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Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa

Final Report

SAPVIA
South African Photovoltaic Industry Association

SAWEA

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Acronyms

CESM	Classification of Educational Subject Matter
DBE	Department of Basic Education (National)
DMRE	Department of Mineral Resources and Energy (National)
DOE	Department of Energy (merged with the Department of Mineral Resources in 2019 to form the DMRE)
GDWG	The SAWEA/SAPVIA Gender Diversity Working Group
GWNET	Global Women's Network for the Energy Transition
HEMIS	Higher Education Management Information System
IBE-UNESCO	International Bureau of Education
IFC	International Finance Corporation
ILO	International Labour Organisation
IPP	Independent Power Producers
IPPPP	Independent Power Producers Procurement Programme
IPP Office	Independent Power Producers Office (established by the DMRE, the South African National Treasury and the Development Bank of Southern Africa)
IRENA	International Renewable Energy Agency
IRP 2019	Integrated Resource Plan 2019
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAPVIA	South African Photovoltaic Industry Association
SAWEA	South African Wind Energy Association
SDG	Sustainable Development Goal
STEM	Science, Technology, Engineering, and Mathematics
TCFD	Task Force on Climate-related Financial Disclosures
UNIDO	United Nations Industrial Development Organization
WEGE	Women Empowerment and Gender Equality

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Executive Summary

The German-South African Energy Partnership in association with the South African Department of Mineral Resources and Energy (DMRE) supported the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study of the **utility-scale solar and wind energy sectors in South Africa**. The three objectives of the study are shown in Figure 7.

Figure 1: The objectives of the study

To complete this gender diversity study, several research reports were compiled. Each report dealt with a different area of research, and the broad purpose of each report is provided in Figure 8. The individual research reports have been included as annexures to this final consolidated report.

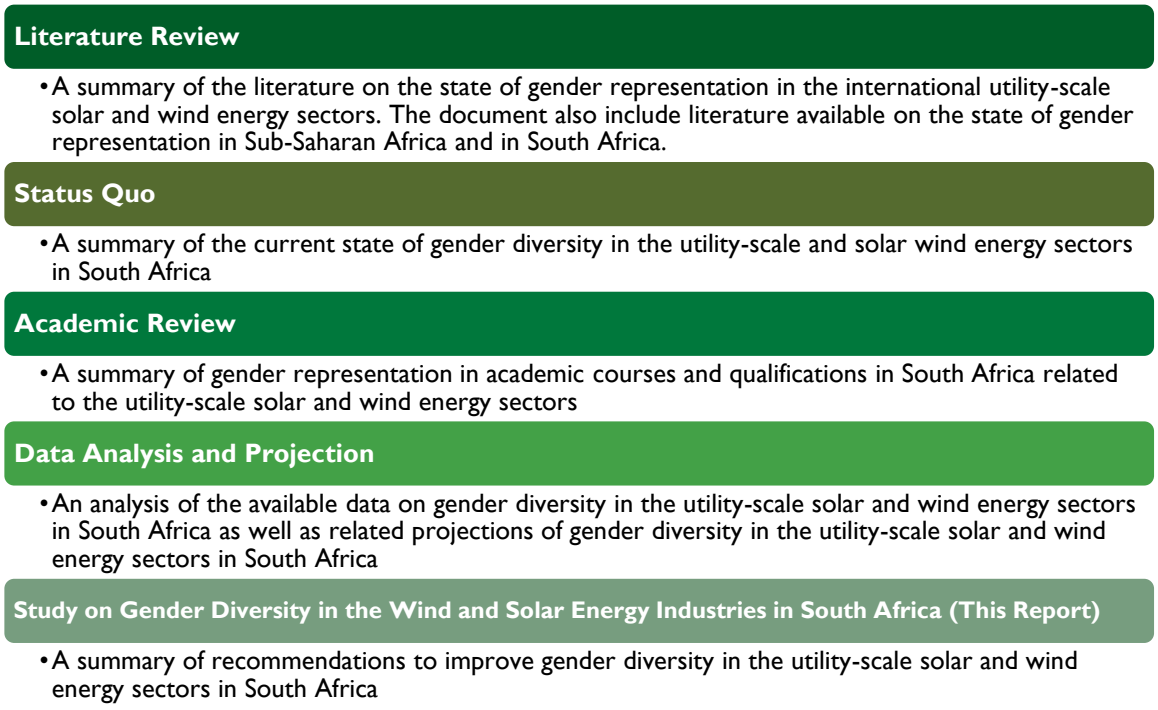


Figure 2: Reports in the Gender Diversity Study

Women's Participation in the Wind and Solar Energy Sector

An estimated 32% of global oil and gas, renewables, and wind power jobs are occupied by women.[1] In the wind sector in particular, women represent 21% of the global workforce.[2] Of these jobs that women occupy, most are lower-level, non-technical and non-decision-making roles. Similar to global statistics, research into women's participation in the renewable energy sector in Sub-Saharan Africa found that, on average, women account for 32% of the full-time employees in the renewable energy sector.[3] However, these positions are mostly concentrated in corporate support functions rather than the core business functions, which are important for feeding the leadership pipeline.[4] Similar to global and African statistics, women account for 33.2% of the workforce in the energy sector, including the electricity, gas, steam and air conditioning supply sector in South Africa (Figure 3).[5]

32%

Women's share in the oil and gas, renewables, and wind power workforce globally

21%

Women's share in the wind power workforce globally

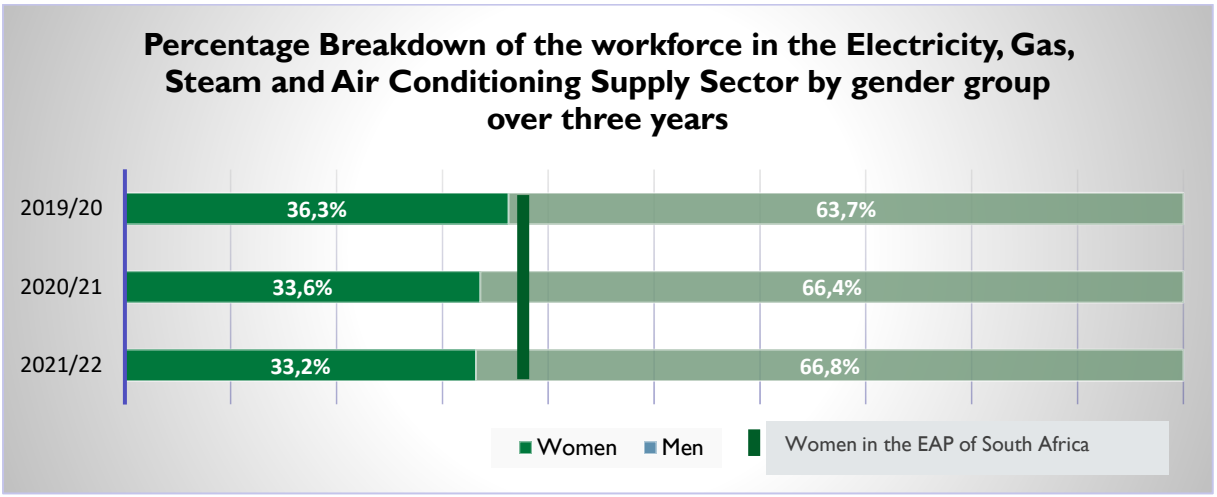


Figure 3: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector in South Africa by gender over three years.[6]

As part of this study, a survey on gender diversity in the workplace in the utility-scale wind and solar energy sectors in South Africa was sent to the members of SAWEA and SAPVIA. In total, survey responses were received from 25 entities registered with SAWEA and/or SAPVIA. A breakdown of the total workforce of the entities by gender shows that women accounted for 33% of the workforce, while men made up the majority with 67% (Figure 4). These results are consistent with the aforementioned global statistics.

[1] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[2] IRENA and ILO.
[3] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[4] IFC.
[5] DEL, "21st Commission for Employment Equity Annual Report 2020-21."
[6] DEL.

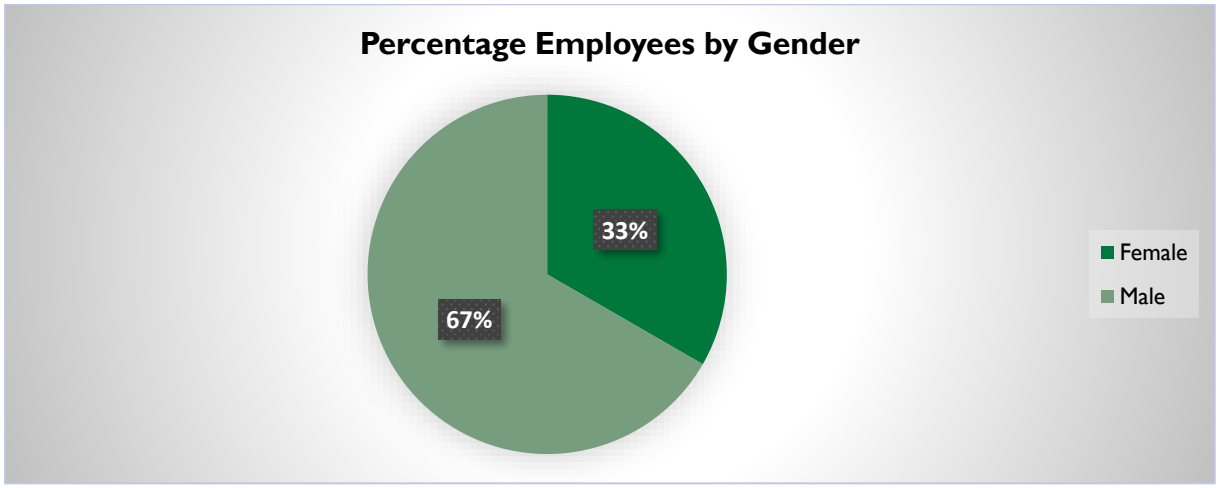


Figure 4: Percentage breakdown of employees, by gender of surveyed companies

A breakdown of the total workforce of the entities that completed the survey by gender and occupational level shows that, apart from an increase in the percentage of women employed in the highest level (top management positions), there is an overall trend that indicates that the number of positions occupied by women declines as the occupational level increases in seniority (Figure 5). Further data collected from the Companies and Intellectual Property Commission (CIPC) on SAPVIA- and SAWEA-member companies revealed that 19% of directors were women while 80% were men. For 1% of directors, their likely gender could not be assumed. The survey results and director's data from the CIPC indicate that a lack of career progression for women to senior positions could be prevalent across many organisations in the utility-scale wind and solar energy sectors in South Africa.

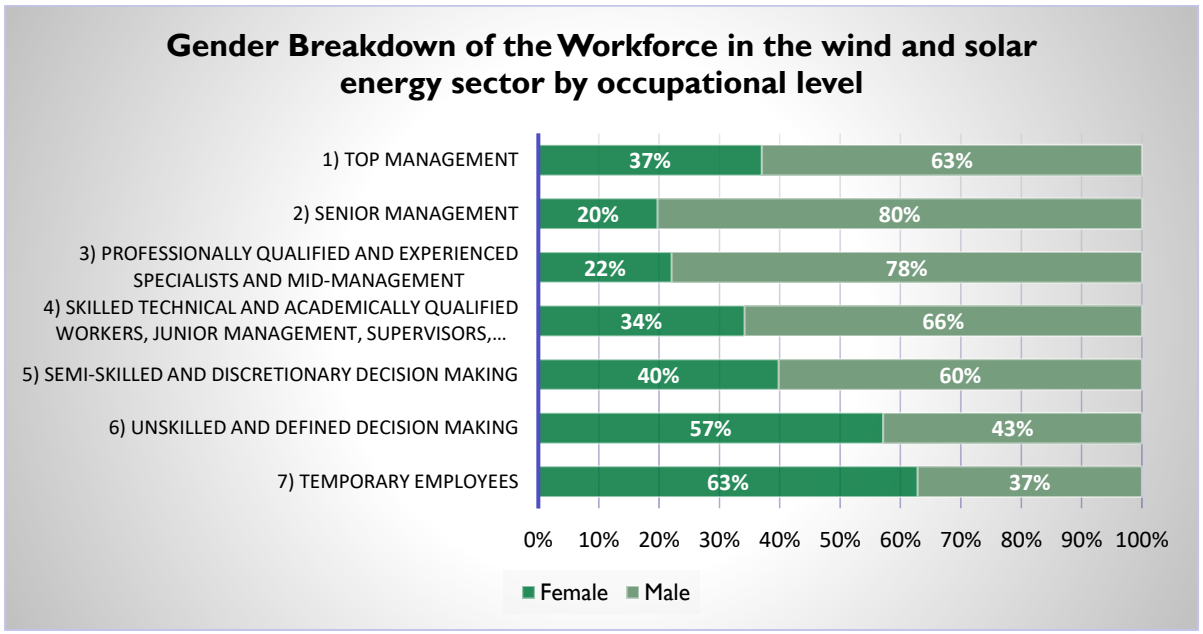


Figure 5: Percentage of employees, by gender and by different occupational levels of surveyed companies.

Academic Review

Findings from undertaking an academic review indicate that the wind and solar energy sectors do not show a preference for specific courses or degrees when recruiting, and job opportunities are varied across business areas. Moreover, there are limited solar and wind-specific qualifications on offer, and it is often generic qualifications, such as engineering, that are required for employment. A comparison of graduation numbers by gender using the Department of Higher Education and Training's Classification of Educational Subject Matter (CESM) categories summed for 2020 shows that, although there is a higher number of women graduating for most CESM categories, men tend to dominate in computer science and information science, mathematics and statistics, and engineering. This implies that fewer women are entering the market with STEM-related qualifications.

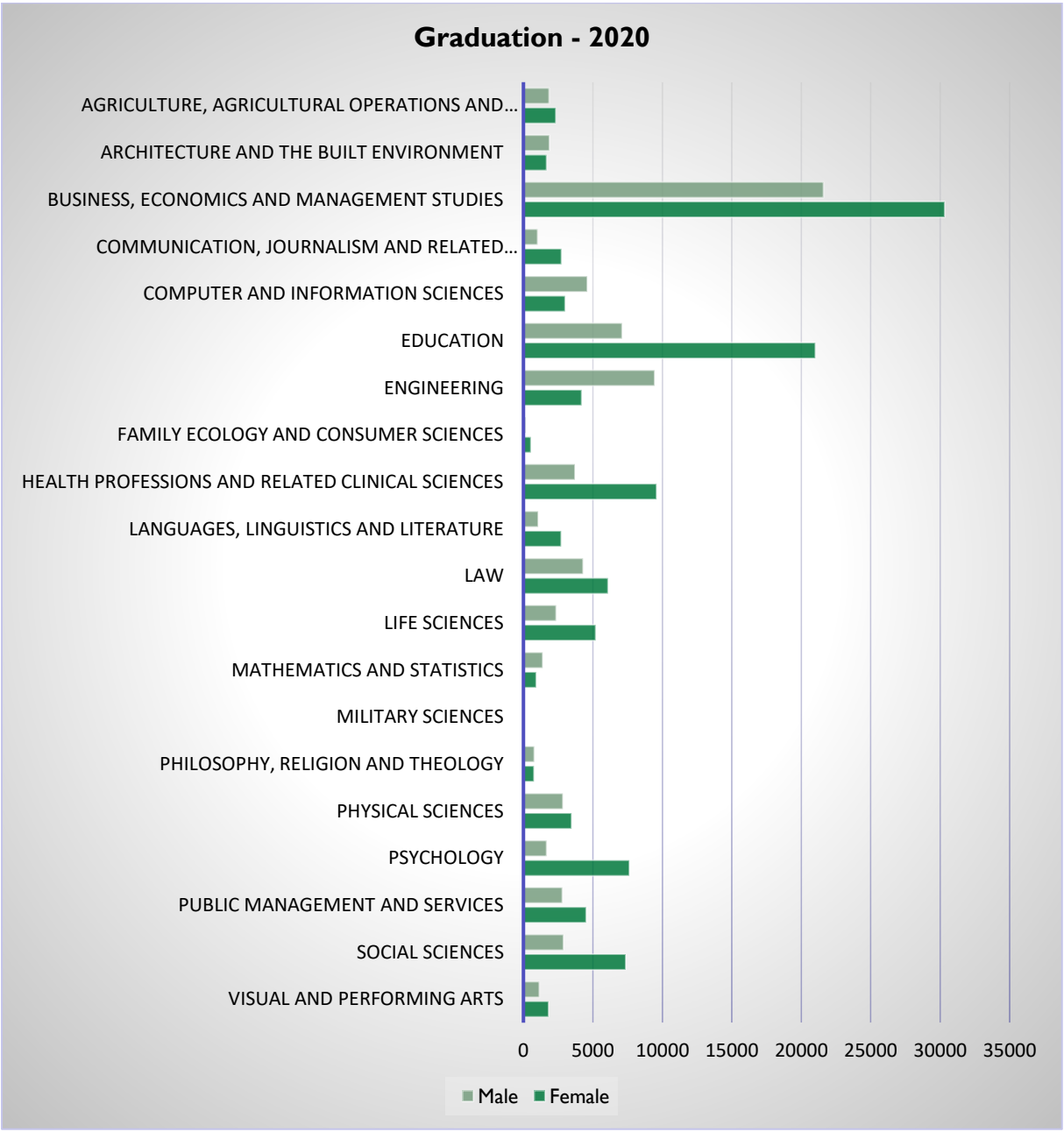


Figure 6: Graduation for all institutions in 2020 for 3-year, 4-year and post-graduate qualifications

Barriers

Current barriers to equitable gender representation in the utility-scale wind and solar energy sectors in South Africa can be split into barriers that apply to entry into the sector and barriers to career progression and retention within the sector. The identified barriers are based on input received from a series of semi-structured interviews with individuals as well as three focus group sessions.

Barriers to entry

Key barriers to entry that have been identified include:

Social norms and gender stereotypes discourage girls and young women from studying STEM-related subjects

Woman and non-binary people experience barriers accessing funds

Young people lack information about the wind and solar sectors as a career option

Recruitment and hiring practices are biased towards men

- ⚥ **Social norms and gender stereotypes discourage girls and young women from studying STEM-related subjects:** Participants highlighted that the crisis in basic education, which frequently included very poor standards of education in the STEM subjects, limited girls (particularly from public schools) from graduating with sufficient grades to enter STEM-related course at the tertiary level. Furthermore, gendered assumptions around women's roles and appropriate careers were reinforced during secondary education, often discouraging girls from studying STEM subjects during this phase, resulting in fewer women studying STEM disciplines at the tertiary level.

- ⚥ **Woman and non-binary people experience barriers accessing funds:** Participants noted that woman and non-binary people experience significant barriers accessing business opportunities for renewable energy development, including start-up funds, loans, and investors.

- ⚥ **Young people lack information about the wind and solar sectors as a career option:** Young people did not know about the wind and solar sector as a future career option and, therefore, did not consider choosing subjects or disciplines which would equip them to enter it. This was particularly relevant in the more technical roles of the sector, where STEM-related subjects are critical. It was noted that many universities still do not offer specific courses related to the wind and solar sectors.

- ⚥ **Recruitment and hiring practices are biased towards men:** Many participants mentioned that positions in the solar and wind sector often require many years of experience, which recent graduates and women wanting to shift from other careers may not have, especially for the technical positions. Also, it has been found that men are more likely to apply for jobs with experience and skill requirements beyond their current resume.

Barriers to career progression and retention

Key barriers in career progression and retention include:

- **Lack of policies that support women and non-binary people's particular needs:** There appears to be a dearth of policies at both company and sector level to meaningfully address the low participation of woman and non-binary people in the solar and wind sector. While there are a few policies to support women in the sector, support for non-binary people appears to be completely absent. Most initiatives that were mentioned, such as mentoring and supporting women to balance family responsibilities, were informal. Participants indicated that where policies to support women's multiple roles did exist, they were sometimes hesitant to make use of these for fear of being perceived as "not delivering equal to their male colleagues".

- **Limited gender targets for Independent Power Producers (IPPs) in South Africa:** In most organisations in the utility-scale wind and solar energy sectors, gender employment targets and considerations are implied but they are not explicitly stated in company policies. There are some commitments being made to gender targets when there is preferential procurement with the focus on sub-contracting to empowered enterprises, black-owned enterprises, and women-owned enterprises.[7]

- **Social norms and gender stereotypes continue to discourage women and non-binary people from the sector:** Despite the wind and solar sector being a new industry, gendered norms continue to play a role in creating perceptions that this is not an appropriate sector for women, and it remains a male-dominated industry, particularly in the technical and senior management spaces. Women also mentioned that men's opinions had "natural hierarchy" because of social norms about who was "naturally best for the job". A few women also mentioned that there is a "boys club" in the wind and solar energy sectors that precludes women and non-binary people on many levels.

- **Women still experience explicit sexism:** Numerous examples of explicit sexism were mentioned by interviewees and focus group participants, relating to verbal sexual harassment, unequal treatment and belittlement, and sexism related to motherhood. In some cases, this sexism was reinforced by gendered norms about what women should and should not do.

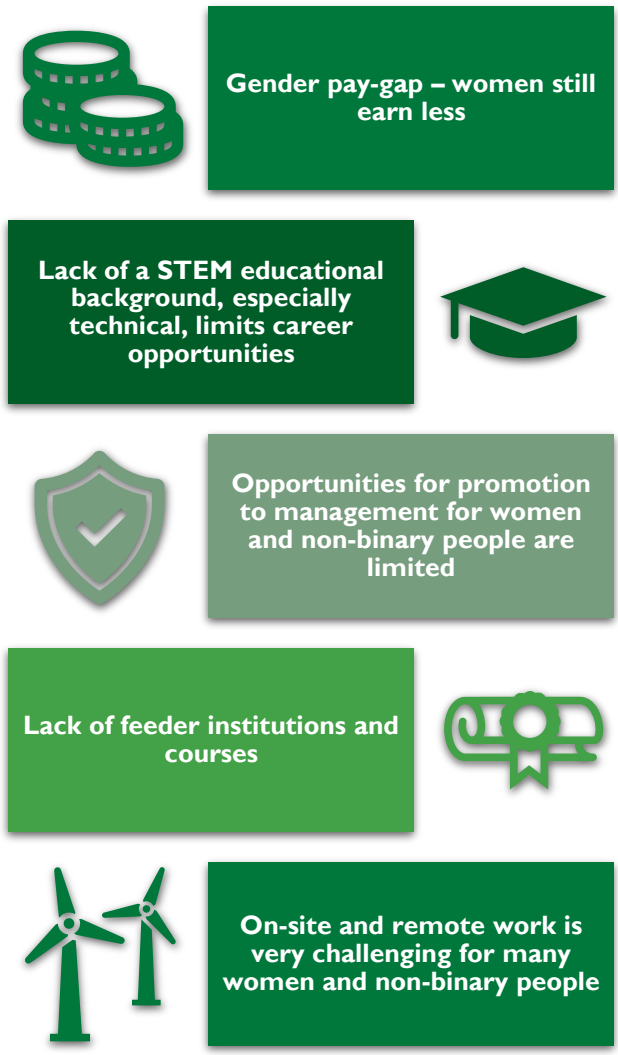
[7] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."

- **Lack of, and poor support for, family-friendly policies:** All participants mentioned the additional responsibilities that many women assume, either as primary parent and/or primary carer and homemaker and noted that these roles were not assumed by most men. Participants stated that these responsibilities place additional pressures on women, often creating barriers to career progression. Many examples were cited of unsupportive environments and even direct discrimination from men and some women, based on motherhood. Other women spoke about choices they must make to accommodate their parenting responsibilities at the expense of promotion or being able to take on-site positions. Pregnancy was also mentioned as another barrier to career advancement for women in the sector, especially for women who are involved in fieldwork. Women and non-binary people face significantly more challenges with site-based positions than when working in office-based positions.

- **Lack of health, safety and wellbeing awareness in workplaces:** Very few respondents based in offices in main centres indicated having experienced issues with a lack of health, safety and wellbeing. However, this was very different for women and non-binary people with site-based positions, who mentioned many safety challenges. Site work can involve night shifts with additional safety concerns for women. There is also a concern among women whose work was predominantly site-based that women are made to feel unwelcome. Respondents also noted the prevalence of micro aggressions in their workplaces, particularly with on-site work.

- **Lack of mentorship and role models for women and non-binary people:** There are very few formal, funded mentoring programmes for women and non-binary people run by the companies in the wind and solar sectors in South Africa. Furthermore, an interviewee highlighted that where support is given to women's career advancement in the sector, it is often reserved for women in departments such as finance, human resources, and legal and absent for those women in technical, engineering and construction roles. Many respondents stated that they had utilised WEConnect and felt it offered a critically important opportunity to support women in the sector. However, it is not funded by the sector. A number of participants mentioned that they had made a point of identifying a mentor for themselves.

- **Gender pay gap – women still earn less:** Despite this being a new sector, pay inequities between women and men continue. Participants mentioned that one is often not aware of what colleagues earn, which enables pay gaps to continue uncontested. Furthermore, some women mentioned that the sector often makes women feel they should be "grateful" for being "allowed" into the sector, which discourages women from challenging these inequities.
- **Lack of a STEM educational background, especially technical, limits career opportunities:** While a few women in the sector do have a STEM background, there are many women without a STEM background who have entered the renewable energy industry. However, even in cases where women have STEM backgrounds, many mentioned that not having the technical skills, particularly engineering, is a significant barrier.
- **Opportunities for promotion to management for women and non-binary people are limited:** A lack of promotion opportunities for women and non-binary people is not only due to a lack of women candidates, but also related to the slow uptake of women in the sector during the recruitment process. Also, as the sectors have become more established in recent years, entry into the utility-scale wind and solar sectors in South Africa has become more difficult as skill requirements have increased. Participants also expressed that in instances where the retention and career advancement of women is supported, this support is mostly reserved for women in departments such as finance, HR, or administration, with little support for women in technical, engineering and construction roles. There is also the reality of a "boys club" in the wind and solar energy sectors that precludes women and non-binary people on many levels.
- **Lack of feeder institutions and courses:** There are no specific feeder institutions or courses for entry into the renewable energy industry. This makes it more challenging when trying to target, and then support, women and non-binary people to enter the sector.
- **On-site and remote work is very challenging for many women and non-binary people:** To date, women only represent 10% of the construction workforce out of the total job opportunities created during the construction phase of IPPs.[8] Several interviewees stated that on-site work, which offers less stability and more frequent travel, is often incredibly difficult for women with family responsibilities. In addition, there are the safety concerns mentioned above.



[8] Independent Power Producers Procurement Programme (IPPPP).

Recommendations to improve gender diversity in the utility-scale solar and wind energy sectors in South Africa

This section provides a comprehensive set of recommendations for the utility-scale solar and wind energy sectors that are relevant to both the private sector (i.e., SAPVIA SAWEA and companies) and government. The recommendations have been sorted into specific areas that need attention and, in many cases, these speak directly to the barriers noted above. This section also provides recommendations aimed at the secondary and tertiary education institutions to ensure an increase in women and non-binary people graduating with STEM-related degrees, particularly in engineering, which continues to be a substantial barrier.

Each recommendation is informed by in-depth interviews and focus group discussions with key stakeholders in the sector, as well as important points gathered during the *Literature Review*. The report strongly suggests that the sectors review these recommendations, identify where to make the greatest impact, and focus initiatives there.

Addressing barriers to entry

The following section provides a summary of the recommendations to address barriers to entry faced by women and non-binary people. The details of each recommendation are presented in Chapter 3 of the report.

Address the social norms and gender stereotypes that discourage girls and young women from studying STEM-related subjects, especially engineering

- Continue to include women and non-binary people in branding and publicity materials
- Identify and increase the visibility of women and non-binary role models in the wind and solar energy sectors
- Engage the Department of Basic Education to actively challenge all depictions of the wind and solar energy sectors as "male only workspaces", and support a narrative that this is a career option for everyone

Ensure that women and non-binary people have equal access to funds and resources

- Increase the number of networking opportunities in the wind ans solar energy sectors specifically for women and non-binary people
- Partner with key financing institutions to develop and implement diversity training and values clarification
- Partner with key financing institutions to revise evaluation criteria to be more inclusive of women and non-binary people.
- Partner with key financing institutions to develop funding programmes specifically for women and non-binary company owners

Increase awareness, at secondary and tertiary level, of the utility-scale solar and wind energy sectors as a feasible career option for all genders

- Develop a scholarship fund focused on engineering students aimed at women and non-binary students
- Partner with development organisations to strengthen the case for renewable energy as a "career of choice" by providing information on renewable energy job opportunities at career days and other appropriate publicity opportunities
- Implement a policy to ensure that a quota of undergraduate student interns are women and non-binary people
- Engage the Department of Higher Education to include a specific CESM category for renewable energy
- Develop materials that can be used by career counselling services at secondary and tertiary level on the role of women and non-binary people in the wind and solar energy sectors and highlight the importance of role models
- Continue to support the Department of Higher Education to adopt gender-responsive STEM education
- Continue to support the Department of Basic Education to introduce the concept of renewable energy at secondary school
- Expand the number local schools that have relationships with wind and solar companies with the aim of improving the quality of STEM-subject teaching

Diversify the recruitment process

- Improve the tracking and analysis of the gender split of employees and directors
- Review the language in draft job adverts to ensure that the language used encourages a gender diverse response
- Expand the benefits and accommodations in job advertisements so that they are attractive to people with family responsibilities
- Adjust job descriptions and adverts to target non-STEM-related graduates
- Establish transparent salary information and salary policies
- Continue to develop and distribute a gender diversity recruitment resources pack
- Implement recommendations from the gender diversity recruitment resources pack
- Develop a gender diversity recruitment training course
- Implement gender diversity recruitment training
- Establish organisations brands as inclusive, representative employers

Ensuring the progression and retention of women and non-binary people

The following section provides a summary of the recommendations to ensure the progression and retention of women and non-binary people. The details of each recommendation are presented in Chapter 3 of the report.

Ensure more women and non-binary people enter senior leadership through establishing and promoting targeted career development and coaching programmes

- Continue to develop and implement a leadership training and coaching programme specifically for women and non-binary people
- Showcase and celebrate success of female and non-binary talent
- Increase the number of networking and knowledge-sharing events that encourage women and non-binary people to advance in the wind and solar energy sector
- Develop and distribute a gender-diversity promotion resources pack
- Implement recommendations from the gender-diversity promotion resources pack
- Identify and remove the systemic barriers to the promotion of women and non-binary people

Establish and support mentorship and networking programmes to enable women and non-binary people to develop greater social capital in the sector

- Continue to formalise and increase resources for mentorship programmes in the workplace
- Set aside dedicated financial and other resources to support women and non-binary people's networking

Improve working conditions which hinder women and non-binary people from working on on-site locations

- Identify and address health and safety concerns associated with site-based work
- Set up systems to address bullying, sexism and sexual harassment against women and non-binary people which is usually more intense at site-based work locations
- Provide gender neutral recreational activities on site that are acceptable to all employees
- Provide additional incentives for women and non-binary people doing site-based work
- Establish sector-wide, and/or company, dialogues on gender diversity at site-based work
- Set up systems that allows site-base workers to be with their families

Amend company policies that do not support women and non-binary people's specific needs

- Review company policies with gender mainstreaming in mind
- Amend company policies that do not support women and non-binary people's specific needs

Workplaces must actively address social norms and gender stereotypes that continue to discourage women and non-binary people from remaining in the sector

- Develop gender diversity and values clarification training
- Implement diversity and values clarification training
- Identify a pool of trainers who can run implementation training sessions and support staff to realise the guidelines for branding, publicity and community engagement
- Utilise the annual wind and solar sector conferences to highlight the status quo around gender diversity, discuss recommendations for change and to run sessions on gender diversify and values clarifications

Amend company policies and shift workplace cultures, to ensure they become family-friendly[5]

- Encourage informal practices between team members that support staff with additional personal responsibilities
- Amend company policies and workplace cultures to allow staff to work remotely and flexibly when required
- Amend company policies and workplace cultures to provide parental transitional support
- Provide financial support for additional childcare expenses when travelling for work
- Review and amend company policies to allow parental leave for all staff

Eradicate sexism, implicit and explicit, from the workplace

- Address sexist attitudes in the workplace through the implementation of gender diversity and values clarification training
- Ensure there are safe spaces in the workplace
- Develop, implement, and monitor an anti-harassment policy

Establish, and monitor, gender diversity targets at all levels: industry targets, IPPs and companies

- Engage the Department of Employment and Labour to include a renewable energy in the Commission for Employment Equity Annual Report
- Establish, monitor, and evaluate gender diversity targets for the utility-scale solar and wind energy sectors
- Encourage companies to set gender diversity targets
- Continue to assess sector wide targets against global developments

Chapter 1: Introduction

The German-South African Energy Partnership in association with the Department of Mineral Resources and Energy (DMRE) supported the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study of the **utility-scale solar and wind energy sectors in South Africa**. The three objectives of the study are show in Figure 7 below.

Figure 7: The objectives of the study

To complete this gender diversity study, several research reports were compiled. Each report dealt with a different area of research and the broad purpose of each report is provided in Figure 8. The individual research reports have been included as annexures to this final consolidated report.

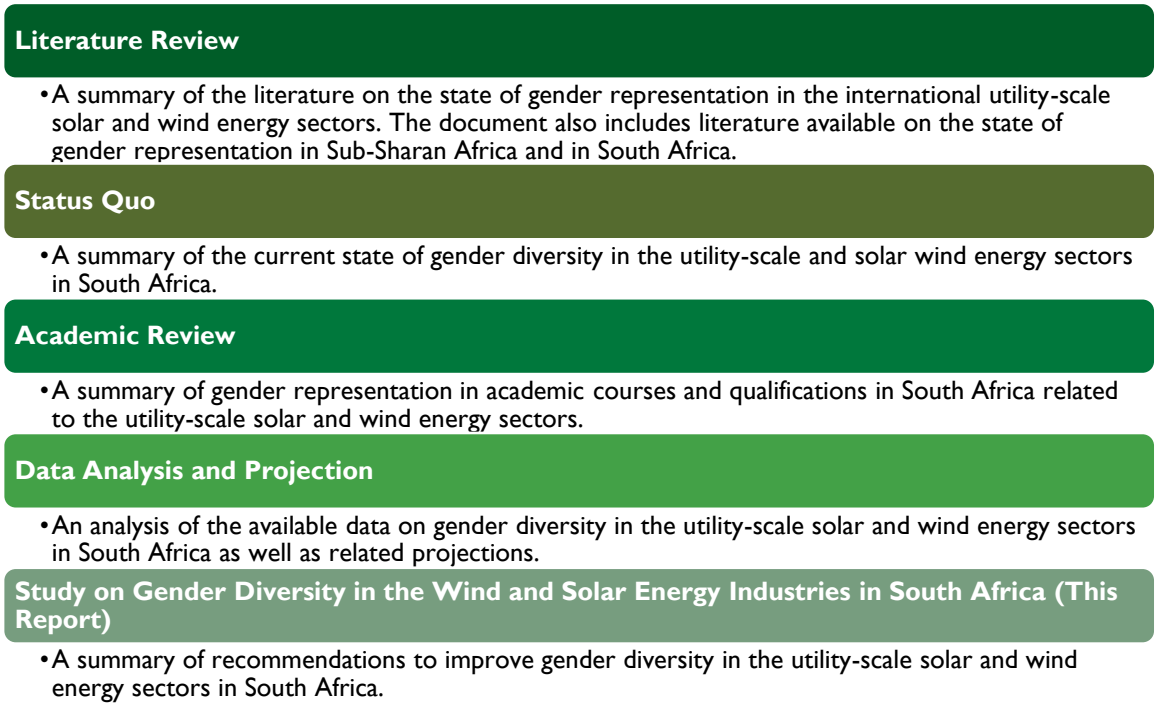


Figure 8: Reports in the Gender Diversity Study

The structure of this report is summarised in Figure 9 below.

Chapter 1: Introduction

Chapter 2: Summary of previous reports

- Overview of gender diveristy in the international and South African wind and solar energy sectors
- Summaries of the previous reports in this study

Chapter 3: Recommendations

- Recommendations for improving gender diversity in the utility-scale wind and solar energy sectors in South Africa, divided into those that:
  - address current barriers to entry faced by women and non-binary people
  - ensure the progression and retention of women and non-binary people

Chapter 4: Conclusion

Annexes

- Literature Review (Annex 1)
- Status Quo (Annex 2)
- Academic Review (Annex 3)
- Data Analysis and Projection (Annex 4)

Figure 9: Chapters summarising the elements of the final research Report

Chapter 2: Summary of previous reports in this study

As noted above, this study on Gender Diversity in the Wind and Solar Industries in South Africa has three key objectives. These are to: audit the status of gender representation in the industries, develop future gender diversity projections, and develop a set of recommendations to achieve a more balanced gender representation in the future.

To achieve these objectives several research reports were compiled. These reports include a literature review of the international, regional and local context; a report on the current status quo of the industry in South Africa; a report of the status of academic institutions playing the role of feeder into the industry; and lastly, a report on possible future projections of gender diversity in the sector. This chapter provides a summary of the key highlights and findings from these different reports. The full reports are also provided in the annexes of this consolidated report.

Literature Review Report

A *Literature Review* of the state of gender diversity in the international utility-scale solar and wind energy sectors highlighted the lack of literature and reporting on gender diversity. Moreover, as this report highlights, the definition of gender diversity adopted in the literature review typically refers only to cis-women and cis-men. "Gender diversity" and "gender representation" is therefore used to refer to only cis-women and cis-men in most of the reports included in the literature review. However, gender diversity should include gender non-conforming people, non-binary people, and trans women and men.

32%

Women's share in the oil and gas, renewables, and wind power workforce globally

21%

Women's share in the wind power workforce globally

An estimated 32% of global oil and gas, renewables, and wind power jobs are occupied by women.[9] In the wind sector specifically, women represent 21% of the global workforce.[10] Of these jobs that women occupy, it was also shown that these are lower level, non-technical and non-decision-making roles. Similar to global statistics, research into women's participation in the renewable energy sector in Sub-Saharan Africa found that on average women make up 32% of the full-time employees in the renewable energy sector. However, these positions are mostly concentrated in corporate support functions rather than the core business functions which are important for feeding the leadership pipeline.[11] Further an examination of women's participation in energy industries in selected countries where data were available showed a more variable picture with women's share of the workforce ranging from as low as 1% up to 31%.

[9] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[10] IRENA and ILO.
[11] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."

