewable Energy Agency's (IRENA) "Renewable Energy and Employment 2023 Report", global renewable energy capacity increased by 295 gigawatts last year, reaching 3,372 gigawatts. Employment in the clean energy sector grew by about 8 per cent last year compared to the previous year, reaching 13 million 700 thousand people. Job opportunities in the green energy sector are growing significantly The US has grown by almost 300,000 jobs in the clean energy sector in 2022.

According to the report based on clean energy technologies such as solar and biomass (IRENA, 2023), the number of people working in the solar energy sector, which ranks first in terms of employment, was recorded at 4,900,000 as of last year. Over the same period, employment in hydropower reached 2,500,000, in biomass, biogas and liquid biofuels 5,580,000 and in wind energy 1,400,000. At the end of last year, employment in the heating and cooling sector was 710,000, while employment in other renewable energy sectors was 640,000. According to the report, employment growth in the clean energy sector is expected to continue and the number of people working in this sector is expected to reach 38,000,000 in 2030. Employment in other energy transition technologies is expected to reach 74,200,000 in this period.

Similarly, according to the International Energy Agency's 2023 report, a significant increase in renewable energy jobs is expected by 2027. This increase could lead to new employment opportunities through increased investment in renewable energy supply projects. By 2030, the clean energy transition is estimated to create a net 10.3 million new jobs worldwide. The largest impact is expected to be in the modernisation of energy infrastructure.

Looking at the situation in Türkiye, the International Energy Agency (IEA) stated that Türkiye's renewable

energy capacity is expected to grow by 64% over the next 5 years, making Türkiye the fourth largest renewable energy market in Europe and one of the top 10 in the world and that 75% of this growth in renewable energy will come from wind and solar. An analysis by the United Nations Development Programme (UNDP) and the International Labour Organisation (ILO) found that by investing in renewable energy instead of relying on fossil fuels, Türkiye could increase its GDP by an additional $8 billion per year and create more than 300,000 new jobs by 2030.

Türkiye's rich green energy resources, security of energy supply and the fact that energy is still the largest item in the current account deficit, the desire to meet the United Nations development goals, increased competition to go green, new sources of finance, economic and political data accelerating the transition to clean energy, have all contributed to the dramatic acceleration of Türkiye's green transformation. This momentum is expected to continue. Growth creates greater demand for high-skilled jobs.

Türkiye has reached 106,6 GW installed capacity of electric in total and with the incentives and support given to licensed and unlicensed applications 55 % of renewable energy capacity by the end of 2023.

Natural Gas	25,5	GW
Coal (All)	11,4	GW
Biomass	2,0	MW
Geothermal	1,7	MW
Wind	11,7	GW
Solar	11,3	GW
Hydroelectric (Dam&River)	32,0	GW
Others	11,0	GW
Total	106,6	GW

Table 1: **Installed Capacity of Türkiye, 01.01.2024**

Source: TEİAŞ Load Dispatch Information System, Turkey Electricity Statistics

There are currently thousands of job vacancies in the green energy sector across a wide range of roles, indicating that there is an active and growing job market in this sector. This expansion is supported by a number of factors, including policy initiatives, technological advances and a growing global commitment to sustainable practices, and points to a solid future for green energy employment. Globally, more than 5 million jobs have been created in renewable energy over the past decade. Growth is particularly strong in Asian countries, where renewable electricity capacity will increase by 9% by 2021. According to the International Labour Organisation (ILO), job gains and losses in the Green Scenario by year are shown in Table 1.

	2024	2027	2030
Job Gains	153.454	286.764	370.035
Job Losses	-61.876	-79.249	-58.774

Table 2: Total job gains and losses in the Green Scenario

Source: ILO, 2022. Social and employment impacts of climate change and green economy policies in Türkiye, applying the Green Jobs Assessment Model to Türkiye

The statistics in the table show that more people will gradually enter and be employed in the green sector over the years. Table 2 shows projections for male and female employment in 2025 and 2030.

	2025		2030	
Employment	Gains	Losses	Gains	Losses
Female	50.115	-19.977	93.476	-5.974
Male	156.596	-47.269	276.560	-52.800

Table 3: **Female and Male Employment gains and losses**

Source: ILO, 2022. Social and employment impacts of climate change and green economy policies in Türkiye, application of the Green Jobs Assessment Model to Türkiye

According to the projections in Table 2, the energy labour force profile in the fossil fuel sector will change in the medium and long term due to coal phase-out and greening policies. In the projected transition to green energy, which will coincide with the transition from fossil fuels, skilled and predominantly female employment with a technical education background will come to the fore.

In the scenario presented within the scope of the National Energy Action Plan announced by the Turkish Ministry of Energy and Natural Resources in January 2023, in 2035; Electricity installed capacity will increase to 189.7 GW in total, of which 52.9 GW in solar, 24.6 GW onshore wind, 5 GW offshore wind, 7.2 GW in nuclear, 35.1 GW in hydroelectric power plants, and 5.1 GW in geothermal and biomass power plants. Additionally, there is a target to install battery capacity of up to 7.5 GW (2 hours charging time), and electrolyzer capacity should reach 5.0 GW.

In the Plan, it is stated that investment needs in the electricity sector will be evaluated together with unexpected developments such as global and regional crises, epidemics, international political crises, and factors such as energy supply security, requirements of the electricity grid, etc. and necessary additional measures will be taken.

With the Energy Efficiency Strategy 2030 and the National Energy Efficiency Action Plan II (2024 - 2030) also published after, a clear roadmap was provided for the objectives of increasing the use of renewable energy resources and energy efficiency.

4.2 Female Employment in Green Energy

While there are projections that employment in green energy will increase, the extent to which women's employment will increase and how female workers or students will be directed into the field are also important questions. While women's employment in green energy is not yet at the desired level, it is projected to increase with the transition away from fossil fuels. As mentioned in the first part of the report, increasing women's employment in green energy depends primarily on women's education in STEM fields. In order to assess the interest of women in Türkiye in green energy occupations, and thus in STEM fields, the gender distribution of students enrolled in green energy occupations in 2022 was examined and analysed. The data has been obtained from the YÖK Atlas system and organized into table (Table 4) by the reporting team. "YÖK Atlas," is an online platform that contains data related to higher education in Türkiye, including information about higher education institutions, programs, and student details. The departments of environmental engineering, electrical engineering, energy systems engineering, energy management and mechanical engineering were included in the scope of the study as the professions actively employed in green energy. The study includes data from 86 state universities and 29 foundations and private universities operating in Türkiye, and the total number of students admitted to the relevant departments in these 115 universities in 2022 is 9099.

The study calculated the "Gender Ratio", which is considered to be the first and most important gender equality indicator, on the basis of each department. (The Gender Ratio (also known as the female-to-male ratio) is an indicator obtained by dividing the number of women by the number of men in an organisation and is considered the basic level among gender equality metrics. It is also useful for benchmarking studies, such as comparing different sectors. Since the analysis aims to give the reader a basic idea, it was considered appropriate to use the Gender Ratio in this study. Furthermore, it was considered appropriate since the study uses data from the higher education environment, comparing different university departments, and therefore does not take into account the different dynamics of the working environment (remuneration, promotion, etc.). While the Gender Ratio is expected to be 1 for organisations where gender equality is ensured, a value higher than 1 indicates that there are more women in the organisation, while a value lower than 1 indicates that there are more men. Below are the Gender Ratio data by department for 9099 students enrolled in departments at 115 universities across the country for the professions actively employed in green energy in 2022.

	FEMALE	MALE	GENDER RATIO
Environmental Engineering	502	321	1,56
Electrical Engineering	101	336	0,30
Energy Science and Technology	20	21	0,95
Energy Systems Engineering	160	259	0,62
Energy Management	26	35	0,74
Mechanical Engineering	1211	6107	0,20
TOTAL	2020	7079	0,29

Table 4: Gender Ratio Values by Departments (2022)

Source: This table is created with data from the YÖK Atlas system.

Looking at the Gender Ratio values for the departments analysed in the study, only one of the six departments approached the ideal value, while four departments had a Gender Ratio value below 1 and one department had a Gender Ratio value above 1. Assuming that the Gender Ratio value is 1 in organisations where gender equality can be considered to exist, it can be stated that only the Energy Science and Technology department approaches the ideal value in this context. In Energy Management and Energy Systems Engineering, the Gender Ratio value is below 1 but relatively balanced, while in Electrical Engineering and Mechanical Engineering, the Gender Ratio value is much lower than in the other two departments. Only in the analysis carried out for the students of the Department of Environmental Engineering was the Gender Ratio value found to be higher than 1. When the Gender Ratio value was calculated over the total number of students placed in the relevant departments, a value of 0.29 was obtained, which shows that two male students correspond to each

female student admitted to the departments actively involved in green energy.

The implication of this picture is that women's participation in STEM subjects is lower than it should be, and that the 50,000 labour shortages expected in the green energy sector each year until 2030, will be filled by relatively fewer women than men.

If we look at departments other than those mentioned here that are related to green energy, we see that architecture has come to the fore in recent years. This is in parallel with the publication of the Green Building Ordinance and the acceleration of building certification efforts in recent years, and the fact that this department is predominantly preferred by women contributes to the employment of women in the field of green energy. Another noteworthy finding of the analysis is that the proportion of female students increases as we move towards the western regions of the country. Furthermore, the inclination of female students in western Türkiye to pursue careers in the same regions where they studied contributes to a notable concentration of female employment in these areas.

Approximately 40% of the workforce in the global solar industry is made up of women.

It is useful to highlight a notable finding from the report's research, namely that the sector's reliance on global developments and foreign technology makes it necessary for employees to have knowledge of foreign languages.

According to a recent employment report published by the International Renewable Energy Agency (IRENA and ILO, 2023), the global solar energy sector employed approximately 5 million people at the end of last year. The report also shows that female employment in the sector is "imbalanced", with women mostly employed in administrative l positions (58%), followed by STEM(38%) and non-STEM positions (35%).

Our analysis of the labour force includes entrepreneurs setting up their own businesses and new enterprises (start-ups), the number and quality of which have increased in recent years. The number of women among the founders of green energy start-ups, which are now being supported by many institutions and organisations, is relatively increasing. Angel investors and financial institutions are also favouring female entrepreneurs.

On the other hand, the diversification of financial support mechanisms for women who want to start a business and the possibilities for distributed mentoring and coaching programmes to reach women in every region, contribute positively to the motivation of women entrepreneurs in the sector. Women's awareness of sustainability and clean energy is increasing day by day, and their inclusion of green and efficient energy practices in their work, even if not directly, is a satisfactory return.

Women's cooperatives that produce and sell sustainable, eco-friendly and organic products using green energy have also become active. Women's cooperatives provide employment opportunities for more than 20,000 women in 61 provinces. There are also green energy cooperatives, such as the Troya Energy Cooperative, whose founders are women (General Assembly Members). The fact that large green energy companies also support women's cooperatives brings female labour into the sector.

In the transition to green energy, "women in energy" has become a topic of particular importantance. This is due to the fact that at a time like this, when the sector is experiencing such significant growth trends, the need of labour is also rapidly increasing. In addition, the preference of skilled workers to go abroad in significant numbers creates a constant need for labour in the sector. Accordingly, the potential for female employment in the sector is increasing. Women's positioning in clean energy is crucial both in terms of awareness and habits, as well as the increasing presence of women in technical and engineering fields compared to the past, and their greater willingness to engage in fieldwork. This opens up new opportunities for women in the sector. As young women discover the potential of the sector, including the opportunities for self-improvement and global job prospects it offers, they recommend joining the sector to their peers, attracting new women to the workforce in the sector.

As a result, with the phasing out from fossil fuels, it is anticipated that women will have a greater presence in the green energy sector, the number of women graduating from relevant university departments will increase, and opportunities will arise for graduates from unrelated fields to enter the green energy sector later. Furthermore, funding support and mechanisms for new startup companies will increase, and factors such as the growth of women's cooperatives will lead to an annual increase in female employment in the sector.

4.3 Incentives and Opportunities

Attracting and promoting female employees in the green energy sector is important for increasing diversity in the sector and ensuring gender equality, as it will serve as a model for gender equality.

As part of the Twelfth Development Plan (2024-2028) published by the Presidency of the Republic of Türkiye, Presidency of Strategy and Budget in October 2023, it was stated that studies will be conducted to increase the number of qualified personnel needed in the energy sector and that higher education programmes will be harmonised with newly developing technologies.It was

also stated that the employment of personnel with postgraduate degrees in these fields will be increased and the quality of education, training and internships in the energy sector will be improved. Within the framework of the issues mentioned in this section, the main actions that can be taken to attract female employees to the green energy sector in Türkiye could be as follows:

Education and awareness: The first step in attracting female engineers to the green energy sector is education and awareness. Universities and educational institutions should inform and support women about career opportunities in the sector. In particular, sharing the stories of female engineers currently working in the sector and prioritising female candidates to join their teams will speed up the process. Existing departments should be better explained, and positive discrimination should be used to encourage women to choose engineering departments. It is also important to raise awareness among families and companies in the sector.

Internships and job opportunities: Green energy companies should accept female engineers as interns and offer potential job opportunities. Internship programmes can help women learn about the industry and gain experience. Internship programmes should match women engineers with mentors and develop career development plans. These processes should also address the accommodation needs of female engineers.

Mentoring programmes: Creating mentoring programmes that pair female engineers with experienced professionals who are successful in the industry, will support their career development. In order for female engineers to stay in the profession, they need more information from people who know the industry.

Promoting diversity: Companies need to adopt and implement diversity and gender equality policies. They should also create opportunities for women to progress. Making promotion processes transparent will not only contribute to the employment of women but will also increase retention rates throughout the company.

Educational scholarships: Offering scholarships and educational grants to support the training of female engineers in the green energy sector, can help to increase the number of women trained in this field. Although there are programmes to support female engineers throughout Türkiye, more scholarships should be offered for the green energy sector.

Create a women's network: Creating networks where female engineers and professionals can connect with each other is important to share experiences and provide support. Discussing difficulties and developing action plans to overcome them in these networks, will ensure that female engineers are attracted to and remain in the sector. In addition, the feeling of not being alone will prevent loss of motivation. Female employees' acceptance of certain working conditions, such as fieldwork and travel, according to their personal preferences and without regional discrimination, will make a positive contribution to employment. In addition, equal pay and promotion policies will increase the motivation of female employees.

Financing gender equality: UN Women, the World Bank and the EBRD have been campaigning for gender loans for more than a decade. This is because public and private finance is critical to advancing gender equality and women's empowerment. In the field of green technologies, this support is even more important, especially for entrepreneurs and women start-ups with high-impact ideas.

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5 Best Practices of Gender Equality in the Energy Sector

While the energy sector holds vital importance for economic growth and development, efforts to ensure equality within this sector have a critical impact on achieving broader societal gender equality goals. This section aims to examine the best practices exemplifying gender equality in the energy sector in Türkiye and globally.

Key areas considered when looking at best practices include the representation of women in the energy sector, opportunities for career advancement, the proportion of women in leadership roles, and the implementation of gender equality policies. Policies and practices promoting gender equality in the energy sector in Türkiye and on a global scale encompass successful examples and potential challenges in the industry. In this context, the steps taken by companies operating in Türkiye towards gender equality in the energy sector, along with standout practices internationally, will shed light on the sector's development and serve as guidance for future policymakers.

The goal of this section is to identify the best practices for achieving gender equality in the energy sector and evaluate the effectiveness of these practices. This evaluation will comprehensively address the steps taken by companies in both Türkiye and other countries concerning gender equality in the energy sector and examine the impact of these practices on the industry.

Given that the energy sector is a rapidly growing industry, the number of companies is increasing, and numerous stakeholders are involved. Many companies are creating specific organizational cultures through their established policies. With globalization, these companies not only cater to the countries in which they operate but also have the potential to address or are faced with different countries beyond their operational scope. In this context, it is observed that companies in the sector feel the need to meet specific criteria or are compelled to do so. Particularly regarding gender equality, companies vary between genuinely creating policies and executing projects with their own volition and a true vision, and others merely striving to comply with international public opinion by taking superficial steps. Although making this distinction is challenging, this report highlights valuable practices.

5.1 Sector Good Practices: Türkiye

In recent times, the initial public offerings (IPOs) of green energy companies have begun to bring a more corporate structure to the sector. This situation also entails public companies making commitments at a global level. Corporate transformation also increases the responsibility for gender equality in the business world. Furthermore, a qualified workforce signifies a skilled and egalitarian workforce. Companies compliant with Environmental, Social, and Governance (ESG) criteria and aiming to create value are listed on the Borsa Istanbul Sustainability Index. Currently, this index hosts several companies operating in the field of green energy. While most of these companies lack active policies on gender equality, it is observed that only one company, apart from the rest, has active policies. This indicates a potential positive impact on achieving equality during the transition of companies into corporate structures.

5.1.1 Zorlu Energy

Zorlu Energy, a signatory of the Principles of Empowering Women, is developing initiatives related to gender equality within the scope of its Sustainability Vision, Smart Life 2030. Zorlu Holding and all its companies have started addressing gender equality within a strategic framework. As part of the roadmap, they aimed to initiate a leadership movement by establishing a Gender Equality Committee consisting of executives from their companies. Their approach to gender equality is based on strategic frameworks, prioritizing equal opportunities, work environment, and collaborations at Zorlu Energy. Additionally, they have launched a mentorship program focused on gender equality, starting in the Osmangazi region.

"Women, The Power of the Future" is a program aimed at increasing female employment in technical fields within the energy sector. As part of the program, female technician candidates studying in technical departments of vocational high schools will receive theoretical and practical training for eight months, while candidates continuing their education in vocational schools will receive two months of theoretical and field application courses. The program aims to prepare women for the business world by offering mentorship support, technical seminars, and rotation programs. In this regard, the Turkish Women Entrepreneurs Association (KAGIDER) has earned the Equal Opportunity Model (FEM) certificate implemented for providing equal opportunities in professional life and ending gender discrimination.

Since 2019, Zorlu Energy (ZE) in collaboration with Bogazici University Lifelong Learning Center (BUYEM) has been organizing a series of training sessions titled "Smart Life Academy" for colleagues. These sessions aim to enhance the knowledge of Zorlu Group

employees in the field of sustainability, covering fundamental topics such as climate crisis, circular economy, systems thinking, ecological economics, diversity, and inclusivity. Under this approach, ZE, under the auspices of the social innovation platform "imece", has launched the "Smart Life Academy" for young individuals. In February of this year, ZE successfully conducted the first edition of the "Sustainable Future Education" program and has commenced the second phase. The main partner for the program is Zorlu Holding, responsible for implementing the program, with imeceLAB, and Bogazici University Lifelong Learning Center providing academic support. Zorlu Energy has implemented the "Power of Women, Power of the Future" program aimed at increasing female employment in technical fields within the energy sector. Female participants will also attend technical seminars and rotation programs, aiming to prepare them for the business world by providing mentorship support. From 2017 to 2019, Zorlu Energy served as the main partner of the imece Support Program, focusing on social entrepreneurship in line with the United Nations' Global Goals. Launched in 2017, the program focused on "Quality Education" and led to the emergence of several recognized social initiatives contributing actively to society, including Hayal Gücü Merkezi, Toyi, and Mektepp.