Similarly, to global and African statistics women make up 33.2% of the workforce in this sector in South Africa and the percentage of women in the workforce in the sector, decreased from 36.3% in 2019/20 to 33.6% in 2020/21.[12]

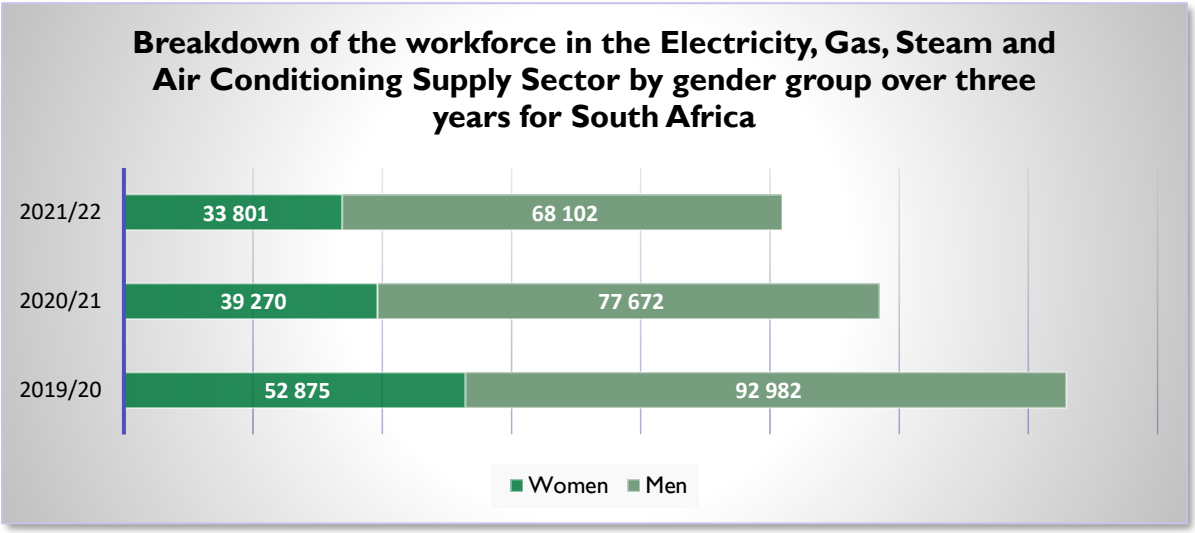


Figure 10: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years for South Africa

This report also identified key barriers to both entry and progression and retention of women in the sectors. These barriers include the perception of gender in relation to energy-related courses and employment, and lack of mentorship and role models.[13] The *Literature Review* also outlined recommendations from literature, which have also informed this report.

The full literature review report is provided below in **Error! Reference source not found.**.

Status Quo Report

The *Status Quo Report* draws from existing literature and company data (where available), a survey of gender diversity in the workplace, and interviews and focus group discussions that were conducted with people active in the two sectors. It also highlights relevant organisations that may influence gender diversity in the utility-scale solar and wind energy sectors, most notably the recently established SAWEA/SAPVIA Gender Diversity Working Group, which aims to address gender diversity challenges in South Africa.

International context

From the global to the national level, policymakers and the private sector are showing increasing commitment to ensuring gender diversity within the Renewable Energy sector, thus, creating an enabling environment within which the utility-scale solar and wind energy sectors can address the barriers around women and non-binary people's participation in the sector.

[12] DEL, "21st Commission for Employment Equity Annual Report 2020-21."
[13] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."

In 2020, the United Nations Women and the Global Impact Office developed a set of Empowerment Principles as a call to action on Establishing Gender Equality in the Renewable Energy Industry.[14] These principles aim to realise the meaningful inclusion of women in the renewable energy sector and incorporate their unique perspectives and necessary skills into the industry. These principles serve as an important tool for the utility-scale solar and wind energy sectors to ensure gender diversity.

Prior to these principles, the United Nations' Sustainable Development Goals (SDGs) developed a global commitment that provides leverage to hold key stakeholders to account around, amongst other things, gender equality and gender diversity and representation in the renewable energy sector through SDG 5 and SDG 7. SDG 5 aims to "achieve gender equality and empower all women and girls" by 2030, whereas SDG 7 seeks to "ensure access to affordable, reliable, sustainable and modern energy for all". Achievement of either of these targets is inter-linked and, as noted in the report, *Accelerating SDG 7 Achievement: Policy Brief 12: Global Progress of SDG 7 – Energy and Gender*, SDG 7 is "more likely to be achieved if the gender-energy-poverty nexus is recognised and integrated into development policies and planning".[15] "At the same time, women's participation (in the energy sector) can increase the project and policy effectiveness and efficiency of energy-sector interventions and the achievement of SDG 7".[16]

Furthermore, a report released in 2019 by the International Renewable Energy Agency (IRENA), *Renewable Energy: A Gender Perspective*, provided a comprehensive set of recommendations to ensure gender diversity in renewable energy including:[17]

♂ tailoring training and skills development

♂ attracting and retaining talent in the sector

♂ challenging cultural and social norms

♂ mainstreaming gender in energy sector frameworks.

South African context

The South African government and private sector have shown a commitment to increasing gender diversity in the renewable energy sector and supporting some of these global commitments. For example, the DMRE has encouraged preferential procurement with a focus on sub-contracting to women-owned enterprise through the Independent Power Producers Procurement Programme (IPPPP) and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which employs a number of energy procurement and advisory service initiatives. Some targets have been established around the share of construction and operational procurement spend that should be sourced from women-owned vendors and these commitments all serve as an incentive for reform. However, despite, these positive steps, there is no mention of non-binary people.

The DMRE established the *2021 – 2025 Women Empowerment and Gender Equality (WEGE) Strategy for the Energy Sector*[18] to ensure that women's empowerment and gender equality are achieved. The WEGE Strategy recommends implementation initiatives for the DMRE and the energy sector to support the women empowerment namely, capacity-building initiatives, organisational support

[14] UN Women, "Call to Action."
[15] ENERGIA, World Bank—ESMAP, and UN Women, "Global Progress of SDG 7 – Energy and Gender," 3.
[16] ENERGIA, World Bank—ESMAP, and UN Women, 3.
[17] IRENA, *A Gender Perspective*.
[18] Department of Mineral Resources and Energy, "2021-2025 WEGE Strategy for the Energy Sector."

initiatives, governance and institutional development initiatives, and economic growth and development initiatives.[19] The WEGE Strategy has four main pillars, as listed in Figure 11 below.

Figure 11: South African policy recommendations to address women's representation in energy sectors

Data collected on South African graduates by the South African National Department of Higher Education and Training, through its Higher Education Management Information System (HEMIS)[20] and data collected by the South African National Department of Employment and Labour, through its mandatory requirement that large companies (organisations with 150 or more employees)[21] operating in South Africa submit Employment Equity Reports annually,[22] graduate and employee numbers are reported by gender. However, there is no extension of gender reporting beyond this binary. Nonetheless, the sector is operating within the constitutional imperative to ensure greater representation of women and minority identities in the workplace. This creates an opportunity to push the utility-scale solar and wind energy sectors to identify more effective ways to include women and non-binary people.

Finally, within the South African utility-scale solar and wind energy sectors there is already an active group advocating for greater gender diversity, the SAWEA and SAPVIA Gender Diversity Working Group. Their mission is captured in their five-year strategy (2021-2025), with four key aims: creating an enabling environment; establishing equality of opportunities; gender mainstreaming; and instituting barrier-free workplaces.[23] Within this strategy, five focus areas are listed, and they align very closely with the recommendations in this report (Where relevant, we will note the alignment under headings.)

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[19] DMRE, "Women Empowerment and Gender Equality Strategy for the Energy Sector 2021 – 2025."
[20] Department of Higher Education, "Higher Education Management Information-System (Hemis) - Data Reports."
[21] Department of Labour, "Employment Equity | Labour Guide."
[22] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."
[23] James, "Gender Diversity Working Group: Aspirations."

South African Industry Status

Women still need to be significantly empowered in the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) as, for instance, they only account for 10% of the job opportunities created during the construction phase of projects[24] Further data collected from the Companies and Intellectual Property Commission on SAPVIA- and SAWEA-member companies revealed that 19% of directors were women and 80% were men. For 1% of directors, their likely gender could not be assumed.

A 2021 survey on gender diversity in the utility-scale solar and wind energy sectors was circulated to SAWEA and SAPVIA member companies and responses indicated that women accounted for 33% of the workforce, while men made up the majority with 67%. These results are consistent with global statistics which estimate that women account for only 32% of the global energy sector's workforce.[25]

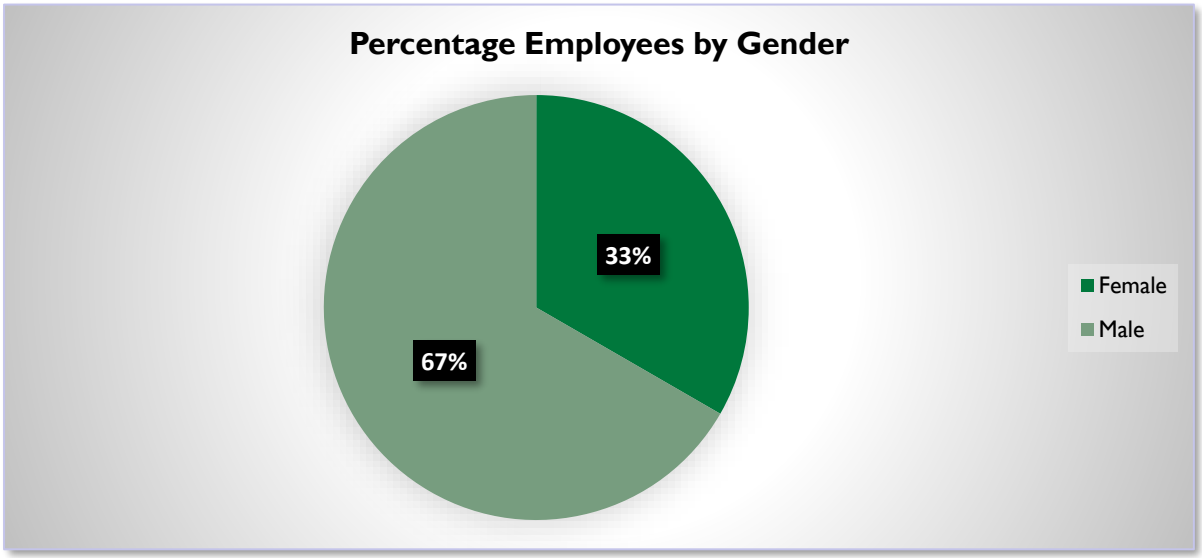


Figure 12: Percentage breakdown of employees, by gender of SAWEA and SAPVIA surveyed companies (2021)

Possible factors owing to the poor levels of women's representation in the sectors were identified based on input received from a series of semi-structured interviews with individuals as well as three focus group sessions. Recruitment and hiring practices biased towards men was consistently cited as a barrier to entry into the renewable workforce, while the lack of, and poor support for, family-friendly policies placed additional pressures on women, often creating barriers to career progression.

The full status quo report is provided below in Annex 2: Status Quo of Gender Diversity.

[24] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview As at 31 December 2021."
[25] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."

Academic Review Report

The *Academic Review* aims to understand factors that drive gender diversity in the utility-scale solar and wind energy sectors and the role that academic institutions can play. This report presents a review of key academic feeder courses and qualifications in South Africa and provides an assessment for interventions that can be made at the academic level to improve gender representation in the utility-scale solar and wind energy sectors in South Africa. Findings indicate that the sectors do not show preference for specific courses, and that job opportunities are varied across business areas. Moreover, there are limited solar and wind specific qualifications on offer and it is often generic qualifications, such as engineering, that are required for employment.

A comparison of enrolment and graduation numbers by gender using the Department of Higher Education and Training's CESM categories summed for the period 2010 to 2020, revealed that women's enrolment and graduation was consistently higher for all CESM categories across the country. Women dominate in the Health and Social Sciences, while men dominate in Information Sciences and Engineering, which implies that there are fewer women entering the market with STEM-related qualifications.

There are numerous short courses on wind and solar energy on offer at mainstream academic institutions at the postgraduate level and through departmental research and continuous development programmes. Outside of these, several short course providers and professional bodies offer a large range of focused wind and solar energy courses. However, there does not seem to be a consistent approach to categorising these courses into CESM categories and so it is not currently possible to assess the number of students graduating from "Renewable Energy" studies in South Africa. This could be addressed through the creation of a specific CESM category for renewable energy, which would help track qualifications in the future as well as mainstream renewable energy as a potential career path for graduates.

The full Academic Review report is provided below in Annex 3: Wind and solar energy-related courses in academic institutions in South Africa

Data Analysis and Projection Report

The purpose of the *Data Analysis and Projection Report* is to assess the future growth in the South African wind and solar energy markets and predict what this growth could mean for gender representation in the sector. The sector is expected to see significant growth in the next decade, in line with the projections outlined in the *Integrated Resource Plan (IRP) 2019*.

The utility-scale solar and wind energy sectors currently suffer from relatively poor gender representation, with only approximately 33% of posts in the operational phase and 10% in the construction phase being taken up by women. Given that women are very badly represented in the construction phase of wind and solar farms, the report notes that it may be tempting to focus on the construction phase in particular. Improvements could be achieved, for example, through interventions that pay attention to making on-site conditions during the construction phase more accommodating to women.

However, the data show that in the long term there will be significantly more job opportunities in the operations phase of wind and solar farms. When potential future operation and construction job opportunities are compared with each other, it is clear that in the short term there is the potential for women to occupy around 10,000 construction jobs and 10,000 operational jobs in the sector if

gender parity was to be reached quickly. However, in the long term, there is significantly more potential for women in operational jobs in the sector. Figure 13 shows that by 2030, if 50% gender job parity is reached in the sector in both construction and operational jobs, there may be significantly more women in operating positions. This is because construction jobs are temporary in nature, while operations jobs are more long-term. As more and more wind and solar farms come online, there will be cumulatively more job opportunities for women in operating these farms.

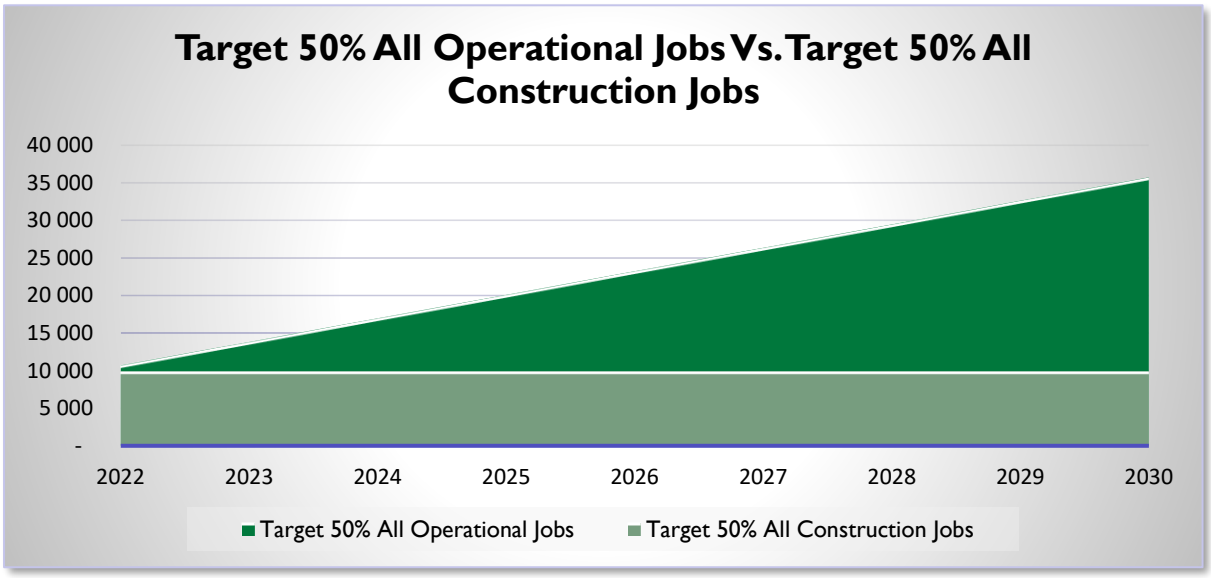


Figure 13: Target 50% All Operational Jobs vs. Target 50% All Construction Jobs in the utility-scale solar and wind energy sectors

Focus therefore needs to be placed on interventions that create a conducive working environment for women in operational positions at wind and solar farms in the future. This is not to minimise the concurrent need for interventions to improve gender representation in the construction phase of wind and solar farms. But in terms of prioritising intervention areas, the focus needs to be on operational job opportunities for women in the utility-scale solar and wind energy sectors in South Africa.

The full Data Analysis and Projection Report is provided in **Error! Reference source not found.**.

Chapter 3: Recommendations to improve gender diversity in the utility-scale solar and wind energy sectors in South Africa

This chapter provides a comprehensive set of recommendations for the utility-scale solar and wind energy sectors that are relevant to both the private sector and government. It speaks to national policy reform where needed; however, the bulk of the recommendations are aimed at the wind and solar energy private sector where there is a need for changes in workplace policies, workplace culture, and operations. The report also provides recommendations aimed at the secondary and tertiary education levels to ensure an increase in women and non-binary people graduating with STEM-related degrees, particularly engineering, as this continues to be a substantial barrier.

The recommendations are discussed by area that needs attention, and in many cases, these speak directly to the barriers noted in the *Status Quo Report*.[26] Each recommendation is informed by the in-depth interviews and focus group discussions with key stakeholders in the sector, as well as important points gathered during the *Literature Review.* The report strongly suggests that the sectors review these recommendations and identify where to make the greatest impact and focus initiatives there.

The recommendations are written within the context of three critical concerns that should receive particular and urgent attention. First, the research found a lack of women at senior management levels, from Directors to Senior Managers, and the research did not find anyone who identified as non-binary in senior positions. Addressing this is critical, and this report proposes a number of strategies to do so.

Second, there is a very limited number of women and non-binary people working in on-site roles (for instance, women account for 10% of construction jobs in the REIPPPP)[27] and the sector needs to urgently address this glaring gap. Unfortunately, no easy solutions were found to address this gap, and while this report includes a few immediate and medium-term recommendations, there is a need for the utility-scale wind and solar energy sectors to convene discussion forums to collectively identify solutions.

Third, while there is a need for more women and non-binary people to graduate with STEM-related degrees generally, the most significant barrier to entry appears to be a lack of women and non-binary people graduating with engineering degrees. This must be addressed.

The research also noted that the COVID-19 pandemic has led to some shifts in working styles and also exposed new working opportunities and dynamics. The sector would benefit from reflecting on the last two years and any changes that occurred which are beneficial for staff and the companies. For example, a few participants cited that they had a new sense of flexibility from the shift in working conditions and, in some instances, this has enabled women with children more opportunity to balance work and family responsibilities. Another interviewee, a non-binary person, highlighted that remote

[26] Urban Earth, "Status Quo of Gender Diversity."
[27] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."

working allowed them to focus more on work rather than taking time to make both themselves and their clients feel comfortable with their appearance.

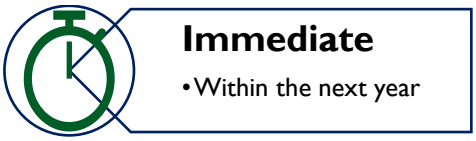
Guide to understanding the recommendations

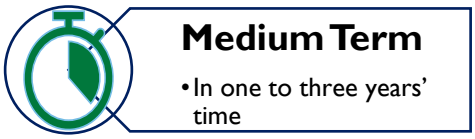
The tables below list recommendations to increase gender diversity in the utility-scale solar and wind energy sectors in South Africa. In these tables,

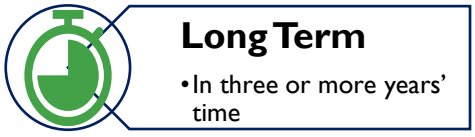
- ⚥ **What** refers to the implementable action,
- ⚥ **When** refers to the suggested timeframe of the action,
- ⚥ **Who** refers to who should implement the action,
- ⚥ **Impact** refers to how potentially significant the recommendation is, and
- ⚥ **How** provides more detail about the action.

In the **Who** column, "Companies" refers to organisations that are active in the utility-scale wind and solar energy sectors in South Africa.

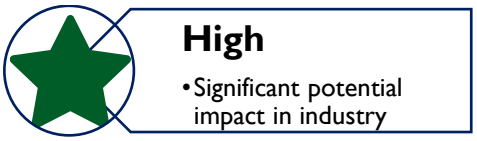
The following timeframes are used in the **When** column:

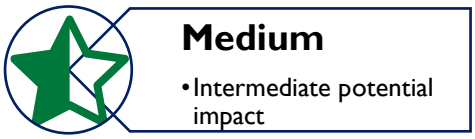


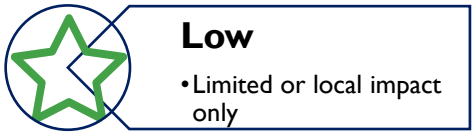




The following categories are used in the **Impact** column:







Relevant quotes from the focus-group discussions and interviews are included in the pages that follow. Quotes are indicated by the following icon:

Addressing barriers to entry

The following section provides recommendations to address barriers to entry faced by women and non-binary people.

Address the social norms and gender stereotypes that discourage girls and young women from studying STEM-related subjects, especially engineering

What	When	Impact	Who	How
Continue to include women and non-binary people in branding and publicity materials	Immediate 	Low 	Companies, SAPVIA, SAWEA	Continue to include and increase the number of photographs of women and non-binary people in the branding and publicity materials of SAPVIA and SAWEA as a way to attract women and non-binary into the sector and to change perceptions that jobs in the sector are more appropriate for men.
Identify and increase the visibility of women and non-binary role models in the wind and solar energy sectors	Immediate 	Medium 	Companies, SAPVIA, SAWEA	A powerful way to break down gender stereotypes is through visible, successful role models who have broken the stereotype. Therefore, the sector should identify women and non-binary role models at all levels and roles. They could then be invited to be champions for women and non-binary people in the sector, ideally visiting schools and tertiary institutions as well as using social media to break the stereotype.
Engage the Department of Basic Education (DBE) to actively challenge all depictions of the wind and solar energy sectors as "male only workspaces", and support a narrative that this is a career	Long Term 	High 	DMRE	As an example, school curricula are regularly updated, and the wind and solar energy sectors could engage with the DBE to review the case studies, examples, cartoons, and characters that are used in textbooks from a gender diversity perspective. When young children see women and non-binary people doing this work, it begins to be normalised.

What	When	Impact	Who	How
option for everyone				

Gender stereotypes around STEM-related careers, namely that "work in these sectors is for men", continues to influence young girls and women's subject and degree choices at secondary and tertiary levels. Furthermore, within the STEM fields of study, engineering remains particularly dominated by men, resulting in a dearth of qualified female engineers in the utility-scale solar and wind energy sectors. Recognising and correcting these gender stereotypes that discourage girls and young women from studying STEM-related subjects, especially engineering, would require implementation of the following recommendations.

"A lot of policies can be invented and implemented, but people's attitudes need to be changed. Without any change in people's attitudes and preconceived notions about women in the workplace, nothing will change."

Table 1: Actions to address the social norms and gender stereotypes that discourage girls and young women from studying STEM-related subjects, especially engineering

Increase awareness, at secondary and tertiary level, of the utility-scale solar and wind energy sectors as a feasible career option for all genders

Many participants mentioned that school children and tertiary students, across all genders, seem to be very unaware of the utility-scale solar and wind energy sectors as a potential career option. Additionally, there are structural challenges within many government schools, which is leading to matriculants having low grades for many STEM-related subjects.

Table 2: Actions to increase awareness, at secondary and tertiary level, of the utility-scale solar and wind energy sectors as a feasible career option for all genders

What	When	Impact	Who	How
Develop a scholarship fund aimed at women and non-binary students focused on engineering	Immediate 	Medium 	SAPVIA, SAWEA	Offering (more) scholarships for women and non-binary students for electrical engineering or renewable energy focussed qualifications would assist in bringing more women and non-

What	When	Impact	Who	How
studies for wind and solar				binary professionals into the sector.
Partner with development organisations to strengthen the case for the renewable energy sector as a "career of choice" by providing information on renewable energy job opportunities at career days and other appropriate publicity opportunities	Immediate 	Medium 	Companies, SAPVIA, SAWEA	SAPVIA and SAWEA, with support from development organisations such as GIZ, as well as individual companies should target career counsellors, open/career days and TV and radio chat shows to raise awareness about the many different opportunities in the sector. Again, it would be most powerful if women and non-binary people were very visible in such processes.
Implement a policy to ensure that a quota of undergraduate student interns are women and non-binary people	Immediate 	Medium 	Companies	Companies need to be more intentional about hiring women and non-binary people as interns even before they graduate as a way to increase awareness of the career opportunities in the wind and solar sector. Recruiting more female and non-binary interns even before they graduate would significantly increase awareness of opportunities in the sector.
Engage the Department of Higher Education to include a specific CESM category for renewable energy	Medium Term 	Low 	DMRE	There is also a need for a specific Department of Higher Education CESM category for renewable energy. This would help track qualifications in the future as well as mainstream renewable energy as a potential career path for graduates.
Develop materials that can be used by career counselling services at secondary and tertiary level on the role of women and non-binary people in	Medium Term 	Low 	SAPVIA, SAWEA	At secondary school level, the sector could work with school counsellors to help learners understand that the sector is suited for all genders. At the tertiary level, there should be more female career counsellors with engineering backgrounds, who could also offer academic counselling and mentorship to young female students so that

What	When	Impact	Who	How
the wind and solar energy sectors and encourage the use of role models				they remain resilient and motivated to graduate with engineering degrees.
Continue to support the Department of Higher Education to adopt gender-responsive STEM education	Medium Term 	High 	DMRE	Adopting gender-responsive STEM education through diverse teaching strategies and developing gender-sensitive STEM curricula for teacher training may help remedy the issue of women in STEM dropping out due to the sexism experienced from both students and lecturers. This action may be informed by the Resource Pack for Gender-Responsive STEM Education developed by the International Bureau of Education (IBE-UNESCO), which outlines interventions for strengthening STEM curricula for girls in Africa and Asia.
Continue to support the DBE to introduce the concept of renewable energy at secondary school	Long Term 	High 	DMRE	The concept of renewable energy and career opportunities in renewable energy is still foreign in secondary schools. The renewable energy sector needs to be promoted in secondary education by incorporating it as a syllabus. DMRE could engage with the DBE to include renewable energy in the secondary school
Expand the number of local schools that have relationships with wind and solar companies with the aim of improving the quality of STEM-subject teaching	Long Term 	Medium 	Companies	Companies could develop close working relationships with the schools in the communities in which they work as a way to both support the quality of maths and science being taught and to expose local school leavers to the field. Companies could sponsor teacher-enrichment training to support improved teaching of the STEM subjects at school level.

Ensure that women and non-binary people have equal access to funds and resources

There is an inherent bias towards men seeking investments in the wind and solar energy sectors. Women and non-binary people reported great difficulty accessing start-up funds, capital, and loans. These limited opportunities for financial support for women and non-binary people lead to their further marginalisation and mean they struggle to compete at the same level as established, male company owners.

Ensuring women and non-binary people have equal access to financing should include the implementation of the following recommendations.

Table 3: Actions to ensure that women and non-binary people have equal access to funds and resources

What	When	Impact	Who	How
Increase the number of specific networking opportunities in the wind and solar energy sectors for women and non-binary people	Immediate 	Medium 	SAPVIA, SAWEA	Networking opportunities provide important platforms for engagement through sharing experiences and offering encouragement. There should be a specific and dedicated networking space for the renewable energy sector that is devoted to women and non-binary people in South Africa. This networking offering should be curated to ensure that it includes capacity-building components on how to apply for funds as well as sessions with successful entrepreneurs who have managed to access finance for their enterprises in the sector.
Partner with key financing institutions to develop and implement diversity training and values clarification	Medium Term 	Medium 	DMRE, SAPVIA, SAWEA	Develop and roll out diversity training workshops that would be appropriate for staff at financing and funding institutions to support them to understand the importance of supporting funding opportunities for women and non-binary people.
Partner with key financing institutions to revise evaluation criteria to be more inclusive of women and non-binary people	Medium Term 	High 	DMRE, SAPVIA, SAWEA	The evaluation criteria for existing funding programmes should be reviewed and amended to ensure that the criteria are inclusive of women and non-binary entrepreneurs.

What	When	Impact	Who	How
Partner with key financing institutions to develop funding programmes specifically for women and non-binary company owners	Long Term	High	DMRE, SAPVIA, SAWEA	The wind and solar energy sectors should develop their own industry funding programme that includes an element specifically aimed at female and non-binary company owners. This fund should be tailored for women and non-binary people's ownership in the sectors and will require capital financing. Studies indicate that women-led companies outperform their male counterparts by 63%, and African companies that have women in at least 25% of their decision-making positions have, on average, 20% higher operating margins than the industry average.[28]

Diversify the recruitment process

The recruitment process was found to be heavily biased towards men, particularly as many positions in the wind and solar energy sectors require many years of experience, which recent graduates, and women and non-binary people wanting to shift from other careers, may not have, especially with regards to technical positions. There should be awareness raising in the industry that fewer women are emerging from the academic environment with STEM degrees and that limiting job descriptions to these degrees could further reduce gender diversity in the sector.

"The sector is relatively new and predominantly male. Setting certain requirements such as the number of years of experience required for a lot of positions already places women at a disadvantage. This restricts their participation and limits their upward progression. There is a need for making these requirements more flexible for women and open to non-binary people who have not been historically allowed to participate in the sector."

This is exacerbated by the fact that in the wind and solar energy sectors there are very few women and non-binary people in decision-making positions who are responsible for recruitment.[29] In addition, research has found that men are more likely to apply for a job when they meet only 60% of the

[28] DuBow and Pruitt, "The Comprehensive Case for Investing More VC Money in Women-Led Startups."
[29] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."

requirements, while women, generally, will only apply for a job if they meet 100% of the requirements.[30] Therefore, how recruitment adverts are drafted is an important consideration.

Below are some of the strategies that Human Resource teams in the utility-scale solar and wind energy sectors could investigate to work toward gender-neutral recruitment. Gender-neutral recruitment refers to a process where hiring teams try to reduce gender-based biases during recruitment and provide more equal opportunities for people applying for jobs.[31]

Table 4: Actions to diversify the recruitment process

What	When	Impact	Who	How
Improve the tracking and analysis of the gender split of employees and directors	Immediate 	Low 	Companies	Companies need to have a clear idea of the current gender splits of their employees and directors so that the gap can be identified and decision-makers can be informed of which departments and employment levels they should prioritise for gender diversity improvements. The analysis should not only be about the number of cis-female versus cis-male employees in the company, but it should also look at the departments and positions in which most women and non-binary employees work.[32]
Review the language in the draft stage of job adverts to ensure that the language used encourages a gender diverse response	Immediate 	Medium 	Companies	When writing job advertisements, the hiring team needs to be cognisant of the language it uses. Certain phrases or terms used in job advertisements could subtly encourage men to apply and discourage their female counterparts from applying.[33] For example, phrases like "determined" and "assertive" in job posts could imply that the job is masculine-oriented, discouraging women from applying.[34] Regarding the rigidity of the language used in job advertisements, if a job needs a specific skill, experience, or certification, it should be indicated as "required", but if it is not necessarily required it should be

[30] Hannon, "Are Women Too Timid When They Job Search?"
[31] Government of South Australia, "Guidelines for Gender-Neutral Recruitment."
[32] Stappard, "4 Ways to Make Your Recruitment Process Gender Inclusive."
[33] Government of South Australia, "Guidelines for Gender-Neutral Recruitment."
[34] Government of South Australia.

What	When	Impact	Who	How
				clearly indicated as a "preference" or "advantageous".[35]
Expand the range of benefits and accommodations that are attractive to people with family responsibilities in job advertisements	Immediate 	Medium 	Companies	To attract more female applicants, job advertisements and company websites should include benefits and accommodation that address the additional responsibilities that many women have as the primary carers at home. These could be opportunities to work remotely, flexible work hours, on-site day-care or after-care facilities, or any other initiative that is attractive for working mothers who are usually the primary caregivers in their households.
Adjust job descriptions and adverts to target non-STEM-related graduates	Immediate 	Medium 	Companies	In addition to their jobs relating to STEM subjects, organisations in the wind and solar energy sectors should also target graduates with business, economics and management qualifications (where possible) as many more women than men have graduated with such degrees in recent years.[36]
Establish transparent salary information and salary policies	Medium Term 	Medium 	Companies	The gender-based pay gap is still a reality in many organisations, and this may discourage women from pursuing opportunities in the wind and solar energy sectors. To address this, organisations should be transparent about salary information in job advertisements. Such openness is also known to build transparency and integrity in the recruitment process.[37] Organisations should also consider publishing their detailed salary policy on their website to emphasise their commitment to equal pay.
Continue to develop and distribute a gender-diversity recruitment resources pack	Medium Term 	Medium 	SAPVIA, SAWEA	Develop and distribute a resource pack for wind and solar companies to use on how to undertake gender-diversity recruitment. This tool will support the process of re-structuring the hiring process with existing knowledge of gender

[35] Inc.Africa, "7 Steps to Promote Gender Equality in Recruiting and Hiring."
[36] Urban Earth, "Wind and Solar Energy-Related Courses in Academic Institutions in South Africa."
[37] Springworks Team, "10 Clever Interview Practices to Attract and Hire More Female Candidates."

What	When	Impact	Who	How
				biases and how to overcome them.
Implement recommendations from the gender-diversity recruitment resources pack	Medium Term 	High 	Companies	Ensure the distribution of the gender-diversity recruitment resources pack to relevant staff and the implementation of the recommendations so that so that their recruiting processes can be adjusted.
Develop a gender diversity recruitment training course	Medium Term 	Medium 	SAPVIA, SAWEA	Develop a gender diversity training course for wind and solar companies to use on how to incorporate gender diversity best practises into their operational processes. All members of recruitment teams should undergo gender diversity training. For example, they could be trained on the type of language to use during recruitment as it is instrumental to the type of talent you attract.[38]
Implement gender diversity recruitment training	Medium Term 	Medium 	Companies	Companies should help ensure the participation of relevant staff in the gender diversity training course and encourage their staff to take forward adjustments to their operational processes so that they incorporate gender diversity best practises based on learnings from the course.
Establish organisations brands as inclusive, representative employers	Medium Term 	High 	Companies	An organisation is more likely to attract more women and non-binary people if it has a diverse and inclusive employer image, especially if this image is represented on its company website and social media platforms.[39] Potential employees are likely to look at a company's social media pages while they prepare for their job applications or interviews.[40] A company could include information about any gender diversity initiatives it has taken and stories about successful women and non-binary people in its organisation.

[38] Inc.Africa, "7 Steps to Promote Gender Equality in Recruiting and Hiring."
[39] Springworks Team, "10 Clever Interview Practices to Attract and Hire More Female Candidates."
[40] Springworks Team.

"If you look at the industry perspective, there is so much emphasis on science subjects. But there is a plethora of other subjects: we need lawyers, financers, etc. I think we need to look at the opportunities not just directly related to technical aspects of wind and solar sectors."

Ensure progression and retention

The following section provides the recommendations to ensure the progression and retention of women and non-binary people.

Ensure more women and non-binary people enter senior leadership through establishing and promoting targeted career development and coaching programmes and removing promotion biases

According to a survey of organisations that are active in the utility-scale solar and wind energy sectors in South Africa,[41] women held, on average, 33% of jobs in the utility-scale solar and wind energy sectors.[42] However, in senior management positions, gender diversity drops significantly as only 19% of directors are women in the utility-scale solar and wind energy sectors.[43] Indeed, a recent report from the IRENA found that the number of women and non-binary people working in the renewable energy sector drops significantly as you move up company hierarchies to the decision-making positions.[44] This report also noted that it is senior management who are often responsible for recruitment, which raises concerns around recruitment biases.[45]

Table 5: Actions to ensure more women and non-binary people enter senior leadership through establishing and promoting targeted career development and coaching programmes

What	When	Impact	Who	How
Continue to develop and implement a leadership training and coaching programme specifically	Immediate	High	SAWEA, SAPVIA	Companies should invest in capacity-building resources that will help develop and support on-the-job training and

[41] The survey was carried out for this study's *Status Quo of Gender Diversity* Report. Survey responses were received from 25 organisations registered with SAWEA and/or SAPVIA.
[42] Urban Earth, "Status Quo of Gender Diversity."
[43] Urban Earth.
[44] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[45] IRENA and ILO.

What	When	Impact	Who	How
for women and non-binary people				coaching programmes for women and non-binary people. These programmes must be tailored to an individual's specific career development needs, focus on assisting individuals with overcoming barriers to career progression in the sector, and should start at the early stages of their careers. The training and coaching programme should focus on both hard and soft skills, especially soft skills around leadership, including effective communication, strategic thinking, successfully supporting teams, etc. The training methods could include assigning women developmental and stretch assignments, job shadowing, and working in teams so that women can learn on-the-job with peer support, mentoring and coaching.
Showcase and celebrate successes of female and non-binary talent	Immediate 	Low 	SAWEA, SAPVIA	Giving recognition and hosting award ceremonies is important as people enjoy being recognised and this also creates awareness of female and non-binary talent in the wind and solar energy sectors, while also providing opportunities to network in an unstructured way. Sharing success stories of women and non-binary people who have advanced to senior executive levels in the wind and solar energy sectors and those who are owners of wind and solar farms may also attract women and non-binary people to the sector, as they may appreciate the more gender-inclusive values.
Increase the number of networking and knowledge-sharing events that encourage women and non-binary people to advance in the	Immediate 	High 	SAPVIA, SAWEA	Organise and host annual workshops or conferences for companies in the wind and solar energy sector that will be used as a semi-formal networking opportunity. These events should incorporate

What	When	Impact	Who	How
wind and solar energy sector				award sessions that provide recognition to women and non-binary people's talents and contributions in the wind and solar energy sectors. The events should also include sessions reserved for women and non-binary people that have successfully advanced to senior and top management positions or those who own thriving enterprises in the sector to share their experiences and stories.
Develop and distribute a gender-diversity promotion resources pack	Medium Term 	Medium 	SAPVIA, SAWEA	Develop a resource pack for wind and solar companies to use, on how to undertake gender-diverse promotions and distribute to the sector. The resource pack should address the need to review and change all documentation related to promotions to avoid language that discriminates and alienates women and non-binary people as well as the need to ensure promotion panels are trained on gender diverse promotion.
Implement recommendations from the gender-diversity promotion resources pack	Medium Term 	High 	Companies	Ensure the distribution of the gender-diversity promotion resources pack to relevant staff, specifically to those on promotion panels. In particular, the promotion panels need an understanding on the importance of, and how to, pro-actively supporting women and non-binary people, with clear pointers on how to action this.
Identify and remove the systemic barriers to the promotion of women and non-binary people	Medium Term 	High 	Companies, SAWEA and SAPVIA	Remove barriers which limit the opportunities for qualified women and non-binary people to acquire the necessary experience to be considered for promotion. For example, barriers at sites (addressed elsewhere) must be removed so that women and non-binary people can acquire necessary site experience and be recognised for other skill sets which they may have.

What	When	Impact	Who	How
				In addition, qualified women and non-binary people must be pro-actively supported by Human Resource personnel, management and mentors to apply for promotion. This includes having sponsors or mentors at top-management levels that provide them with the necessary support they require to progress to senior management positions. Companies also need to develop a fair, transparent, and objective evaluation and promotion system keeping in mind the lack of gender diversity in senior management positions. Promotion or employment policies should include realistic and reasonable targets for female representation in company boards. These policies should encourage gender balance or gender parity, and companies must be liable for providing explanations on why they cannot meet their targets for female representation in senior management positions.

"One thing that particularly helped me was having a mentor and a structured career development plan at a very early stage of my career. I have also been fortunate to have good leadership early in my career, my manager ensured that my training programme opened me up to opportunities that could accelerate my career growth"

Establish and support mentorship and networking programmes to enable women and non-binary people to develop greater social capital in the sector

Women and non-binary people all mentioned that they found it very difficult to create social networks and social capital in the wind and solar energy sectors, and particularly difficult to break into the male-dominated networks. They mentioned that not having this social capital meant they were sometimes excluded from creative thinking processes and informal decision-making processes. Creating spaces for exchange and networking is important as it provides entry level professionals with informal mentors and opportunities to connect to more experienced employees.

"A lot of brainstorming, development of strategies, decision-making and mentorship are done outside of formal settings, for example, golf courses. This is already a disadvantage to women as they are usually not invited by men to these informal settings"

Table 6: Actions to establish and support mentorship and networking programmes to enable women and non-binary people to develop greater social capital in the sector

What	When	Impact	Who	How
Continue to formalise and increase resources for mentorship programmes in the workplace	Immediate 	High 	Companies, SAPVIA and SAWEA	Companies should support the development of structured mentorship programmes by providing resources such as time and the necessary capacity-building tools. Although the mentorship programmes should be formalised, the mentorship programme could be flexible in terms of how often the mentee and mentor meet and how these meetings occur. Ensuring the right coach-mentee match is crucial and must be carefully thought through. The chosen mentors must possess a similar skill set to that of the mentee or those that the mentee aims at acquiring. They must be from a domain relevant to the mentee and should resonate with or understand the mentee's challenges so that they are able to provide the best advice on how to overcome these challenges and develop their careers.

What	When	Impact	Who	How
				Mentorship programmes should not only be reserved for women and non-binary people at the early stages of their careers, but they must also be made available for women and non-binary people in mid-management positions to assist them with ongoing challenges that may hinder their advancement to senior management and top management positions. Existing mentorship programmes for women and non-binary people, such as those provided by WE Connect, should be actively supported with financial resources and other resources to ensure longevity of these initiatives.
Set aside dedicated financial and other resources to support women and non-binary people's networking	Immediate 	Medium 	SAPVIA, SAWEA	Companies and sector-wide bodies, such as SAPVIA and SAWEA, should allocate resources to support networking between women and non-binary people. Currently, the initiatives of both the SAWEA and SAPVIA Gender Diversity Working group and WE Connect are incredibly effective and many participants made mention of the impact they have had on them and their career. Transformation cannot rely on volunteerism, however; companies need to show their commitment to diversity with resources. Companies should also support women and non-binary people to attend industry conferences and events as these are important networking spaces.

"A lot of policies can be invented and implemented, but people's attitudes need to be changed. Without any change in people's attitudes and preconceived notions about women in the workplace, nothing will change."

Improve working conditions which hinder women and non-binary people from working on on-site locations

Significantly fewer women and non-binary people than men are employed in on-site construction jobs in the utility-scale solar and wind energy sectors. Only 10% of employees are women[46] (the per cent of non-binary people working as on-site employees is unknown). However, as already noted, several participants indicated that the more traditional values often found in many rural areas discourage women and non-binary people from taking on-site positions. The challenges for women and non-binary people with regards to on-site work have been outlined in this Study's *Status Quo Report*.[47] To re-emphasise the main point: for women with family commitments it is very difficult to take families to these rural communities, which often lack good schools, family support, etc. These challenges result in young (often single) women being the only candidates for this work. Some women also mentioned concerns about safety on site. Addressing this barrier is critical, as site work appears have the least gender diversity and, as the sector grows, one assumes the number of on-site positions will increase.

Table 7: Actions to improve working conditions which hinder women and non-binary people from working on on-site locations

What	When	Impact	Who	How
Identify and address health and safety concerns associated with site-based work	Immediate 	Medium 	Companies, SAPVIA, SAWEA	Ensure that field work is accessible and safe for women and non-binary people in the sector by developing and adopting health and safety policies that consider the needs of women, men and non-binary people. Women and non-binary people must be provided with equal access to personal protective equipment that is designed to the correct fit and be given access to separate toilets, changing rooms, showers and accommodation. Companies must provide round-the-clock security and transport to avoid people having to commute alone in remote areas, which is especially unsafe for women and non-binary people.
Set up systems to address bullying, sexism and sexual harassment against women and non-	Immediate	Medium	Companies, SAPVIA, SAWEA	All leaders based on-site should openly communicate with employees about creating a respectful workplace, model respectful behaviour, and

[46] Urban Earth, "Status Quo of Gender Diversity."
[47] Urban Earth.

What	When	Impact	Who	How
binary people which is usually more intense at site-based work locations				encourage employees to report disrespectful behaviour. Companies should develop and implement existing policies and procedures that support respectful workplace practices. People in leadership positions need to reinforce zero tolerance to sexism, bullying, sexual harassment and sexual assault, clearly articulate where employees should report discrimination in the workplace, and be knowledgeable about what support will be provided for affected employees. Implementation of anti-bullying and sexual harassment policies must be coupled with mandatory training for all employees and people in leadership positions. The training sessions must be facilitated by a neutral, qualified, and skilled practitioner.
Provide gender neutral recreational activities on-site that are acceptable to all employees	Immediate 	Low 	Companies	To make site-based work more attractive to women and non-binary people, companies should consider providing recreational activities that appeal to everyone, for example, family fun days, games or quiz evenings. The important point here is to attempt to shift away from recreational activities that include drinking and traditionally male activities, so that everyone feels welcome and can enjoy themselves.
Provide additional incentives for women and non-binary people doing site-based work	Medium Term 	High 	Companies	Offer additional incentives such as housing and travelling allowances. Improve access to physical wellness and mental health facilities. Offer counselling and support to victims of gender-based violence. Provide financial and legal assistance.
Establish sector-wide, and/or company, dialogues on gender diversity at site-based work	Long Term	Low	Companies, SAPVIA, SAWEA	Have continuous dialogues across the sector and within companies around improving gender diversity at site-based work.

What	When	Impact	Who	How
				SAPVIA and SAWEA can convene a dialogue process to explore the barriers and solutions, to hear from staff themselves what challenges they experience, and identify suggestions for addressing this. Companies could also engage with their female staff and ask about their concerns and brainstorm creative solutions.
Set up systems that allow site-base workers to be with their families	Long Term 	High 	Companies, SAPVIA, SAWEA	Companies could help by identifying nearby, good-quality boarding schools with weekly boarding, and allowing employees time to drop the children on Monday morning and collect them on Friday afternoons. For younger children, the company could establish a crèche which also enrols children from nearby communities. This would also build bridges between the sectors and the local communities.

Amend company policies that do not support women and non-binary people's specific needs

Company policies, both explicit and implicit can have a significant impact in terms of promoting (or hindering) gender diversity. It is important that companies review their existing policies and make amendments to explicitly support gender diversity.

"Conversations around the day-to-day expectations of women and non-binary people in the sector are not held enough. For example, conversations around how to carry yourself professionally, how to deal with discrimination in the sector professionally, how to ensure that your voice is heard in the sector, and how to have your contributions seen as valuable to the sector."

Table 8: Actions to amend company policies that do not support women and non-binary people's specific needs

What	When	Impact	Who	How
Review company policies with gender mainstreaming in mind	Medium Term 	Medium 	Companies	Conduct a review of company policies to determine whether they support gender diversity and inclusivity in the workplace. Determine whether policies are effectively addressing disparities due to gender, gender diversity, and discrimination against women, non-binary people and people of different sexualities.
Amend company policies that do not support women and non-binary people's specific needs	Medium Term 	High 	Companies	Engage women and non-binary people to assist with amending policies that do not support gender diversity and inclusivity in the workplace. Policies should be amended so that they support specific needs identified by women and non-binary people that will encourage them to remain and advance in the wind and solar energy sector. Once amended, policies and changes brought about by the implementation of the policies must be continuously monitored and evaluated to determine if they are successfully increasing the retention and progression of women and non-binary people in the wind and solar energy sector.

Actively address social norms and gender stereotypes in the workplace that continue to discourage women and non-binary people from remaining in the sector

The research shows that within the wind and solar sector, social norms and gendered stereotypes continue to play a role in creating perceptions that this is not an appropriate sector for women, and it remains a male-dominated industry, particularly in the technical and senior management spaces. Women mentioned that they experienced remarks and attitudes which reinforced the belief that they should not be in the sector, especially in the more technical roles. They also noted that men's opinions often had "natural hierarchy", with men's opinions carrying more weight than women's. Refence was

also made to the ongoing existence of the "boys club" in the wind and solar energy sectors, which precludes women and non-binary people on many levels.

"For most of my career, I have worked on construction sites with senior traditional men who had negative perceptions of women. I have always made it a point to hold my own and hold my place in conversations around making decisions for construction."

A number of points are considered under other recommendations, such as addressing sexism, ensuring family-friendly policies to avoid stigmatising women with domestic responsibilities, etc. In such cases we have not repeated the recommendations here.

Table 9: Actions for workplaces to actively address social norms and gender stereotypes that continue to discourage women and non-binary people from remaining in the sector

What	When	Impact	Who	How
Develop gender diversity and values clarification training	Immediate 	Medium 	Companies, SAPVIA, SAWEA	Key role players in the industry, with support from skilled professionals as needed, should develop a resource pack of gender-diversity and values clarification training for companies. Values clarification is a process that supports individuals and organisations to identify their values and reflect on their own behaviours to achieve these. This resource pack could then become a resource for others in the sector to implement as appropriate. To build awareness and buy-in, the resource pack could be introduced at the SAWEA and SAPVIA Gender Working Group networking session and at the Board meetings.
Implement diversity and values clarification training	Medium Term 	Medium 	Companies	All companies should be encouraged to implement the gender-diversity and values clarification training developed for the sector. All staff, from the most senior ranking to the site staff, should attend such training, and it should be a part of all

What	When	Impact	Who	How
				induction trainings or re-run every few years.
Identify a pool of trainers who can run implementation training sessions and support staff to realise the guidelines for branding, publicity and community engagement	Medium Term 	Medium 	SAPVIA, SAWEA	Companies may struggle to identify trainers who are familiar with training on such material; therefore, it is advisable that the people who develop the training also put out a call for CVs for trainers with experience in this field. These names could then be shared with companies as needed, although this should not limit companies from identifying their own trainers should they wish to.
Utilise the annual wind and solar sector conferences to highlight the status quo around gender diversity, discuss recommendations for change, and run sessions on gender diversify and values clarifications	Medium Term 	Low 	SAPVIA, SAWEA	Annual sector events (e.g., Solar Power Africa Trade Show and the Windaba) are an important place to raise awareness of the status of gender diversity in the wind and solar sector. However, these events could go beyond simple awareness raising and run gender diversity and values clarification sessions during the conferences. Furthermore, while pre-conference workshops are important and a good place to raise the problem of gender diversity, these issues also need to be mainstreamed throughout the conference agenda, with questions about gender diversity being considered in different discussions.

Amend company policies and shift workplace cultures, to ensure they become family-friendly

All participants noted that the additional responsibilities that many women assume, either as primary parent and/or primary carer and homemaker, place additional pressures on female staff, often creating barriers to career progression. Examples ranged from unsupportive environments to direct discrimination, from men and some women, based on motherhood. Others cited cases where mothers who accommodated their parenting responsibilities had to do so at the expense of promotion or being

able to take on-site positions. Pregnancy has also been noted as a barrier to career advancement for women in the sector, especially for women who are involved in fieldwork.

The report suggests a number of ways to amend company policies and shift workplace cultures so that they become family-friendly.

Table 10: Actions to amend company policies and shift workplace cultures, to ensure they become family-friendly

What	When	Impact	Who	How
Encourage informal practices between team members that support staff with additional personal responsibilities	Immediate 	Low 	Companies	Staff can shift the company culture, even in the absence of policy changes, and agree to proactively support one another. A caring work team could agree to accommodate people's personal flexitime and responsibilities, for instance, by not setting internal meetings during school pick-up times.
Amend company policies and workplace cultures to allow staff to work remotely and flexibly when required	Medium Term 	Medium 	Companies	The COVID-19 pandemic has demonstrated that remote work and flexible hours can be beneficial for both staff and companies. It allowed women with family responsibilities to meet these, and companies found that staff were still productive and happy; indeed, in many cases happier. Companies should build on these lessons and, through discussions with staff, agree on policies and ways of working which allow this to continue, while still achieving targeted performance goals. Working remotely can also be helpful for non-binary people who feel unsafe or prejudiced in certain settings. For example, an on-line meeting may be an easier way to establish a good working relationship with a partner who otherwise may be openly prejudiced. Once this relationship is formed, a later meeting in person would be easier.
Amend company policies and workplace cultures to provide parental transitional support	Medium Term 	Medium 	Companies	Companies need to ensure a comfortable working environment for women returning from parental leave. This can include parental transitional coaching or having a quiet room with separate fridges for breastfeeding mothers who want to pump. Such maternity initiatives could attract and retain more women on-site.

What	When	Impact	Who	How
Provide financial support for additional childcare expenses when travelling for work	Medium Term	Medium	Companies	When mothers travel for work they often have to pay for additional childcare support. Companies should consider providing mothers with an allowance when travelling to cover some, or part, of these related expenses.
Review and amend company policies to allow parental leave for all staff	Long Term	High	Companies	A review of parenting leave policies is advisable. Globally, there is a trend towards fairer parenting policies that allow parents to choose which parent will take leave, or allow both parents to share parental leave. Such policy shifts allow parents to share the family responsibilities as best suits their situation and avoids unnecessarily burdening woman.

"Seeing deserving women advancing in the sector even if they have been away for maternity leave sends a message to other women across the company that you can be a mother and still advance in the sector."

Eradicate sexism, both implicit and explicit, from the workplace

Women within the sector reported ongoing instances of both implicit and explicit sexism, ranging from verbal sexual harassment, unequal treatment, and belittlement to sexism related to motherhood. Experiencing sexism in the workplace is a human rights violation, and it creates a toxic work environment where women are likely to feel unwelcome and even unsafe.

Table 11: Actions to eradicate sexism, implicit and explicit, from the workplace

What	When	Impact	Who	How
Address sexist attitudes in the workplace through the implementation of gender diversity and values clarification training	Immediate 	High 	Companies	Companies should implement compulsory diversity and values clarification training. While these sessions will not end sexism and discrimination, such workshops challenge people to reflect on their own values, attitudes and behaviours, and they give clear signals to employees and directors about what behaviour is unacceptable at work.
Ensure there are safe spaces in the workplace	Immediate 	Medium 	Companies	Companies need to create safe spaces for women and non-binary people. Ideally, all company spaces can be safe spaces. This is particularly necessary at site-based locations, as a number of research participants reported that some people do not feel safe on-site. Perhaps flowing from the diversity and values clarification workshops, companies could engage with staff about where they feel unsafe and why, and then address those concerns. Examples may include the toilets because of their location, dark carparks after working late, waiting outside the building for a taxi, sharing accommodation with men for on-site work, etc.
Develop, implement, and monitor an anti-harassment policy	Medium Term 	Medium 	Companies	All companies in the wind and solar energy sectors should have a policy that addresses sexual and gender harassment in the workplace. Such a policy should include that the company has zero tolerance for harassment or discrimination of any sort and for any reason. If a company does not have an anti-harassment policy, one should be developed in a collaborative process

What	When	Impact	Who	How
				that includes employees and directors. Developing such a policy can be a powerful process in and of itself to begin shifting sexist attitudes. Once a policy is developed, it must be implemented and monitored, and employees and directors must know there will be severe consequences for any violations of the policy.

Establish and monitor gender diversity targets at all levels: industry targets, IPPs and companies

Gender targets at all levels are a necessary key step towards gender diversity in the workplace. Evidence shows that setting targets, and ensuring regular transparent monitoring and reporting, leads to a shift in gender diversity. While the IPP does have some gender equity targets, these should be reviewed and implementation monitored. Setting, and working towards achieving, these targets also aligns with a core outcome of the SAWEA/SAPVIA Gender Diversity Working Group's (GDWG) programmes through the operationalisation of the DMRE's *2021 – 2025 WEGE Strategy*.[48]

"Organisations need to be proactive or intentional with increasing the ratio of women to men. This doesn't mean giving women more opportunities by virtue of them being women, but rather giving qualified women more opportunities than what they are given now".

Table 12: Actions to establish, and monitor, gender diversity targets at all levels: industry targets, IPPs and companies

What	When	Impact	Who	How
Engage the Department of Employment and Labour (DEL) to include a measure for renewable energy in the	Immediate 	High 	DMRE	DMRE should engage with the Department of Employment to revise the data collection process for the Employment Equity Annual Report to include Renewable Energy as a category.

[48] James, "Gender Diversity Working Group: Aspirations."

What	When	Impact	Who	How
Commission for Employment Equity Annual Report				
Establish, monitor, and evaluate gender diversity targets for the utility-scale solar and wind energy sectors	Immediate 	High 	DMRE, Companies, SAPVIA, SAWEA	DMRE should review existing gender targets for the REIPPPP to ascertain if these can be extended. SAPVIA and SAWEA should hold workshops with their members to establish gender diversity targets and results (in the form of outputs, outcomes, and impacts) based on the recommendations in this report and the input from member companies.
Encourage companies to set gender diversity targets	Immediate 	High 	SAPVIA, SAWEA	Incentives and membership requirements can be used to encourage organisations to become intentional about setting gender diversity targets and employing women and non-binary people at all organisational levels.
Continue to assess sector-wide targets against global developments	Medium Term 	Medium 	DMRE	An assessment should be undertaken to ensure the sector targets are aligned to global developments, such as the SDGs and the United Nations Women and UN Global Compact's Empowerment Principles.

Chapter 4: Conclusion

This report has shown that while the South African wind and solar energy sectors need to undertake more work to become truly gender diverse, there is an openness within the sectors to embrace gender diversity, with some creative initiatives, both formal and informal, underway. It is also encouraging to see that many in these sectors have moved beyond the female/male binary to embrace non-binary identities when discussing gender, and to reflect on what this means for gender diversity and the changes that need to be made in the sectors.

As this report noted earlier, achieving the SDGs by 2030 is a global priority, and the wind and solar sectors can play an important role in supporting the achievement of SDG 5 (women's equity) and SDG 7 (sustainable, modern energy for all). This report provides recommendations, with clear actions, to support and encourage the sectors to ensure greater gender diversity and contribute to the global movement towards realising the SDGs.

References

DEL. "20th Commission for Employment Equity Annual Report 2019-20." Pretoria, South Africa: Department of Employment and Labour, 2020. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2019%20-2020/20thCEE_Report_.pdf.

———. "21st Commission for Employment Equity Annual Report 2020-21." Pretoria, South Africa: Department of Employment and Labour, 2021. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2020-2021/21%20CEE%20Report.pdf.

———. "22nd Commission for Employment Equity Annual Report 2021-22." Pretoria, South Africa: Department of Employment and Labour, 2022. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2021/22nd%20CEE%20Annual%20Report.pdf.

Department of Labour. "Employment Equity | Labour Guide." Labour Guide, 2022. https://www.labourguide.co.za/employment-equity/employment-equity.

Department of Mineral Resources and Energy. "Women Empowerment and Gender Equality Strategy for the Energy Sector (2021-2025)." Strategy, April 7, 2021. http://www.energy.gov.za/files/PPMO/2021-2025-WEGE-Strategy-for-the-Energy-Sector.pdf.

———.. "Women Empowerment and Gender Equality Strategy for the Energy Sector 2021 – 2025." Pretoria, South Africa: Department of Mineral Resources and Energy, 2020. http://www.energy.gov.za/files/PPMO/2021-2025-WEGE-Strategy-for-the-Energy-Sector.pdf.

Department of Higher Education T. "Higher Education Management Information-System (HEMIS) - Data Reports." Department of Higher Education and Training. Accessed September 21, 2022. https://www.Department of Higher Education t.gov.za/SitePages/Higher-Education-Management-Information-System.aspx.

DuBow, Wendy, and Alison Scott Pruitt. "The Comprehensive Case for Investing More VC Money in Women-Led Start-ups." Harvard Business Review, September 18, 2017. https://buy.tinypass.com/checkout/template/cacheableShow?aid=mbs77qtzUz&templateId=OTBSP342X41S&templateVariantId=OTVONZEJ553KR&offerId=fakeOfferId&experienceId=EXKXS3HNJTI4&iframeId=offer_4462b92d0ea4750a828e-0&displayMode=inline&widget=template&url=https%3A%2F%2Fhbr.org.

ENERGIA, World Bank—ESMAP, and UN Women. "Accelerating SDG 7 Achievement: Policy Brief 12 - Global Progress of SDG 7 – Energy and Gender." UN, 2018. https://sustainabledevelopment.un.org/content/documents/17489PB12.pdf.

Government of South Australia. "Guidelines for Gender-Neutral Recruitment," January 2022, 12.

Hannon, Kerry. "Are Women Too Timid When They Job Search?" Newsletters. *Forbes* (blog), September 11, 2014. https://www.forbes.com/sites/nextavenue/2014/09/11/are-women-too-timid-when-they-job-search/.

IFC. "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees." International Finance Corporation, 2022. https://www.ifc.org/wps/wcm/connect/b089848b-2dd3-458b-85e1-5db3f04cb153/IFC135+-+E2E+Report_V5.pdf?MOD=AJPERES&CVID=o52j5wH.

Inc.Africa. "7 Steps to Promote Gender Equality in Recruiting and Hiring." Newsletter. Inc.Africa, 2020. https://incafrica.com/library/entrepreneurs-organization-7-steps-to-promote-gender-equality-in-recruiting-hiring.

IPP Office. "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021." Quarterly. Centurion, South Africa: Independent Power Producers Office, March 2022. https://www.ipp-projects.co.za/Publications.

IRENA. *Wind Energy: A Gender Perspective*. Abu Dhabi: International Renewable Energy Agency, 2020. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jan/IRENA_Wind_gender_2020.pdf.

IRENA and ILO. "Renewable Energy and Jobs – Annual Review 2021." Abu Dhabi, United Arab Emirates: International Renewable Energy Agency, 2021. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_823807.pdf.

James, Laura. "Gender Diversity Working Group: Aspirations." PowerPoint presented at the SAWEA GDWG Networking Group Breakfast, Cape Town / Johannesburg, August 9, 2022.

Springworks Team. "10 Clever Interview Practices to Attract and Hire More Female Candidates." Blog. *Springworks Blog* (blog), August 25, 2021. https://www.springworks.in/blog/hire-female-candidates/.

Stappard, Chris. "4 Ways to Make Your Recruitment Process Gender Inclusive." Luminate, February 2020. https://luminate.prospects.ac.uk/4-ways-to-make-your-recruitment-process-gender-inclusive.

UN Women. "Women's Empowerment Principles Call to Action: Gender Equality in the Renewable Energy Industry." UN Women, 2020. https://www.weps.org/sites/default/files/2021-02/CALL_TO_ACTION_Gender_Equality_Renewable_Energy_Industry.pdf.

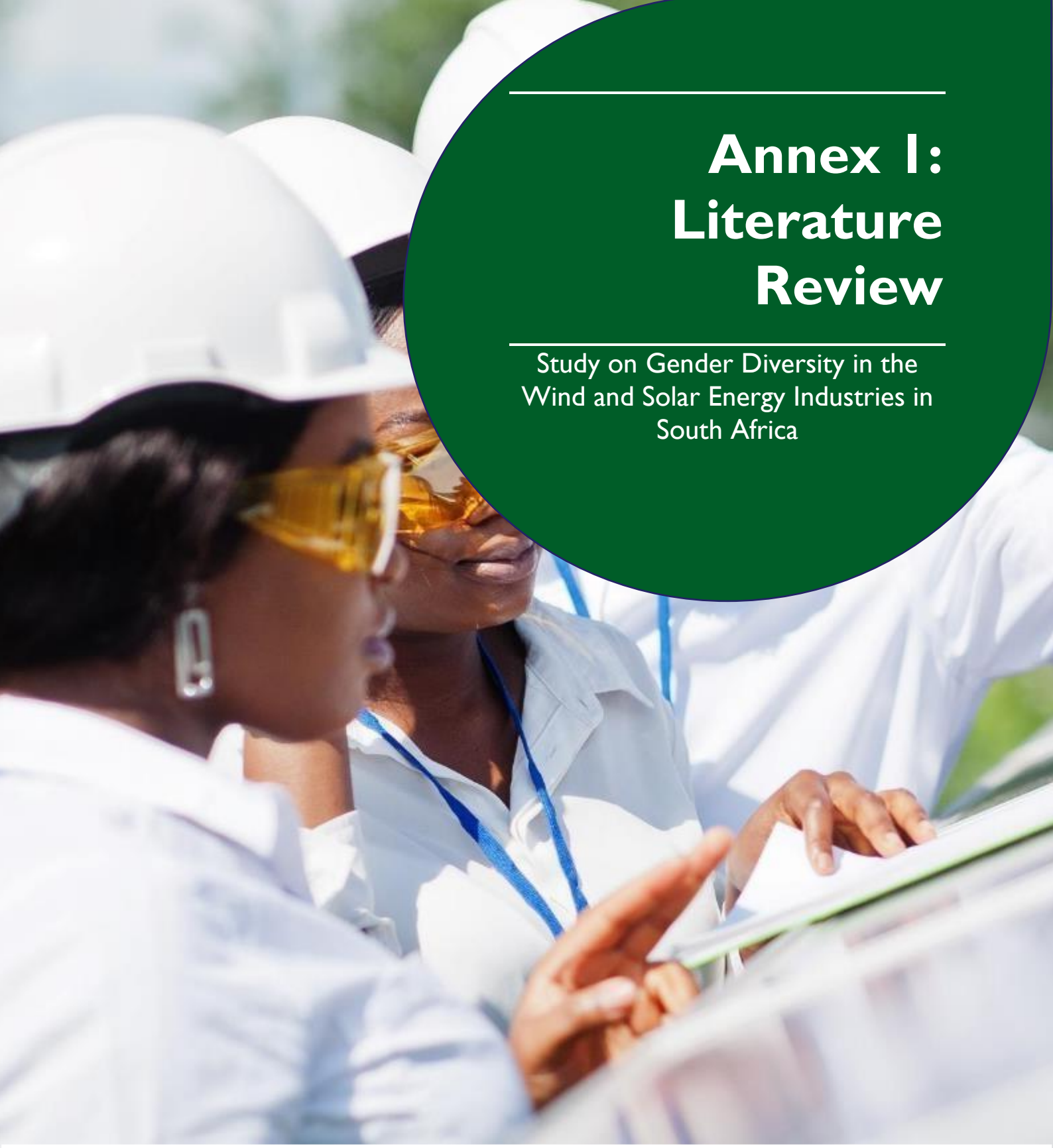
Urban Earth. "Status Quo of Gender Diversity." Unpublished Draft. Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa, September 2022. https://ueptyltd.sharepoint.com/:w:/s/GIZStudyonGenderDiversity/EW4Z9Zdmv1NCo5Bdps8qo1QBr5ZUAEBEVLbGJ_03B2j_6Q?e=1nd0G1.

———. "Wind and Solar Energy-Related Courses in Academic Institutions in South Africa." Unpublished Draft. Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa, September 2022. https://ueptyltd.sharepoint.com/:w:/s/GIZStudyonGenderDiversity/EW4Z9Zdmv1NCo5Bdps8qo1QBr5ZUAEBEVLbGJ_03B2j_6Q?e=1nd0G1.

Annexes

The following reports are presented as annexes below:

- Literature Review Report
- Status Quo Report
- Academic Review Report
- Data analysis and Projections Report



Annex 1: Literature Review

Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa

Energy Partnership
Energiepartnerschaft
South Africa - Deutschland

mineral resources & energy
Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

SAWEA

SAPVIA
South African Photovoltaic Industry Association

Federal Ministry
for Economic Affairs
and Climate Action

Annex 1: Literature Review

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Acronyms

AGENT	Advancing Gender in the Environment (ten-year program launched by USAID in 2014 and implemented by the IUCN)
C3E	Clean Energy, Education, and Empowerment
CEEW	Council on Energy, Environment and Water
CFF	Climate Finance Facility
DMRE	Department of Mineral Resources and Energy (National)
DOE	Department of Energy (Merged with the Department of Mineral Resources in 2019 to form the DMRE)
DPSA	Department of Public Service and Administration (National)
EAP	Economically active population
GWEC	Global Wind Energy Council
GWNET	Global Women's Network for the Energy Transition
IEA	International Energy Agency
IFC	International Finance Corporation
ILO	International Labour Organisation
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
OECD	Organisation for Economic Co-operation and Development
PV	Photovoltaic
SAPVIA	South African Photovoltaic Industry Association
SAWEA	South African Wind Energy Association
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
STEM	Science, Technology, Engineering, and Mathematics
TCFD	Task Force on Climate-related Financial Disclosures
UN	United Nations
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WEGE	Women Empowerment and Gender Equality

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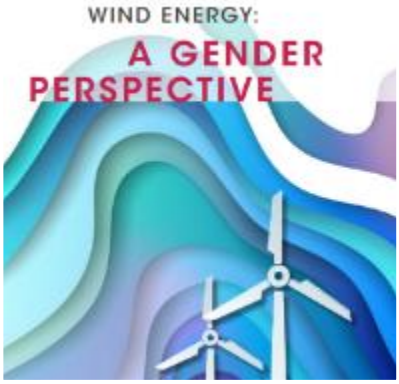
Executive Summary

The German-South African Energy Partnership in association with the Department of Mineral Resource and Energy (DMRE) are supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study on the utility-scale wind and solar sectors in South Africa. The purpose of this report is to provide a summary literature review of the state of gender diversity in the international utility-scale solar and wind energy sectors.



However, in recent years the International Renewable Energy Agency and the International Labour Organisation have produced a series of reports and documents on jobs and gender representation in the renewable energy sector.

This report is limited by the lack of a significant body of literature and data on gender diversity in the utility-scale wind and solar sectors.

What is Gender Diversity?

Gender diversity and representation should incorporate everyone in all their diversity including cis-women, cis-men, gender non-conforming people, non-binary people, and trans women and men.

Given that the data in the wind and solar sector is significantly limited to cis-women and cis-men, for ease of reading in this Literature Review we will refer to women and men. Further, "gender diversity" and "gender representation" will be used to refer to only cis-women and cis-men unless stated otherwise.

Women's participation in the wind and solar sectors

Globally, it has been estimated that women account for only 32% of the oil and gas, renewables, and wind power workforce.[49] However, research by the International Renewable Energy Agency (IRENA), specifically on gender in the wind industry, found that women held just 21% of jobs in the wind workforce.[50] In addition to the lower rates of participation, global research has found "that women are more likely to be employed in lower-paid, non-technical, administrative and public relations positions than in technical, managerial or policy-making positions".[51]

A breakdown of women's share of employment by key job categories in the global oil and gas, renewables, and wind power workforce for 2018 is shown in the figure below.[52] This graph clearly shows a poor representation of women in careers that required science, technology, engineering, and mathematics (STEM) trained professionals.

32%

Women's share in the oil and gas, renewables, and wind power workforce globally

21%

Women's share in the wind power workforce globally

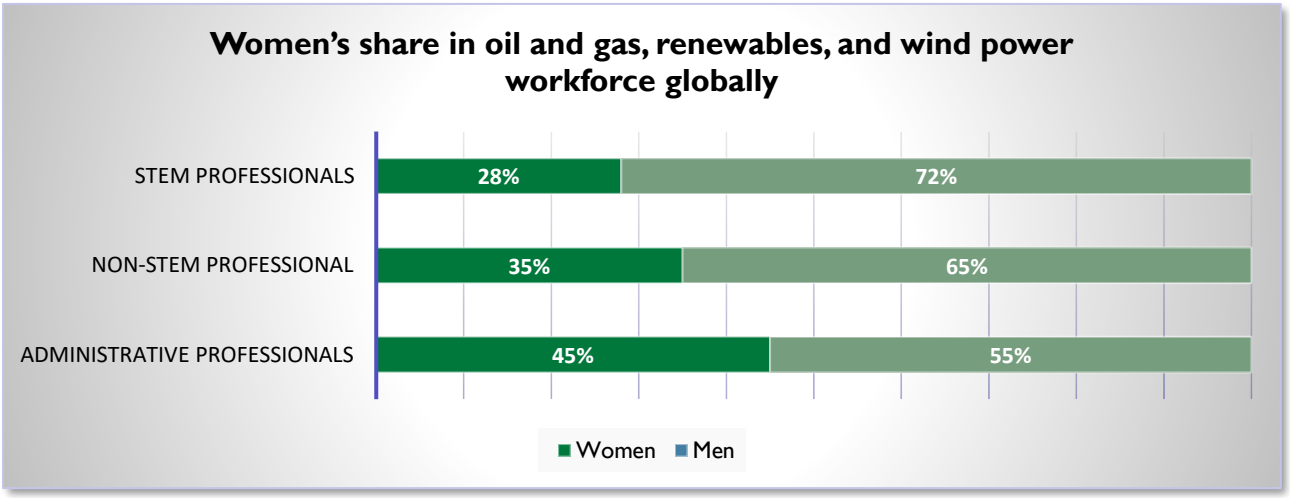


Figure 14: Women's share in oil and gas, renewable energy and wind power workforce globally

Similar to global statistics, research into women's participation in the renewable energy sector in Sub-Saharan Africa (SSA) found that on average women make up 32% of the full-time employees in the renewable energy sector. However, these positions are mostly concentrated in corporate support functions rather than the core business functions which are important for feeding the leadership pipeline.[53] Figure 15: Gender Share of employment by Department in SSA Survey below shows the breakdown of women's share of employment by category for the SSA market.[54]

[49] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[50] IRENA and ILO.
[51] IRENA and ILO, 18.
[52] IRENA and ILO, 18.
[53] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[54] IFC.

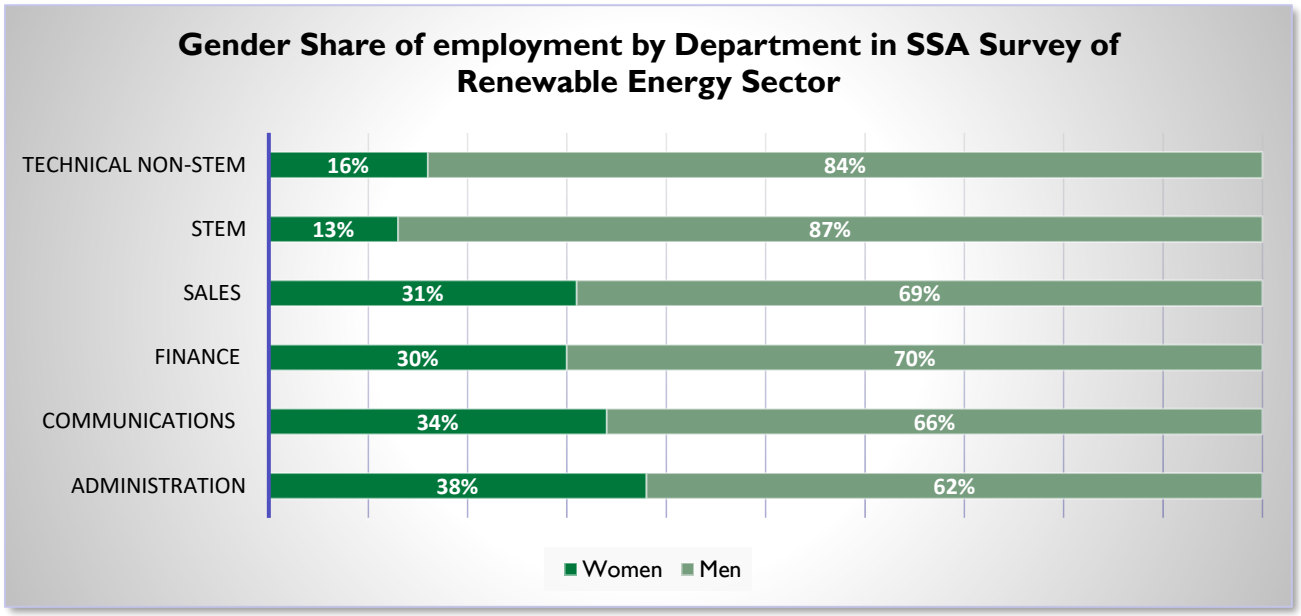


Figure 15: Gender Share of employment by Department in SSA Survey

Examination of women's participation in energy industries in selected countries where data were available showed a more variable picture with women's share of the workforce ranging from as low as 1% up to 31% depending on country and sector.

Jordan	In the Middle Eastern country of Jordan, women held 5% of renewable energy jobs in 2020. Furthermore, in 2020 in Jordan's solar sector women held 8% of jobs, while in the wind sector women held just 1% of the jobs.[55]
Türkiye	Women accounted for 10.5% of the workforce in the "Electricity, gas, steam, water supply, sewerage etc." economic activity in Türkiye in 2021.
India	In a study on the rooftop solar sector in India, in which data was collected at the end of 2018 from eight Indian companies, it was found that women accounted for, on average, 11% of the workforce in these companies.[56]
Australia	In Australia, women accounted for 24% of the workforce in the "Electricity, Gas, Water and Waste Services" sector.[57]

[55] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[56] IEA and CEEW, "A Look at India's Transition to Clean Energy."
[57] Australian WGEA, "Gender Segregation in Australia's Workforce."