5.1.2 Enerjisa Energy

Enerjisa, being part of Bloomberg's Gender Equality Index, has excelled in five assessment categories, securing a 100% rating in the "Anti-Sexual Harassment Policies" category and an 87% rating in the "Inclusive Culture" category. Enerjisa Energy;

- Signatory of UN Women's Empowerment Principles (WEPs)
- Signatory of the United Nations Global Compact
- Membership in the "Business World Against Domestic Violence in the Workplace" platform coordinated by Sabancı University Management Forum
- Participation in the UN Global Compact Target Gender Equality Platform
- Collaboration with the European Bank for Reconstruction and Development (EBRD) for the implementation of the "Equal Opportunities in the Electricity Distribution Sector" project
- Membership, leadership roles, and collaborations in NGOs focusing on increasing female employment, such as "TurkishWIN Kodluyoruz-Patika," Technology Women's Association (WTECH), Turkish Women in Renewable Energy (TWRE) Platform, and Green Collar Women Association (GCWA)
- Establishment of the Enerjisa Diversity and Inclusion Platform
- Equal Opportunities in Electricity Distribution Sector Project: In collaboration with the European Bank for Reconstruction and Development (EBRD) and with consultancy from Deloitte, Enerjisa is implementing the Equal Opportunities in the Electricity Distribution Sector project within the Gender Equality Program. This project aims to review Human Resources practices, promote female employment in technical and managerial positions, set clear and measurable goals for gender equality, and establish collaborations with organizations working in this field. These activities are conducted by a project team comprising volunteers from various company units and reported to a steering committee consisting of top management. The project, initiated in November 2020, continued until 2021.
- Million Women Mentor Program is an initiative bringing together young girls aged 15-25 and industry leaders on a digital platform for mentorship. In 2021, the Million Women Mentor Program was launched to support young girls with career goals in STEM fields and expanded in 2023 to encompass all young girls and high school students regardless of their field of interest. The program's goal is to provide support to all young girls seeking mentors on their career journey.

5.2 Global Practices in the Sector

5.2.1 Schneider Electric

As of December 2022, women represent 41% of Schneider's board of directors, and the company is committed to achieving a gender balance goal of 50:40:30 by 2025 (which entails having 50% of new hires, 40% of all first-level managers, and 30% of senior leadership positions occupied by women). Schneider Electric's practices promoting gender equality in the energy sector have consistently earned recognition in gender equality indexes such as Bloomberg GEI, showcasing the company's commitment to equality across various aspects, including pay equity, inclusive culture, leadership cadre, and external branding. Efforts to promote all forms of diversity, including the workplace, have resulted in high rankings in diversity assessments by organizations like the Financial Times. Their principal initiatives are outlined as follows:

- Regular Industry Comparisons for Pay Equity: Schneider Electric conducts regular industry comparisons to ensure fair compensation regardless of gender.
- Workplace Flexibility Policy: Introduced two years ago to support maintaining work-life balance for employees, this policy benefits both women and men, fostering an inclusive work environment. Revised in 2023, the Global Leave Policy now includes an additional ten days of Care Leave that employees can use as they wish.
- Leadership Training and Development: Schneider Electric endeavors to create an inclusive workplace culture by emphasizing continuous learning and leadership development. Recognizing the importance of empowering women for overall corporate success, the "How Women Rise" program was launched four years ago aiming to support women in their careers. The concept aptly named "A Journey of Becoming Unstuck" aims to guide women in their career journeys, identifying and breaking habits that hinder their success. Focused on preparing women

for future leadership roles, the "Rise Anyway" program aims to unlock expertise and assist women in reaching their potential while focusing on Building Resilience, Preventing Burnout, and Building Your Leadership Brand. Additionally, "Schneider Women in Sales (SWIS)" is a MEA Region initiative launched in May 2022, serving as a platform to inform, educate, and support future female leaders interested in engaging in commercial operations.

- Mentorship Opportunities: The company encourages both formal and informal mentorship opportunities throughout the organization to facilitate knowledge-sharing and career development.
- Ownership, Executive Representation, and Workforce Diversity: Schneider Electric has set specific goals regarding female representation at various corporate levels such as ownership, executive positions, senior management, and the general workforce.
- Professional Development Platform: Schneider Electric University addresses skill gaps in the data center industry globally, enabling professionals to stay updated on technological, sustainability, and energy efficiency advancements. Available in 14 different languages and accessible online for free, this specialized professional development platform helps industry stakeholders stay informed about the latest technology, sustainability, and energy efficiency initiatives influencing the industry.

5.2.2 Siemens Energy

Siemens Energy, a global employer with a workforce exceeding 92,000 individuals, includes 25% female representation. In this context, we have succinctly encapsulated their principal methodologies:

- Encouraging Equal Opportunities and Skills: The company actively promotes equal opportunities regardless of gender through open workshops and discussions that encompass diversity, equal opportunities, and corporate culture. It emphasizes encouraging girls in schools to progress in STEM fields and consider engineering careers. As an example, Siemens collaborated with UN Women and Women in Germany to develop the skills of over 600 young African women in South Africa, Kenya, Rwanda, Senegal, and Uganda. Launched in April 2022, the joint venture initiated a hybrid event hosted by Siemens South Africa, including the Africa Girls Can Code It (AGCCI) coding camp and the SieMent EmpowHer mentoring program. The UN Women - Africa Girls Can Code It Initiative (AGCCI) educates young women aged 17 to 25 in digital literacy, programming, and job-ready skills. The goal is to empower them to work in the ICT sector as programmers, coders, and designers. Following the initial event, coding camps started in South Africa in June, followed by Rwanda, Kenya, Senegal, and Uganda. Following the two-week AGCCI curriculum, the EmpowHer Africa program encompasses digital and job-ready skills from coding to cybersecurity in specialized workshops. The program covers a broad spectrum of learning content, from basic coding to career options in IT, and is supported by the Siemens mentoring program SieMent EmpowHer.
- Supportive Apprenticeship Programs: Siemens Energy offers apprenticeship programs that provide support and training for engineering careers. Testimonies from employees highlight the company's support for personal and professional development.
- Diversity Goals: It has set specific goals to increase the ratio of women in senior management positions to 25% by 2025 and 30% by 2030. It acknowledges the importance of diversity and inclusion in creating a supportive and open society.
- Forces Networking Initiative: Aimed at empowering women entrepreneurs in the climate technology sector, this initiative aims to create a meaningful network, support, and a safe space for amplifying women's voices in a traditionally male-dominated industry. The initiative aims to address the inequality in venture capital funding and support companies led by women in the energy sector, promoting gender equality. Women entrepreneurs face challenges in securing sufficient funding as they receive significantly less venture capital funding compared to their male counterparts. Factors contributing to this inequality include biases in investment decisions, differences in risk-taking behavior, and the prevailing masculine value system in the business world. Unconscious biases among investors and lack of awareness of gender inequality in the sector pose barriers for women entrepreneurs. Siemens Energy's Forces Networking event has shed light on potential strategies to close the gender inequality in the energy sector. These include promoting confidence and risk-taking behavior, building diverse networks, encouraging role models through mentorship and education, questioning prevailing value systems, and addressing unconscious biases. Discussions during the event highlighted the importance of expanding awareness beyond gender to embrace diversity in different spectrums to embrace diversity in the industry.

5.2.3 Siemens Gamesa

Siemens Gamesa has championed various initiatives recognized by Bloomberg's Gender Equality Index (GEI) 2023, acknowledging companies' efforts in advancing gender equality through policy development, representation, and transparency. This year's GEI index encompasses 484 companies from 45 countries or regions across 11 different industries (as of February 1, 2023). The strategic endeavors implemented by Siemens Gamesa encompass:

"The Getting to 25 in 2025" Program: This initiative aims to achieve a 25% representation of women in the workforce and in senior management positions, targeting a female workforce ratio of 30% and a 25% representation of women in senior management. Presently, the percentage of women in professional positions stands at 27%, and in senior management, it's 14%. Siemens Gamesa endeavors to increase the

representation of women in the workforce and senior management positions, aiming for 30% representation in professional roles and 25% in senior management by the end of 2025.

Professional Development Initiatives: Siemens Gamesa collaborates with universities, develops equal pay policies, and organizes mentorship programs to encourage professional growth.

Leadership Programs and Women in Leadership (WIL) initiative focusing on elevating women into leadership roles. Inclusive Language Guide: The company emphasizes the importance of inclusive language in eradicating workplace inequality and discrimination through its Inclusive Language Guide.

Diversity and Inclusion Metrics: Siemens Gamesa incorporates diversity and inclusion metrics for managers and conducts inclusive leadership training for senior management.

Work-Life Balance Initiatives: The Smart Working program advocates for flexible working hours policies and promotes disconnecting from digital connections to support work-life balance, enhance productivity, and foster diversity and inclusion.

Aid and Protection Protocol: Addressing the social issue of violence against women, Siemens Gamesa implements a protocol including various measures to support and protect employees affected by domestic violence.

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6 Research on Gender Equality in the Energy Sector

This chapter provides an in-depth look at gender equality in the energy sector. Although the energy sector plays a critical role in the global economy, it faces significant gender equality challenges. This study aimed to identify gender inequalities in the sector and their causes and effects, based on the experiences of employees.

The research adopted a mixed methods approach. Mixed methods aim to provide more comprehensive and varied answers to research questions by bringing together both quantitative and qualitative data. Quantitative data allows us to identify general trends and patterns through numerical indicators, while qualitative data helps us to delve deeper into individuals' experiences, perceptions and meanings. Combining these two methods provides a richer and more diverse understanding of gender equality in the energy sector.