Brazil	A breakdown of the workforce in Brazil's solar energy sector showed that, in 2019, 28% of the workforce was women and 72% was men.[58]
United States of America	In the United States in 2021, women accounted for 25% of the workforce on average in the energy sector. However, in both the solar and wind energy sectors in the United States, women accounted for 30% of the workforce on average in 2021.[59]
Canada	In Canada, in 2019, women accounted for 31% of the workforce in the energy sector as a whole (including the renewable energy sector).[60]

Figure 16: Statistics on women's participation in the renewable energy sector in selected countries

Figure 16 is a summary of the gender representation in the sector for the different countries, where data was available. It is challenging to compare these countries to South Africa because of different developmental and economic priorities and specific contextual realities. However, the data does show that in only two countries (Canada and USA) women accounted for more than 30% of the workforce, which are similar percentages to South Africa (see below).

Figure 16 also shows that in countries which have similar socio-economic and developmental priorities to South Africa (such as India and Brazil), women representation in the solar sector is lower than the global average, with India reporting only 11% in the surveyed companies and Brazil 28% of the solar workforce. Other countries, such as Jordan and Türkiye have even lower levels of women represented in the sector.

There is relatively good gender representation in the workplace data for South Africa, due to mandatory employment equity reporting. However, this data is limited to large sectors in the overall economy. Renewable energy forms part of the large "Electricity, Gas, Steam and Air Conditioning Supply sector". Similar to Global and African statistics women make up 33.2% of the workforce in this sector. It should also be noted that the total size of the workforce, as well as the percentage of women in the workforce in the sector, decreased from 36.3% in 2019/20 to 33.6% in 2020/21.[61]

[58] CFF and GIZ, "Solar Energy in Brazil."
[59] U.S Department of Energy, "United States Energy and Employment Report 2022."
[60] Natural Resources Canada, "Energy Fact Book 2021-2022."
[61] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

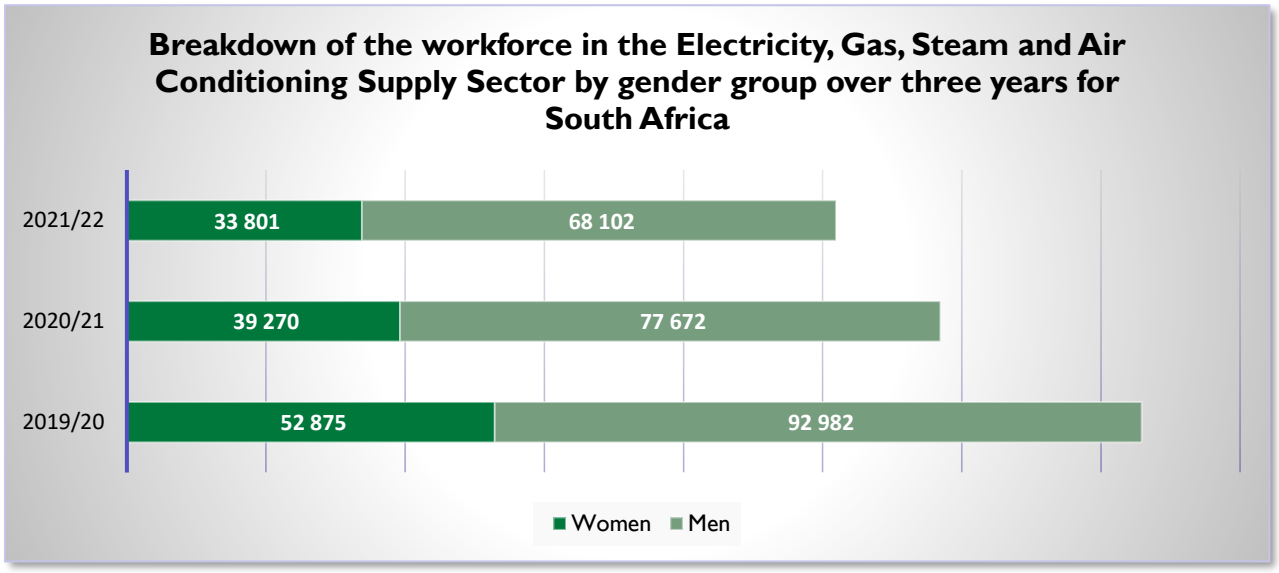


Figure 17: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years for South Africa

The gender dimensions of employment in the global renewable energy sector are therefore generally not well reported as few countries capture gender in their national employment statistics.[62] Where data is available, it is often for the broader energy sector which includes traditional energy industries such as oil and gas rather than the renewable energy industry alone. Employment and gender data on specific components of the renewable energy industry such as Solar or Wind, which is ideally required for this report, is even more limited.

Barriers to equitable gender representation

There are several barriers to equitable gender representation in the global renewable energy industry, in general, and the solar and wind sectors in particular, that have been identified in the literature. These barriers have been categorised into ***barriers to entry*** and barriers in ***career progression and retention***.

[62] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."

Barriers to entry

Key barriers to entry that have been identified are:

- ⚥ **Perception of gender in relation to energy-related courses and employment:** Historically, the energy industry has been associated with both intense physical labour and/or the science and engineering fields, all of which have been perceived to be "male work".

- ⚥ **Social norms and gender stereotypes:** Prevalent social norms and gender stereotypes drive many of the barriers women experience when entering the sector perpetuating a vicious cycle of gender-based division in the roles and responsibilities of women and men.

- ⚥ **Lack of (effective) programmes promoting women's uptake of energy or STEM-related courses at the tertiary level:** Studies have shown that women are less represented in energy-related courses.[63] Although there have been some efforts and programmes globally to encourage women's uptake of energy or STEM-related courses, this has not yet resulted in a meaningful representation of women at the tertiary level.

- ⚥ **Lack of information about the wind and solar sectors:** Reports indicate many women remain uninformed about the wind and solar energy sectors as these sectors stemmed from the renewable energy sector, which in turn forms part of the energy industry.[64]

Perception of gender in relation to energy related courses and employment

Social norms and gender stereotypes

Lack of (effective) programmes promoting women's uptake of energy or STEM-related courses at tertiary level

Lack of information about the wind and solar sectors

[63] C3E International and IEA, "Gender Equality in the Energy Sector."
[64] Baruah, "Renewable Inequity?"

Barriers to progression and retention

Key barriers in career progression and retention that have been identified are:

- **Lack of gender supportive policies and targets:** Many studies cite the lack of gender supportive policies within companies and organisations, related to this is a lack of targets around gender diversity and audits (with associated corrective action plans).
- **Legal Barriers:** There are countries in sub-Saharan Africa which have laws that prohibit women from accessing good-paying jobs in the renewable energy sector, which will impede women's ability to move into senior, well-paying, roles in the sector.
- **Social Norms and Gender Stereotypes:** Social norms and gender stereotypes within the renewable energy sector have been widely identified as significant barriers to career progression and retention of women.
- **Lack of and poor support for family-friendly policies:** The renewable energy sector, and within it the wind and solar sector, remains dominated by a lack of family-friendly policies that recognise most women's double role as both the primary caregiver and homemaker and professional.
- **Lack of health, safety and wellbeing in workplaces:** The lack of focus on women's health, safety and wellbeing, while a problem in itself, also limits women's career progression and affects retention of women in the sector.
- **Lack of mentorship and role models:** Women cited a lack of mentorship and role models as a significant factor limiting their participation and confidence in pursuing higher positions and/or more technical roles, with most senior positions filled by men.[65] [66]
- **Gender pay gap:** Pay inequalities between men and women remain a reality, which discourages women from entering and remaining in the sector.
- **Lack of STEM educational background:** This barrier to career growth is an outcome of a barrier to entry, namely the low number of women studying STEM at secondary and tertiary levels.

[65] IEA and CEEW, "A Look at India's Transition to Clean Energy."
[66] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."

- ⚥ **Limited career growth opportunities:** The literature showed limited career growth opportunities for women within the sector, driven by perceptions that the nature of the work is inappropriate for women and the idea still widely held in the sector that women do not deliver high-quality work in these sectors.[67] The literature also found the "glass ceiling" to be a significant challenge to retaining women and women's career progression in the renewable energy sector.[68]
- ⚥ Recommendations from the literature

The following key recommendations are highlighted in the literature to address barriers to gender diversity:

- ⚥ **Tailoring training and skills development programmes for women:** There is a need to tailor training and skills development programmes for women to ensure that women's participation in the sector is supported and reinforced through training and mentoring.[69]
- ⚥ **Gender transformative training for policy and decision-makers:** There is a need to put in place gender transformative training for policy and decision-makers, and industry role players and regulators at the higher levels to inform policies and programmes and create an enabling environment for gender inclusivity.[70]
- ⚥ **Attracting women to the sector:** There is a need to attract more women to enter the sector across all work bands through effective recruitment strategies that target women.
- ⚥ **Retaining women in the sector:** There is a need to create work environments in the sector that support the retention of women.
- ⚥ **Challenging cultural and social norms:** There is a need to challenge barriers to gender inclusivity that are perpetuated through gendered norms and social expectations which lead to assumptions that leadership and technical skills in the wind and solar energy field are best suited to men.
- ⚥ **Mainstreaming gender in energy sector frameworks:** There is a need to mainstream gender into energy sector frameworks including policies, programme design and project implementation.
- ⚥ **Improve gender-disaggregated data by job category:** There is a need to have gender disaggregate data by job categories in the wind and

[67] CFF and GIZ, "Solar Energy in Brazil."
[68] IRENA, *Renewable Energy and Jobs – Annual Review 2018*.
[69] IRENA, *A Gender Perspective*, 15.
[70] Elwell, Mershon, and Aguilar, "Women at the Forefront of the Clean Energy Future."

solar sectors to understand the status of gender diversity and track the effectiveness of action to address gender diversity.

- ⚥ **Setting targets and quotas:** Global commitments are important; however, targets are integral in ensuring gender equity and inclusivity in renewable energy.[71]

[71] Elwell, Mershon, and Aguilar.

Introduction

The German-South African Energy Partnership in association with the Department of Mineral Resources and Energy is supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study of the utility-scale wind and solar energy sectors in South Africa.

Figure 18: The objectives of the study

To complete this gender diversity study, several different reports have been commissioned including:

Report	Purpose
Literature Review (This Report)	A summary of the literature on the state of gender representation in the international utility-scale wind and solar energy sectors
Status Quo	A summary of the current state of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Academic Review	A summary of gender representation in academic courses and qualifications in South Africa related to the utility-scale wind and solar energy sectors
Data Analysis and Projection	An analysis of the available data on gender diversity in the utility-scale wind and solar energy sectors in South Africa as well as related projections of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Recommendations to improve Gender Diversity	A summary of recommendations to improve gender diversity in the utility-scale wind and solar energy sectors in South Africa

The purpose of this report is to provide a summary literature review of the state of gender representation in the international utility-scale solar and wind energy sectors. The report includes a summary of current available information regarding gender diversity in the international and local solar and wind sectors. The structure of the literature review is summarised in Figure 19 below.

Context

- The definitions and terms used in the review are described.

Methodology

- The methodology for the review and the limitations of this methodology are described.

Women's Participation

- The available statistics on gender diversity internationally in the utility scale wind and solar sectors are portrayed?

Barriers

- Existing barriers to women's participation in in the utility scale wind and solar sectors are identified?

Recommendations

- Recommendations for addressing barriers in the utility scale wind and solar sectors are defined?

Figure 19: Chapters summarising the elements of the Literature Review

Context

The following chapter provides an overview for the literature review and outlines key terms and concepts. This chapter includes definitions of gender diversity, what we consider to be included in the wind and solar sector and how employment in South Africa is defined.

Defining Gender Diversity

Gender diversity is the equitable and fair representation of people of different genders within an organisation or system. Globally, and in South Africa, gender is often assumed to refer only to cis-women and cis-men (someone whose gender identity aligns with the sex they were assigned at birth); however, the recent past has seen important developments in understanding gender identity, with recent definitions embracing a broad definition of gender as seen below from the Ontario Human Rights Commission.[72]

> *"Gender identity is each person's internal and individual experience of gender. It is a person's sense of being a woman, a man, both, neither, or anywhere along the gender spectrum. A person's gender identity may be the same as or different from their birth-assigned sex."*

Gender identity has developed to embrace and recognise everyone in all their diversity, and as such, gender identity includes:

- ⚥ **cis-women, cis-men** (someone whose gender identity aligns with the sex they were assigned at birth),
- ⚥ **gender non-conforming people** (individuals who do not follow gender stereotypes based on the sex they were assigned at birth),
- ⚥ **non-binary people** (people who do not wish to be identified as either male or female, believing that their identity is beyond the binary of either female or male), and
- ⚥ **transgender people** (an umbrella term that describes people with diverse gender identities and gender expressions that do not conform to stereotypical ideas about what it means to be a woman or man in society).

Gender diversity and representation should therefore incorporate everyone in all their diversity including cis-women, cis-men, gender non-conforming people, non-binary people, and trans women and men.

However, the international and South African wind and solar energy sector's data is currently overwhelmingly limited to cis women and cis men. This means that the data available from most of the sectors will not offer information for all genders, but rather will provide a picture of representations of cis-women and cis-men. It is possible that the tertiary sectors may have begun to collect this data using broader categories of gender. Where these data are available, they will be included.

Given that the data in the wind and solar sector is significantly limited to cis-women and cis-men, for ease of reading in this Literature Review we will refer to women and men. Further, "gender diversity" and "gender representation" will be used to refer to only cis-women and cis-men unless stated otherwise. However, the

[72] Ontario Human Rights Commission, "Policy on Preventing Discrimination Because of Gender Identity and Gender Expression."

final report will reflect on this and recommend the sector adopt a broader understanding of gender diversity and representation.

Defining Equality and Equity

There are important differences between gender equality and gender equity. *Gender Equality* refers to a scenario where everyone gets the same and has the same opportunities irrespective of their sex assigned at birth. *Gender Equity*, on the other hand, everyone gets what they need to be successful and to realise opportunities. This distinction between equality and equity is illustrated in Figure 20, which clearly shows the importance of equity and the concept of fairness. [73]

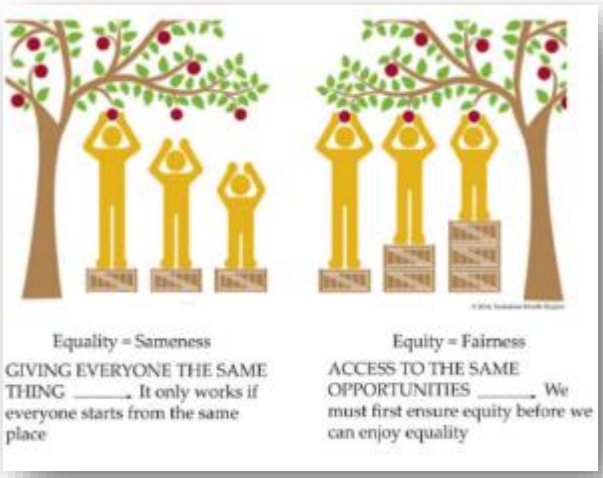


Figure 20: Illustration of Equality vs Equity

Many global and national policies and reports call for gender equality within the wind and solar sector. However, equality between all genders is an end goal, with equity being a necessary first step to enable equality to be realised. At this stage within the wind and solar sector we need to focus on gender equity, as this involves specifically addressing the historical inequities, and challenges experienced by women and other minority genders, both in terms of entering the sector and progressing once in it.

Gender Diversity as a Sustainable Development Goal

Sustainable Development Goals (SDGs) have created a global commitment that provides leverage to hold key stakeholders to account around, amongst other things, gender equality and gender diversity and representation in the renewal energy sector through SDGs 5 and 7 in the figure below.

[73] Saskatoon Health Region, "CommunityView Collaboration - Saskatoon Health Region Advancing Health Equity."

Figure 21: SDG 5: Gender Equality and SDG 7: Affordable and Clean Energy

SDG 5 aims to "achieve gender equality and empower all women and girls" by 2030 and SDG 7 seeks to "ensure access to affordable, reliable, sustainable and modern energy for all".

Achievement of either of these targets is inter-linked and as noted in the "First SDG 7 Review at the UN High Level Political Forum 2018", SDG 7 is "more likely to be achieved if the gender-energy-poverty nexus is recognised and integrated into development policies and planning." Furthermore, the report noted that integrating energy and gender issues will also contribute to achieving many other SDGs "through improving the quality of services provided for maternal health, food security, clean water, entrepreneurship, agriculture, and education. At the same time, women's participation [in the energy sector] can increase the project and policy effectiveness and efficiency of energy-sector interventions and the achievement of SDG 7".[74]

Despite these two SDGs providing important leverage for the greater and more equitable involvement of women and girls in the renewable energy sector, most of the targets focus on increasing women and girls' access to renewable energy, rather than equal representation within the renewable energy sector. Furthermore, while referring to "gender equality" they appear to focus almost exclusively on women and girls and ignore non-binary people.

[74] ENERGIA et al., "Global Progress of SDG 7 - Energy and Gender."

Defining the Employment in the Wind and Solar Sector

The Wind Sector

For this study, the wind sector is defined as individuals and organisations that are involved in the process of converting wind power to generate electricity. This process typically involves a wind turbine that is connected to an electricity reticulation grid. Wind turbines can range from small household-level "off-grid" turbines that do not connect to the municipal electricity grid, to large on-shore or off-shore farms that connect to the national transmission network. It should be noted that for this study as the focus is on the utility-scale wind sector the specific area of interest is large on-shore and off-shore wind farms.

The Solar Sector

For this study, the Solar sector is defined as individuals and organisations that are involved in the process of converting energy from the sun into electricity or thermal energy. The conversion of solar energy to electricity typically involves solar photovoltaic panels connected to the electricity grid through an inverter, while the conversion of solar energy to thermal energy can be through technologies that concentrate solar energy or through direct transfer technologies such as solar water heating. As with the wind sector, the solar sector ranges in size from small household units to large industrial-scale solar farms. It should be noted that for this study as the focus is on the utility-scale solar sector the specific area of interest is large solar farms.

Defining employment

A core focus of the gender diversity study in the wind and solar sectors in South Africa is the number of people employed in the sector. The definition of employment does however vary depending on your location and sector.

The International Labour Organisation (ILO) defines "persons in employment" as:[75]

[75] ILO, "Resolution I."

Persons in employment are defined as all those of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit. They comprise (a) employed persons "at work", i.e., who worked in a job for at least one hour; (b) employed persons "not at work" due to temporary absence from a job, or to working-time arrangements (such as shift work, flexitime and compensatory leave for overtime).

Furthermore, the ILO defines the "Working-age population" as:[76]

The working-age population is commonly defined as persons aged 15 years and older, although the age limits can vary from country to country.

In South Africa, "employment" is defined in the *Basic Conditions of Employment Act, 1997 (No. 75 of 1997)* as having a meaning that corresponds (is equivalent to) "employee" and "employed".[77] These three terms are defined as:

> *"employee" means—*
>
> *(a) any person, excluding an independent contractor, who works for another person or for the State and who receives, or is entitled to receive any remuneration; and*
>
> *(b) any other person who in any manner assists in carrying on or conducting the business of an employer.*
>
> *and "employed" and "employment" have a corresponding meaning*

Furthermore, the *Basic Conditions of Employment Act, 1997 (No. 75 of 1997)* states that children under the age of 15 may not be employed:[78]

> ***Prohibition of employment of children***
>
> *43. (1) No person may employ a child—*
>
> *(a) who is under 15 years of age; or*
>
> *(b) who is under the minimum school-leaving age in terms of any law. if this is 15 or older. "*
>
> *(2) No person may employ a child in employment—*
>
> *(a) that is inappropriate for a person of that age;*
>
> *(b) that places at risk the child's well-being. education. physical or mental health. or spiritual. moral or social development.*

[76] ILO, "Labour Statistics Glossary."
[77] Republic of South Africa, Basic Conditions of Employment Act, 1997 (No. 75 of 1997).
[78] Republic of South Africa.

Employment Opportunities in the Wind and Solar Sectors

The utility-scale solar and wind sector is a diverse and complex industry. The private sector value chain alone includes many different activity areas such as project development, construction, manufacturing, finance, and operations and maintenance. There are also many public sector roles and responsibilities such as compliance, auditing, setting regulations and enforcement. A third broad area of activity lies with civil society, where organisations can promote the industry, communicate with stakeholders and apply pressure on different spheres of government to fast-track the industry. A non-exhaustive list of employment opportunities in the sector is provided in the Annex entitled Annexes

Annex 1.1: List of Employment Opportunities in the Solar and Wind Sectors.

Methodology and Limitations

An initial online search revealed very little literature focused on issues of gender diversity and representation within the solar and wind sector value chain, therefore, it was not necessary to develop a sampling method to identify key literature. All literature, both international and national, covering the topic of gender representation in the renewable energy value chain were included as sources and summarised. Online searches using Google search, Google Scholar and key relevant websites considered published papers, reports and relevant policy reviews. Once an initial list of online literature was compiled it was shared at both the project inception meeting and a meeting with representatives from the SAWEA Gender Diversity Working Group, where partners were asked to identify additional resources that had not been listed. This validation and input process with key stakeholders was essential to identify additional sources, particularly unpublished reports, as so little has been published on the topic. A total of 101 papers and reports were reviewed. All literature was analysed to identify key themes and sub-themes, these were synthesised to extract key data, lessons and good practice, gaps, and recommendations.

A list of international reports is shown in the Annex entitled Annex 1.2: Key International Reports and a list of national reports is shown in the Annex entitled Annex 1.3: Key National Reports

Despite an extensive body of research covering the international wind and solar sectors this literature review has limitations. The bulk of the research is focused on the technical and financial aspects of the two sectors, with limited international research on gender representation in the sectors. Furthermore, the focus of gender-based research in the renewable energy sector is often on ensuring women and girls access to wind and solar energy, specifically in the context of poor and marginalised communities, very little research has focused on women's meaningful involvement in all elements of the value-chain. Additionally, data that is available focuses almost exclusively on cis-women and cis-men, ignoring other genders, resulting in an incomplete analysis of gender diversity and representation in the wind and solar sectors. Finally, very few reports focused on the Southern Africa region.

Key sources of information

The International Renewable Energy Agency (IRENA) and the ILO are key institutions in the wind and solar sectors, that have produced a series of reports and documents on jobs and gender representation in the renewable energy sector. The bulk of statistics on global gender representation in the wind and solar industries are provided by IRENA's annual review publication on Renewable Energy and Jobs, and

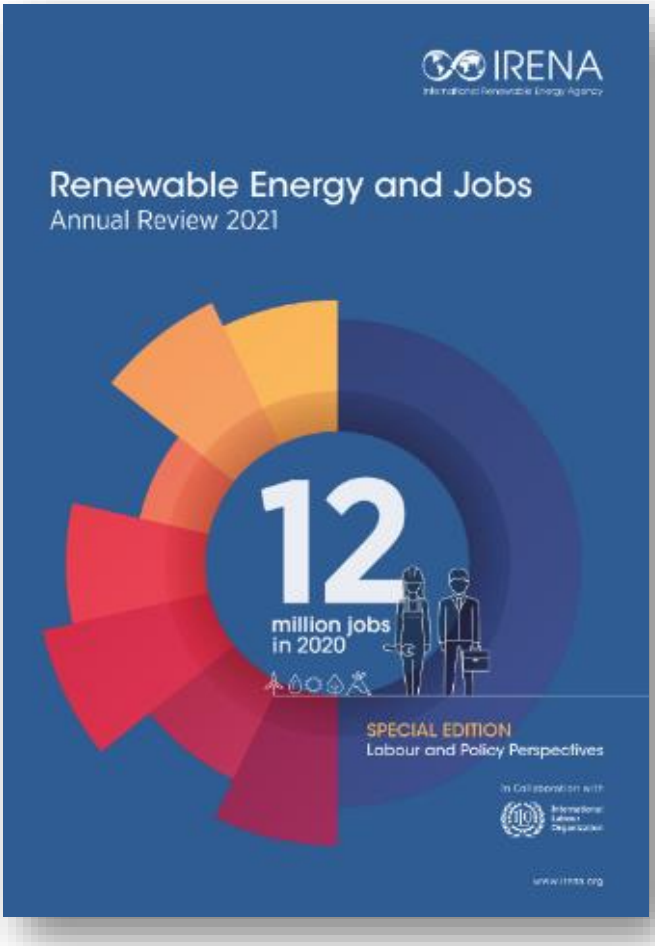


Figure 22: Cover page of IRENA Renewable Energy and Jobs Review 2021

most notably the recent Special Edition Labour and Policy.[79] This work has also been supported by the ILO, which has also published its own key resources, which have informed this review. The ILO has also developed a publication series on Skills for Green Jobs in countries which are not dominant role players in the renewable industry. This series has also provided key insights into renewable energy labour markets in developing economies.[80] The United States Agency for International Development (USAID) together with the International Union for Conservation of Nature (IUCN) have published a series of reports on their *Advancing Gender in the Environment (AGENT)* program which aims to promote gender equality in the energy sector. These reports also served as important resources. The International Energy Agency (IEA) is an important resource that has informed review. The IEA and the Council on Energy, Environment and Water (CEEW) have undertaken studies focused on renewable energy in selected countries[81] and broader energy market-related reports.[82]

The International Finance Corporation (IFC) published a report entitled *Women's participation in renewable energy workforce in Sub-Saharan Africa: Identifying barriers and opportunities for women as leaders and employees*, which was a key report that informed this review.[83] Other key South African reports include the national Department of Employment and Labour's *22nd Commission for Employment Equity Annual Report 2021-22*,[84] the United Nations Industrial Development Organization's (UNIDO) Policy Assessment for the Economic Empowerment of Women in Green Industry - Country Report: South Africa, and two other reports, *Employment Potential of Renewable Energy in South Africa,*[85] and *South Africa's renewable energy policy roadmaps*.

Figure 23: Cover page of IFC Report on Women's Participation in The Renewable Energy Workforce in sub-Saharan Africa

[79] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[80] ILO, *Skills for Green Jobs in Bangladesh*.
[81] IEA and CEEW, "A Look at India's Transition to Clean Energy."
[82] IEA, *World Energy Outlook 2019*.
[83] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[84] DEL, "22nd Commission for Employment Equity Annual Report 2021-22."
[85] UNIDO, "Policy Assessment for the Economic Empowerment of Women in Green Industry - Executive Summary: South Africa."

Women's participation in the wind and solar sectors

The following chapter provides a summary of the available data on women's representation and participation in the global wind and solar sectors.

Introduction

Understanding the level of women's participation in the wind and solar sectors is hampered by the absence of good data. The gender dimensions of employment in the renewable energy sector are generally not well reported as few countries capture this in their national employment statistics.[86] It should also be noted that data is not always available for the renewable energy industry, but rather for the broader energy sector including traditional energy industries such as oil and gas. Reporting on specific components of the renewable energy industry such as Solar or Wind, which is ideally required for this report, is even more limited. However, IRENA has included gender-disaggregated data in some of its reporting[87] and has recently published a report on gender in the wind industry.[88] IRENA is also planning to release a report on gender in the Solar PV sector soon.[89] In addition, some data has been sourced on individual countries.

Global Statistics

It is estimated that nearly 12 million people were employed in the renewable energy industry globally in 2020 up from 11.5 million in 2019.[90] Globally IRENA has found that women account for only 32% of the oil and gas, renewables, and wind power workforce.[91] In addition, IRENA noted that "women are more likely to be employed in lower-paid, non-technical, administrative and public relations positions than in technical, managerial or policy-making positions".[92] A breakdown of women's share of employment by key job categories is shown in Figure 24 below.

[86] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[87] IRENA and ILO.
[88] IRENA, *A Gender Perspective*.
[89] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[90] IRENA and ILO.
[91] IRENA and ILO.
[92] IRENA and ILO, 18.

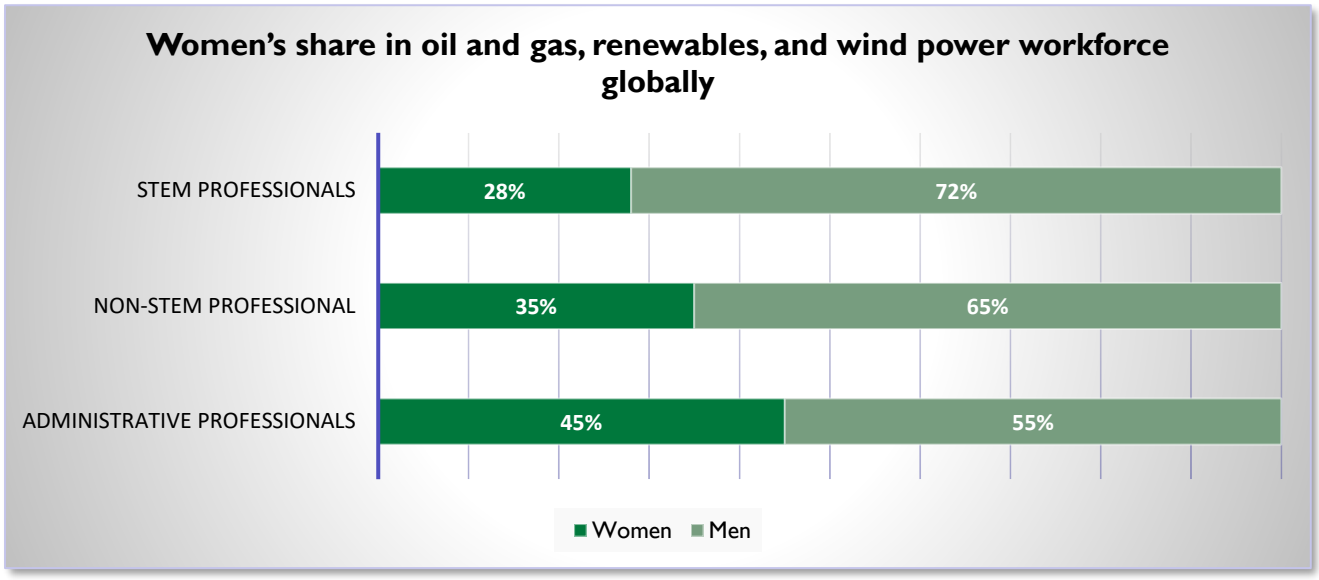


Figure 24: Women's share in oil and gas, renewable energy and wind power workforce globally

IRENA's more detailed report on gender in the wind industry found that women held just 21% of jobs in the wind workforce.[93] Again, it was found that the majority of jobs held by women at the lower level were non-technical roles. A breakdown of women's share of employment by job categories and job activities in the wind industry is shown in the figures below.[94] Figure 25 shows the gender share by job category and clearly indicates a decline in the role of women as jobs become more senior.

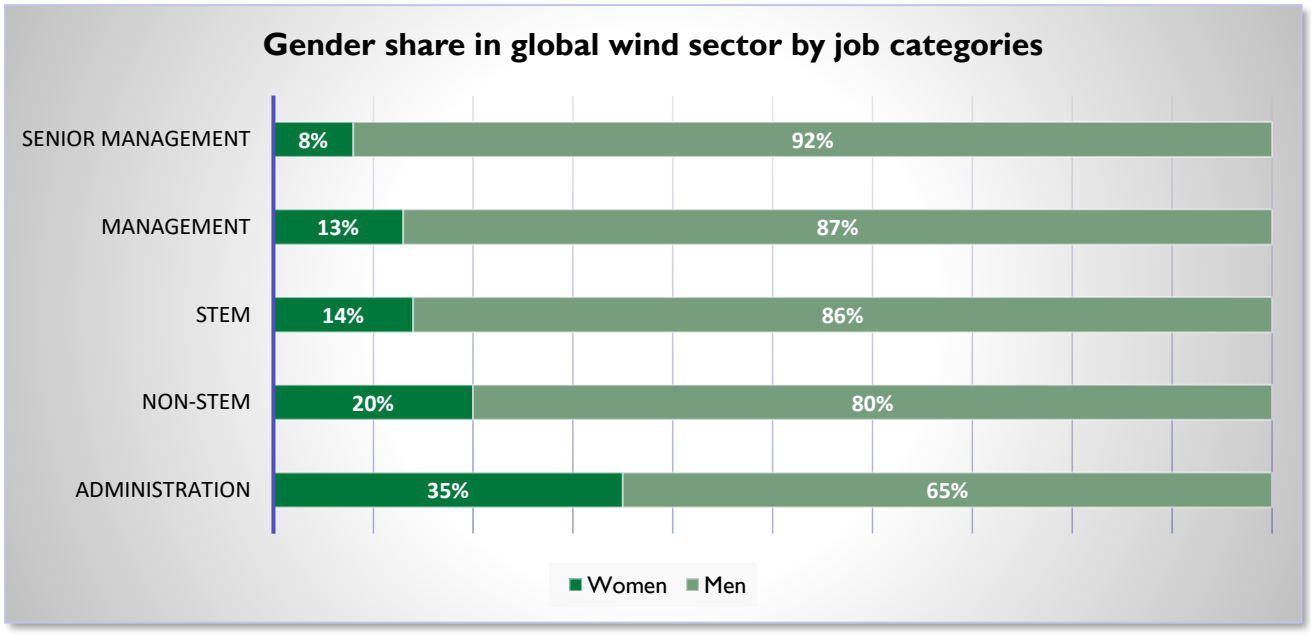


Figure 25: Gender share in wind sector by job categories

Figure 26 below shows the representation of women in different job activities. The most notable difference is the less than average representation of women in manufacturing activities.

[93] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[94] IRENA and ILO.

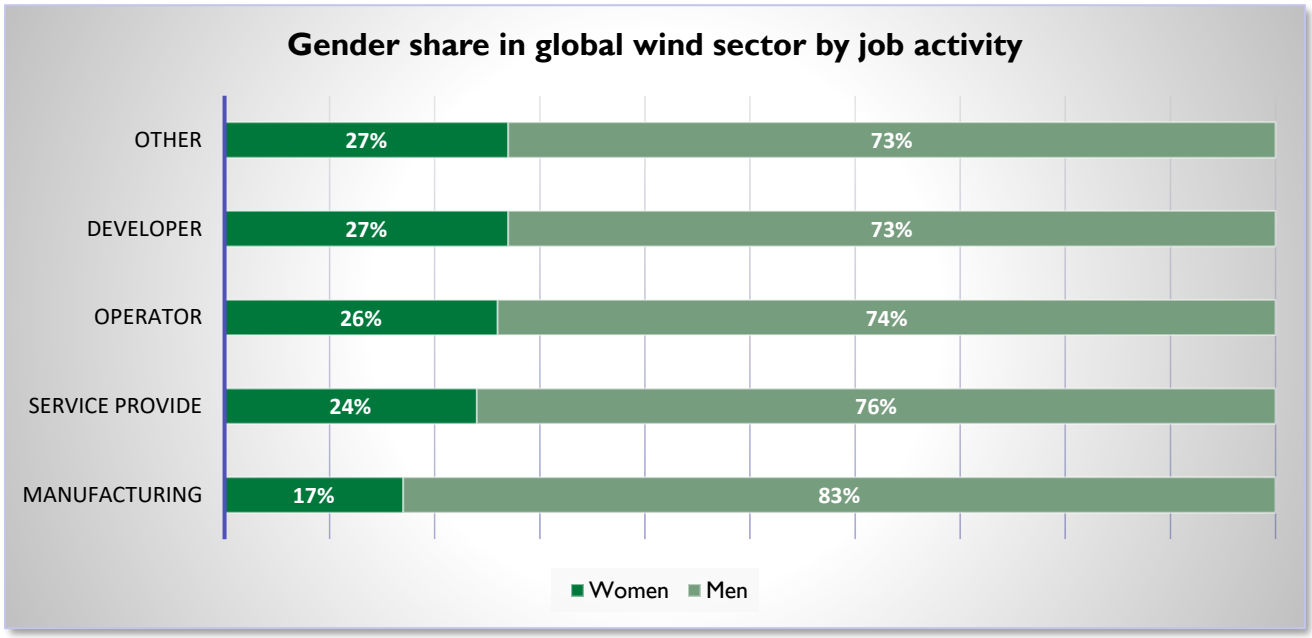


Figure 26: Gender share in global wind sector by job activity

African Statistics

In general, there is limited information on women's share of renewable energy jobs in Africa. However, a study was conducted by the International Finance Corporation into women's participation in the renewable energy workforce in Sub-Saharan Africa (SSA) in 2022.[95] In this study, 64 private sector companies that provide both on-grid and decentralised solar, wind, hydro and biomass power were surveyed. These companies were selected from ten SSA countries, including Cameroon, Ethiopia, Kenya, Mali, Nigeria, Rwanda, Senegal, South Africa, Togo, and Zambia.[96]

Studies in Africa show that on average women make up 32% of the full-time employees in the renewable energy sector

Similarly, to global statistics the survey found that on average women make up 32% of the full-time employees in the renewable energy sector, however, they are mostly concentrated in corporate support functions rather than the core business functions which are important for feeding the leadership pipeline.[97] The figure below shows the breakdown of women's share of employment by department.[98]

[95] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[96] IFC.
[97] IFC.
[98] IFC.

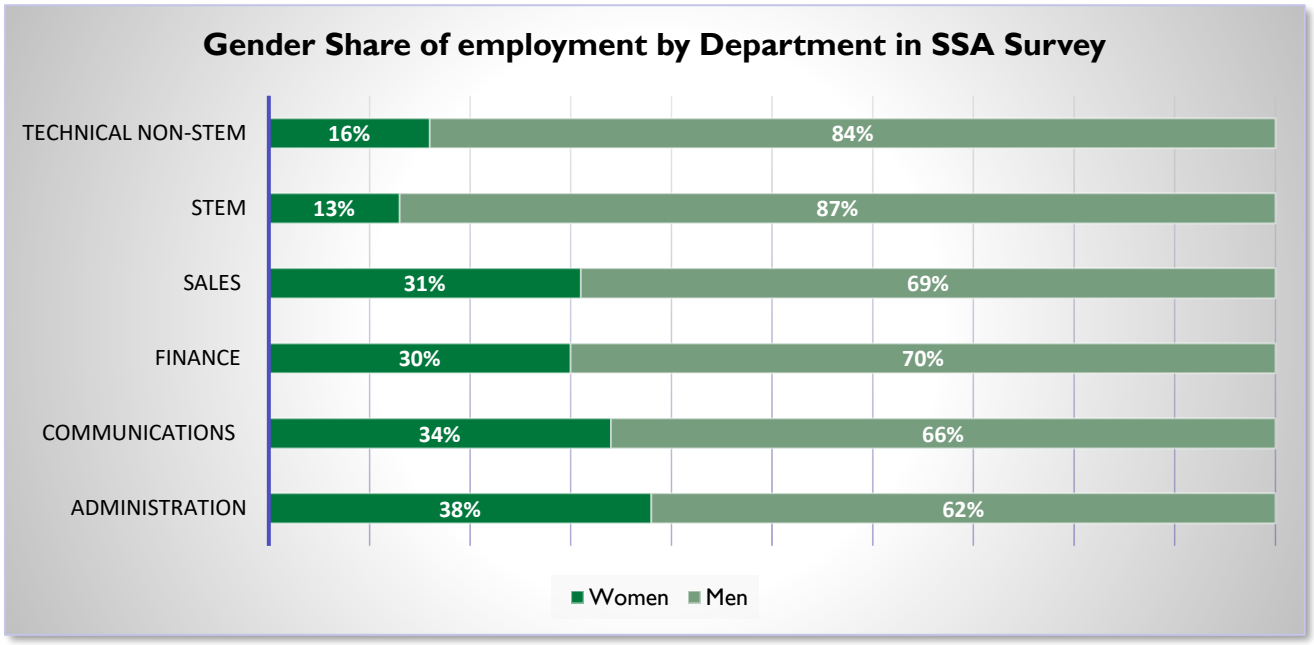


Figure 27: Gender Share of employment by Department in SSA Survey

In addition, the study found that women had a 37% share of employment at small-scale, off-grid decentralised renewable energy systems compared to a 22% share of employment in large-scale, on-grid centralised renewable energy systems.[99] Figure 28 below shows these statistics in graphic form.

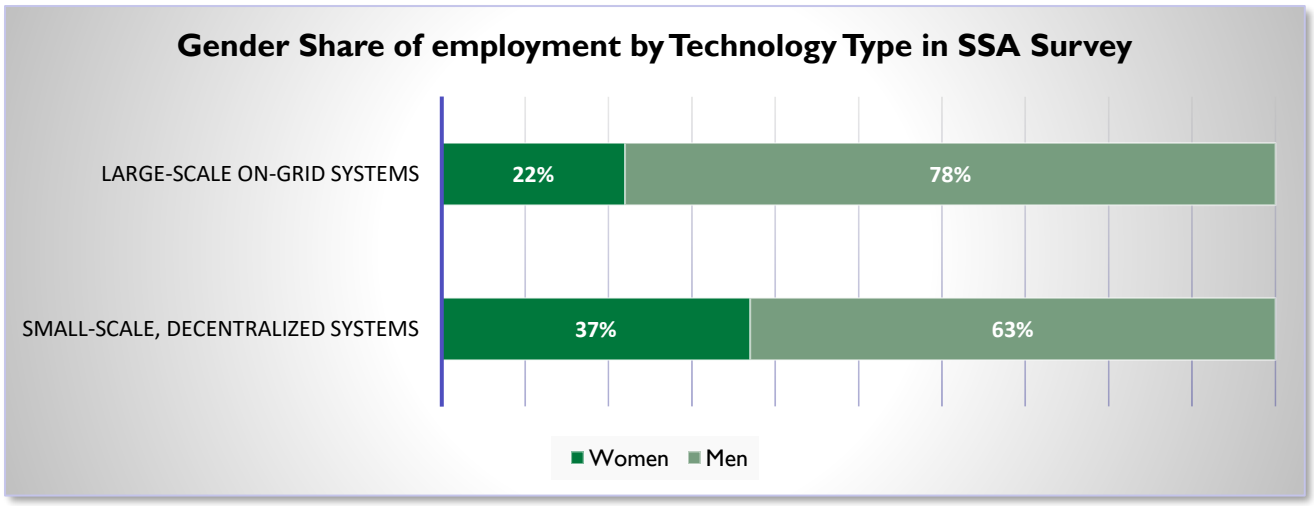


Figure 28: Women's Share of employment by Technology Type in SSA Survey

The study also found that women had a lower share of leadership positions.[100] The breakdown is shown in Figure 29.

[99] ILO, *Women in Business and Management: The Business Case for Change*.
[100] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."

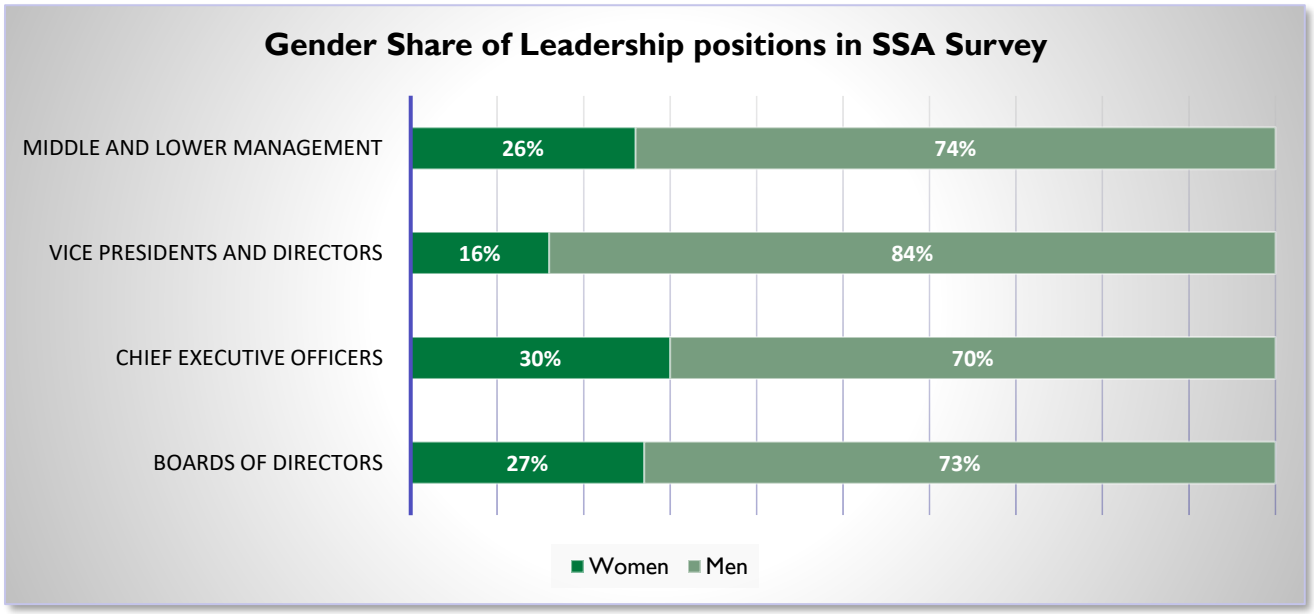


Figure 29: Gender Share of Leadership positions in SSA Survey

Various Country-specific Statistics

In addition to the review of global statistics on gender in the solar and wind industries research was conducted into country-specific statistics. As noted previously the gender dimensions of employment in the renewable energy sector are generally not well reported in national statistics[101] and as a result, there is generally limited information on women's share of employment in many countries. A brief review of the statistics for countries where this information is available is documented in the table below. The countries listed in the table below show women's participation in the renewable energy sector and the table is ordered from the lowest participation rate to the highest. The "% Renewable Energy share of electricity production" statistics[102] and the "% Wind and Solar Energy share of electricity production:" statistics[103] both come from Enerdata's *World Energy & Climate Statistics – Yearbook 2021*. The population statistics come from the United Nations Population Fund's World Population Dashboard.[104]

Table 13: Statistics on women's participation in the renewable energy sector in selected countries

Flag	Country	Women's Participation in the Renewable Energy Sector
	**Jordan -** Population: 10 million people % Renewable Energy share of electricity production: **unknown** % Wind and Solar Energy share of electricity production: **unknown**	In the Middle Eastern country of Jordan, women held 5% of renewable energy jobs in 2020.[105] Furthermore, in 2020 in Jordan's solar sector women held 8% of jobs, while in the wind sector women held just 1% of the jobs.[106]

[101] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[102] Enerdata, "Renewables in Electricity Production | Statistics Map by Region | Enerdata."
[103] Enerdata, "Wind & Solar Share in Electricity Production Data | Enerdata."
[104] UNFPA, "World Population Dashboard."
[105] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[106] IRENA and ILO.

Flag	Country	Women's Participation in the Renewable Energy Sector
	**Türkiye -** Population: 85 million people % Renewable Energy share of electricity production: **41.6%** % Wind and Solar Energy share of electricity production: **15.1%**	The transcontinental country, Türkiye, produces an annual breakdown of employment in the country by gender group for a range of economic activities.[107] One of the economic activities listed is "Electricity, gas, steam, water supply, sewerage etc.", which in 2021 employed 334,000 people, of which 35,000 were women, equating to 10.5%.[108] The number of women in the workforce of the "Electricity, gas, steam, water supply, sewerage etc." economic activity in Türkiye's increased from 23,000 to 32,000 between 2015 and 2020.[109]
	**India -** Population: 1,406 million people % Renewable Energy share of electricity production: **22.5%** % Wind and Solar Energy share of electricity production: **8.2%**	India has a lack of publicly available gender-disaggregated employment data.[110] However, the participation rate of women in the labour market in India was estimated to be 26% in 2018, which was below the global average of 46%.[111] Furthermore, women's participation in the workforce in India is concentrated in the agricultural sector, as this one sector employs more than half of all women in the Indian workforce.[112] In a study on the rooftop solar sector in India, in which data was collected at the end of 2018 from eight Indian companies (that represent more than 40% of the project developers' market and approximately 20% of the engineering, procurement, and construction markets), it was found that women accounted for, on average, 11% of the workforce in these companies.[113] However, the share of women employees in the sector varied by segment. In the sector, a

[107] Turkish Statistical Institute, "Gender Statistics 2021."
[108] Turkish Statistical Institute, 111–13.
[109] Turkish Statistical Institute, 111–13.
[110] IEA and CEEW, "A Look at India's Transition to Clean Energy."
[111] IEA and CEEW.
[112] IEA and CEEW.
[113] IEA and CEEW.

Flag	Country	Women's Participation in the Renewable Energy Sector
		much larger percentage of women had office-based jobs in the corporate segment (34%) than had on-site jobs such as design and preconstruction (18%), business development (12%), construction and commissioning (3%) and operation and maintenance (1%).[114]
	**Australia -** Population: 26 million people % Renewable Energy share of electricity production: **23%** % Wind and Solar Energy share of electricity production: **15.3%**	In Australia, women's participation in the workforce of the "Electricity, Gas, Water and Waste Services" sector increased from 17.6% in 1998 to 23.8% in 2018, a 6.2% increase over the 20 years.[115] During the 12-month period from April 2020 to March 2021, the percentage of women in the sector's workforce was 24%, an increase of 0.2% since 2018.[116] The percentage of women managers in the sector during this most recent period was also 24%. Of the 19 measured sectors, the Electricity, Gas, Water and Waste Services sector had the third-lowest participation of women.[117] At a more detailed level, the workforce of the Electricity Supply sub-sector was 28.6% women in 2021. This is a slight increase compared to 2014 when women accounted for 27% of the sub-sector's workforce.[118] At the managerial level, women accounted for 27.2% of managers in the Electricity Supply sub-sector. This was an increase compared to 2014 when women accounted for 21.6% of the sub-sector's managers.[119]

[114] IEA and CEEW.
[115] Australian WGEA, "Gender Segregation in Australia's Workforce."
[116] Australian WGEA, "Australia's Gender Equality Scorecard."
[117] Australian WGEA.
[118] Australian WGEA, "WGEA Data Explorer: Industries - Electricity Supply within Electricity, Gas, Water and Waste Services Division."
[119] Australian WGEA.

Flag	Country	Women's Participation in the Renewable Energy Sector
	**Brazil -** Population: 215 million people % Renewable Energy share of electricity production: **84.1%** % Wind and Solar Energy share of electricity production: **10.6%**	Data sources women's participation in the renewable energy sector in Brazil was focussed on the Solar Energy Sector. A breakdown of the workforce in Brazil's solar energy sector showed that, in 2019, 28% of the workforce was women and 72% was men.[120] The percentage of women in the sector's workforce has followed a downward trend since reaching a high of 34% in 2015 and 2016.[121] While there were about twice as many male managers (excluding directors) as there were women managers (excluding directors) in Brazil's solar energy sector in 2019, the percentage of women managers (excluding directors) to total women in the sector's workforce (6.9%) was higher than the same percentage for men (5.9%).[122] However, the opposite was true for directors (excluding managers) in the sector, where the percentage of women directors (excluding managers) to total women in the sector's workforce (0.7%) was lower than the same percentage for men (0.9%).[123] In total, there were about 3.3 times as many male directors (excluding managers) as there were female directors (excluding managers) in Brazil's solar energy sector in 2019.[124]
	**United States of America -** Population: 334 million people % Renewable Energy share of electricity production: **19.8%**	One of the leading countries in the solar energy industry worldwide is the United States of America.[125] On average, in the United States, women accounted for 47% of the national workforce in 2021.[126] In the country's energy sector in 2021, women accounted for 25% of the workforce on average.[127] However, in both the solar- and wind-energy sectors in the United States, women accounted for 30% of the workforce on average in 2021.[128]

[120] CFF and GIZ, "Solar Energy in Brazil."
[121] CFF and GIZ.
[122] CFF and GIZ.
[123] CFF and GIZ.
[124] CFF and GIZ.
[125] IRENA, *Renewable Energy and Jobs – Annual Review 2018.*
[126] U.S Department of Energy, "United States Energy and Employment Report 2022."
[127] U.S Department of Energy.
[128] U.S Department of Energy.

Flag	Country	Women's Participation in the Renewable Energy Sector
	% Wind and Solar Energy share of electricity production: **11.2%**	
	**Canada -** Population: 38 million people % Renewable Energy share of electricity production: **67.7%** % Wind and Solar Energy share of electricity production: **6.5%**	In Canada, in 2019, women accounted for 31% of the workforce in the energy sector as a whole (including the renewable energy sector).[129] However, in terms of hourly wages, women earned on average 91% of what men earned in 2019.[130] This gender wage gap has closed slightly as in 2009, women earned on average 84% of what men earned.[131] Regarding occupation type in Canada's energy sector, women accounted for 82% of office roles, while only accounting for 3% of trade roles.[132]

[129] Natural Resources Canada, "Energy Fact Book 2021-2022."
[130] Natural Resources Canada.
[131] Natural Resources Canada.
[132] Natural Resources Canada.

South African Statistics

South Africa has better gender-disaggregated data available than many countries globally as a result of an active effort by the South African government to track participation in the workforce by race as well as gender. In particular, the national Department of Employment and Labour publishes an employment equity report annually based on reports submitted by employers in South Africa. In the early Commission for Employment Equity Annual Reports, the economically active population (EAP) was broken down into 11 broad economic sectors.[133] However, starting with the *20th Commission for Employment Equity Annual Report 2019/20,* the EAP has been broken down into 18 economic sectors as per the *Draft Employment Equity Regulations, 2018*.[134] One of these 18 economic sectors is "Electricity, Gas, Steam and Air Conditioning Supply"[135] and as a result gender information is available for the broader energy sector in South Africa in the last three reports.

The size of the workforce in South Africa's Electricity, Gas, Steam and Air Conditioning Supply sector, including a breakdown by gender group, over the past three years is shown in the figure below. Similar to Global and African statistics women make up 33.2% of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply sector in 2021/22. However, it should be noted that the total size of the workforce, as well as the percentage of women in the workforce of the Electricity, Gas, Steam and Air Conditioning Supply sector, decreased from 36.3% in 2019/20 to 33.6% in 2020/21.[136] Figure 30 below shows that men make up the majority of the sector's workforce and that the size of the sector's workforce has decreased in consecutive years.

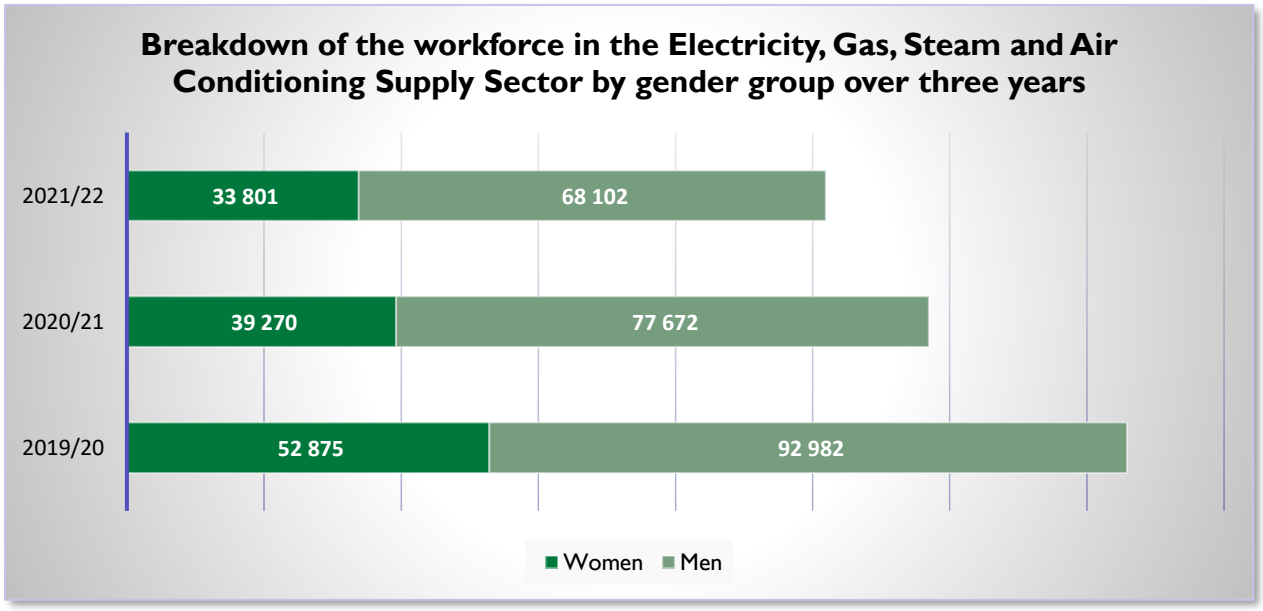


Figure 30: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years

Using data from the *22nd Commission for Employment Equity Annual Report 2021-22*, a breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply sector as percentages for 2021/22 is

[133] DEL, "21st Commission for Employment Equity Annual Report 2020-21."
[134] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."
[135] Previously, in the Commission for Employment Equity Annual Reports, electricity and gas had been combined with water under a broad economic sector, entitled "Electricity, Gas and Water".
[136] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

shown in Figure 31 below.[137] The vertical line in below represents the percentage of women in the economically active population of South Africa (44.7%) in 2021/22.[138]

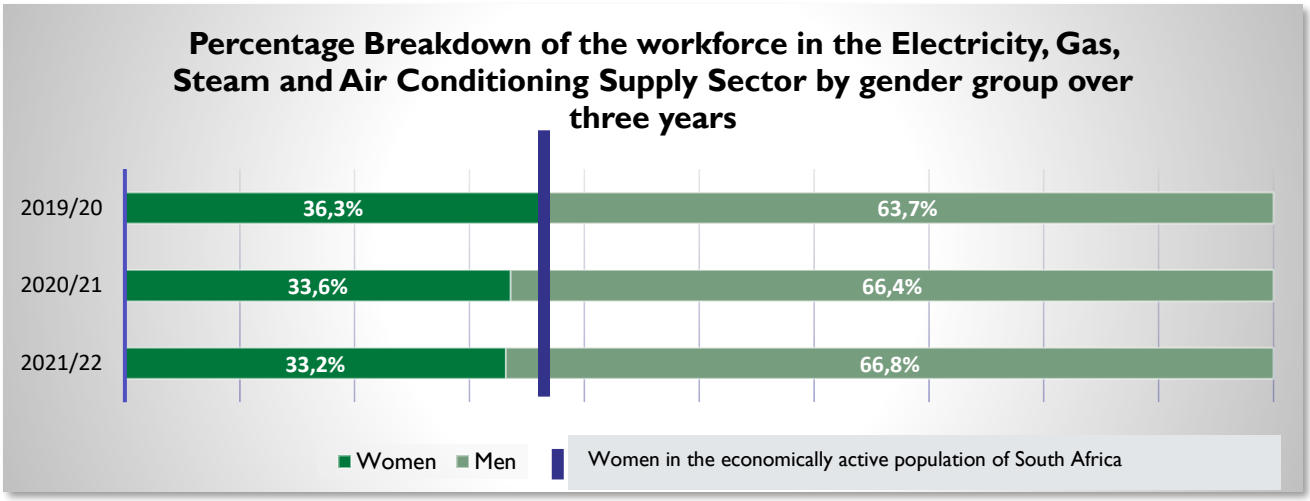


Figure 31: Percentage breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years with the economically active population (EAP) percentage of women in South Africa

In Figure 32, the workforce is broken down by gender group for six occupational levels (of permanent employees) from "Top Management" to "Unskilled" as well as for temporary employees.[139]

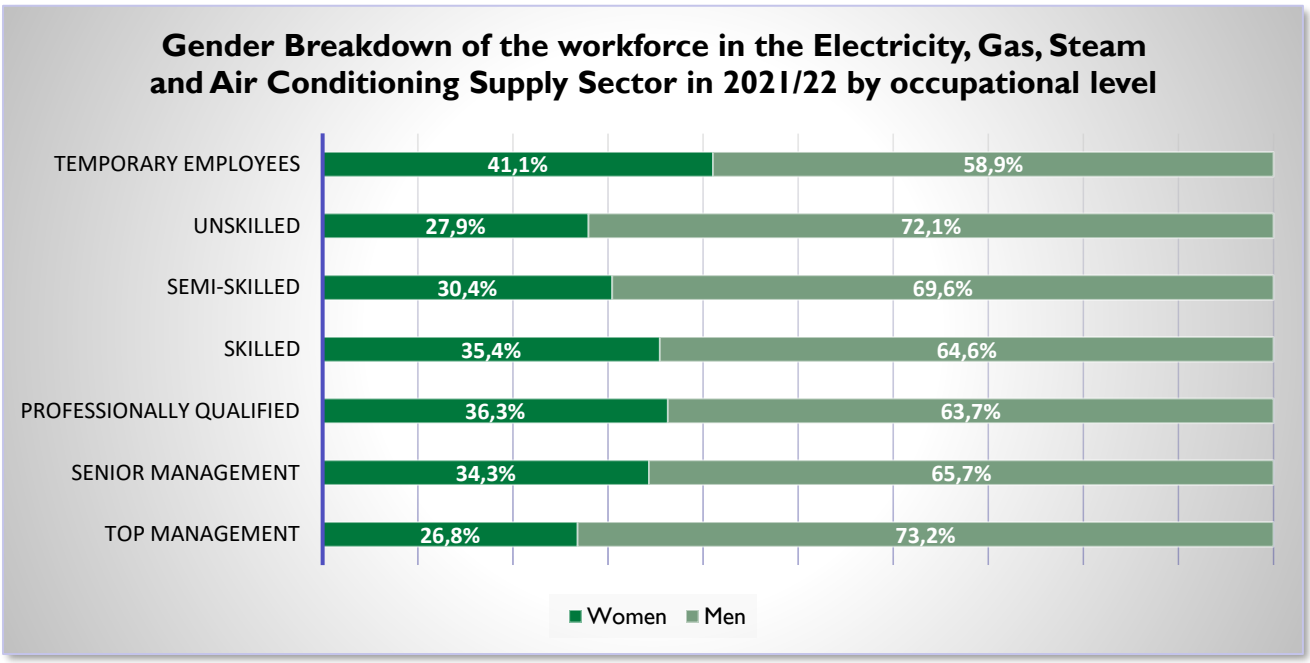


Figure 32: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector in 2021/22 by occupational level and gender group percentage contrasted with the economically active population (EAP) percentage of women in South Africa

[137] DEL, "22nd Commission for Employment Equity Annual Report 2021-22."
[138] DEL.
[139] DEL.

A breakdown of the workforce numbers and percentages of the Electricity, Gas, Steam and Air Conditioning Supply sector for the past three years in terms of occupational level, temporary employees and gender groups are shown in Table 14 below.[140]

Table 14: Workforce profile for the Electricity, Gas, Steam and Air Conditioning Supply sector for 2021/22

Workforce Profile for 2021/22	Women	Women (%)	Men	Men (%)	Total
Top Management	201	26.8%	549	73,2%	750
Senior Management	618	34.3%	1,182	65,7%	1,800
Professionally qualified	4,222	36.3%	7,407	63,7%	11,629
Skilled	13,757	35.4%	25,052	64,6%	38,809
Semi-skilled	9,455	30.4%	21,610	69,6%	31,065
Unskilled	3,794	27.9%	9,784	72,1%	13,578
Total Permanent	32,047	32.8%	65,584	**67,2%**	97,631
Temporary employees	1,754	41.1%	2,518	58,9%	4,272
Grand Total	33,801	33.2%	68,102	**66,8%**	101,903

[140] DEL; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

Barriers to equitable gender representation

This chapter explores the barriers to equitable gender representation in the renewable energy industry in general, with a focus on the solar and wind sectors where literature is available.

Introduction

The barriers listed in this chapter apply to both **entering the sector** and to **career progression and retention** within the sector, including women's direct experiences and perceptions and structural challenges.[141] The study, *Women in Clean Energy, Middle East and North Africa Survey* found that 34% of respondents, inclusive of women and men, reported that women encounter more difficulties than men in the sector.[142] The IRENA report *Wind Energy: A Gender Perspective,* 2020, also explored barriers to women's participation in the industry, distinguishing between barriers to entry and employment and career progression. Finally, a study by the International Finance Corporation established that the three most prominent barriers hindering women from participating in the renewable energy sector in sub-Saharan African countries include, (1) workplace policies and practices, (2) social norms and gender stereotypes, (3) legal barriers.[143]

IRENA's *A Gender Perspective* 2020 study found that just over two-thirds (66%) of the women surveyed believed women working or seeking work in the sector experienced barriers.

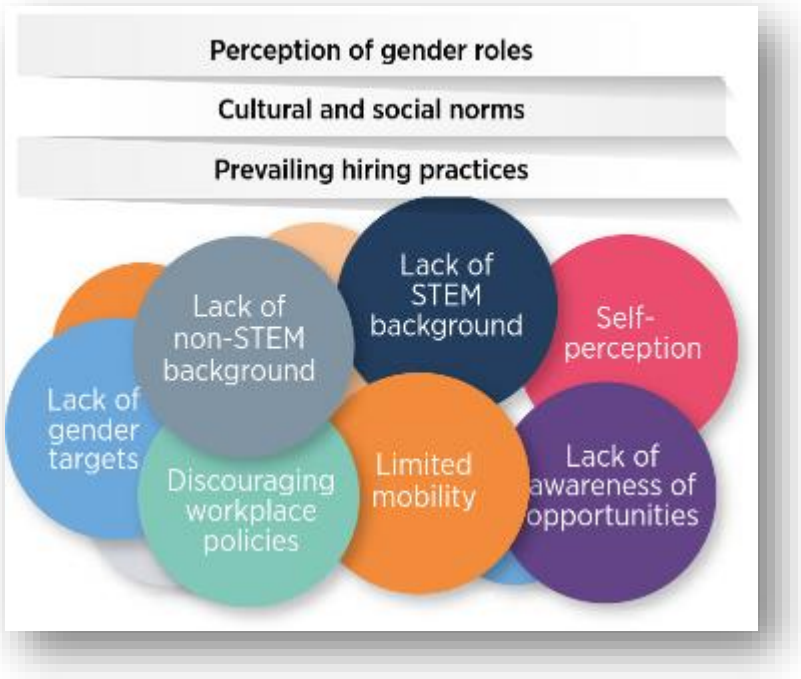


Figure 33: Barriers to entry for women in the renewable energy sector (Source IRENA 2020)

Barriers to entry

Addressing barriers to entry into the wind and solar sectors is critical as lower rates of entry for women lay the foundation for lower participation rates of women in these sectors. Some of the barriers to entry perceived by respondents to a survey of the renewable energy sector in Sub-Saharan Africa are shown in Figure 34 below.[144]

[141] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[142] Bloomberg, IRENA, and CEBC, "Women in Clean Energy, Middle East and North Africa Survey."
[143] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[144] IFC.

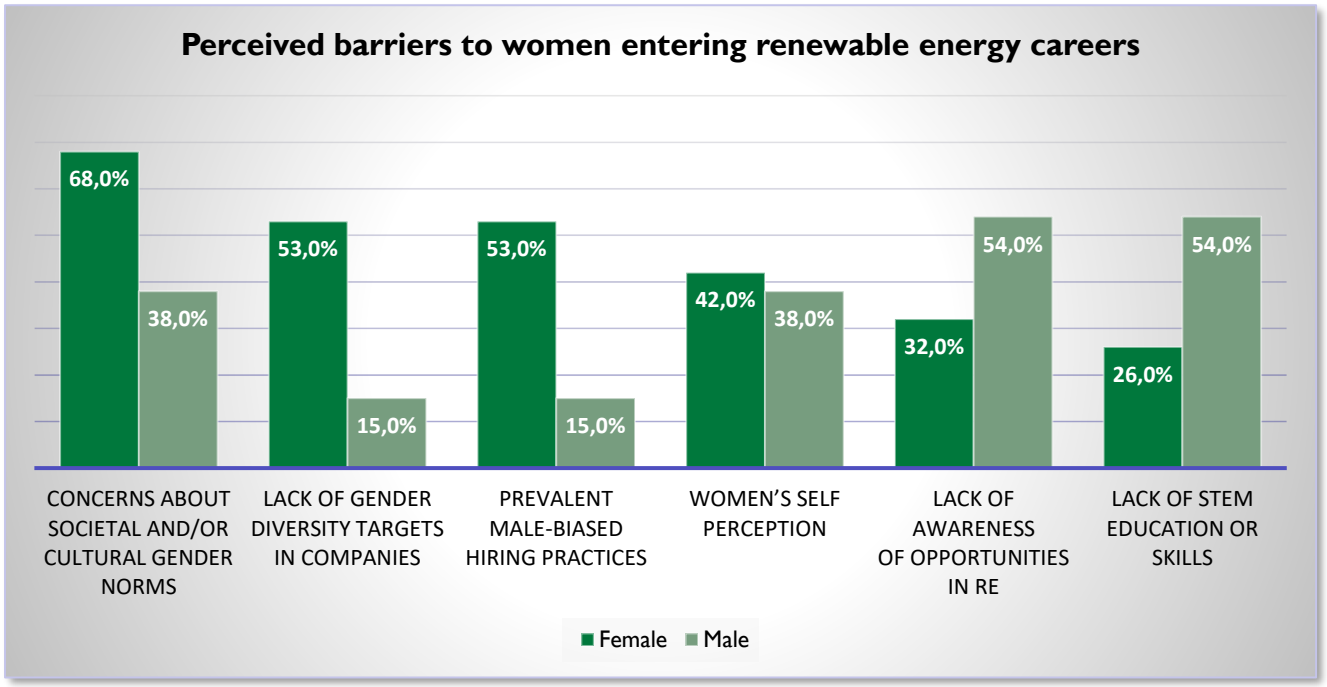


Figure 34: Perceived barriers to women entering the renewable energy sector

Perception of gender in relation to energy-related courses and employment

Historically the energy industry has been associated with both intense physical labour and the science and engineering fields, all of which have been perceived to be "male work". These perceptions stem from unequal gender norms within our global patriarchal settings and deter many women from studying courses perceived to be "inappropriate" for women, particularly the energy and science, technology, engineering, and mathematics (STEM) related courses. [145] [146] Research in sub-Saharan Africa confirmed that the nature of working conditions in large-scale renewable energy companies, such as challenging physical conditions and the need for technical experience, are some of the challenges that result in less attraction and retention of women.[147] Furthermore, the fact that the energy and STEM sectors remain male-dominated,[148] deters some women from considering this professional option to avoid working in a male-dominated space.[149] This results in the lowered uptake of energy-related courses, and subsequently poorer representation in the energy and related workforces.

Lack of (effective) programmes promoting women's uptake of energy or STEM-related courses at the tertiary level

Studies have shown that women are less represented in energy-related courses.[150] This may be due to the perception of gender in these industries as discussed above, or this may be attributable to other factors not evident from the literature reviewed. Although there have been some efforts and programmes globally to encourage women's uptake of energy or STEM-related courses, this has not yet resulted in a meaningful representation of women at the tertiary level. An Organisation for Economic Co-operation and Development (OECD) report showed that in countries surveyed, the number of male graduates was consistently higher than the number of female

[145] IRENA, A Gender Perspective.
[146] UN Women, "Call to Action."
[147] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[148] IEA, World Energy Outlook 2019.
[149] CFF and GIZ, "Solar Energy in Brazil."
[150] C3E International and IEA, "Gender Equality in the Energy Sector."

graduates.[151] [152] This outcome also follows the implementation of programmes aimed at women in selected countries such as Canada.[153] [154] In addition, an evaluation of programmes offering women training for entry-level positions in the green economy suggested that training at the entry-level is insufficient in securing long-term job opportunities, [155] reinforcing that the significant barrier is at the level of tertiary studies.

Social norms and gender stereotypes

Prevalent social norms and gender stereotypes drive many of the barriers women experience when entering the sector. Indeed, women respondents in a study in Sub-Saharan Africa identified social/cultural norms as the number one barrier to their entry into the renewable energy sector, whilst men respondents identified the lack of women's STEM background as their main barrier to entering the renewable energy sector.[156] Examples of social norms and gender stereotypes include deeply held, often unconscious beliefs that women should participate in the caring and support professions while technical professions are the realm of men. Traditional and societal norms perpetuate a vicious cycle of gender-based division in the roles and responsibilities of women and men.

Lack of information about the wind and solar sectors

Reports indicate many women remain uninformed about the wind and solar energy sectors as these sectors stemmed from the renewable energy sector, which in turn forms part of the energy industry.[157] This is especially the case when women are considering tertiary education options. Related to this, there are still relatively few direct courses for entry into the solar and wind sectors, although, there has been a notable increase in renewable energy, wind and solar-specific courses in more recent years. Findings suggest the movement into these sectors is from the STEM and related fields within the energy sector, such as engineering and construction, installation and manufacturing jobs, with the associated limitations on women's participation noted above.[158]

[151] C3E International and IEA.
[152] UN Women, "Call to Action."
[153] EHRC, "Profile of Women Working in the Clean Energy Sector in Canada."
[154] Baruah and Gaudet, "Creating and Optimizing Employment Opportunities for Women in the Clean Energy Sector in Canada."
[155] Baruah and Gaudet.
[156] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[157] Baruah, "Renewable Inequity?"
[158] Pearl-Martinez and Stephens, "Toward a Gender Diverse Workforce in the Renewable Energy Transition."

Barriers to career progression and retention

Once employed in the renewable energy sector, women experience numerous challenges that limit career progression and retention. Reasons for this include a lack of gender-responsive policies and plans within institutions and organisations[159] alongside workplace cultures that are often limiting for women, may be unsafe for women and do not employ family-friendly policies.[160] [161] The perceived barriers to the career progression of women in the renewable energy sector in Sub-Saharan Africa are shown in Figure 36 below.[162]

Figure 35: Barriers to retention and advancement for women in the renewable energy sector (Source IRENA 2020)

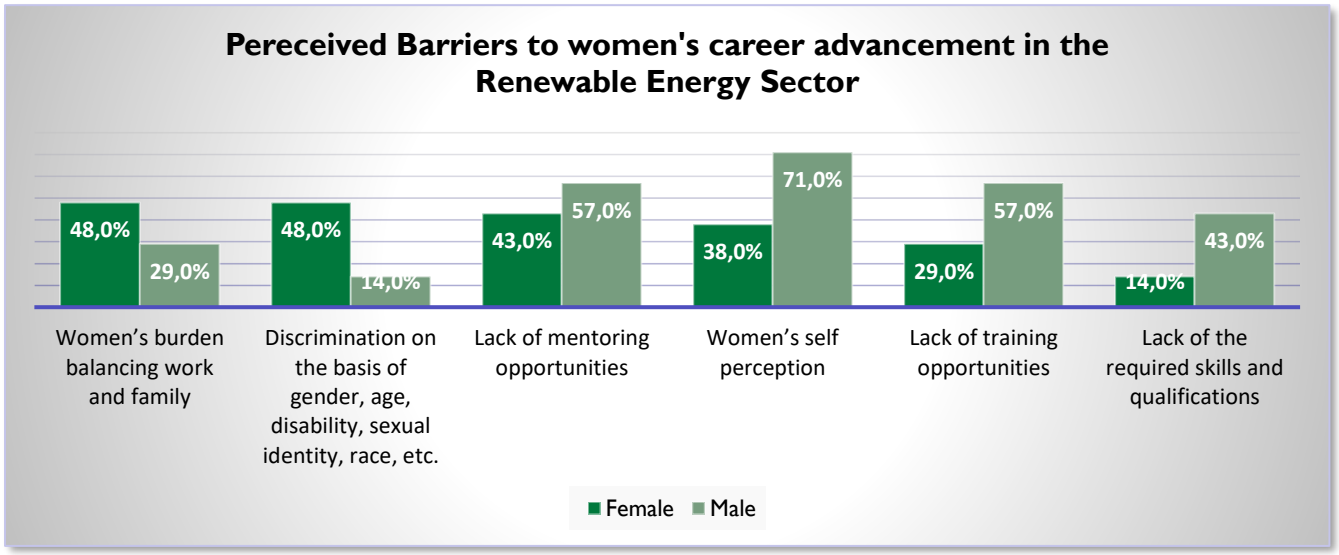


Figure 36: Perceived barriers to women's career progression in the renewable energy sector

[159] IRENA, *A Gender Perspective*.
[160] UN Women, "Call to Action"; IEA and CEEW, "A Look at India's Transition to Clean Energy."
[161] CFF and GIZ, "Solar Energy in Brazil."
[162] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."