Although mixed methods designs have been discussed by different authors, this study employed one of the mixed methods designs described by Creswell (2017) in his book Research Design: the convergent parallel mixed methods design. This design envisages the simultaneous collection and analysis of quantitative and qualitative data, but both data sets are initially assessed separately. The main advantage of this approach is that the insights provided by both types of data are combined at the final stage, providing a more comprehensive and in-depth understanding. The reason for using the convergent parallel mixed methods design is that the issue of gender equality in the energy sector requires both an understanding based on comprehensive numerical data and a detailed perspective that includes individual experiences and perceptions. This method enabled us to provide more holistic and effective findings and recommendations by highlighting both general and specific aspects of the issue.

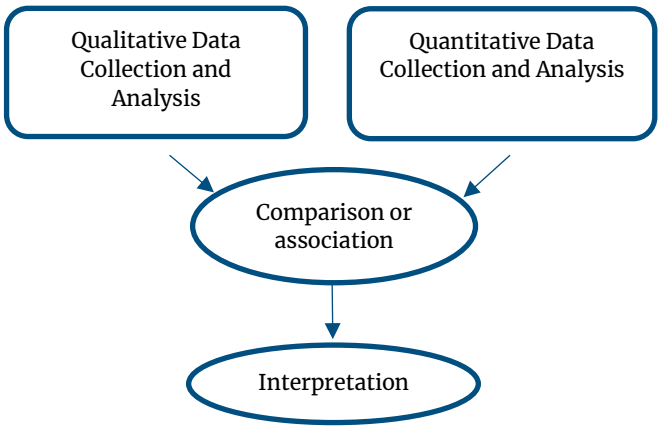

Figure 6: **Convergent Parallel Mixed Methods Pattern**

Source: Creswell (2017), Research Design: Qualitative, Quantitative and Mixed Methods Approaches

The quantitative part of the research was carried out using the survey method. This part was attempted to be measured by asking the participants questions on different topics, such as the career progression of women working in the energy sector, prejudices, fear of proving oneself, and company policies. The data obtained will be evaluated as concrete indicators of gender in the sector. In the qualitative part, the interpretive phenomenological analysis method was used. This approach aims to understand in depth the experiences and perceptions of individuals. Interviews with individuals working in the energy sector reveal personal views and experiences on gender equality. This analysis is crucial for understanding the socio-cultural dynamics underlying gender inequalities in the sector.

NOTE: Additionally, in the final section (6.4), data related to the number of employees in the Turkish energy sector is provided. This comprehensive data allows for a more thorough evaluation of both quantitative and qualitative research findings

6.1 About the Study's Quantitative Research Method

The quantitative research method used survey data collection and five different basic dimensions were identified through both literature review and the experience of the report team. The survey questions were designed according to these dimensions.

These dimensions are:

- Social roles
- Acceptance
- Representation
- Career development
- Politics

The sample consists of female employees working in the Türkiye energy sector. For the quantitative research, data was collected from 189 participants using a survey method. Other information about the sample is as follows:

Age range of the sample: The majority of participants in the sample are between 25 and 45 years old (69.2%). Other participants are in other age groups appropriate to the working conditions.

Marital Status: 56.1% of the sample are married and 43.9% are single.

Educational Status: 56.3% of the sample consists of participants with a bachelor's degree, 33.3% with a master's degree and 7% with a doctorate degree.

Sector Experience: On the assumption that it is important for participants to have a certain level of experience, efforts were made to reach more employees with sector experience. In this context, 73.7% of the participants in the sample have more than 5 years of experience and 26.3% have less than 5 years of experience.

6.2 About the Qualitative Research Method of the Study

This section explores perceptions and experiences of gender equality in the Turkish energy sector using the interpretive phenomenological analysis (IPA) approach. Smith (2009) states that the IPA method focuses on the processes of making sense of participants' experiences, and in this context the research aims to provide in-depth understanding. Interpretive phenomenological analysis (IPA) is a qualitative research approach that aims to describe in detail the lived experiences of individuals and the ways in which they make sense of these experiences (Smith, 2011). We use this method because we want to explore in depth the perceptions, experiences and thoughts of individuals working in the Turkish energy sector about gender equality. IPA presents participants' personal stories and perspectives in a rich context that helps researchers understand how participants make sense of and internalise their experiences (Smith, Flowers & Larkin, 2009).

This method is particularly suitable for exploring the impact of gender equality on employees in the energy sector and how this is reflected in their individual and professional development. It also includes an interpretive process to uncover common themes and structures of meaning in participants' statements. This process provides in-depth insights to assist policy makers and industry leaders in evaluating current practices and planning for possible improvements (Larkin, Watts & Clifton, 2006).

Our research aims to explore in detail individuals' experiences of gender equality in the Turkish energy sector and the significance of these experiences. The objectives of this study include determining the perceptions of female employees in the sector regarding gender equality, the challenges and opportunities they face, understanding the impact of gender norms on career paths and professional development, and evaluating current policies and practices in the sector and suggesting improvements.

Our research questions are:

- What are the experiences of individuals working in the Turkish energy sector with regard to gender equality?
- How do these individuals express the impact of gender norms on their careers?
- What is the effectiveness of current policies and practices regarding gender equality in the sector and what are suggestions for improving these policies?

Semi-structured interviews were conducted with 14 women participants working in the energy sector in Türkiye, based on the research method and purpose. These participants explained in detail the impact of gender equality policies and practices in the sector on their personal and professional lives. The data obtained is crucial to better understand the current situation of gender equality in the energy sector and to guide future policy developments.

6.3 Research Findings

Based on a convergent parallel mixed methods design, the quantitative and qualitative data were analysed using the specified approaches and as a result of the analysis it was decided to present the findings under seven themes. These themes are:

- Gender Discrimination
- Sexist Discourses
- Equal Opportunities and Career Development
- Work Sharing
- Perception and Acceptance
- Career Development
- Policies

Each of these basic headings or themes is examined under one heading. Quantitative data is presented first, followed by qualitative research data that supports or refutes this data.

NOTE: In the interviews conducted as part of the qualitative research, care was taken not to use the

names of the participants and not to give any information about their personal details. In this context, the names of the participants interviewed in this section have been changed and reflected in the text. None of the names mentioned in the text belong to real people.

6.3.1 Gender Discrimination in The Energy Sector

Gender equality is defined as a fundamental human right in the Global Goals for Sustainable Development. In the recent years, the issue of gender equality in the workplace has become increasingly important.

All individuals have characteristics that they are born with and cannot change, such as their race, gender, ethnicity, age, etc. In an ideal world, working life should not depend on these factors. However, there are real situations where these factors can lead to discrimination. In particular, gender can lead to discrimination within and/or outside of working life because of society's expectations, established beliefs and perceptions about gender. The most common manifestations of gender discrimination in working life can be seen in wages, employment and promotion opportunities, career development opportunities, flexible working arrangements and deeply held beliefs that women are not suitable for certain jobs. However, as broadly defined in the Sustainable Development Goals, gender equality is fundamentally about "ending all forms of discrimination against women and girls everywhere". To create a fairer, more sustainable, inclusive and productive working environment, gender equality must be ensured at all levels.

The survey part of the research aimed to measure gender discrimination in the energy sector and statements on this were included. Below is a summary of the statements included in the survey and the responses received.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%26,1	%20,7	%19,0	%27,0	%7,2

Table 5: Summary of responses to the statement "There is gender discrimination in my work environment".

34.2% of the participants in the survey expressed the opinion that there is gender discrimination in the energy sector. On the other hand, 46.8% stated that they do not agree with the statement that there is gender discrimination. In order to phrase this fundamental question (about gender discrimination) differently and to ask it from various perspectives, participants were also presented with statements regarding their managers and colleagues, the details of which are shown in Table 5 and Table 6.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%39,6	%27,0	%15,4	%12,6	%5,4

Table 6: Summary of responses to the statement "My manager/s think I cannot do some jobs because of my gender".

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%40,5	%29,7	%13,6	%11,7	%4,5

Table 7: Summary of responses to the statement "My colleagues think I cannot do some jobs because of my gender".

In addition to these statements, a question regarding bias was also posed, asking participants whether they had experienced prejudiced behavior due to their gender. Table 7 displays the details of the responses to this specific statement.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%28,8	%25,2	%12,6	%24,4	%9,0

Table 8: Summary of responses to the statement "I have been exposed to prejudiced behaviour or attitudes because of my gender".

33.4% of the participants indicated that they had experienced prejudiced behavior due to their gender, while 54% stated that they had not. In our survey, which assessed the issue of discrimination in the workplace through four different questions, the findings we obtained offer some insights but should not be used to make evaluations or draw definitive conclusions on their own. Thus, relying solely on these data for assessment can be misleading. Therefore, it would be beneficial to combine these findings with those obtained from our face-to-face interviews for a more comprehensive presentation.

It has been observed in the interviews that, even though participants have differing views on gender equality, they agree that there has been improvement, especially in recent years. Participant 11 described the current situation as "much better lately." However, Participant 9 expressed feeling gender discrimination almost every day with these words:

"I face issues related to equality every day. Some of them are major, but most are minor. These issues are so exhausting that it becomes quite difficult for me to focus on other things. It also affects my career, as I need to be constantly on alert."

On the other hand, Participant 10 emphasizes that the changing structure of the energy sector and its increasing appeal is altering the current situation.

"The renewable energy sector has become a bit more popular in recent years. I think female employment in this field will increase a bit more in the future. Therefore, it is evolving towards a more egalitarian structure."

Similarly, other participants constantly compare the old and new in terms of gender discrimination. They emphasize that the problems they experienced in the past were due to the low number of female employees and note that the increasing number of women entering the sector is changing the situation.