Lack of gender-supportive policies and targets

Many studies cite the lack of gender supportive policies within companies and organisations, related to this is a lack of targets around gender diversity and audits (with associated corrective action plans). Furthermore, where policies exist, they may fail as they are not well implemented nor supported due to a poor level of inclusive company culture.[163] This has been shown in the study *Cultivating Female Talent in Energy: What the sector can do to resolve the barriers faced by women in middle management,*[164] findings suggested that although the energy sector in the U.K. has invested in diversity and inclusion programmes, this has not necessarily translated to an increase in women represented in the industry. This is largely owing to a lack of skills development and women moving to other sectors for this reason.[165] Some of the main policy concerns identified by a Sub-Saharan Africa study include the lack of implementation of maternity and paternity leave policies, biases in recruitment and promotion, and sexual harassment and violence in the workplace:[166]

Figure 37: Summary of lack of gender supportive policies and targets

Maternity, paternity, and parental leave policies:	All the companies surveyed in a study in Sub-Saharan Africa were legally required to provide paid maternity leave to their women employees as per the regulations of the international Maternity Protection Convention. No similar obligation applies for paternity leave. However, the study found that approximately 40% of the women interviewed emphasised that despite the existence of maternity leave policies, taking long-term maternity leave has an impact on the career progression of women in the renewable energy sector.[167]
Biases in recruitment and promotion	Approximately 64% of the companies surveyed for the Sub-Saharan Africa study had at least one policy that encourages or promotes equal opportunities for women and men during the recruitment process. However, about one in five of the women employees interviewed for this study stated that despite having recruitment and promotion policies in place, their employer's employment processes are biased, and they favour men over women.[168]
Sexual harassment and violence in the workplace	Despite high levels of sexual harassment and violence in the sector, results from the Sub-Saharan Africa survey show that only 54% of companies surveyed had anti-sexual harassment policies, 37% had anti-bullying policies, 35% had gender equality training for employees and 32% trained employees on various forms of gender-based violence. Furthermore, women employees and managers indicated

[163] POWERful Women, "Cultivating Female Talent in Energy."
[164] POWERful Women.
[165] POWERful Women.
[166] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[167] IFC.
[168] IFC.

that "intimidation" from male colleagues was a main challenge in retaining and advancement of women's careers.[169]

Legal Barriers

There are countries in sub-Saharan Africa which have laws that prohibit women from accessing good-paying jobs in the renewable energy sector, which will impede women's ability to move into senior, well-paying, roles in the sector. Cameroon, Ethiopia, Mali, Nigeria, and Senegal all have national laws that have some restrictions on how women can work in industrial jobs such as mining, construction, factories, energy, transportation, etc.[170]

Social Norms and Gender Stereotypes

Social norms and gender stereotypes within the renewable energy sector have been widely identified as significant barriers to the career progression and retention of women. The sub-Saharan Africa report found that women identified their main barrier to career advancement as discrimination based on their gender and their burden of balancing work and family.[171] On the other hand, 71% of male respondents indicated that women's self-perception is a barrier to their career progression. Interestingly interviewees in management positions (both men and women) also responded that women's self-perception is the primary barrier to their career progression rather than other systematic barriers – revealing a disconnect between the experiences and perceptions of the majority of women and the minority who have moved into management.

Lack of mentorship and role models

Women cited a lack of mentorship and role models as a significant factor limiting their participation and confidence in pursuing higher positions and/or more technical roles, with most senior positions filled by men.[172] [173] For women just entering the sector, there are very few mentorships and support networks, which are critical for career advancement, including opportunities for knowledge sharing, being introduced to key players and growth.[174] Additional issues such as gender inequality in the workplace, the gender pay gap and work-life balance are key areas of convergence that mentorship and networking opportunities could support.[175] The lack of these structures can therefore limit women's abilities to progress in their careers.

Lack of and poor support for family-friendly policies

The renewable energy sector, and within it the wind and solar sector, remains dominated by a lack of family-friendly policies that recognise most women's double role as both the primary caregiver and homemaker and professional. For example, the utility-scale operations and plants of the wind and solar sectors are often located in remote locations, requiring frequent and/or extended periods of travel, which may be incompatible with many women's double roles.[176] Many companies have not developed policies and workstyles that can both accommodate women's responsibilities and create opportunities for women to grow and contribute to the sector. Furthermore, in some cases where companies have introduced family-friendly policies women are reluctant to use them for fear it may affect potential career growth. The organisation, POWERful Women in conjunction with Bain and Company undertook a survey in the United Kingdom, on gender balance, across all levels in the energy sector. Respondents cited that although workplaces have flexible and family support policies, women are hesitant to make use of these as there is a perception that this may lead to

[169] IFC.
[170] IFC.
[171] IFC.
[172] IEA and CEEW, "A Look at India's Transition to Clean Energy."
[173] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[174] IRENA, A Gender Perspective.
[175] CFF and GIZ, "Solar Energy in Brazil."
[176] IEA and CEEW, "A Look at India's Transition to Clean Energy."

decreased levels of responsibility and career growth opportunities.[177]

Lack of health, safety and wellbeing in workplaces

The lack of focus on women's health, safety and wellbeing, while a problem in itself, also limits women's career progression and affects the retention of women in the sector. The wind and solar energy sectors are both perceived to be, and often are, relatively unsafe workspaces for women. The utility-scale operations and plants of the wind and solar sectors can be located in remote locations,[178] with an overwhelming dominance of men. This can lead to women feeling unsafe for fear of sexual harassment or sexual violence, additionally, there are not always female toilets available, these factors have been found to make many women feel uncomfortable and unsafe.[179] The Sub-Saharan Africa study found both women and men employees surveyed identified sexual harassment, bullying and violence as one of the problems women face regarding their retention and career advancement.[180] Female interviewees emphasised that they are commonly intimidated and harassed during fieldwork and are more likely to experience sexual harassment when the managers they report to are men. Therefore, women are less likely to take these remote on-site opportunities, which in turn may limit career progression, as it may be seen as a lack of interest in opportunities for career development, furthermore, companies may be wary to send women to these more remote locations due to the perception of a lack of safety at project sites.[181]

Gender pay-gap

Pay inequalities remain a persistent challenge cited by women in the renewable energy sector. *IRENA's Renewable Energy – Annual Review* (2018),[182] found that more than half of the respondents believed men in the industry earn more than women in the same role. This has been supported by findings from the C40 Cities Finance Facility (CFF) that men earned about a quarter more than women at the same qualification level and experience.[183]

Lack of STEM educational background

This barrier to career growth is an outcome of a barrier to entry, namely the low number of women studying STEM at secondary and tertiary level. Women's frequent lack of STEM background means that where women may take an interest in the wind or solar sector, they often lack the necessary skills or qualification to participate. This often limits them to administrative and non-technical roles, in which women are already the majority in the renewable energy industry.[184]

[177] POWERful Women, "Cultivating Female Talent in Energy."
[178] IUCN and USAID, "Gender-Responsive Geothermal Generation."
[179] CFF and GIZ, "Solar Energy in Brazil."
[180] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[181] IEA and CEEW, "A Look at India's Transition to Clean Energy."
[182] *Renewable Energy and Jobs – Annual Review 2018*.
[183] C3E International and IEA, "Gender Equality in the Energy Sector."
[184] IRENA, *Renewable Energy and Jobs – Annual Review 2018*.

Limited career growth opportunities

The literature showed limited career growth opportunities for women within the sector, driven by perceptions that the nature of the work is inappropriate for women and the idea still widely held in the sector that women do not deliver high-quality work in these sectors.[185] Many managers perceive remote on-site work to be unsuitable for women[186] and are therefore reluctant to send women to work at these locations. Likely impeding women's opportunities for growth as the work at such locations provides technical skills exposure that is necessary for advancement in the field.

> *The glass ceiling refers to the fact that a qualified person wishing to advance within the hierarchy of his/her organisation is stopped at a lower level due to a discrimination most often based on sexism or racism. The glass ceiling refers thus to vertical discrimination most frequently against women in companies.*

Much of the literature (e.g., Babic and Hansez)[187] has found the glass ceiling to be a significant challenge to retaining women and women's career progression in the renewable energy sector. This discrimination, much of which is discussed above, was noted as a factor in stalling women's career development and limiting women's representation in middle and senior management roles.[188]

Barriers specific to the South African Context

The United Nations Industrial Development Organization (UNIDO) and the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) published a report in 2021 titled the "Policy Assessment for the Economic Empowerment of Women in Green Industry" for South Africa.[189] The report was part of a larger multi-country study which aimed to "advise policymakers and practitioners on the establishment and implementation of a policy framework to integrate gender and green industry policies." The report summarises gender mainstreaming and representation in key policy documents in South Africa. Although this assessment looked beyond the wind and solar industries by including waste management and transport, the findings are still relevant to the current study. Each of the policy document reviews was evaluated according to various gender criteria such as engendering, intersectionality, incremental transformation, etc. and then scored according to a relative index. Several recommendations were also proposed for each of the policy documents for improving gender integration. The overall observation from this policy is that there is a strong focus on moving towards a Just Transition in South Africa, however, the current policy environment is focused more on environmental than socio-economic aspects such as gender mainstreaming and empowerment.

Although the South African government prioritises policies and programmes to mitigate climate change and support green industry, there is scope to enhance the presence of gender mainstreamed measures to enhance

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[185] CFF and GIZ, "Solar Energy in Brazil."
[186] CFF and GIZ.
[187] Babic and Hansez, "The Glass Ceiling for Women Managers," 2.
[188] IRENA, *Renewable Energy and Jobs – Annual Review 2018*.
[189] UNIDO, "Policy Assessment for the Economic Empowerment of Women in Green Industry - Executive Summary: South Africa."

gender equality and the empowerment of women. In pursuing a "Just Transition" for South Africa; green industry policy must ensure both environmental and socio-economic concerns are met.[190]

The Policy Assessment Report also included results from a brief market assessment (from select interviews, surveys and focus groups).[191] Observations from participants include a list of skills that women bring to the sector, the current division of labour in the sector, with a bias toward men being more involved in key decision-making roles, as well as a list of perceived barriers to advancement and transformation faced by women in the sector.[192] The report notes that these barriers are multi-faceted and are different for different races and economic groups. The list of barriers is summarised below.[193]

- Lack of technical skills and specialised knowledge
- Lack of awareness about policies and programmes designed to benefit women and/or encourage participation in the green industry
- Lack of access to the technology necessary to start green businesses or upscale existing businesses
- Difficulty in finding and hiring skilled workers
- Lack of social capital
- Lack of access to necessary capital, collateral and credit resources
- Lack of markets to sell their products
- Discriminatory norms and hiring practices
- Sexual harassment
- Caretaking responsibilities

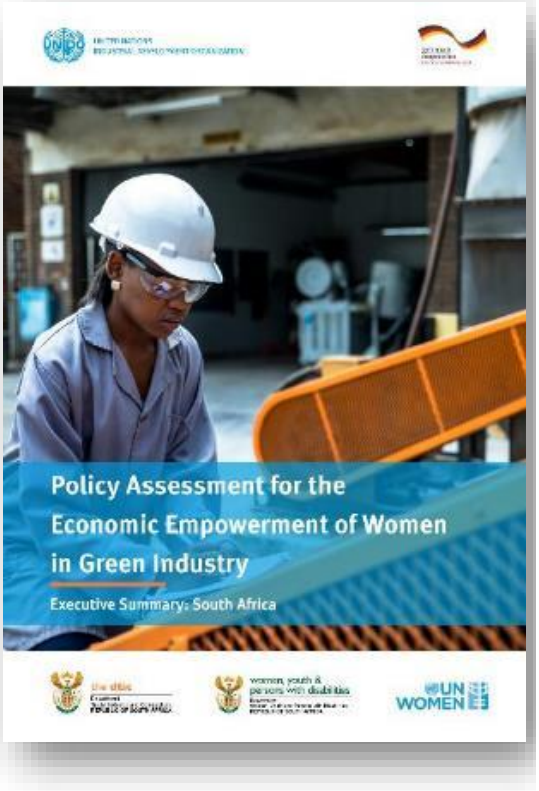


Figure 38: Summary of barriers faced by South African women in the sector

[190] UNIDO, 12.
[191] UNIDO, "Policy Assessment for the Economic Empowerment of Women in Green Industry - Executive Summary: South Africa."
[192] UNIDO.
[193] UNIDO.

Summary of Barriers

As can be seen in the section about and summarised in the image below, the barriers to gender equity in the wind and solar sectors are extensive. These barriers are present at the point of entry and possible even more extensive in limiting career progression.

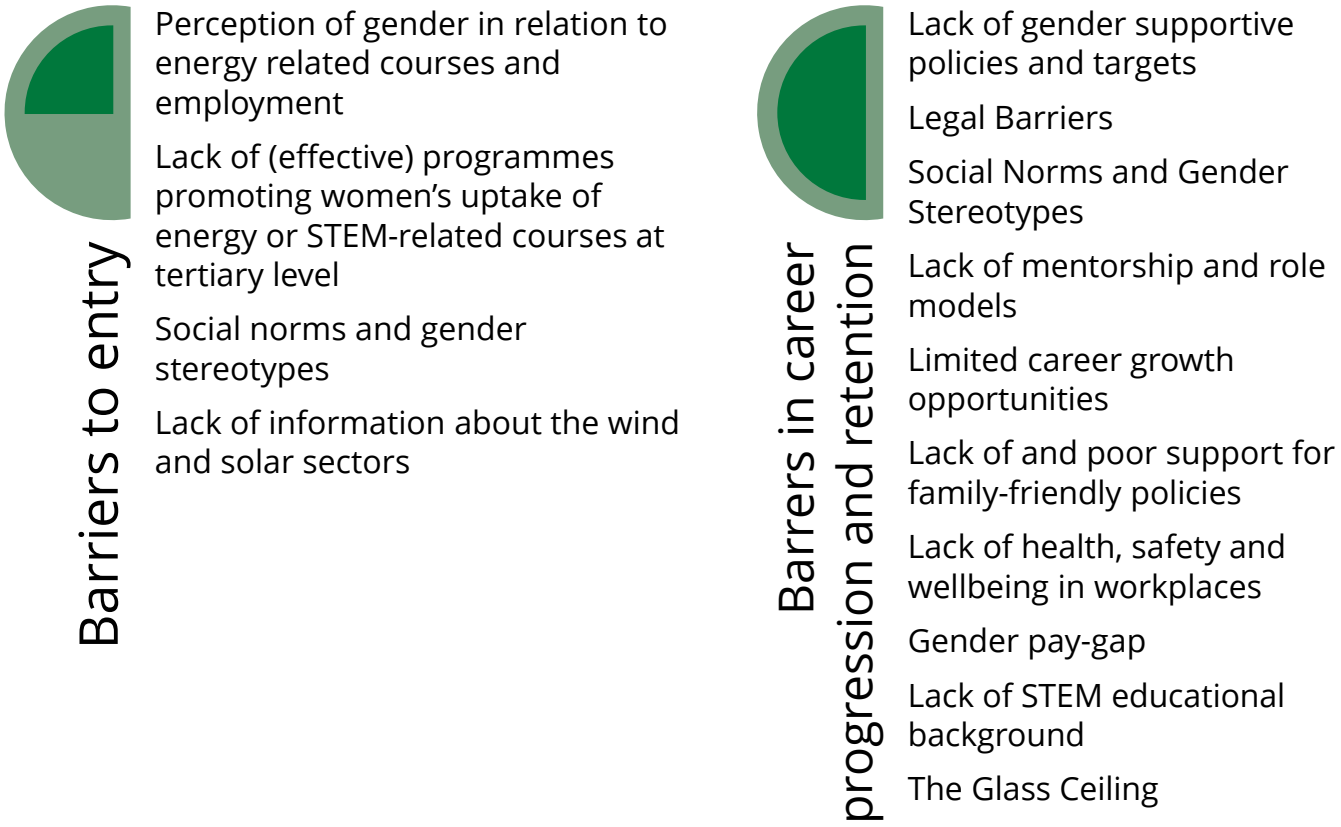


Figure 39: Summary of barriers to gender equity

Recommendations from literature

In 2020, the United Nations Women and the Global Impact Office developed a set of Empowerment Principles, as a call to action on *Establishing Gender Equality in Renewable Energy Industry*. These principles, shown in the figure below, aim to realise **the meaningful inclusion of women in the renewable energy sector** and **incorporate the unique perspectives and skills needed in the industry**.[194] Despite a number of promising commitments such as this alongside a few examples of good practice in some companies (which have been mentioned throughout this literature review), within the literature there remains a paucity of policies at national, sector and global level which have been shown to drive gender inclusion in the wind and solar sector.

Figure 40: United Nations Women and the Global Impact Office Empowerment Principles Establishing Gender Equality in Renewable Energy Industry[195]

These principles serve as an important tool for renewable energy industries to develop gender-responsive policies and the 2020 IRENA report, *Wind Energy: A Gender Perspective*, found these recommendations to apply to the wind sector.[196] They also reinforce the 2019 IRENA report, *Renewable Energy: A Gender Perspective*, which provides a comprehensive set of recommendations to ensure gender diversity in renewable energy including:[197]

- ⚥ tailoring training and skills development
- ⚥ attracting and retaining talent in the sector
- ⚥ challenging cultural and social norms
- ⚥ mainstreaming gender in energy sector frameworks

[194] UN Women, "Call to Action."
[195] UN Women.
[196] IRENA, *A Gender Perspective*.
[197] IRENA, *Renewable Energy: A Gender Perspective*.

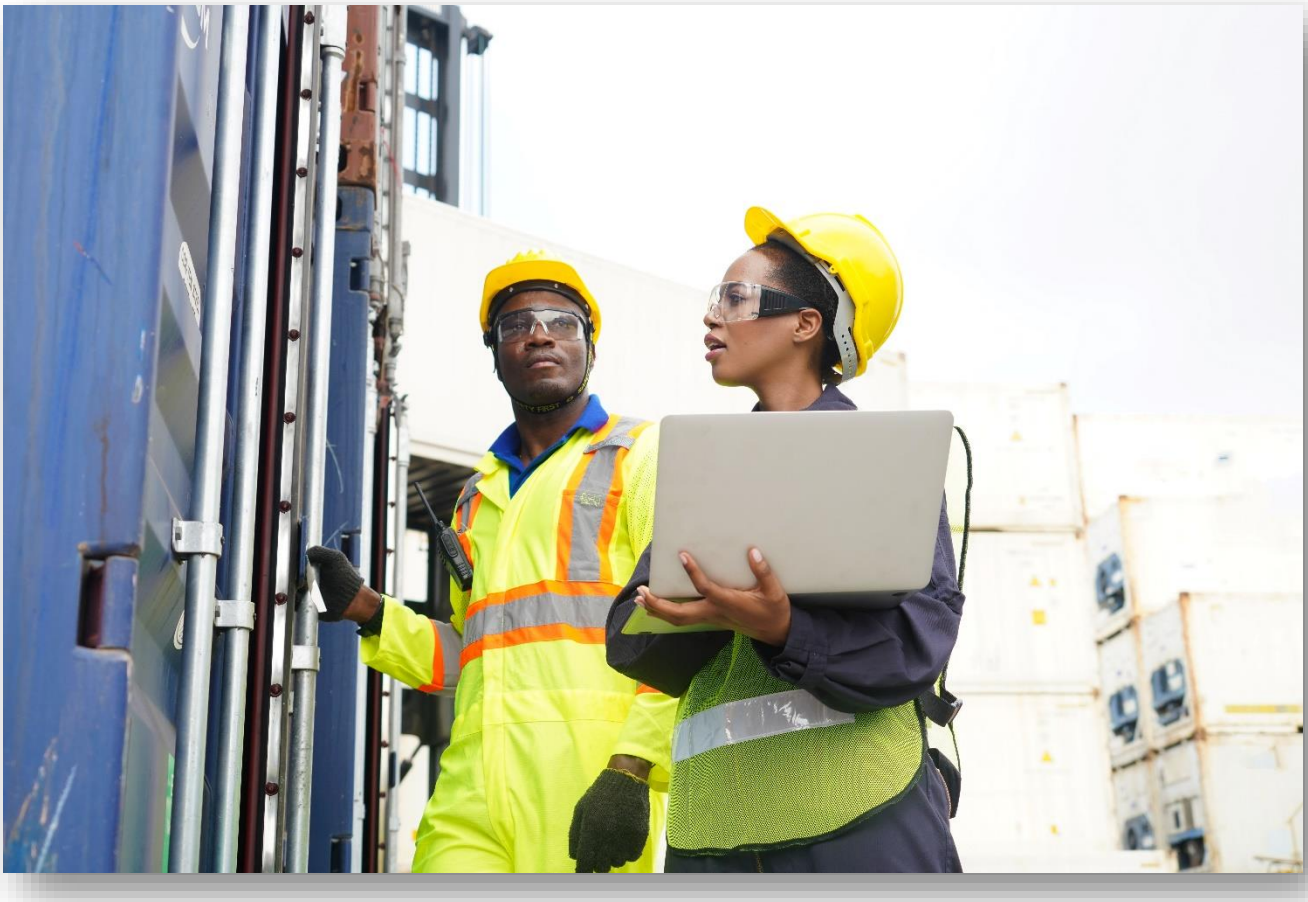
This section uses these four headings, combined with the principles from the UN Women's Call to Action and additional recommendations from the literature review.

Tailoring training and skills development programmes for women

There is a need to tailor training and skills development programmes for women to ensure that women's participation in the sector is supported and reinforced through training and mentoring:[198]

> "... in technical and non-technical subjects, and in broad business and leadership skills. Governments, educational institutions, industry associations, and other actors need to adapt curricula and strengthen mentoring opportunities for women."

This involves both on-the-job skills development and capacity growth to ensure women are supported to succeed and lead within the sector, as well as institutions of higher learning and training reflecting on their recruitment, funding, and support for women students in the technical subjects especially. In addition, this should also be addressed at secondary school.



[198] IRENA, *A Gender Perspective*, 15.

Gender transformative training for policy and decision-makers

There is a need to put in place gender transformative training for policy and decision-makers, and industry role players and regulators at the higher levels to inform policies and programmes and create an enabling environment for gender inclusivity.[199]

Attracting women in the sector

There is a need to attract more women to enter the sector across all work bands through effective recruitment strategies that target women. The literature shows a significant lack of women in key technical and leadership roles in the industry, with the "glass ceiling" mentioned frequently – for meaningful transformation this must be addressed by recruiting more women into the industry. However, for this to be effective women need to see opportunities for growth and a safe and supportive work environment as discussed below.

Retaining women in the sector

There is a need to create work environments in the sector that support the retention of women. In particular, the literature noted that **effective recruitment strategies** (discussed in section 0) **need to be supported by strategies to retain women in the industry**. USAID developed a useful framework **"A Best Practices Framework for Increasing Gender Equality in Male-Dominated Industries",** which provides the practical resources organisations need to increase gender equality across their operations and corporate structure. It has twelve categories to support companies to meaningfully integrate women at multiple levels, from attracting them to the sector and throughout their career. Frameworks such as these are critical tools for shifting both policy and practice at company and sector level.

There are many factors that combine to improve the retention of women, which are summarised in Figure 41 below.

Pay	Equal pay for women and men.
Policies	Family-friendly policies that recognise most women's double role as both the primary caregiver and homemaker and professional. For example, in El Salvador, a geothermal company, LaGeo, conducted a gender assessment of its policies and activities. Following this, a gender equity policy was developed, which stipulated interventions such as maternity benefits for women. This resulted in a 5 % increase in women's representation in the company.[200] Similarly, the Sub-Saharan Africa study found that women believe men should ideally be given similar paternity leave benefits as women. They believe that this would provide parents with the support needed to share the responsibilities for caring for a new child and this would reduce gender discrimination based on motherhood and encourage women's continued participation and advancement in the renewable energy workforce.[201]

[199] Elwell, Mershon, and Aguilar, "Women at the Forefront of the Clean Energy Future."
[200] IUCN and USAID, "Gender-Responsive Geothermal Generation."
[201] Jared, "10 Reasons Every Company Should Offer Paid Paternity Leave."

Network and Mentoring	Networking and mentoring opportunities with other successful women in the industry to offer guidance, inspire women and "open doors". For example, a junior project manager at a solar plant in India highlighted the challenges of attitudes about traditionally female work and the need for women in leadership positions in the sector, as "Women tend to learn much better from other women than from men - but there aren't enough women role models in the sector".[202]
Health and Safety	Addressing women's health and safety concerns, for instance when working on remote sites, through additional security to ensure women's health, safety and wellbeing are upheld at all times, ensuring safe access to private toilets.
Awareness	Gender sensitisation training for all staff, management, and executives.

Figure 41: Factors that can improve retention of women

Challenging cultural and social norms

There is a need to challenge barriers to gender inclusivity that are perpetuated through gendered norms and social expectations which lead to assumptions that leadership and technical skills in the wind and solar energy field are best suited to men. Multiple initiatives are needed to challenge these views, many of which are mentioned elsewhere and repeated here for emphasis:

- promoting initiatives to support and empower women toward leadership roles
- ensuring the sector has high-level gender champions in leadership
- recognising women's multiple roles and ensuring training sessions are scheduled around women's childcare responsibilities and sensitive to mobility constraints and security concerns
- fostering women entrepreneurs and improving access to finance
- promoting gender-inclusive norms and running gender sensitisation training throughout the industry.

Mainstreaming gender in energy sector frameworks

There is a need to mainstream gender into energy sector frameworks including policies, programme design and project implementation. IRENA describes gender mainstreaming as "The practice of assessing, in any planned law, policy, or programme, its differential implications for women and men with the ultimate goal of achieving gender equality and empowerment of women".[203]

The IRENA Wind report (2020) noted that mainstreaming gender needed to occur at multiple levels, policymaking, programme design and project implementation, arguing this was essential to "heighten awareness of restrictive cultural and social norms and to challenge persistent gender myths".[204] They recommend that effective mainstreaming is achieved through 1) presenting gender-disaggregated data and 2) raising the visibility of the diverse roles women already play in expanding the wind energy sector and promoting energy transition.[205]

There are several examples of gender policies and programmes which aim to improve women's representation in the renewable energy sector. Global initiatives include the Advancing Gender in the Environment (AGENT) programme supported

[202] IEA and CEEW, "A Look at India's Transition to Clean Energy," 20.
[203] IRENA, *Renewable Energy: A Gender Perspective.*, 8.
[204] IRENA, 34.
[205] IRENA, *Renewable Energy: A Gender Perspective.*

by the International Union for Conservation of Nature (IUCN) and the United States Agency for International Development (USAID). This collaboration seeks to improve the outcomes of USAID's efforts to incorporate gender dimensions into environmental fields.[206] The Global Wind Energy Council (GWEC) and the Global Women's Network for the Energy Transition (GWNET) have also launched a leadership programme. This programme aims to facilitate career development toward leadership roles, using mentorship and knowledge sharing.[207] Similarly, the Economic Community of West African States has published its Policy for Gender Mainstreaming in Energy Access. While the policy does not initially reference employment, it does seek to address gender balance in the public sector energy-linked jobs.[208] These regional policies may also act to inform national-level intervention entry points to promote women's participation through supported climate programmes.

The Clean Energy, Education, and Empowerment (C3E) initiative aims to improve the representation and participation of women in the clean energy industries. The initiative recognises the importance of gender visibility and international cooperation. It also publishes data collected from the various C3E member countries, on understanding and monitoring progress on improving gender diversity in the clean energy sector.[209]

Improve gender-disaggregated data by job category

There is a need to have gender-disaggregated data by job categories in the wind and solar sectors to understand the current status of gender diversity and track the effectiveness of action to address gender diversity.

Developing a clearer understanding of gender diversity in the wind and solar sectors rests largely on the availability of data and analysis.[210] Therefore, continuous research and dynamic data tracking are necessary for developing programmes and policies to improve gender diversity, at the industry and sector levels [211]. The publication, *Women at the Forefront of the Clean Energy Future,* recommends the mandatory collection of gender-disaggregated data in the clean energy sector, as this will further facilitate the monitoring of gender representation in the sector.[212]

Setting targets and quotas

Global commitments are important; however, targets are integral in ensuring gender equity and inclusivity in renewable energy.[213] Accordingly, there is a need to set targets for gender representation, develop toolkits to support reaching such targets and implementation of annual reviews as highlighted in the literature. Actions may include a gendered analysis of existing policies and frameworks which enable energy programmes to establish a baseline and identify gaps that need to be addressed.[214] This could further inform a baseline assessment guideline, necessary for the development of gender-specific programmes. The creation of policy to support gender integration at the project development level is crucial and may support gender inclusive-responsive local economic development strategies. Regular reporting by gender is also crucial to encourage and recognise gender transformation. IRENA also

[206] IUCN and USAID, "Making the Case for Gender Equality in Large-Scale Renewable Energy Infrastructure Development."
[207] GWEC, "GWEC Global Wind Report."
[208] ENERGIA et al., "Global Progress of SDG 7 - Energy and Gender."
[209] C3E International and IEA, "Gender Equality in the Energy Sector."
[210] ENERGIA et al., "Global Progress of SDG 7 - Energy and Gender."
[211] IUCN and USAID, "Making the Case for Gender Equality in Large-Scale Renewable Energy Infrastructure Development."
[212] Elwell, Mershon, and Aguilar, "Women at the Forefront of the Clean Energy Future."
[213] Elwell, Mershon, and Aguilar.
[214] Elwell, Mershon, and Aguilar.

notes that the introduction of quotas has seen accelerated transformation:[215]

> Countries that have instituted mandatory quotas have achieved a higher level of representation of women in the boardroom, and done so more rapidly, than countries that have opted instead to encourage gender diversity via a "comply or explain" approach, which requires companies to consider the representation of women or explain the reason for not doing so.

There are also examples of the components of the renewable energy industry developing its own set of recommendations for gender diversity. Broadly, these relate to gender and climate legislative and reporting requirements, which have been taken up largely by European countries.[216] This includes companies' adoption of recommendations such as the Task Force on Climate-related Financial Disclosures (TCFD) and legislated gender targets. It has been shown that some companies, involved in clean energy which have adopted these commitments, have a higher level of gender diversity. In some cases, there can be a direct link between diversity and business performance.[217] One such example is Shell, which is a signatory under the "Catalyst CEO Champions for Change" programme. This programme aims to realise the support of companies and the chief executive officers for the progression of women at all leadership levels. Shell's commitment to women's progression has been realised as it has been featured in the Times Top 50 employers for women list, for many years.[218] The company has also established a GameChanger accelerator programme, which is led by a woman director, with women also comprising about half of the team. The GameChanger is the accelerator unit launched to incubate early-stage clean technologies.[219]

Recommendations at an institutional level

The UNIDO "Policy Assessment for the Economic Empowerment of Women in Green Industry" for South Africa[220] report also makes a list of recommendations for the public, civil society and the private sector to drive gender mainstreaming in the sector.[221] These recommendations are summarised in Figure 42 below:

[215] IRENA, *Renewable Energy: A Gender Perspective.*, 49.
[216] Bloomberg and SPF, "Gender Diversity and Climate Innovation."
[217] Bloomberg and SPF.
[218] C3E International and IEA, "Gender Equality in the Energy Sector."
[219] Bloomberg and SPF, "Gender Diversity and Climate Innovation."
[220] UNIDO, "Policy Assessment for the Economic Empowerment of Women in Green Industry - Executive Summary: South Africa."
[221] UNIDO.

Government

- A specific gender-mainstreamed policy for the green industry
- Facilitate and incentivise collaboration across departments and sectors
- Address systemic discrimination
- Access to affordable childcare
- Parental leave for all workers
- Policy formulation that does not sit alone in each government department but is inter-departmental.

Local Government

- Consciousness-raising
- Political buy-in
- Gender-responsive regulations and policies
- Stakeholder engagement

Civil Society

- Accountability and oversight
- Advocacy groups
- Promote collaboration
- Targeting Women
- Create highly visible role models
- Exchange and network more among each other
- Engage more men

Private Sector

- Foster business practices that empower women
- Lead by example
- Create enabling environments for gender equality
- Invest in exchange visits
- Ensure equal terms and conditions of work for men and women
- Invest in training and capacity building

Figure 42: Summary of institutional level recommendations

South African Policy Recommendations

To address the lack of representation and participation of women in the energy sector, the Department of Mineral Resource and Energy (DMRE) established the *2021 – 2025 Women Empowerment and Gender Equality (WEGE) Strategy for the Energy Sector*.[222] The DMRE formulated this strategy to ensure that the department and the energy sector are bound by the provisions of the strategy so that women's empowerment and gender equality are achieved. The WEGE Strategy has four main pillars, these are listed in Figure 43 below:[223]

Key operational Interventions

The four main strategic pillars listed in Figure 43 of the WEGE strategy will be achieved through the implementation of actions that are linked to key operational interventions.

Table 15 below is a summary of recommended initiatives and actions that would ensure the effective implementation of the WEGE strategy.[224]

Table 15: Recommended initiatives and action to support implementation of WEGE strategy

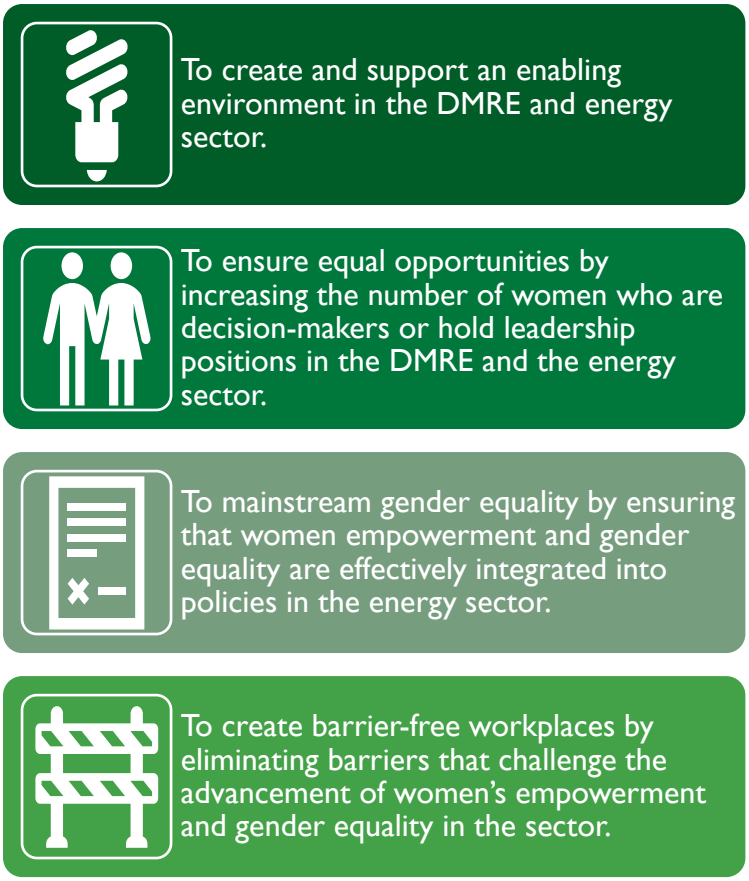


Figure 43: South African policy recommendations to address women's representation in energy sectors

[222] Department of Mineral Resources and Energy, "2021-2025 WEGE Strategy for the Energy Sector."

[223] Department of Mineral Resources and Energy.

[224] Department of Mineral Resources and Energy.

Implementation Initiatives	Actions by the DMRE and Energy Sector
Capacity-Building Initiatives	⚥ Investing in capacity-building initiatives that strengthen women-owned enterprises in the energy sector. ⚥ Developing and implementing leadership development programmes that focus on the advancement of women in mid-management positions to senior management. ⚥ Develop and implement toolkits and guidelines that will help organisations with identifying, promoting, supporting, and retaining women in senior management positions. ⚥ Offer bursaries, graduate programs, internships and learnerships that are tailored for girl learners and women from disadvantaged backgrounds. ⚥ Continuous training of staff, management, and board on mainstreaming gender in policies, programmes, practices, and projects of organisations in the sector.
Organisational Support Initiatives	⚥ Effectively implementing the Employment Equity Act which seeks to eliminate unfair discrimination of marginalised groups of people such as women. ⚥ Ensuring that policies and processes around performance management and talent management support the advancement of women. ⚥ Including gender considerations in data collection, monitoring and evaluation systems that are used to improve organisational practices. ⚥ Organisations setting aside gender budgets which clearly show the allocation of funds that will be used to support women's empowerment and gender equality.
Governance and Institutional Development Initiatives.	⚥ Creating a women-specific database for women in the energy sector across all employment levels in different organisations. The information in the database should be accessible to all business divisions. ⚥ Incentivising organisations that show the active participation of women in the business's supply chain. ⚥ Companies in the energy sector should encourage the participation of women in leadership positions in the sector by supporting events that target the advancement of women such as the Women in Energy Awards. ⚥ Ensuring that organisations account for gender mainstreaming through Monitoring & Evaluation reporting, gender audits, disaggregated data, and gender analysis.

Implementation Initiatives	Actions by the DMRE and Energy Sector
Economic Growth and Development Initiatives	⚥ The DMRE should inform and influence government policy, resource allocation and service delivery to address and improve the position of women as energy users, employees, leaders, and businesswomen in the energy sector. ⚥ Organisations should develop and implement programmes and projects which specifically aim at improving the employment and economic prospects of women in the energy sector. ⚥ Companies must work together with relevant government departments such as the DMRE to leverage the growth of renewable energy generation as an economic driver for women's empowerment. ⚥ Companies and government departments should participate and host sessions on business opportunities, access to finance, markets, and capacity-building initiatives which specifically target women in the energy sector. ⚥ Encourage the participation of women as business owners or executives in the energy sector by ensuring that a considerable percentage of most supply chain contracts are granted to women, as per the revised Preferential Regulations.

Enablers and Risks

There are several enablers and risks that could either support or hinder the achievement of the objectives of the WEGE strategy. The enablers will be used to support and strengthen the key operational implementation initiatives that have been identified, whilst the risks will be mitigated by putting in place measures that will minimise or eliminate them.

Table 16 below shows a summarised list of enablers and associated risks that could support or hinder the achievement of the interventions proposed in the strategy.[225]

Table 16: Summary of WEGE strategy enablers and risks

Enablers	Risks
Existing public service leadership development programmes which specifically focus on women's empowerment	Gender diversity, specifically women's empowerment is not prioritised by all DMRE staff members and decision-makers, and organisations in the energy sector as a whole.
The government's commitment to women's empowerment and the achievement of gender equality	There is a lack of understanding of the value of women's empowerment and gender equality for an effective just transition to renewable energy generation. In this regard, there is also a lack of commitment to the financial and human resources required to implement women's empowerment and gender equality in the renewable energy sector.
The existence of policies and frameworks that encourage gender equality such as the DPSA's Strategic Framework for Gender Equality and the DOE's Women Empowerment and Gender Equality Policy	As these policies and strategies exist in a patriarchal society where policies and strategies of this nature are not given the necessary recognition and support.

[225] Department of Mineral Resources and Energy.

Enablers	Risks
Gender mainstreaming champions being capacitated, and accountability being clearly defined	The responsibility of gender mainstreaming is being shifted to under-resourced and ill-equipped offices and accountability and responsibilities are not being clearly defined.
Allocation of the financial and human resources required	The financial resources that could be used to implement all identified actions which would ensure the successful implementation of the strategy is limited.
Compliance of organisations, including public and private, to the Revised Preferential Procurement Regulations	The resistance of the private sector organisations may affect the ability to drive change in the energy sector.