6.3.2 Sexist discourses at work

The most obvious indicators of gender inequality in work and everyday life are in language, and at the same time language is the most important source of nourishment. Discourses can carry traces of prejudice and discrimination based on an individual's sex, i.e. gender codes. Identifying and consciously changing sexist language in the workplace is the first step in raising awareness. The use of sexist language in job advertisements and recruitment processes, sexist jokes in the workplace, a lack of gender sensitive communication in the work environment, sexist perceptions and attitudes regarding wages and job positions are just some of the manifestations of sexist discourses in working life. This situation has a profound impact on the sense of belonging at work and is a major obstacle to creating a fairer, more inclusive and more equal working life. Table 8 provides a summary of the participants' responses on sexist discourses.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%6,3	%9,9	%10,0	%41,4	%32,4

Table 9: Summary of responses to the statement "Expressions such as slang, swearing, etc. used to emphasise gender are avoided in my workplace".

The majority of participants (73.8%) emphasized that sexist language is avoided in their energy companies. Only 16.2% of the participants stated that such expressions exist.

Sexist language in the workplace can lead to significant problems. Sexist attitudes at work can decrease employee motivation and productivity, reduce job satisfaction, and even cause psychological distress. However, these expressions can become so entrenched that they are hard to recognize and address. In the interviews, participants particularly noted that these expressions were much more prevalent in the past. They focused on the lack of effective solutions due to situations like the very low number of women in the past. However, they also emphasized that there has been improvement in the recent years. Participant 4 conveyed the importance of sexist language based on personal experience:

"In the past, the sector was completely male-dominated, and there were unpleasant statements accompanied by prejudice against women. I heard sentences like 'this job is too hard for women' so often, but now, such statements have significantly decreased."

Participant 12 highlights the statements developed on the inability of women to perform certain jobs in the energy sector:

"Part of the sector involves technical jobs, and unfortunately, I used to hear talks that women couldn't be successful in these jobs, that they couldn't do them. These were openly stated. At one point, I even started to accept them."

These statements may not always be very explicit and can be subtly inserted into conversations. On the other hand, individuals may not have sufficient awareness about these statements. In such cases, frequently used sexist statements in the workplace become normalized. Participant 6 explains the importance of awareness as follows:

"Honestly, at first, I didn't oppose these types of statements because I didn't fully understand them. But as I became more aware, I realized how badly they affected me."

Another point that many participants mentioned is culture. They express that such workplace expressions are a reflection of the culture prevalent in society and are inherited from society. However, they also note significant improvements in recent years.

6.3.3 Equal opportunities and career development in the energy sector

One of the most important ways to ensure gender equality is to ensure equal opportunities in education, employment, career development and promotion. Ensuring equal opportunities ensures a diverse workforce by eliminating discrimination on the basis of gender, race, ethnicity, age and other similar factors, thus enabling individuals to reach their full potential. A workforce with different perspectives and experiences is very important for ensuring efficiency and increasing innovation in the sector. This can be an important step in terms of opportunities to progress to leadership positions in business.

The research sought to measure equal opportunities and career development in the energy sector through two different questions. The opinions of the participants on the basis of the energy sector are presented in Tables 10 and 11

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%8,9	%17,9	%13,4	%36,6	%23,2

Table 10: Summary of responses to the statement "Career development opportunities are equal for men and women".

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%8,9	%16,1	%18,7	%31,3	%25

Table 11: Summary of responses to the statement "Everyone has equal access to opportunities, regardless of gender".

Participants gave proportionally similar answers to the two different questions. While a small proportion of participants (26.8% and 25% respectively) emphasised that there was an unequal environment in terms of career development and equal opportunities, the majority (59.8% and 56.3% respectively) stated that there were equal opportunities. However, a definitive assessment based on survey data alone may be misleading. It would therefore be healthy to evaluate qualitative research findings, which may support or refute these results, together with quantitative data.

An important issue raised by the interviewees was the need to ensure equal opportunities in order to achieve gender equality. It is also emphasised that it is very important for them to have equal opportunities in terms of professional development. However, it should be emphasised that the participants had different experiences on this issue. Participant 1 is an experienced worker who has worked in the energy sector for many years. Drawing on her own experience, she highlights a fundamental issue in career development.

"Another situation I have seen is that if two people are running for the same goal and their situations are very similar, the female employee has to work extra hard, maybe twice as hard, to get one step ahead."

Participant 2 sees the situation from a different perspective. She emphasises that female employees should be given more opportunities:

"When I go to a company, there are men in all positions, there are always men in the group, there is only one woman working there. Many people have a different perception because of this situation. Are our women so incompetent, without infrastructure and uneducated? Is that why they don't get much coverage? No, we have a lot of very talented, very competent women. So maybe we should give them a bit more of a chance."

One of the important steps for professional development is ensuring access to education and providing equal opportunities in this regard. This allows an employee to increase their current knowledge and gain additional competencies. Participant 3 expressed encountering a different situation than desired, being unable to access the training they wanted: "I wanted to attend other trainings but was not allowed. I was told that these are enough for me. So, I just accepted it and that's that. When that happens, your motivation decreases, and you start to coast." Participants, especially those who mentioned issues with technical training, repeatedly brought up this issue and underscored the inequality of opportunities. Participant 13 described the situation with the words, "women can't get much technical training".

6.3.4 The role of gender in the division of labour

Gender is a social construct consisting of of different roles, responsibilities, and duties in terms of "what individuals can do" and "what they should do" according to their biological sex. The division of labour has played an important role in defining and maintaining gender roles for centuries. This situation has significant implications for individuals' choices and decisions from birth. More specifically, it affects girls' and women's career choices, their sectoral choices, their working life choices, their career planning and their aspirations and choices for leadership positions. Labelling jobs as "women's work" and/or "men's work" based on the gender division of labour leads to

inequality of opportunity and ultimately gender inequality.

On the basis of the report, the concept of division of labour was evaluated in the context of segmentation in both recruitment and work processes and, accordingly, an attempt was made to measure it using two different terms. Tables 12 and 13 show the participants' views on the role of gender in the division of labour in the energy sector.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%4,5	%31,3	%21,3	%26,8	%16,1

Table 12: Summary of responses to the statement "The division of labour is gender neutral".

Table 12 shows that 35.8% of employees in the energy sector (within the opinions of the respondents to this survey) think that the division of labour is based on gender, and 42.9% think that the division of labour is not based on gender.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%9,8	%22,3	%24,2	%33,0	%10,7

Table 13: Summary of responses to the statement "Gender is a determining factor in recruitment".

During the recruitment process, 43.7% of respondents said that gender was a determining factor in the recruitment process, while 32.1% said that it was not a determining factor.

A more balanced division of labor in terms of gender equality can increase women's participation in the workforce, their career development, and access to leadership positions. In the interviews conducted, some participants mentioned the significant impact of societal structure on job division, while others highlighted the influence of physical/biological factors. Participant 14 pointed out the relationship between societal structure and job division, saying,"'a woman might not be able to go out in the evening, or she might not adapt to flexible working hours due to restrictions brought by society and family." Participant 9 discussed the changing norms in job division, stating, "Of course, site work is dangerous and physically demanding, and the practice of women working in such fields is only gradually becoming accepted."

Some participants noted that women employees are more often employed in office jobs, but there has been an increase in field assignments recently. Participant 11 shared their experience: "For example, I received training for working at heights. It's a very technical training that requires physical strength. In my previous job, when I wanted to take the training, they didn't allow it, asking, "What's the need?"

Participant 6 also emphasized the importance of awareness and stated that change could be achieved through it: "I generally think that awareness training and cultural change activities are very beneficial. What I mean by this: I think the perception that only male engineers or technicians work in the field needs to be broken. You can do this with different trainings. You can also do it with different employment programs. But first, you need to increase awareness."

Most participants emphasized the changing structure. They highlighted that there were almost no women in fieldwork for many years. However, recently, this has begun to change, with more women being employed outside the office. Participant 12 described this shift: "Ten years ago, when I went to the field, they were very surprised. They would ask, "What are you doing here? Why have you come?" But now they are starting to get used to it."

6.3.5 Sexist perceptions: Acceptance and impact on working life

Sexist perceptions have a profound impact on individuals' experiences of working life and shape the process of acceptance. Gendered perceptions, attitudes, behaviours, and prejudices in the workplace have a negative impact on career progression and lead to unequal access to opportunities. It also leads to the adoption or implementation of different standards of work-related measurement and evaluation. Different standards of measurement and evaluation perpetuate gender inequalities embedded in society in the processes of acceptance, recognition, promotion, and participation in decision-making.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Disagree
%28,6	%25,0	%8,9	%29,5	%8,0

Table 14: Summary of responses to the statement "Even though I have similar qualifications and skills to my colleagues, "because of my gender" I worry about proving myself in some of the jobs I do."

Anxiety about proving oneself can arise in different ways and in different situations in working life, and there are cases where it manifests itself on the basis of gender. When it emerges as a problem, the desire to

prove oneself can reach an exhausting and unsettling dimension. In the responses to the questionnaire, 37.5% of the participants said that they felt anxious about proving themselves because of their gender.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Disagree
%38,4	%33,9	%17,0	%7,1	%3,6

Table 15: Summary of responses to the statement "I feel that I am not sufficiently accepted at my workplace because of my gender."

In terms of acceptance, the majority of respondents (72.3%) said that there is no problem, while 10.7% said that they are not sufficiently accepted in their workplace because of their gender.

The concept of acceptance refers to individuals or groups being approved, valued, and considered as conforming to the norms by the community in social, cultural, or professional environments. Acceptance strengthens individuals' self-esteem, sense of belonging, and their place in the working world. Moreover, acceptance facilitates individuals' participation in and impact on change and development processes at work. In the qualitative research conducted, a significant number of participants spoke about negative perceptions, prejudices towards female employees, and particularly about experiences of non-acceptance. Participant 1 described this situation as, "I felt there was a belief that I couldn't do the job." Participant 5 expressed their experience of non-acceptance saying, "Initially, I felt that I was not accepted by my colleagues in a professional context."