References

Australian WGEA. "Australia's Gender Equality Scorecard: Key Results from the Workplace Gender Equality Agency's 2020-21 Employer Census." Sydney, Australia: Workplace Gender Equality Agency, February 2022. https://www.wgea.gov.au/sites/default/files/documents/2020-21_WGEA_SCORECARD.pdf.

———. "Gender Segregation in Australia's Workforce." Factsheet Series. Sydney, Australia: Workplace Gender Equality Agency, April 2019. https://www.wgea.gov.au/sites/default/files/documents/18_04_Industrial_segregation.pdf.

———. "WGEA Data Explorer: Industries - Electricity Supply within Electricity, Gas, Water and Waste Services Division." WGEA Data Explorer, 2022. https://data.wgea.gov.au/industries/291#gender_comp_content.

Babic, Audrey, and Isabelle Hansez. "The Glass Ceiling for Women Managers: Antecedents and Consequences for Work-Family Interface and Well-Being at Work." *Frontiers in Psychology* 12 (March 9, 2021): 618250. https://doi.org/10.3389/fpsyg.2021.618250.

Baruah, Bipasha. "Renewable Inequity? Women's Employment in Clean Energy in Industrialized, Emerging and Developing Economies." *Natural Resources Forum* 41, no. 1 (2017): 18–29. https://doi.org/10.1111/1477-8947.12105.

Baruah, Bipasha, and Crystal Gaudet. "Creating and Optimizing Employment Opportunities for Women in the Clean Energy Sector in Canada." *Journal of Canadian Studies*, March 28, 2022, e20190001. https://doi.org/10.3138/jcs.2019-0010.

Bloomberg, IRENA, and CEBC. "Women in Clean Energy, Middle East and North Africa Survey." Bloomberg Finance, 2017. https://assets.bbhub.io/professional/sites/24/2017/05/2017-05-03-BNEF-CEBC-IRENA-MENA-Women-in-Clean-Energy-Final.pdf.

Bloomberg and SPF. "Gender Diversity and Climate Innovation." Bloomberg Finance, December 2020. https://assets.bbhub.io/professional/sites/24/BNEF-Sasakawa-Peace-Foundation-Gender-Diversity-and-Climate-Innovation_12012020_FINAL.pdf.

C3E International and IEA. "Status Report on Gender Equality in the Energy Sector." Clean Energy, Education, and Empowerment, 2019. https://www.globalwomennet.org/wp-content/uploads/2019/10/c3e-data-report-en-1.pdf.

CFF and GIZ. "Solar Energy in Brazil: Which Are the Barriers and Opportunities for Women Professionals in the Field?" Berlin, Germany: C40 Cities Finance Facility and Deutsche Gesellschaft für Internationale Zusammenarbeit, 2021. https://www.globalwomennet.org/solar-energy-brazil/.

DEL. "20th Commission for Employment Equity Annual Report 2019-20." Pretoria, South Africa: Department of Employment and Labour, 2020. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2019%20-2020/20thCEE_Report_.pdf.

———. "21st Commission for Employment Equity Annual Report 2020-21." Pretoria, South Africa: Department of Employment and Labour, 2021. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2020-2021/21%20CEE%20Report.pdf.

———. "22nd Commission for Employment Equity Annual Report 2021-22." Pretoria, South Africa: Department of Employment and Labour, 2022. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2021/22nd%20CEE%20Annual%20Report.pdf.

Department of Mineral Resources and Energy. "Women Empowerment and Gender Equality Strategy for the Energy Sector (2021-2025)." Strategy, July 4, 2021. http://www.energy.gov.za/files/PPMO/2021-2025-WEGE-Strategy-for-the-Energy-Sector.pdf.

EHRC. "Findings Report: Profile of Women Working in the Clean Energy Sector in Canada." Ottawa, Canada: Electricity Human Resources Canada, June 12, 2017. https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/energy-resources/Profile_of_Women_Working_in_the_Clean_Energy_Sector_in_Canada_compressed.pdf.

Elwell, Natalie, Andre Mershon, and Lorena Aguilar. "Women at the Forefront of the Clean Energy Future: A White Paper of the USAID/IUCN Initiative Gender Equality for Climate Change Opportunities (GECCO)." USAID, IUCN, November 2014. https://www.esmap.org/sites/default/files/resources-document/FINAL_women_at_the_forefront_of_the_clean_energy_futur_OPTIMIZEDe.pdf.

Enerdata. "Renewables in Electricity Production | Statistics Map by Region | Enerdata." Enerdata, 2022. https://yearbook.enerdata.net/renewables/renewable-in-electricity-production-share.html.

———. "Wind & Solar Share in Electricity Production Data | Enerdata." Enerdata, 2022. https://yearbook.enerdata.net/renewables/wind-solar-share-electricity-production.html.

ENERGIA, ESMAP, UN, and UN Women. "Accelerating SDG 7 Achievement Policy Brief 12 Global Progress of SDG 7 - Energy and Gender." UN, 2018. https://sustainabledevelopment.un.org/content/documents/17489PB12.pdf.

GWEC. "GWEC Global Wind Report." Brussels, Belgium: Global Wind Energy Council, March 25, 2021. https://gwec.net/wp-content/uploads/2021/03/GWEC-Global-Wind-Report-2021.pdf.

IEA. *World Energy Outlook 2019*. France: International Energy Agency, 2019. https://www.iea.org/reports/world-energy-outlook-2019.

IEA and CEEW. "Women Working in the Rooftop Solar Sector: A Look at India's Transition to Clean Energy." International Energy Agency & Council on Energy, Environment and Water, February 2019. https://iea.blob.core.windows.net/assets/67e60726-8659-4c58-aefd-c86bdaa5fc10/Women_working_in_the_rooftop_solar_sector.pdf.

IFC. "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees." International Finance Corporation, 2022. https://www.ifc.org/wps/wcm/connect/b089848b-2dd3-458b-85e1-5db3f04cb153/IFC135+-+E2E+Report_V5.pdf?MOD=AJPERES&CVID=o52j5wH.

ILO. "Labour Statistics Glossary." *ILOSTAT* (blog), 2022. https://ilostat.ilo.org/resources/concepts-and-definitions/glossary/.

———. "Resolution I: Resolution Concerning Statistics of Work, Employment and Labour Underutilization," October 11, 2013. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_230304.pdf.

———. *Skills for Green Jobs in Bangladesh*. Geneva, Switzerland: International Labour Organisation, 2018. http://www.ilo.org/dhaka/Whatwedo/Publications/WCMS_694947/lang--en/index.htm.

———. *Women in Business and Management: The Business Case for Change*. Geneva: International Labour Organisation, 2019. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_700953.pdf.

IRENA. *Renewable Energy: A Gender Perspective*. Abu Dhabi: International Renewable Energy Agency, 2019. https://www.irena.org/publications/2019/Jan/Renewable-Energy-A-Gender-Perspective.

———. *Renewable Energy and Jobs – Annual Review 2018*. 5th ed. Abu Dhabi: International Renewable Energy Agency, 2018. https://www.irena.org/publications/2018/May/Renewable-Energy-and-Jobs-Annual-Review-2018.

———. *Wind Energy: A Gender Perspective*. Abu Dhabi: International Renewable Energy Agency, 2020. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jan/IRENA_Wind_gender_2020.pdf.

IRENA and ILO. "Renewable Energy and Jobs – Annual Review 2021." Abu Dhabi, United Arab Emirates: International Renewable Energy Agency, 2021. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_823807.pdf.

IUCN and USAID. "Advancing Gender in the Environment: Gender-Responsive Geothermal Generation." International Union for Conservation of Nature, February 2019. https://www.globalwomennet.org/wp-content/uploads/2020/03/iucn-usaid-lageo-brief-accesible-spreads.pdf.

———. "Advancing Gender in the Environment: Making the Case for Gender Equality in Large-Scale Renewable Energy Infrastructure Development." Brief. AGENT Thematic Energy. Washington DC: International Union for Conservation of Nature, 2018. https://www.globalwomennet.org/wp-content/uploads/2020/03/IUCN-USAID-Making_the_case_for_INFRASTRUCTURE.pdf.

Jared, Cline. "10 Reasons Every Company Should Offer Paid Paternity Leave." *10 Reasons Every Company Should Offer Paid Paternity Leave* (blog), 2019. https://www.catalyst.org/2019/06/12/10-reasons-every-company-should-offer-paid-paternity-leave-and-every-father-should-take-it/.

Natural Resources Canada. "Energy Fact Book 2021-2022," 2021. https://www.nrcan.gc.ca/sites/nrcan/files/energy/energy_fact/2021-2022/PDF/2021_Energy-factbook_december23_EN_accessible.pdf.

Ontario Human Rights Commission. "Policy on Preventing Discrimination Because of Gender Identity and Gender Expression," 2014, 62.

Pearl-Martinez, Rebecca, and Jennie C. Stephens. "Toward a Gender Diverse Workforce in the Renewable Energy Transition." *Sustainability: Science, Practice and Policy* 12, no. 1 (April 2016): 8–15. https://doi.org/10.1080/15487733.2016.11908149.

POWERful Women. "Cultivating Female Talent in Energy: What the Sector Can Do to Resolve the Barriers Faced by Women in Middle Management." London, UK: POWERful Women, April 2022. https://powerfulwomen.org.uk/wp-content/uploads/2022/04/Cultivating-Female-Talent-in-Energy_PfW-Bain_April-2022-FINAL_2-1.pdf.

Republic of South Africa. Basic Conditions of Employment Act, 1997 (No. 75 of 1997), Pub. L. No. Act No. 75 of 1997, 18491 (1997). https://www.gov.za/sites/default/files/gcis_document/201409/a75-97.pdf.

Saskatoon Health Region. "CommunityView Collaboration - Saskatoon Health Region Advancing Health Equity," 2014. https://www.communityview.ca/infographic_shr_health_equity.html.

Turkish Statistical Institute. "Gender Statistics 2021." Ankara, Türkiye: Turkish Statistical Institute, March 2022. https://www.tuik.gov.tr/media/announcements/toplumsal_cinsiyet_istatistikleri_2021.pdf.

UN Women. "Women's Empowerment Principles Call to Action: Gender Equality in the Renewable Energy Industry." UN Women, 2020. https://www.weps.org/sites/default/files/2021-02/CALL_TO_ACTION_Gender_Equality_Renewable_Energy_Industry.pdf.

UNFPA. "World Population Dashboard." United Nations Population Fund, 2022. https://www.unfpa.org/data/world-population-dashboard.

UNIDO. "Policy Assessment for the Economic Empowerment of Women in Green Industry - Executive Summary: South Africa." Executive Summary, 2021. https://www.unido.org/sites/default/files/files/2021-06/SouthAfrica_Executive%20Summary_Final_0.pdf.

U.S Department of Energy. "United States Energy and Employment Report 2022." U.S Department of Energy's Office of Policy, Office of Energy Jobs, June 2022. https://www.energy.gov/sites/default/files/2022-06/USEER%202022%20National%20Report_1.pdf.

Annexes

Annex 1.1: List of Employment Opportunities in the Solar and Wind Sectors

Solar Sector

Below are different job categories found in the solar sector that is drawn from an article on different careers in the solar sector. See: https://www.bls.gov/green/solar_power/

Category	Job Description	Duties/Responsibilities
Wind farm Project Development	Land Acquisition Specialists	Responsible for designing and implementing land acquisition plans for new wind farm development sites
Wind farm Project Development	Project Manager	They are responsible for overseeing and planning projects to make sure that they run on time and within budget. They'll plan and allocate resources, prepare budgets, monitor progress, and keep higher management and stakeholders informed about the project's development
Scientific Research	Physicists	In the solar industry, physicists work with chemists, material scientists and engineers to improve the efficiency of solar panels. They are also responsible for investigating new more efficient materials that could be used for solar panel generation, such as thin-film photovoltaic solar panels.
Scientific Research	Chemists	In the solar power industry, chemists are responsible for improving solar cell design, developing materials for making solar cells and improving existing materials.
Scientific Research	Materials Scientists	They are responsible for researching materials that are used in the solar power field, they also consistently research ways that would increase solar panel efficiency.
Solar Power Engineering	Materials Engineers	They are involved in the development, processing and testing of materials that are used in products that must meet specialised design and performance specifications.
Solar Power Engineering	Chemical Engineers	In the solar power industry, chemical engineers are responsible for designing equipment and processes for large-scale manufacturing, planning and testing methods of manufacturing solar cells and supervising solar cells.
Solar Power Engineering	Electrical and Electronic Engineers	They are responsible for developing, testing and supervising the manufacturing of electrical components that are used in solar power generation.
Solar Power Engineering	Industrial Engineers	They are concerned primarily with increasing productivity through the management of people, the use of technology and the improvement of production methods of solar cells or mirrors. To maximise efficiency, industrial engineers study product requirements carefully and design manufacturing information systems.
Solar Power Engineering	Mechanical Engineers	They work on machines that are used in the manufacturing of solar panels. They are also responsible for designing and testing electrical generators and pumps that are used in concentrating solar power plants.
Solar Power Engineering	Computer Software Developers	They are responsible for developing software that is used in forecasting weather and sunlight patterns to assess the feasibility and cost of generating solar power in a particular area.
Solar Power Engineering	Engineering Technicians	They assist engineers with solving technical problems in research, development, manufacturing, construction, operation and maintenance. They usually asst with building or setting up

Category	Job Description	Duties/Responsibilities
		equipment, preparing and conducting experiments, collecting data and recording results.
Manufacturing	Semiconductor Processors	They oversee the manufacturing process of solar cells. They also perform necessary maintenance and repairs on equipment.
Manufacturing	Computer-controlled machine tool operators (CNC operators)	They are responsible for running numerically controlled (CNC) machines, which are used for forming and shaping solar mirror panel components. Highly trained CNC operators are also responsible for programming the machine to cut new pieces according to design schematics.
Manufacturing	Welding, soldering and brazing workers	These workers apply heat to metal pieces during the manufacturing process, melting and fusing them to form a permanent bond.
Manufacturing	Glaziers	They are responsible for selecting, cutting, installing, replacing, and removing glass or glass-like materials that are used in the manufacturing of photovoltaic panels.
Manufacturing	Coating and painting machine setters, operators and tenders.	They are responsible for applying coatings to solar panels.
Manufacturing	Electrical and electronic installers and repairers	They are responsible for installing and repairing a number of complex electronic equipment that the solar energy industry depends on.
Manufacturing	Industrial Production Manager	They plan, direct and coordinate work in the manufacturing factory. They ensure that production runs on schedule and are responsible for solving problems that could jeopardise the quality of the components needed in a solar farm.
Solar Plant Development	Real Estate Brokers	They are instrumental in the procurement of land on which solar power plants can be built. Besides the procurement of land, they also work alongside atmospheric scientists to determine if the land is suitable for its intended purpose.
Solar Plant Development	Atmospheric Scientists and Meteorologists	They are responsible for studying areas that would be considered for the development of solar power plants. They are needed to study the atmosphere and weather conditions prior to the development of plants or large commercial solar projects.
Solar Plant Development	Environmental Scientists	They ensure that environmental regulations and policies are followed and that sensitive parts of the ecosystem are protected during the construction and operation of a solar power plant
Solar Installation	Site Assessors	Determine how much energy can be harvested at a particular location and make recommendations based on that assessment. They help determine the best type, size and layout of solar panels and help draw up plans for installation crews.
Solar Installation	Plumbers	They are responsible for installing solar water heating systems
Solar Installation	Roofers	They install and repair roofs and ensure that any cuts or holes made in the roof during the installation of solar panels and mounting racks are properly repaired.
Solar Installation	Solar sales person	Solar manufacturers need well-trained salespeople to sell their products to customers. They are responsible for making solar products known and generating interest in the products
Construction	Construction Managers	They oversee the construction of solar power plants from site selection to final construction of the plant. They are also responsible for supervising a diverse team of people who will be

Category	Job Description	Duties/Responsibilities
		involved in the construction of the power plants, this includes engineers, scientists, operators, construction workers, etc.
Construction	Civil Engineers	Are responsible for the design and the construction of power plants. They design necessary infrastructure which includes roadways, support structures, foundations and plumbing systems
Construction	Construction Laborers	They are responsible for preparing the construction site by removing trees and debris. They are also responsible for monitoring and repairing compressors, pumps and generators. They also erect scaffolding and other support structures, as well as loading, unloading, identifying and distributing materials in accordance with project plans.
Construction	Construction equipment operators	They are responsible for operating heavy machinery that is used to move construction materials, earth and other heavy materials at the construction site
Construction	Welders	In concentrating solar power plants, welders are responsible for joining structural beams together when constructing buildings and joining pipes together. Welders working in photovoltaic plants are instrumental in building the solar panel mounting systems.
Construction	Structural Iron and Steel Workers	They are responsible for placing and installing iron or steel girders, columns and other structures that form as part of support structures for power plants.
Operation and Maintenance	Power Plant Operators	They are mainly responsible for monitoring power generation and distribution from control rooms at power plants.
Operation and Maintenance	Pump Operators	They control and operate the pump and manifold systems that transfer oil, water and other materials throughout Concentrated Solar Power plants.
Operation and Maintenance	Electricians	They are responsible for installing and maintaining electrical equipment and wiring that connects the plant to the electrical grid.
Operation and Maintenance	Plumbers, pipefitters and steamfitters	They install, maintain and repair pipe systems.
Operation and Maintenance	Electrical and electronics installers and repairers	They use electronic power equipment to operate and control generating plants, substations and monitoring equipment. They also install, maintain, and repair these complex systems.
Operation and Maintenance	Solar photovoltaic installers	They are instrumental in the process of solar panel installation and maintenance. They use specialised skills to install solar panels in residential and commercial solar projects.
Professional and Administrative positions	Secretaries/ Administrative assistant	They are responsible for facilitating communications within an office or fielding interactions. Their duties include answering and redirecting phone calls, scheduling meetings and providing personalised support for other employees in their office
Professional and Administrative positions	Receptionists/ Front Desk Receptionist	They are responsible for performing clerical tasks within an office setting to support daily operations. Their duties include answering and transferring phone calls to employees, sorting and delivering mail to employees and greeting visitors when they arrive for meetings with management or sales staff
Professional and Administrative positions	Human Resource	A Human Resources (HR) Officer is responsible for managing every aspect of the employment process, including orientation and training of new staff members. They also assist with payroll management, so employees receive their pay checks on time.
Professional and Administrative positions	Accountants	Accountants are responsible for helping solar businesses make critical financial decisions by collecting, tracking, and correcting the company's finances. They are responsible for financial audits,

Category	Job Description	Duties/Responsibilities
		reconciling bank statements, and ensuring financial records are accurate throughout the year.
Professional and Administrative positions	Auditors	They ensure compliance with established internal control procedures by examining records, reports, operating practices, and documentation. Verifies assets and liabilities by comparing items to documentation. Completes audit workpapers by documenting audit tests and findings.
Professional and Administrative positions	Solar Energy Attorneys	A solar energy attorney is a lawyer who is legally authorised to work in the energy sector. Energy attorneys are experts in energy use, regulation, and law. As an energy attorney, you must understand the rules that dictate how companies create and harvest energy. Their duties may include representing companies that develop solar power plants and solar farms, as well as handling pipeline contractual agreements, power purchasing, and energy-related contracts.
Supporting Occupations	Cleaners or Custodians	They are responsible for keeping offices clean and neat.
Supporting Occupations	Security Guards	They are responsible for securing premises and personnel by patrolling property, monitoring surveillance equipment and inspecting buildings and equipment. Their duties can also include monitoring access points as well as prohibiting or permitting entry

Wind Sector

Below are different job categories found in the wind sector that is drawn from an article on different careers in the wind sector See: https://www.bls.gov/green/wind_energy/

Category	Job Description	Duties/Responsibilities
Wind farm Project Development	Land Acquisition Specialists	Responsible for designing and implementing land acquisition plans for new wind farm development sites.
Wind Farm Developers	Project Managers	They are responsible for overseeing and planning projects to make sure that they run on time and within budget. They plan and allocate resources, prepare budgets, monitor progress, and keep higher management and stakeholders informed about the project's development.
Wind farm Project Development	Asset Managers	Responsible for representing the interests of wind farm owners, especially by determining ways of maximining profits. They oversee the project's budget, finances, and contractual requirements.
Wind farm Project Development	Logisticians	They are responsible for making transportation as efficient as possible. Logisticians also must ensure that the manufacturer and the construction team develop an optimised schedule for delivering turbine components.
Scientific Research	Atmospheric Scientists/ Meteorologists	They are responsible for monitoring the atmosphere around the potential project to ensure that there is adequate wind to produce electricity. They are also responsible for assessing whether wind or other weather conditions are too extreme for viable wind farm development. Atmospheric scientists in the wind industry are in relatively high demand.
Scientific Research	Zoologists and Wildlife Biologists	They evaluate the wind farm's effect on local animal species. They are also responsible for supervising the development of reports on the environmental impacts wind farms may have.
Scientific Research	Geologists	They do a lot of fieldwork which includes identifying and examining the underlying topography of a proposed wind farm. They also study the surfaces on which turbines will be constructed to provide guidance and recommendations on how best to construct foundations for the turbines and other supporting structures.
Scientific Research	Environmental Scientists	They work with wind farm developers to assist with ensuring that there is compliance with environmental regulations and policies.
Wind Power Engineering	Aerospace engineers	Designing, testing and supervising the manufacturing of turbine blades and rotors, and conducting aerodynamic assessments.
Wind Power Engineering	Civil Engineers	Designing and supervising the construction of wind farms, this includes roads, support buildings and the tower and foundation portions of the wind turbine.
Wind Power Engineering	Electrical Engineers	Design, develop, test and supervise the manufacture of the turbine's electrical components, including electric motors, machinery controls, lighting and wiring, generators, communications systems and electricity transmissions.
Wind Power Engineering	Electronic Engineers	Responsible for dealing with complex electronic systems that are used to operate the turbines.
Wind Power Engineering	Environmental Engineers	Responsible for dealing with potential environmental impacts of wind turbines, this includes noise and visual impacts and impacts on plants and animal species found in wind farms.
Wind Power Engineering	Health and Safety Engineers	Identifying and measuring potential hazards of wind turbines. Providing appropriate recommendations on avoiding incidents and implementing systems that ensure safe manufacture and operations of wind turbines.

Category	Job Description	Duties/Responsibilities
Wind Power Engineering	Industrial Engineers	Assist with financial planning, cost analysis, and the design of production processes and control systems. Also, responsible for determining the most effective way to use the basic factors of production to make components of wind turbines.
Wind Power Engineering	Materials Engineers	Design, develop, process and test materials that will be used to construct wind turbines and their components.
Wind Power Engineering	Engineering Technicians	Responsible for assisting engineers or scientists especially in research and development and in the manufacturing process. Responsibilities could include working in quality control, inspections and data collection.
Manufacturing	Industrial Production Manager	The production manager is responsible for planning, directing and coordinating the work in the manufacturing factory. They are also responsible for solving problems that could jeopardise the quality of their company's components.
Manufacturing	Machinist	Responsible for producing precision metal and plastic pieces in numbers that are too small to be manufactured with automated machinery. They are sometimes also responsible for applying finishes on parts that were manufactured by automated machinery.
Manufacturing	Compute-controlled machine tool operators	These operators run computer numerically controlled machines, which use the machine tool to form and shape turbine components. Highly trained operators are also responsible for programming the machines to cut new pieces according to the designers' schematics.
Manufacturing	Assemblers	They assist in the manufacturing of all turbine components.
Manufacturing	Welders	They are responsible for applying heat to metal pieces, melting and fusing them to form a permanent bond.
Manufacturing	Quality-control Inspectors	They are responsible for verifying that parts are well fitted, are able to move correctly and are properly lubricated. They are also responsible for consistently examining parts and submitting regular quality-control reports.
Construction	Project Managers	Due to the complexity of constructing wind farms, project managers may be responsible for managing portions of the construction, such as site cleaning, foundation construction, or tower erection.
Construction	Construction Laborers	Usually, work as contractors and are responsible for preparing the wind farm site and building the surrounding infrastructure,
Construction	Construction Workers	They are responsible for ensuring that all work on-site is performed safely and correctly. Depending on their level of training and competency, they are sometimes responsible for servicing wind turbines.
Construction	Construction Equipment Operators	They are responsible for operating heavy equipment that is used on the construction site.
Construction	Crane Operators	They are responsible for operating cranes which are used to lift components of the wind turbines off trucks as they arrive. They also operate cranes that are used to stack the tower segments of the turbines.
Construction	Electricians	They ensure that electricity generated by the wind turbine is transferred to the power grid.
Operation and Maintenance	Wind Turbine Service Technicians	They are responsible for inspecting turbines and providing servicing wind turbines. They diagnose and fix problems to avoid turbines getting shut down completely.
Operation and Maintenance	Power Plant Operators	They are mainly responsible for monitoring power generation and distribution from control rooms at power plants.

Category	Job Description	Duties/Responsibilities
Operation and Maintenance	Pump Operators	They control and operate the pump and manifold systems that transfer oil, water and other materials throughout the wind farm.
Operation and Maintenance	Electricians	They are responsible for installing and maintaining electrical equipment and wiring that connects the plant to the electrical grid.
Operation and Maintenance	Plumbers, pipefitters and steamfitters	They install, maintain and repair pipe systems.
Operation and Maintenance	Electrical and electronics installers and repairers	They use electronic power equipment to operate and control generating plants, substations and monitoring equipment. They also install, maintain, and repair these complex systems.
Professional and Administrative positions	Secretaries/ Administrative assistant	They are responsible for facilitating communications within an office or fielding interactions. Their duties include answering and redirecting phone calls, scheduling meetings and providing personalised support for other employees in their office.
Professional and Administrative positions	Receptionists/ Front Desk Receptionist	They are responsible for performing clerical tasks within an office setting to support daily operations. Their duties include answering and transferring phone calls to employees, sorting and delivering mail to employees and greeting visitors when they arrive for meetings with management or sales staff.
Professional and Administrative positions	Human Resource	HR is responsible for managing every aspect of the employment process, including the orientation and training of new staff members. They also assist with payroll management, so employees receive their pay checks on time. A Human Resources (HR) Officer is responsible for managing every aspect of the employment process, including orientation and training of new staff members. They also assist with payroll management, so employees receive their pay checks on time.
Professional and Administrative positions	Accountants	Accountants are responsible for helping wind businesses make critical financial decisions by collecting, tracking, and correcting the company's finances. They are responsible for financial audits, reconciling bank statements, and ensuring financial records are accurate throughout the year.
Professional and Administrative positions	Auditors	They ensure compliance with established internal control procedures by examining records, reports, operating practices, and documentation. Verifies assets and liabilities by comparing items to documentation. Completes audit workpapers by documenting audit tests and findings.
Professional and Administrative positions	Wind Energy Attorneys	A wind energy attorney is a lawyer who is legally authorised to work in the energy sector. Energy attorneys are experts in energy use, regulation, and law. As an energy attorney, you must understand the rules that dictate how companies create and harvest energy. Their duties may include representing companies that develop wind farms, as well as handling pipeline contractual agreements, power purchasing, and energy-related contracts.
Supporting Occupations	Cleaners or Custodians	They are responsible for keeping offices clean and neat.
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Annex 1.2: Key International Reports

The international reports listed below were synthesised in this literature review.

Title	Publication Year	Author	URL
Employment model in Bangladesh: Promoting green jobs in renewable energy sector: Women Solar Technicians and Entrepreneurs	2012	Australian Aid	http://www.ilo.org/asia/areas/green-jobs/WCMS_183806/lang--en/index.htm
Australia's gender equality scorecard: Key results from the Workplace Gender Equality Agency's 2020-21 employer census	2022	Australian WGEA	https://www.wgea.gov.au/sites/default/files/documents/2020-21_WGEA_SCORECARD.pdf
Gender Segregation in Australia's Workforce	2019	Australian WGEA	https://www.wgea.gov.au/sites/default/files/documents/18_04_Industrial_segregation.pdf
WGEA Data Explorer: Industries - Electricity Supply within Electricity, Gas, Water and Waste Services Division	2022	Australian WGEA	https://data.wgea.gov.au/industries/291#gender_comp_content
The Glass Ceiling for Women Managers: Antecedents and Consequences for Work-Family Interface and Well-Being at Work	2021	Babic, Audrey; Hansez, Isabelle	https://www.frontiersin.org/articles/10.3389/fpsyg.2021.618250/full
Renewable inequity? Women's employment in clean energy in industrialised, emerging and developing economies	2017	Baruah, Bipasha	https://www.researchgate.net/profile/Bipasha-Baruah/publication/309279663_Renewable_inequity_Women's_employment_in_clean_energy_in_industrialized_emerging_and_developing_economies/links/59c9a55245851556e97a731d/Renewable-inequity-Womens-employment-in-clean-energy-in-industrialized-emerging-and-developing-economies.pdf
Creating and Optimising Employment Opportunities for Women in the Clean Energy Sector in Canada	2022	Baruah, Bipasha; Gaudet, Crystal	https://publish.uwo.ca/~bbaruah/pdf/Baruah_KSG_Final%20Report_May%202016.pdf
Women in Clean Energy, Middle East and North Africa Survey	2017	Bloomberg; IRENA; CEBC	https://assets.bbhub.io/professional/sites/24/2017/05/2017-05-03-BNEF-CEBC-IRENA-MENA-Women-in-Clean-Energy-Final.pdf
Gender Diversity and Climate Innovation	2020	Bloomberg; SPF	https://assets.bbhub.io/professional/sites/24/BNEF-Sasakawa-Peace-Foundation-Gender-Diversity-and-Climate-Innovation_12012020_FINAL.pdf
Women for Sustainable Energy: Strategies to Foster Women's Talent for Transformational Change	2019	Boyd, Anya; Nobelius, Ann-Maree; Stands, Sarah	https://www.globalwomennet.org/wp-content/uploads/2020/02/Gwnet-study.pdf
Status Report on Gender Equality in the Energy Sector	2019	C3E International; IEA	https://www.globalwomennet.org/wp-content/uploads/2019/10/c3e-data-report-en-1.pdf
Mainstreaming Gender in Energy Projects: A Practical Handbook	2011	Cecelski, Elizabeth; Dutta, Soma	https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/Energia_Mainstreaming_gender_in_energy_projects_A_practical_Hand_book.pdf

Title	Publication Year	Author	URL
Solar Energy in Brazil: Which are the Barriers and Opportunities for Women Professionals in the Field?	2021	CFF; GIZ	https://www.globalwomennet.org/solar-energy-brazil/
Late Developers: Gender Mainstreaming in the Energy Sector	2009	Clancy, Joy	http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.574.3264&rep=rep1&type=pdf
Findings Report: Profile of Women Working in the Clean Energy Sector in Canada	2017	EHRC	https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/energy-resources/Profile_of_Women_Working_in_the_Clean_Energy_Sector_in_Canada_compressed.pdf
Women at the Forefront of the Clean Energy Future: A White Paper of the USAID/IUCN Initiative Gender Equality for Climate Change Opportunities (GECCO)	2014	Elwell, Natalie; Mershon, Andre; Aguilar, Lorena	https://www.esmap.org/sites/default/files/resources-document/FINAL_women_at_the_forefront_of_the_clean_energy_futur_OPTIMIZEDe.pdf
Renewables in Electricity Production | Statistics Map by Region | Enerdata	2022	Enerdata	https://yearbook.enerdata.net/renewables/renewable-in-electricity-production-share.html
Wind & Solar Share in Electricity Production Data | Enerdata	2022	Enerdata	https://yearbook.enerdata.net/renewables/wind-solar-share-electricity-production.html
Accelerating SDG 7 Achievement Policy Brief 12 Global Progress of SDG 7 - Energy and Gender	2018	ENERGIA; ESMAP; UN; UN Women; SEforALL; IEA	https://sustainabledevelopment.un.org/content/documents/17489PB12.pdf
German-South African Energy Partnership	2022	GIZ	https://www.giz.de/en/worldwide/65749.html
Annual Wind Report	2022	GWEC	https://gwec.net/wp-content/uploads/2022/04/Annual-Wind-Report-2022_screen_final_April.pdf
GWEC Global Wind Report	2021	GWEC	https://gwec.net/wp-content/uploads/2021/03/GWEC-Global-Wind-Report-2021.pdf
Technical Working Document: Strategies to Foster Women's Talent for Transformational Change	2020	GWNET	https://www.globalwomennet.org/wp-content/uploads/2020/02/GWNET-study-Technical.pdf
Green Employment for Women: Towards gender-inclusive renewable energy careers	2021	IASS	https://www.globalwomennet.org/wp-content/uploads/2021/11/COBENEFITS-Impulse_Green-Employment-for-Women-1.pdf
Stepping Up Women's STEM Careers in Infrastructure Summary Note: Entry Points for World Bank Project Teams	2020	IBRB; WBG	https://www.globalwomennet.org/wp-content/uploads/2021/01/Summary-Note-Entry-Points-for-World-Bank-Project-Teams.pdf
Southeast Asia Energy Outlook	2019	IEA	https://www.iea.org/reports/southeast-asia-energy-outlook-2019
World Energy Outlook 2019	2019	IEA	https://www.iea.org/reports/world-energy-outlook-2019

Title	Publication Year	Author	URL
Women Working in the rooftop solar sector: A look at India's transition to clean energy	2019	IEA; CEEW	https://iea.blob.core.windows.net/assets/67e60726-8659-4c58-aefd-c86bdaa5fc10/Women_working_in_the_rooftop_solar_sector.pdf
Tracking SDG 7: The Energy Progress Report	2021	IEA; IRENA; UN Statistic Division; World Bank Group; WHO	https://www.irena.org/publications/2021/Jun/Tracking-SDG-7-2021
2012 Global South Development Expo: Report on the ILO Solution Forum - Energy, Climate Change and Decent Work	2012	ILO	http://www.ilo.org/pardev/south-south/WCMS_194302/lang--en/index.htm
Green jobs and renewable energy in Namibia: low carbon, high employment	2014	ILO	http://www.ilo.org/global/topics/green-jobs/publications/WCMS_250690/lang--en/index.htm
ILO Action Plan for Gender Equality 2018-21	2018	ILO	http://www.ilo.org/gender/Informationresources/WCMS_645402/lang--en/index.htm
ILO Environmental Sustainability Action Plans for 2018–21: Narrative Report	2020	ILO	http://www.ilo.org/global/topics/green-jobs/publications/WCMS_756648/lang--en/index.htm
ILO Participatory Gender Audit: Relevance and use for the United Nations and its agencies	2011	ILO	http://www.ilo.org/gender/Informationresources/WCMS_151526/lang--en/index.htm
Inclusive Future of Work: Brazil	2019	ILO	http://www.ilo.org/global/about-the-ilo/how-the-ilo-works/multilateral-system/brics/2019/WCMS_732856/lang--en/index.htm
Labour Statistics Glossary	2022	ILO	https://ilostat.ilo.org/resources/concepts-and-definitions/glossary/
Research Brief - Investment in renewable energy generates jobs. Supply of skilled workforce needs to catch up	2011	ILO	http://www.ilo.org/skills/pubs/WCMS_168354/lang--en/index.htm
Resolution I: Resolution concerning statistics of work, employment and labour underutilisation	2013	ILO	https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/normativeinstrument/wcms_230304.pdf
Skills for Green Jobs in Bangladesh	2018	ILO	http://www.ilo.org/dhaka/Whatwedo/Publications/WCMS_694947/lang--en/index.htm
Study on green employment in China	2010	ILO	http://www.ilo.org/beijing/what-we-do/publications/WCMS_155395/lang--en/index.htm
Sectoral Assessment of Women's Entrepreneurship Development in the Agriculture and Renewable Energy Sectors in Somalia	2020	ILO-WED	http://www.ilo.org/empent/areas/womens-entrepreneurship-development-wed/facet/WCMS_757371/lang--en/index.htm
Global Renewables Outlook: Energy transformation 2050	2020	IRENA	https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020

Title	Publication Year	Author	URL
Renewable Energy and Jobs – Annual Review 2018	2018	IRENA	https://www.irena.org/publications/2018/May/Renewable-Energy-and-Jobs-Annual-Review-2018
Renewable Energy and Jobs: Annual Review 2019	2019	IRENA	https://www.globalwomennet.org/wp-content/uploads/2019/06/IRENA_RE_Jobs_2019-report.pdf
Renewable Energy: A Gender Perspective	2019	IRENA	https://www.irena.org/publications/2019/Jan/Renewable-Energy-A-Gender-Perspective
Wind Energy: A gender perspective	2020	IRENA	https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jan/IRENA_Wind_gender_2020.pdf
Renewable Energy and Jobs – Annual Review 2021	2021	IRENA; ILO	https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_823807.pdf
Advancing Gender in the Environment: Gender-Responsive Geothermal Generation	2019	IUCN; USAID	https://www.globalwomennet.org/wp-content/uploads/2020/03/iucn-usaid-lageo-brief-accesible-spreads.pdf
Advancing Gender in the Environment: Making the Case for Gender Equality in Large-Scale Renewable Energy Infrastructure Development	2018	IUCN; USAID	https://www.globalwomennet.org/wp-content/uploads/2020/03/IUCN-USAID-Making_the_case_for_INFRASTRUCTURE.pdf
Assessing the gender and social equity dimensions of energy transitions	2020	Johnson, Oliver; Han, Jenny Yi-Chen; Knight, Anne-Louise; Mortensen, Sofie; Aung, May Thazin; Boyland, Michael; Resurrección, Bernadette	https://cdn.sei.org/wp-content/uploads/2020/04/assessing-the-gender-and-social-equity-dimensions-of-energy-transitions-2020.pdf
Global Green Skills Report	2022	LinkedIn	https://economicgraph.linkedin.com/content/dam/me/economicgraph/en-us/global-green-skills-report/global-green-skills-report-pdf/li-green-economy-report-2022-annex.pdf
The transition in play: Worldwide employment trends in the electricity sector	2018	Montt, Guillermo; Maître, Nicolas; Amo-Agye, Silas	http://www.ilo.org/global/research/publications/working-papers/WCMS_625865/lang--en/index.htm
Energy Fact Book 2021-2022	2021	Natural Resources Canada	https://www.nrcan.gc.ca/sites/nrcan/files/energy/energy_fact/2021-2022/PDF/2021_Energy-factbook_december23_EN_accessible.pdf
Gender and Renewable Energy: Entry Points for Women's Livelihoods and Employment	2017	Nelson, Sibyl; Kuriakose, Anne	https://www.climateinvestmentfunds.org/sites/cif_enc/files/knowledge-documents/gender_and_re_digital.pdf
Women in Energy Global Study	2018	NES Global Talent; Energy Jobline	https://www.globalwomennet.org/wp-content/uploads/2020/02/EJL_WomenInEnergy.pdf
Gender Identity and Gender Expression	2014	Ontario Human Rights Commission	https://www.ohrc.on.ca/en/policy-preventing-discrimination-because-gender-identity-and-gender-expression/3-gender-identity-and-gender-expression
Policy on preventing discrimination because of Gender Identity and Gender Expression	2014	Ontario Human Rights Commission	https://www3.ohrc.on.ca/sites/default/files/Policy%20on%20preventing%20discrimination%20because%20of%20gender%20identity%20and%20gender%20expression.pdf