On the other hand, some participants related the perceptual situation to culture and emphasized that a separate evaluation was not possible. Participant 8 shared their views as follows:

"The societal culture affects everything. People working in companies come from this culture, so we cannot make a separate evaluation. Unfortunately, there are prejudices in society about what women can or cannot do. Similarly, in the sector, male employees find it hard to accept that a female employee is good at technical subjects. Of course, there is change and improvement, but I can say there are still people who do not accept."

Some participants mentioned that perceptions exist, but whether one is accepted or not has turned into a personal situation. Participant 10 stated the current situation as, "You won't have a problem with being accepted as long as you can present yourself accurately and completely."

6.3.6 Glass Ceilings: Careers in the shadow of gender

The glass ceiling metaphor describes the invisible barriers that women face in the workplace. It refers to the invisible barriers that stand in the way of their career advancement (especially to senior management positions). Glass ceilings or these invisible barriers are not independent of prejudices, perceptions, attitudes, and behaviours embedded in social perceptions. In the case of women, gendered perceptions mean that women are held to unfair and unequal standards in terms of appointment and promotion, even when they have the necessary qualifications. Glass ceilings are barriers to a fair, equitable and inclusive working life.

As this issue - in terms of career development and promotion - is a structure that underpins gender in working life, it was felt that it would be appropriate to measure this issue with more expressions. In this context, Tables 15 and 16 show the summary of the participants' answers.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%3,6	%26,8	%15,2	%31,2	%23,2

Table 16: Summary of responses to the statement "Promotion/professional advancement is not determined by gender."

The fact that a high proportion of women are employed in workplaces is not enough in itself; it is also important how many of these employees are in managerial and/or decision-making positions. In this respect, career progression is a key issue in ensuring equality. Table 15 shows that 54.4% of respondents think that gender is not an important factor in career advancement, while 30.4% think that it is.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%23,2	%14,3	%15,2	%25,0	%22,3

Table 17: Summary of responses to the statement "It is more difficult for female employees to participate in senior management than for male employees."

Although it is known that the number of women in senior management is proportionally low in the energy sector, the reasons for this may vary. This study did not pose a direct question for these reasons, Table 16 provides a summary of respondents' views on the status

of female employees in senior management. 47.3% of respondents think that it may be more difficult for female employees to participate in senior management than for male employees.

The increase in female employment does not solely represent equality. It is crucial that female employees have equal opportunities for career development and particularly in participating in decision-making mechanisms within the institution. In the interviews, participants emphasized the lack of representation of women employees in upper tiers. Participant 7 linked this to culture, stating, "Our country is not yet very adapted to the idea of women in leadership roles." Some participants pointed out that their career development does not align with their skills. Participant 9 shared their experience:

"My manager claimed I was inadequate, but that was not the case; it was done to prevent my promotion. I tried to endure it for a long time, then I had to leave that company. In the next company, I advanced very quickly."

Some participants mentioned that while there is no issue with the employment of women, problems arise in career advancement. Participant 13 described the situation as, "I don't think women are being filtered out in the applications and men are prioritized, but I feel that traditionally, it's more often the men within the company who are promoted.'"

6.3.7 Gender equality policies in the energy sector

It is very important to follow institutional policies to eliminate gender inequality in working life. These policies will help to shape existing values, norms, behaviours, and attitudes. A working culture free from sexist perceptions will help to reshape working life in the light of egalitarian principles. A working environment in which workers are valued on the basis of their skills, performance and potential, rather than their gender, will also ensure equal opportunities and gender equality. At this point, it is also very important to implement programmes such as trainings, seminars/webinars, etc. that raise awareness against sexist discourses and practices and transform them.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%6,1	%9,6	%10,6	%40,4	%33,3

Table 18: Summary of Responses to the Statement "There is an Effective Gender Equality Policy at My Company".

73.7% of the participants stated that there is an effective gender equality policy in their company. 15.7% reported that there is no effective gender equality policy. The policy aspect was also evaluated in the context of training, and participants were asked if there is an effective training policy (in terms of gender equality) at their companies. Table 19 provides a summary of the responses to this question.

I Strongly Disagree	I Disagree	I Neither Agree Nor Disagree	I Agree	I Strongly Agree
%18,4	%36,0	%28,1	%10,5	%7,0

Table 19: Summary of Responses to the Statement "There is an Effective Gender Equality Training Program at My Company".

54.4% of the participants stated that there is no effective gender equality program in their company, while 17.5% indicated that there is an effective gender equality program.

Policies are one of the most effective ways to achieve gender equality in the workplace. In this context, questions were directed to the participants on this theme in the conducted interviews. Most participants emphasized that an egalitarian structure follows if there is a specific policy in their companies. If the company is corporate and/or adopts certain policies on gender equality, employees feel more comfortable regarding equality. Participant 3 expressed this situation as, "Policies are quite effective for achieving equality and, of course, increasing female employment. There is a need for improvement in both state and corporate policies." Participant 4 highlighted the importance of company policies, saying, "Of course, the issue of equality varies from company to company. While some companies have much fewer problems, others face even the most basic issues." Participant 7 shared the negative experience they had in their company due to the lack of a clear policy for working parents:

"After my first child was born, I used my annual leave. I took maternity leave. I used to go home at noon as my home was close to the workplace. For a while, I left work an hour early by using one hour of my annual leave each day. Unfortunately, during this period, I faced many problems and eventually was fired."

Some participants pointed out that as companies start doing business internationally, gender equality policies begin to take more precedence. However, Participant 6 expressed a different perception:

"Some companies want to promote female employees for various reasons, like they need to promote 3 women but there aren't enough at that level. In such cases, they promote another woman who is not competent. The reason is that we need to fill this number. This is not good for women. You are promoting her just because she is a woman. Then, when a woman genuinely earns her promotion, a wrong perception arises. They think she was promoted just to fill the quota."

A portion of the participants mentioned that recently, companies are becoming more aware of gender equality and are moving towards change. Participant 2 described this situation as, "The issue of gender equality is only recently entering the vocabulary of some companies in the energy sector. Therefore, they are now getting feedback. I think as more companies increase their awareness over time, more comprehensive improvements will occur."

6.4 The Number of Employees in the Turkish Energy Sector (2023 data)

There is no publicly available comprehensive data on the number of employees in the energy sector in Türkiye. In order to create a dataset for this purpose, energy companies that were considered representative of the sector were identified, and data on the number of employees were requested from these companies. Data were collected from 25 major companies operating in Türkiye including public bodies, project developers, system operators, electricity generating, electricity distribution, manufacturing and construction companies.

This data was categorized and analyzed. The relevant categories were identified as the structure of the total number of employees, the structure of the number of managers, and the structure of the number of board members. The findings obtained from the analysis are presented below.

6.4.1 Results of the Evaluation According to the Structure of the Number of Employees

To display different components of the number of employees, the data have been evaluated under the following headings: the total number of employees, the total number of male employees, the total number of female employees, the numbers of white-collar and the blue-collar employees, the number of male white-collar employees, the number of female white-collar employees, the number of male blue-collar employees, and the number of female blue-collar employees.

The total number of employees, the numbers of male and female employees, and the numbers of white-collar and blue-collar employees are shown in Figure 7.

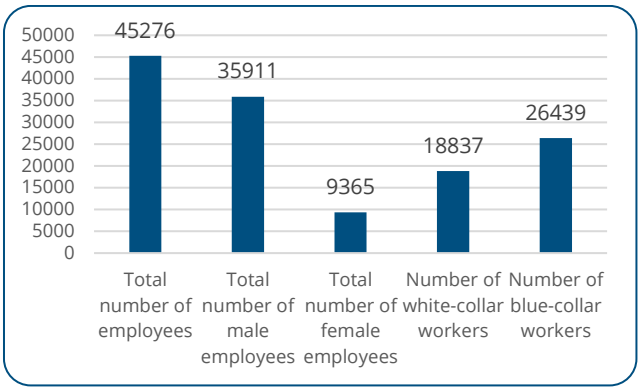

Figure 7: Data on the Number of Employees

More detailed data on blue-collar and white-collar employees are shown in Figure 8 and Figure 9.

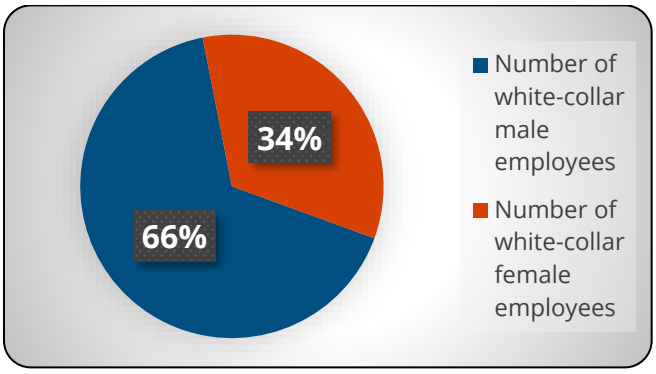

Figure 8: Number of White-Collar Employees

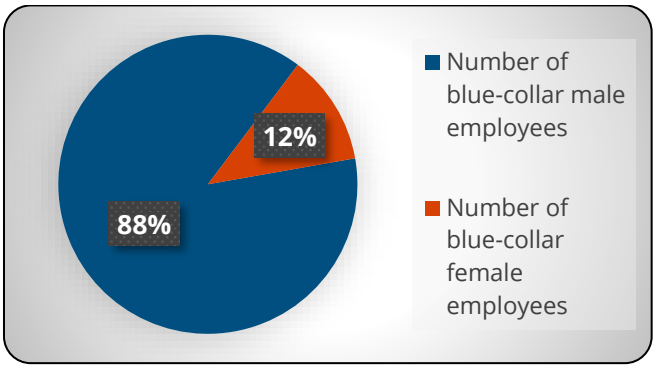

Figure 9: Number of Blue-Collar Employees

6.4.2 Results of the Evaluation According to the Number of Managers

The number of employees alone is not sufficient to evaluate the entirety. Adding the number of managers can provide a broader perspective. In this context, the total number of managers, and the number of male and female managers were determined. Additionally, taking into account the three-tiered management category (low, mid, and high-level manager) that is often used in the business world, the levels at which managers work have been identified. Figure 10shows the total number of managers, and the number of male and female managers.

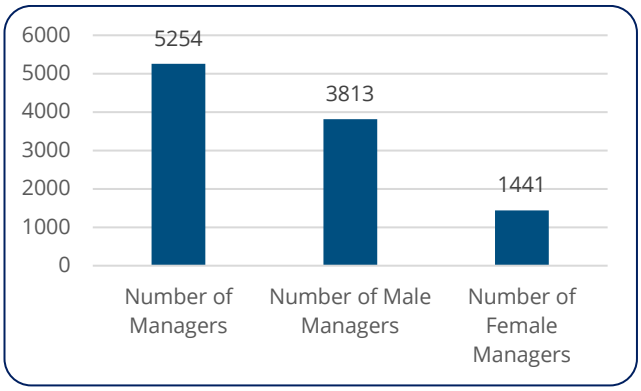

Figure 10: Number of Managers

In addition to the number of managers, making a distinction according to management levels is also important. This allows to see at which management level male and female employees are more predominantly positioned. Figure 11 shows the statistics of the management levels at which male and female managers serve.

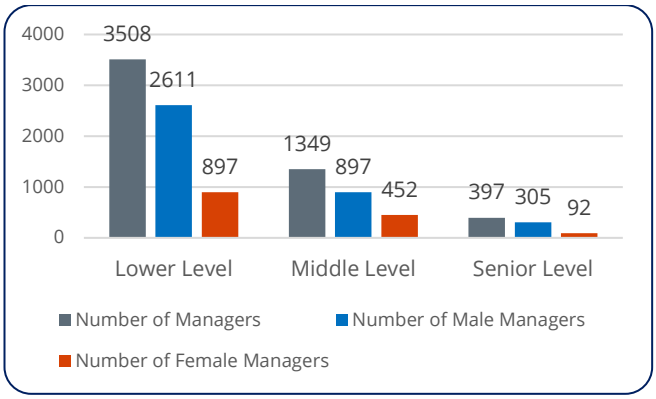

Figure 11: Number of Managers According to Management Level

6.4.3 Results of the Evaluation According to the Number of Board Members

At the macro level, according to a report published by Sabancı University (2023), the percentage of women on the boards of directors of Istanbul Stock Exchange (Borsa Istanbul) companies is approximately 19% in 2023. In addition, there are still 21 companies listed in the BIST 100 that have no women on their boards. Focussing on the energy sector, the percentage of women on the boards of directors aligns with the Istanbul Stock Exchange study.

Using the collected data from 17 companies, figure 12 and figure 13 have been created.

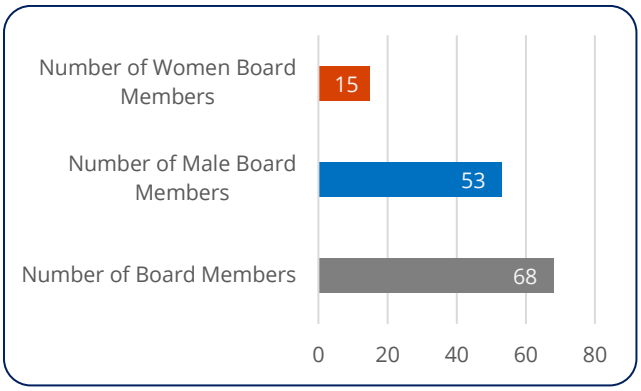

Figure 12: Distribution of Board Members

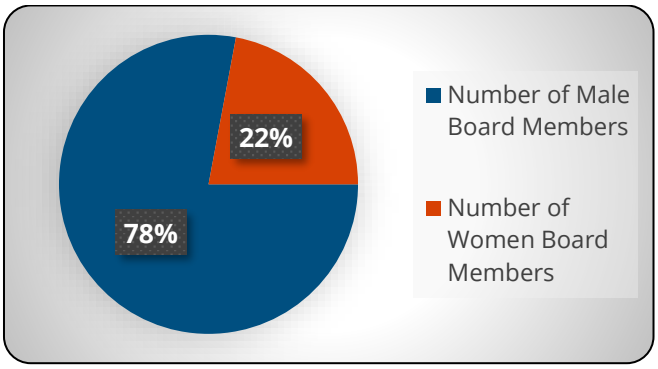

Figure 13: Proportion of Men and Women on the Board of Directors

In addition, 11 of the 18 companies analyzed (approximately 61 percent) do not have any women on their boards of directors.

7 Suggestions and Recommendations

As a result of the research study and literature review, the actions, and steps that may be taken to ensure gender equality in the energy sector have been determined. In this context, recommendations of the study are as follows:

7.1 Recommendation 1: Establishing Gender Equality Policies within the Company

Our research shows that institutions with gender equality policies create a more egalitarian perception and environment among employees. Considering these findings, it may be useful for energy sector companies to act within the framework specified below:

a. Developing Comprehensive Gender Equality Policies: It is important for companies to develop clear and detailed policies that support gender equality. These policies should take a clear stance against gender-based discrimination and commit to providing equal opportunities.

b. Training and Awareness Programs: Raising awareness and training of employees about gender equality ensures sustainability of the change. These programs should include information on measures to prevent gender discrimination and how to create an egalitarian work environment.

c. Monitoring and Rating Mechanisms: Monitoring and rating mechanisms should be established to evaluate the effectiveness of the developed policies and to ensure continuous improvement on them. This includes implementing policies as well as monitoring how egalitarian approaches are embedded in the workplace.

d. Transparency and Accountability: Adhering to the principles of transparency and accountability during the implementation of gender equality policies increases trust and transparency. Companies should regularly share their progress towards achieving gender equality goals.

e. Role Modelling and Leadership Commitment: Example setting and active role taking of senior managers and leaders for gender equality creates a positive impact throughout the organisation. Leaders should reinforce these values within the organisation by exhibiting behaviours that support egalitarian approaches.

These recommendations are designed to ensure that employees in the energy sector have more positive perceptions and experiences regarding gender equality. Establishing and implementing company policies will be a critical step in reducing the gender imbalance in the industry.

7.2 Recommendation 2: Encouraging Female Students to Enter the Sector

In order to reduce gender imbalance in the energy sector and raise future leaders, it is crucial to channel female students to the field and encourage them. In this regard, the following strategies are recommended:

a. Training Programs and Scholarships: Training programs and scholarships specific to the energy sector should be created in cooperation with schools and universities. These programs should aim to attract the attention of female students by informing them about existing career opportunities and facilitating their entry into the sector.

b. Role Model and Mentoring Initiatives: Highlighting successful female professionals as role models and organising mentoring programs will help to show possible career paths in the sector to female students and motivate them. Such initiatives give students the confidence and inspiration that they can succeed in the industry.

c. School and University Visits: Companies and professionals should conduct school and university visits to provide students with information about the energy sector and encourage them to pursue a career in this field. These visits offer students the opportunity to directly learn about the dynamics and opportunities of the sector.

d. Internship and Work Experience Opportunities: Internship and work experience programs especially for female students enable them to gain practical experience in the industry and develop their professional networks. These experiences help students make informed decisions about their choices on career by bringing them the real working environment in the industry.

e. Media and Public Opinion Studies: Spreading the success stories of women in the energy sector through media and public opinion studies reaches a wide audience and creates a perception that supports gender diversity in the sector. These stories inspire female students and increase the visibility of female role models in the industry.

These recommendations aim to increase the interest and participation of female students in the energy sector.

7.3 Recommendation 3: Raising Awareness Efforts for Gender Equality

To reach sustainable progress on gender equality, it is critical to raise widespread awareness in the energy sector. In this context, the following strategies are recommended:

a. Seminars and Workshops: Seminars and workshops organised by companies aim to increase employees' knowledge and awareness of gender equality. These activities should focus on the causes and effects of gender discrimination and ways to combat it.

b. Internal Communication Campaigns: Regularly publishing gender equality messages through internal communication channels ensures that the issue is constantly kept on the agenda. These campaigns may include information, stories and success stories related to gender equality.

c. External Relations and Partnerships: By establishing collaborations and partnerships with organisations off the sector, wider audiences can be reached on gender equality. These partnerships can raise awareness through campaigns, events, and social responsibility projects.

d. Social Media and Digital Platforms: By taking advantage of the power of social media and digital platforms, sharing content related to gender equality is possible to reach a wider audience. These platforms offer effective tools to raise awareness through interactive and visual content.

e. Measurement and Feedback: Regular feedback and evaluation processes are important to measure the impact of awareness efforts and ensure continuous improvement. This allows companies to track the effectiveness of their awareness strategies and adjust as needed.

These recommendations are designed to raise awareness of gender equality in the energy sector and create lasting, continuous development and change. Raising awareness through education, communication and interaction will contribute to reducing the gender imbalance in the sector and developing a more equitable working environment.

7.4 Recommendation 4: Expansion of Civil Society Activities:Strengthening the Role of NGOs for Gender Equality

Expanding the activities of non-governmental organisations (NGOs) is highly important to improve gender equality in the energy sector. Companies in the energy sector can expand their sphere of influence by partnering with NGOs working on gender equality and organising training programs, campaigns, and events. These partnerships aim to reach wider segments of society and create broader awareness and support for gender equality. Additionally, NGOs conducting awareness and education activities by interacting directly with local communities contributes to the spread of change from the bottom up. Research activities conducted to monitor and report on the status of gender equality in the energy sector can provide valuable information for policy makers and industry leaders, helping to make strategic decisions.

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Creating widespread awareness by NGOs through public relations and media activities can reach wider segments of society and create awareness and support on this issue. Together, these approaches will strengthen efforts to promote gender equality in the energy sector and contribute significantly to reducing the gender imbalance in the sector.

7.5 Recommendation 5: Periodic Data Collection and Evaluation: Data-Based Approach for Effective Policies

Periodic data collection and evaluation is crucial to ensure the sustainability of progress in gender equality in the energy sector and to develop effective policies on it. This process includes continuous monitoring of gender breakdown numbers, career advancement opportunities, salary gaps and other relevant metrics across the energy sector. Periodic data collection and analysis will allow companies and policymakers to objectively assess the distance covered, identify potential areas for improvement and track changes over time. Additionally, these data can be an essential tool for measuring the effectiveness of gender equality initiatives and reshaping them when necessary. Periodical and regular collection and analysis of data in the energy sector will directly contribute to making more informed decisions, determining strategic goals, and improving gender equality in the sector. In this context, it is recommended that scientific research be disseminated and sustained.

7.6 Recommendation 6: Promoting Internationalisation – Advancing Gender Equality Through Global Collaborations and Networks

To support the advancement of gender equality in the energy sector, it is of great importance to promote international collaborations and networks. This approach offers a valuable opportunity to exchange knowledge between companies and professionals in the sector, share best practices and develop joint strategies at a global level. In this context, the following approaches are recommended:

a. Developing Global Networks and Partnerships: By taking part in international platforms, companies can collaborate with other organisations already working on gender equality.

b. Sharing Best Practices: Internationally, sharing best practices that support gender equality in the sector encourages the exchange of verified knowledge and experience.

c. Joint Projects and Collaborations: Joint projects and collaborations between companies and organisations in different countries can be effective in achieving common goals on gender equality.

d. International Conferences and Seminars: International conferences, seminars and workshops provide a great opportunity to exchange ideas and create a gender equality network between industry professionals.

e. Intercultural Understanding and Awareness: International collaborations increase understanding and awareness of gender equality issues from different points of view, in various cultural codes and contexts.

8 Conclusion

Overview

This report offers an in-depth look at gender equality in the Turkish energy sector, addressing the current situation and challenges in this field. The presence of barriers to women's career journeys, reinforced by societal norms and gender stereotypes, limits the full potential of women in the energy sector.

The report includes information on renewable energy, opinions, and statistics on female employment, and outlines the legal framework. Additionally, comprehensive research has been conducted, using both quantitative and qualitative data to create a mixed-method research design.

The findings of the report present extensive insights into gender equality in the energy sector and reflect employee perceptions and experiences. The research indicates significant changes in the context of "gender equality" in the energy sector, especially in recent years, due to various reasons. However, there are still ongoing issues. These issues are detailed in the research section, and recommendations for solutions are provided in the suggestions part. The most notable of the current problems relates to company policies. The corporatisation of companies and the development of gender equality policies play an effective role in resolving existing problems or inequality situations. In this context, increasing awareness in companies and developing policies towards "gender equality" will undoubtedly bring significant benefits.

Research results and limitations

The research section in the report was designed using a mixed-method approach, incorporating both quantitative and qualitative data. Additionally, an assessment of employee data was included. Within the scope of the quantitative method, data collected through survey forms indicate that there are no radical issues regarding gender equality in the Türkiye energy sector. However, this data does not fully reflect the current situation. Despite the survey questions consisting of consistent statements, participants' awareness levels can influence their responses. Furthermore, even though necessary measures have been taken to address ethical concerns, some participants tend to provide positive responses, which is a reality. To better understand the situation, it is important to examine the data collected through the qualitative method. One-on-one interviews, where participants focus on their experiences from a broader perspective and feel safe to be more candid with encouragement from researchers, have led to different or more comprehensive results. In order to convey this to the readers within the report, quantitative data results are presented followed by a qualitative data assessment. Overall, it can be said that significant differences exist between quantitative and qualitative data. These differences indicate that some participants have a low awareness of evaluating their experiences in the workplace (within the context of gender). This situation suggests the need to increase awareness among female employees.

Limitations of the study

On the other hand, employee data is also considered a significant indicator. In Türkiye's energy sector (based on the companies examined), the percentage of female employees is approximately 21%. Among blue-collar workers, this rate is 12%, while among white-collar workers, it is 34%. The percentage of female managers is approximately 27%. Additionally, a noteworthy aspect is the number of women on the board of directors. Based on the companies examined, this rate is approximately 22%. These numbers and percentages indicate that women employees are less present and less represented in Türkiye's energy sector. However, since a temporal analysis cannot be conducted, it does not demonstrate the extent of progress. The inability to analyse changes in the number of employees and managers over the years in the Türkiye energy sector due to data accessibility issues is a significant limitation of the study. This limitation, one of the boundaries of the study, can be addressed differently in future research, using the data from this report as a basis for review.

Employment facts

The need for multidisciplinary experience for field operations and management was evident from the verbal data collected from field specialists and project managers of power plant projects. Staffing requirements for engineering and design activities for solar energy (field projects) include a project manager, a cartographer, an electrical design engineer, an occupational health and safety specialist, and a civil engineer for complex sites. On the other hand, the human power required to install and commission a solar power plant is estimated at 250 people per megawatt (MW). During the operation and maintenance period, a much smaller and more focused team of one mechanical expert, two electrical engineers and specialists in safety protocols and operational monitoring is sufficient.

In the case of onshore wind farms, experience has shown that at least 30 people are required to install and commission each wind turbine. This requirement underlines the significant labour requirements associated with the construction and commissioning of wind energy infrastructure and further highlights the

importance of labour considerations in the broader discourse on energy investment and transitions.

It is also known that offshore wind turbines require 10 times more labour than onshore turbines for installation and operation.

Looking at the production ecosystem of the wind industry mostly located in Western Türkiye, the employment figures reported by the Turkish Wind Energy Association are around 25,000 people.

Similarly, the Solar Energy Industrialists Association of Turkey lists 78 (non-integrated) factories, most of which are involved in the production of panels. However, it should be noted that the average workforce required to operate a production line from cell to module in one shift is 60 people, including planning, production, quality and process work.

New employment opportunities and outlook

According to estimates provided by the European Commission, the investment of every 1 billion Euros in green hydrogen initiatives corresponds to the creation of approximately 20,000 jobs spanning the entirety of the supply chain. This projection underscores the substantial employment opportunities inherent in the development and proliferation of green hydrogen technologies, thereby highlighting their potential as a catalyst for economic growth and workforce expansion within the renewable energy sector.

Indeed, given Türkiye's ambitious energy targets for 2035 and commitment to achieve net-zero emissions by 2053, the trajectory of higher education and research must evolve to address emerging challenges and opportunities. The landscape of engineering and social science specialisations is set to change significantly, requiring a proactive approach to anticipate and cultivate expertise in emerging fields. Artificial Intelligence (AI) is a central field that is poised to revolutionise various sectors, including energy, through improved efficiency, optimisation, predictive analytics, and cyber security. Integrating AI into energy systems can facilitate smarter decision-making, improve resource allocation, and enhance network management, thereby accelerating progress towards sustainability goals.

In addition, the diffusion of low-carbon systems and materials will be instrumental in decarbonising Türkiye's economy and mitigating the effects of climate change. Research and development efforts focused on advancing renewable energy technologies, energy storage solutions and sustainable infrastructure will be critical to achieving long-term energy goals while reducing carbon footprints. Anticipating these future needs underlines the importance of fostering interdisciplinary collaboration and investing in cutting-edge research and innovation. By nurturing talent and expertise in evolving fields, Türkiye can position itself as a leader in the global transition to a sustainable, low-carbon future, while unlocking economic opportunities and enhancing societal well-being.

In conclusion, this report highlights that achieving gender equality in the energy sector can be viewed from multiple dimensions, emphasising that the culture of society and companies are vital components. It states that taking steps towards gender equality in the energy sector will not only improve the welfare of women but also enhance the well-being of the entire society and contribute to a sustainable future. In the multidisciplinary and multifaceted energy transition, it is important that all competent people have a career, and that women and men have equal opportunities to do so.

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List of Abbreviations

AGCCI: Africa Girls Can Code It Initiative

BETAM: Bahcesehir University Center for Economic and Social Research

Bloomberg GEI: Bloomberg Gender-Equality Index

BUYEM: Bogazici University Lifelong Learning Center

CEO: Chief Executive Officer

DOLS: Dynamic Ordinary Least Square

EBRD: European Bank for Reconstruction and Development

ESG: Environmental, Social, and Governance

EU: European Union

FEM: Equal Opportunities Model

FMOLS: Fully Modified Ordinary Least Square

GDP: Gross Domestic Product

GW: Gigawatt

IEA: International Energy Agency

ILO: International Labour Organization

IPOs: The Initial Public Offerings

IRENA: International Renewable Energy Agency

IT: Information Technology

KAGIDER: Turkish Women Entrepreneurs Association

MEA: Middle East and Africa

NREL: National Renewable Energy Laboratory

OECD: Organization for Economic Cooperation and Development

SDGs: Sustainable Development Goals

STEM: Science, Technology, Engineering and Mathematics

SWIS: Schneider Women in Sales

TEİAŞ: Turkish Electricity Transmission Corporation

UN: United Nations

UNIDO: United Nations Industrial Development Organization

US: United States

WIL: Women in Leadership

WTECH: Technology Women's Association

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