Title	Publication Year	Author	URL
Toward a gender diverse workforce in the renewable energy transition	2016	Pearl-Martinez, Rebecca; Stephens, Jennie C.	https://www.tandfonline.com/doi/full/10.1080/15487733.2016.11908149
Cultivating Female Talent in Energy: What the sector can do to resolve the barriers faced by women in middle management.	2022	POWERful Women	https://powerfulwomen.org.uk/wp-content/uploads/2022/04/Cultivating-Female-Talent-in-Energy_PfW-Bain_April-2022-FINAL_2-1.pdf
The role of women as drivers of change in the energy transition	2019	Regen eWiRE	https://www.regen.co.uk/publications/promoting-the-role-of-women-as-drivers-of-change-in-the-energy-transition/
Rural renewable energy investments and their impact on employment	2017	Renner, Michael	http://www.ilo.org/global/docs/WCMS_562269/lang--en/index.htm
Towards a Prosperous and Sustainable Africa: Maximising the Socio-Economic Gains of Africa's Energy Transition	2022	RES4Africa; IRENA; UNECA	https://www.irena.org/publications/2022/Feb/Towards-a-prosperous-and-sustainable-Africa
Working conditions in "green jobs": Women in the renewable energy sector	2012	Rustico, Lisa; Sperotti, Francesca	http://oit.org/wcmsp5/groups/public/---ed_dialogue/---actrav/documents/publication/wcms_207887.pdf#page=77
Energy, Jobs and Skills: A rapid assessment of potential in Mtwara, Tanzania	2009	Samji, Waheeda; Nsa-Kaisi; Albee, Alana	http://www.ilo.org/emppolicy/pubs/WCMS_117167/lang--en/index.htm
Zimbabwe Green Jobs Assessment Report	2021	Svenja, Kirsten Svenja; Andersen, Tina; Simas, Moana; Harsdorf, Marek	http://www.ilo.org/global/topics/green-jobs/publications/assessments/WCMS_823543/lang--en/index.htm
Gender Statistics 2021	2022	Turkish Statistical Institute	https://www.tuik.gov.tr/media/announcements/toplumsal_cinsiyet_istatistikleri_2021.pdf
United States Energy and Employment Report 2022	2022	U.S Department of Energy	https://www.energy.gov/sites/default/files/2022-06/USEER%202022%20National%20Report_1.pdf
Turning promises into action: gender equality in the 2030 Agenda for Sustainable Development	2018	UN Women	https://www.unwomen.org/en/digital-library/publications/2018/2/gender-equality-in-the-2030-agenda-for-sustainable-development-2018
Women's Empowerment Principles Call to Action: Gender Equality in the Renewable Energy Industry	2020	UN Women	https://www.weps.org/sites/default/files/2021-02/CALL_TO_ACTION_Gender_Equality_Renewable_Energy_Industry.pdf
Green jobs: towards decent work in a sustainable, low-carbon world	2008	UNEP; ILO; IOE; ITUC	https://web.archive.org/web/20090725113624/http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf
Sustainable Development	2015	UNESCO	https://en.unesco.org/themes/education-sustainable-development/what-is-esd/sd
World Population Dashboard	2022	UNFPA	https://www.unfpa.org/data/world-population-dashboard
Nigeria Green Jobs Assessment Report: Measuring the Socioeconomic Impacts of Climate Policies to Guide NDC	2021	Wiebe, Kirsten Svenja; Simas, Moana; Harsdorf, Marek	http://www.ilo.org/global/topics/green-jobs/publications/assessments/WCMS_818466/lang--en/index.htm

Title	Publication Year	Author	URL
Enhancement and a Just Transition			
The Gender of Renewable Energy: Theory on the politics of sustainable energy development in Iceland	2015	Woodworth, Jamie	https://scholar.colorado.edu/downloads/wd375w873

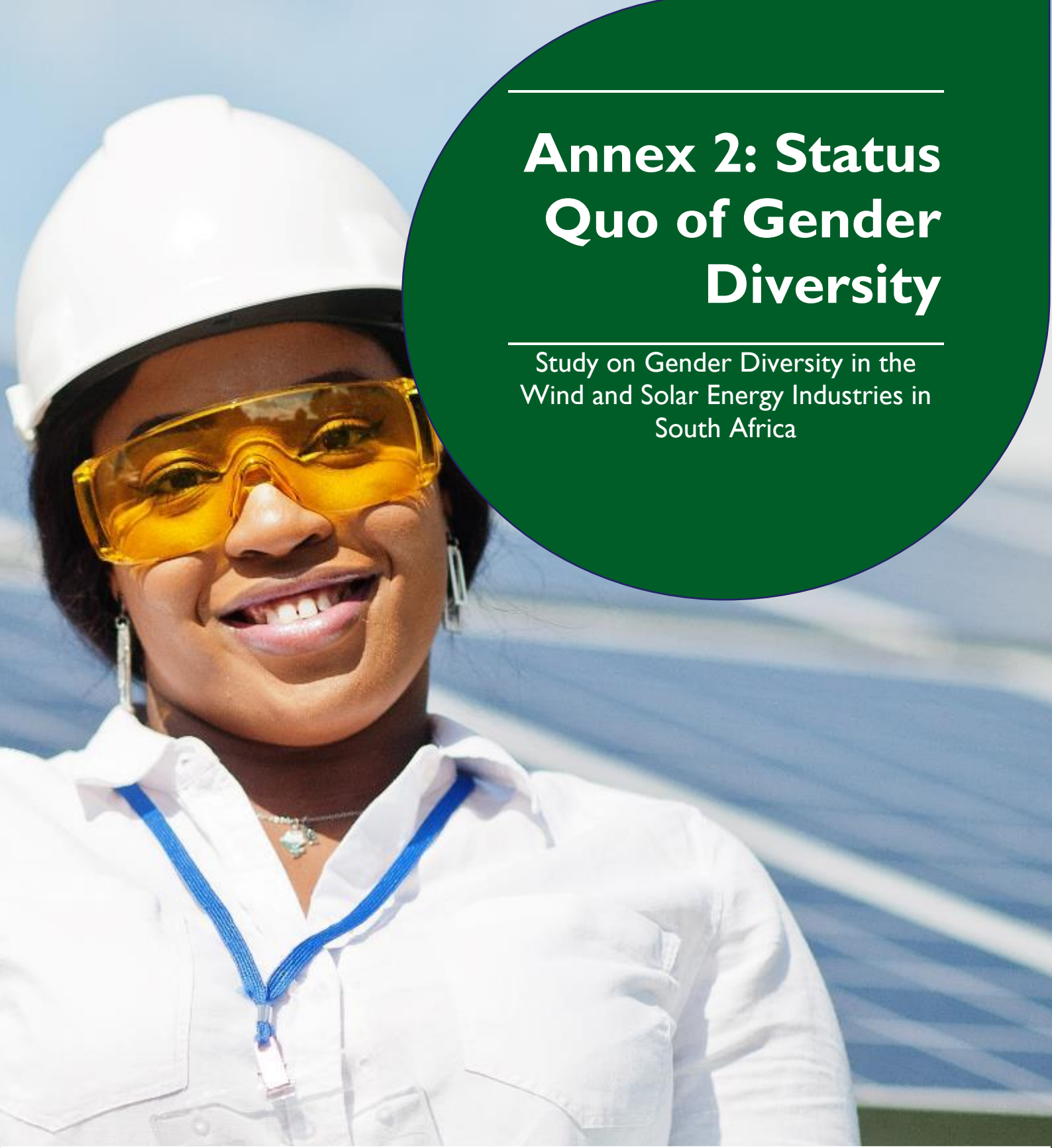
Annex 1.3: Key National Reports

The national reports listed below were synthesised in this literature review.

Title	Publication Year	Author	URL
Employment Potential of Renewable Energy in South Africa	2003	Austin, Greg; Williams, Anthony; Morris, Glynn; Spalding-Fecher, Randall; Worthington, Richard	https://projects.gibb.co.za/Portals/3/projects/200911%20PMBR/App%201%20-Issues%20and%20Response%20Reports/Vol%201_2_3%20Att/Earthlife%20Africa%20Ethekwini/Employment%20Potential%20of%20renewable%20resources%20in%20SA.pdf
The CS Gender 3000: The Reward for Change	2016	Credit Suisse	https://www.credit-suisse.com/media/assets/corporate/docs/about-us/research/publications/csri-gender-3000.pdf
20th Commission for Employment Equity Annual Report 2019-20	2020	DEL	https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2019%20-2020/20thCEE_Report_.pdf
21st Commission for Employment Equity Annual Report 2020-21	2021	DEL	https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2020-2021/21%20CEE%20Report.pdf
22nd Commission for Employment Equity Annual Report 2021-22	2022	DEL	https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2021/22nd%20CEE%20Annual%20Report.pdf
Integrated Resource Plan (IRP) 2019)	2019	Department of Energy	http://www.energy.gov.za/IRP/2019/IRP-2019.pdf
Policy Framework for women empowerment and gender equality	2016	Department of Energy (DOE)	http://www.energy.gov.za/files/PPMO/Framework-for-Women-Empowerment-and-Gender-Equality.pdf
National Waste Management Strategy 2020	2020	Department of Environment, Forestry and Fisheries	https://www.dffe.gov.za/sites/default/files/docs/2020nationalwaste_managementstrategy1.pdf
National Waste Management Strategy 2011	2011	Department of Environmental Affairs	https://www.dffe.gov.za/sites/default/files/docs/nationalwaste_management_strategy.pdf
Strategy Toward Gender Mainstreaming in the Environment Sector 2016 - 2020	2016	Department of Environmental Affairs	https://www.dffe.gov.za/sites/default/files/docs/publications/strategytowardgendermainstreamingintheenvironmentsector2016_2021.pdf
Department of Forestry, Fisheries and the Environment 2019/20 - 2023/24 Strategic Plan and 2020/21 Annual Performance Plan	2020	Department of Forestry, Fisheries and the Environment	https://www.dffe.gov.za/sites/default/files/docs/strategicplan202021to202324.pdf
Women Empowerment and Gender Equality Strategy for the Energy Sector (2021-2025)	2021	Department of Mineral Resources and Energy	http://www.energy.gov.za/files/PPMO/2021-2025-WEGE-Strategy-for-the-Energy-Sector.pdf
Re-imagining our industrial strategy to boost inclusion and private investment	2019	Department of Trade Industry and Competition	http://www.thedtic.gov.za/wp-content/uploads/Re-imagining-Industrial-Strategy-FINAL-13-June-2019.pdf

Title	Publication Year	Author	URL
Green Transport Strategy for South Africa : 2018-2050	2018	Department of Transport	https://www.transport.gov.za/documents/11623/89294/Green_Transport_Strategy_2018_2050_onlineversion.pdf/71e19f1d-259e-4c55-9b27-30db418f105a
South Africa's renewable energy policy roadmaps	2010	Edkins, Max; Marquard, Andrew; Winkler, Harald	http://hdl.handle.net/11427/16881
Careers in Solar Power	2011	Hamilton, James	https://www.bls.gov/green/solar_power/solar_power.pdf
Careers in wind energy	2010	Hamilton, James; Limming, Drew	https://www.bls.gov/green/wind_energy/wind_energy.pdf
Africa Energy Outlook: A focus on Energy Prospects in Sub-Saharan Africa	2014	IEA	https://www.icafrica.org/fileadmin/documents/Knowledge/Energy/AfricaEnergyOutlook-IEA.pdf
Women's participation in renewable energy workforce in Sub-Saharan Africa: Identifying barriers and opportunities for women as leaders and employees	2022	IFC	https://www.ifc.org/wps/wcm/connect/b089848b-2dd3-458b-85e1-5db3f04cb153/IFC135+-+E2E+Report_V5.pdf?MOD=AJPERES&CVID=o52j5wH
Women in business and management: the business case for change	2019	ILO	https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_700953.pdf
Convention C183 - Maternity Protection Convention, 2000 (No. 183)	2002	International Labour Organisation	https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C183
10 Reasons Every Company Should Offer Paid Paternity Leave	2019	Jared, Cline	https://www.catalyst.org/2019/06/12/10-reasons-every-company-should-offer-paid-paternity-leave-and-every-father-should-take-it/
Women Matter Africa August 2016.pdf	2016	Moodley, Lohini; Holt, Tania; Leke, Acha; Desvaux, Georges	https://www.mckinsey.com/~/media/mckinsey/featured%20insights/Women%20matter/Women%20matter%20Africa/Women%20Matter%20Africa%20August%202016.ashx
National Development Plan 2030: Our Future - Make it Work	2012	NPC	http://www.gov.za/issues/national-development-plan-2030
Basic Conditions of Employment Act, 1997 (No. 75 of 1997)	1997	Republic of South Africa	https://www.gov.za/sites/default/files/gcis_document/201409/a75-97.pdf
Draft Climate Change Bill, 2018	2018	Republic of South Africa	https://cer.org.za/wp-content/uploads/2018/05/Draft-Climate-Change-Bill.pdf
Energy Performance Certificate Guideline – Understanding the application and implementation of EPCs for buildings in South Africa	2022	SANEDI	https://iepa.org.za/wp-content/uploads/2022/05/EPC-Guideline-_-FINAL-SANEDI.pdf
Economic empowerment, 2001-2017	2017	Statistics SA	http://www.statssa.gov.za/publications/03-10-17/03-10-172017.pdf
Gender equality on corporate boards: analysis of 2200 issuers on 22 stock exchanges in G20 countries	2021	Sustainable Stock Exchanges	https://sseinitiative.org/wp-content/uploads/2021/03/UN-SSE-Gender-Equality-Policy-Brief.pdf

Title	Publication Year	Author	URL
Turning promises into action: gender equality in the 2030 Agenda for Sustainable Development	2018	UN Women	https://www.unwomen.org/en/digital-library/publications/2018/2/gender-equality-in-the-2030-agenda-for-sustainable-development-2018
Policy Assessment for the Economic Empowerment of Women in Green Industry - Country Report: South Africa	2021	UNIDO	https://www.unido.org/sites/default/files/files/2021-06/South%20Africa_Country%20Report_Final_0.pdf
Policy Assessment for the Economic Empowerment of Women in Green Industry - Executive Summary: South Africa	2021	UNIDO	https://www.unido.org/sites/default/files/files/2021-06/SouthAfrica_Executive%20Summary_Final_0.pdf



Annex 2: Status Quo of Gender Diversity

Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa

Energy Partnership
Energiepartnerschaft
South Africa - Deutschland

mineral resources & energy
Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

SAWEA

SAPVIA
South African Photovoltaic Industry Association

Federal Ministry
for Economic Affairs
and Climate Action

Annex 2: Status Quo of Gender Diversity

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Acronyms

CIPC	Companies and Intellectual Property Commission
CSP	Concentrated solar power
DMRE	Department of Mineral Resources and Energy (National)
EAP	Economically active population
FTE	Full-time equivalent (employment created for one individual for one person-year)
INSPIRE	Initiative for Social Performance in Renewable Energy
IPPPP	Independent Power Producers Procurement Programme
IRP 2019	Integrated Resource Plan 2019
PPE	Personal protective equipment
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAEEC	Southern African Energy Efficiency Confederation
SAPVIA	South African Photovoltaic Industry Association
SAWEA	South African Wind Energy Association
SDGs	Sustainable Development Goals
STEM	Science, Technology, Engineering, and Mathematics
UNESCO	United Nations Educational, Scientific and Cultural Organization

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Executive Summary

The German-South African Energy Partnership in association with the Department of Mineral Resource and Energy (DMRE) are supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study on the utility-scale wind and solar energy sectors in South Africa.

The purpose of this report is to summarise the current state of gender diversity in the utility-scale wind and solar energy sectors in South Africa. The information in the report is drawn from existing literature and company data (where available) as well as from a survey of gender diversity in the workplace, and interviews and focus group discussions that were conducted with people active in the two sectors.

Relevant Organisations

The table below provides a summary of key organisations that can play a role in promoting gender diversity in the utility-scale wind and solar sectors in South Africa.

The South African Wind Energy Association — SAWEA	SAWEA was launched in 2004 to advocate for investing in wind energy generation, promote socio-economic development and transformation, provide information about the wind market to the public, and promote the use of renewable energy in large-scale and small-scale operations.
The South African Photovoltaic Industry Association — SAPVIA	SAPVIA was launched in 2010 to deliver a Solar PV-powered future in South Africa. It is the go-to organisation for all matters relating to the development, regulation and promotion of Solar PV generation in South Africa.
SAWEA and SAPVIA Gender Diversity Working Group	The Gender Diversity Working Group is a collaboration between SAWEA and SAPVIA. It was launched in 2021 to address gender diversity challenges and assist with women's empowerment and career advancement in the wind and solar energy sectors in South Africa.
Women Energy Connect — WE Connect	WE Connect is a non-profit organisation that was launched in 2020. It is a networking platform that provides women and non-binary people, participating in the renewable energy sector in South Africa, with opportunities for knowledge sharing and connects mentors with mentees for career advancement.
The Southern African Females in Energy Efficiency — SAFEE	SAFEE is a platform that was launched in 2015 by the Southern African Energy Efficiency Confederation (SAEEC) with the objective to support and celebrate the role of women in the energy efficiency industry in South Africa. SAFEE develops, trains, and educates women on residential and commercial energy efficiency programmes.
Women in Engineering — WomEng	WomEng was launched in 2006. It was established to develop highly skilled young girls and women for the engineering and technology industries. WomEng encourages women to pursue STEM-related careers and supports organisations in the engineering and technology sector to attract, develop, retain and advance women. WomEng has a global footprint, but its head office is based in South

Women's Energy Council	The Women's Energy Council was launched in 2014 by the Energy Council to promote gender diversity and inclusivity in the oil, gas and energy industries. It encourages networking and mentorship amongst industry professionals which is critical for women's empowerment in the sector. This global organisation has an office in Cape Town.
Initiative for Social Performance in Renewable Energy — INSPIRE	INSPIRE is a non-profit organisation that was launched in 2021 to advance the field of social performance in South Africa's renewable energy. Its wider goal is to become the world's leading capacity building and best practice platform. SAWEA and SAPVIA are INSPIRE'S implementation partners.

Women's Participation

Until recently energy generation and supply in South Africa has been dominated by Eskom which has largely relied on coal-fired power stations to produce electricity. In 2011, South Africa introduced a Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) to procure renewable energy from the private sector for purchase by Eskom.[226] The establishment of the REIPPPP was a key catalyst in the emergence of a utility-scale renewable energy sector in South Africa that did not previously exist. As of June 2021, it has been calculated that the REIPPPP created 63,291 jobs in South Africa.[227] Of these jobs, 48,110 (76%) were created during construction and 15,182 (24%) in the operational phase of the projects.[228] Unfortunately, women still need to be significantly empowered in the REIPPPP programme as, for instance, they only account for 10% of the job opportunities created during the construction phase of REIPPPP projects.[229]

To better understand the existing status quo with regards to gender diversity in the various job opportunities available in the utility-scale wind and solar sectors in South Africa, that have been created by the REIPPPP and other drivers of renewable energy, it is necessary to review the participation of women in director positions and the participation of women in the workforce of the utility-scale wind and solar sectors in South Africa.

Currently, 19 % of directors for SAPVIA and SAWEA member companies are women

Using data from the Companies and Intellectual Property Commission (CIPC), a breakdown of gender representation of SAPVIA and SAWEA member companies revealed that **19 % of directors were women** and 80 % were men. For 1 % of directors, their likely gender could not be assumed.

There is relatively good gender representation in the workplace data for South Africa, due to mandatory employment equity reporting. However, this data is limited to large sectors in the overall economy. Renewable energy forms part of the large "Electricity, Gas, Steam and Air Conditioning Supply sector" and data for this sector has been report for the last three years.

Women made up 33.2% of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply sector in 2021/22. However, it should be noted that the total size of the workforce, as well as the

[226] Akinbami, Oke, and Bodunrin, "The State of Renewable Energy Development in South Africa."
[227] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[228] Independent Power Producers Procurement Programme (IPPPP).
[229] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview As at 31 December 2021."

percentage of women in the workforce of the Electricity, Gas, Steam and Air Conditioning Supply sector, decreased from 36.3% in 2019/20 to 33.6% in 2020/21.[230]

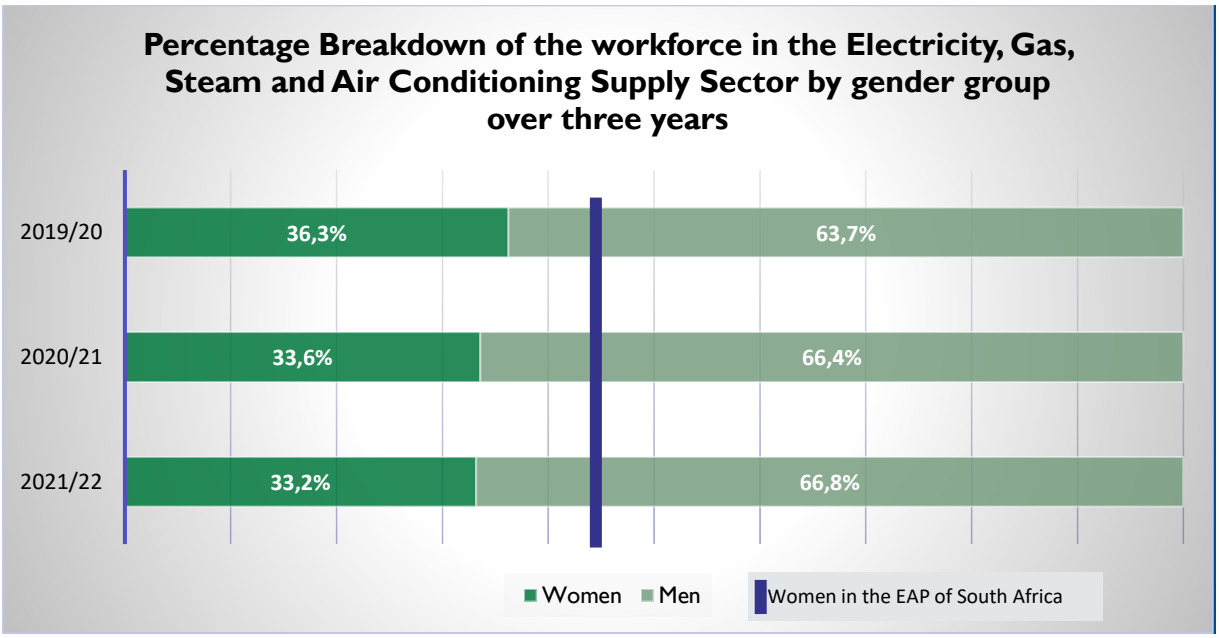


Figure 44: Percentage breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years with the economically active population (EAP) percentage of women in South Africa

Figure 44 shows that men make up the majority of the sector's workforce and that the size of the sector's workforce has decreased in consecutive years.[231]

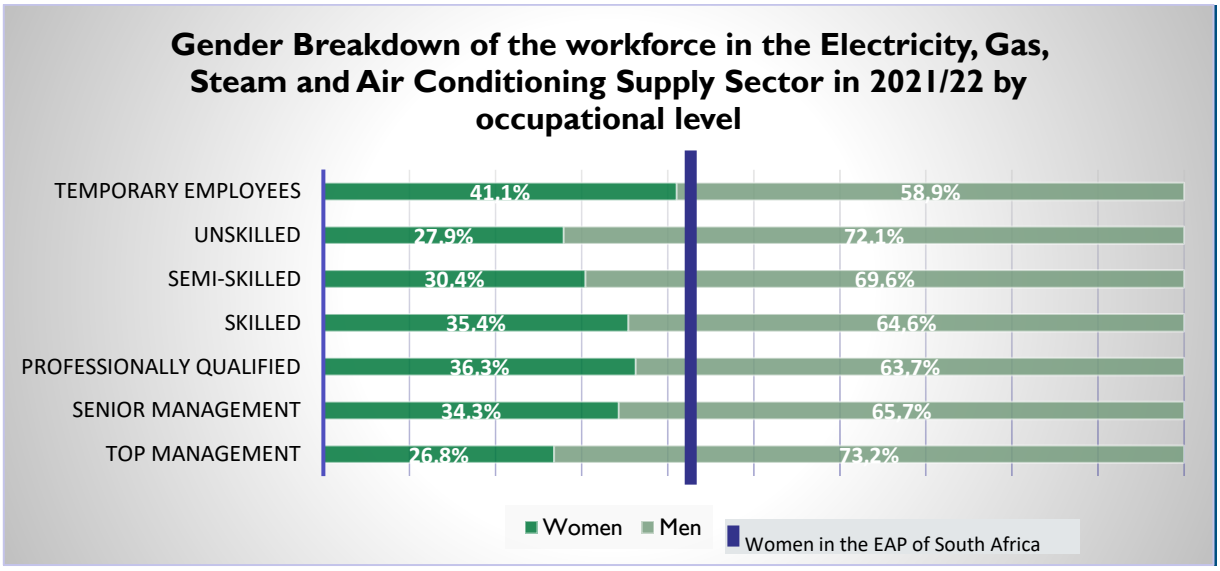


Figure 45: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector in 2021/22 by occupational level and gender group percentage contrasted with the economically active population (EAP) percentage of women in South Africa

[230] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."
[231] DEL, "22nd Commission for Employment Equity Annual Report 2021-22."

The workforce is broken down by women and men for six occupational levels (of permanent employees) from "Top Management" to "Unskilled" as well as temporary employees in the Figure 45.[232] The vertical line in the figure above represents the percentage of women (44.7%) in the economically active population of South Africa in 2021/22.

To develop a better understanding of the gender diversity of the utility-scale wind and solar sector itself a survey on gender diversity in the workplace in South Africa was sent to the members of SAWEA and SAPVIA. In total, survey responses were received from 25 entities registered with SAWEA and/or SAPVIA. These responses were analysed to:

- ♀♂ better understand gender diversity in the workforce of entities that are active in the utility-scale wind and solar energy sectors, and
- ♀♂ assess gender diversity at different organisational levels across the participating entities.

The survey responses showed that most of the entities that participated in the survey had relatively few employees, with the majority of entities having between 0 and 49 employees.

A breakdown of the total workforce of the entities by gender shows that women accounted for 33% of the workforce, while men made up the majority with 67%. These results, shown in the figure below are consistent with global statistics which estimate that women account for only 32% of the global energy sector's workforce, which includes oil, gas, renewables, etc.[233] A breakdown of the total workforce of the entities by gender and occupational level shows that apart from a slight increase in the percentage of women employed in top management positions, there is an overall trend that indicates that the number of positions occupied by women declines as the occupational level increases in seniority.

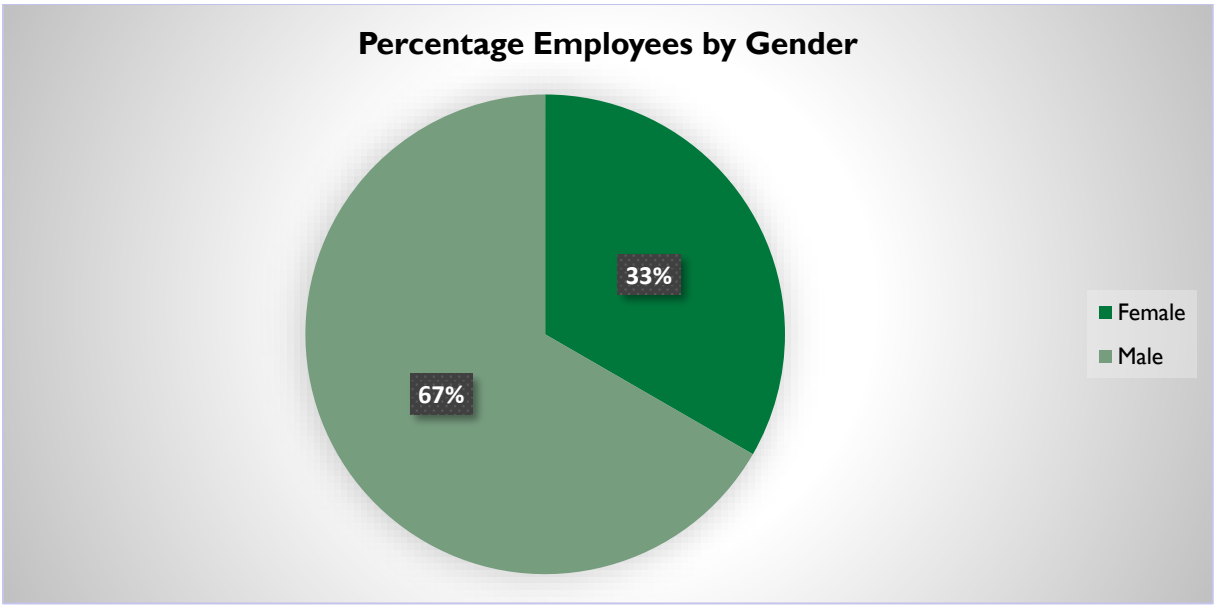


Figure 46: Percentage breakdown of employees, by gender of surveyed companies

Barriers

Current barriers to equitable gender representation in the utility-scale wind and solar energy sectors in South Africa can be split into barriers that apply to entry into the sector and barriers to career progression and

[232] DEL.
[233] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."

retention within the sector. The identified barriers are based on input received from a series of semi-structured interviews with individuals as well as three focus group sessions.

Barriers to entry

Key barriers to entry that have been identified include:

Social norms and gender stereotypes discourage girls and young women from studying STEM-related subjects

Woman and non-binary people experience barriers accessing funds

Lack of information about the wind and solar sectors as a career option

Recruitment and hiring practices biased towards men

- ⚥ **Social norms and gender stereotypes discourage girls and young women from studying STEM-related subjects:** Participants highlighted that the crisis in basic education which frequently included very poor standards of education in the STEM subjects, limited girls (particularly from public schools) from graduating with sufficient grades to enter STEM-related course at the tertiary level. Furthermore, gendered assumptions around women's roles and appropriate careers were reinforced during secondary education, often discouraging girls from studying STEM subjects during this phase, resulting in fewer women studying STEM disciplines at the tertiary level.
- ⚥ **Woman and non-binary people experience barriers accessing funds:** Participants noted that woman and non-binary people experience significant barriers accessing business opportunities for renewable energy development, including start-up funds, loans, and investors.
- ⚥ **Lack of information about the wind and solar sectors as a career option:** Young people did not know about the wind and solar sector as a future career option and therefore did not consider choosing subjects or disciplines which would equip them to enter it. This was particularly relevant in the more technical roles of the sector, where STEM-related subjects are critical. It was noted that many universities still do not offer specific courses related to the wind and solar sectors.
- ⚥ **Recruitment and hiring practices biased towards men:** Many participants mentioned that positions in the solar and wind sector often require many years of experience, which recent graduates and women wanting to shift from other careers may not have, especially for the technical positions. Also, it has been found that men are more likely to apply for jobs with experience and skill requirement beyond their current resume.

Barriers to career progression and retention

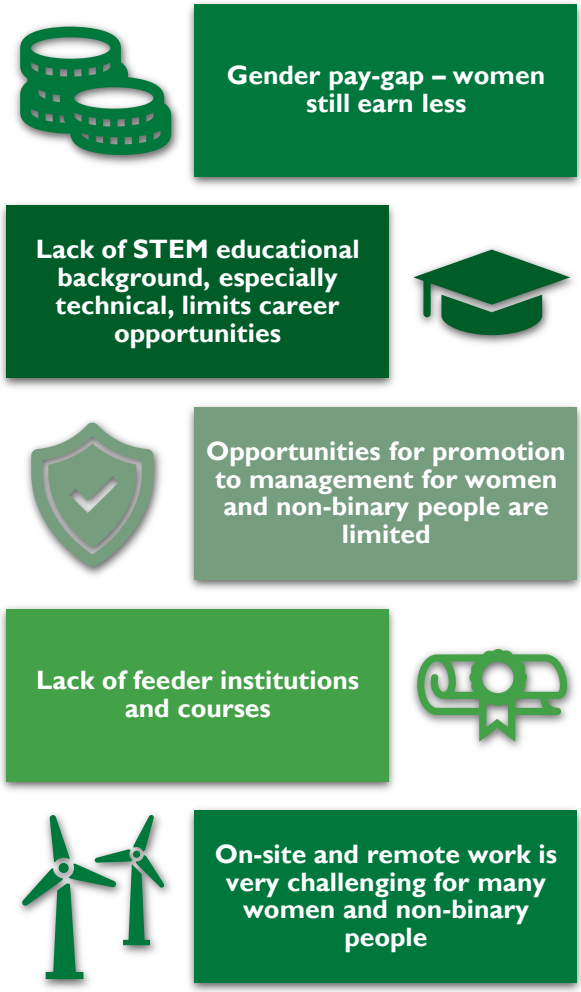
Key barriers in career progression and retention include:

- ⚥ **Lack of policies supportive of women and non-binary people's particular needs:** There appears to be a dearth of policies at both company and sector level to meaningfully address the low participation of woman and non-binary people in the solar and wind sector. While there is a shortage of policies to support women in the sector, support for non-binary people appears to be completely silent. Most initiatives that were mentioned such as mentoring and supporting women to balance family responsibilities were informal. Participants indicated that where policies to support women's multiple roles did exist, they were sometimes hesitant to make use of these for fear of being perceived as "not delivering equal to their male colleagues".
- ⚥ **Limited gender targets for Independent Power Producers in South Africa:** In most organisations in the utility-scale wind and solar energy sectors, gender employment targets and considerations are implied but they are not explicitly stated in company policies. There are some commitments made to gender targets when there is preferential procurement with the focus on sub-contracting to empowered enterprises, black-owned enterprises, and women-owned enterprise.[234]
- ⚥ **Social norms and gender stereotypes continue to discourage women and non-binary people from the sector:** Despite the wind and solar sector being a new industry, gendered norms continue to play a role in creating perceptions that this is not an appropriate sector for women, and it remains a male-dominated industry, particularly in the technical and senior management spaces. Women also mentioned that men's opinions had "natural hierarchy" because of social norms about who was "naturally best for the job". A few women also mentioned that there is a "boys club" in the wind and solar energy sectors that precludes women and non-binary people on many levels.

[234] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."

- **Women still experience explicit sexism:** Numerous examples of explicit sexism were mentioned by interviewees and focus group participants, relating to *inter alia* verbal sexual harassment, unequal treatment and belittlement, and sexism related to motherhood. In some cases, this sexism was reinforced by gendered norms about what women should and should not do.
- **Lack of, and poor support for, family-friendly policies:** All participants mentioned the additional responsibilities that many women assume, either as primary parent and/or primary carer and homemaker and noted that these roles were not assumed by most men. Participants stated that these responsibilities placed additional pressures on women, often creating barriers to career progression. Many examples were cited of unsupportive environments, and even direct discrimination, from men and some women, based on motherhood. Other women spoke about choices they must make to accommodate their parenting responsibilities at the expense of promotion or being able to take on-site positions. Pregnancy was also mentioned as another barrier to career advancement for women in the sector, especially for women who are involved in fieldwork. Women and non-binary people face significantly more challenges with site-based positions then when working in office-based positions.

- **Lack of health, safety and wellbeing in workplaces:** Very few respondents, based in offices in main centres, indicated having experienced issues with a lack of health, safety and wellbeing. However, this was very different for women and non-binary people with site-based positions, who mentioned many safety challenges. Site work can involve night shifts with additional safety concerns for women. There is also a concern among women whose work was predominantly site-based that women are made to feel unwelcome. Respondents also noted the prevalence of micro aggressions in their workplaces, particularly with on-site work.
- **Lack of mentorship and role models for women and non-binary people:** There are very few formal, funded mentoring programmes for women and non-binary people run by the companies in the wind and solar sectors in South Africa. Furthermore, an interviewee highlighted that where support is given to women's career advancement in the sector it is often reserved for women in departments such as finance, human resources, and legal and not women in technical, engineering and construction roles. Many respondents stated that they had utilised WE Connect and felt it offered a critically important opportunity to support women in the sector. However, it is unfunded by the sector. A number of participants mentioned that they had made a point of identifying a mentor for themselves.



- **Gender pay gap – women still earn less:** Despite this being a new sector, pay inequities between women and men continue. Participants mentioned that often one is not aware of what colleagues earn which enables pay gaps to continue uncontested. Furthermore, some women mentioned that the sector often made women feel they should be "grateful" for being "allowed" into the sector, which discouraged women from challenging these inequities.
- **Lack of STEM educational background, especially technical, limits career opportunities:** While a few women in the sector do have a STEM background, women without a STEM background have entered the renewable energy industry. However, even in cases where women have STEM backgrounds, many mentioned that not having the technical skills, particularly engineering, was a significant barrier.
- **Opportunities for promotion to management for women and non-binary people are limited:** A lack of promotion opportunities for women and non-binary people is not only due to a lack of women candidates, but also related to the slow uptake of women in the sector during the recruitment process. Also, as the sectors have become more established in more recent years, entry into the utility-scale wind and solar sectors in South Africa has become more difficult as skill requirements have increased. Participants also expresses that in instances where the retention and career advancement of women is supported, this support is mostly reserved for women in departments such as finance, HR, or administration, with little support for women in technical engineering and construction roles. There is also the reality of a "boys club" in the wind and solar energy sectors that precludes women and non-binary people on many levels.
- **Lack of feeder institutions and courses:** There are no specific feeder institutions or courses for entry into the renewable energy industry, this makes it more challenging when trying to target, and then support, women and non-binary people to enter the sector.
- **On-site and remote work is very challenging for many women and non-binary people:** To date, women only represent ten percent of the construction workforce from the total job opportunities created during the construction phase of IPPs.[235] Several interviewees stated that on-site work, which offers less stability and frequent travel, is often incredibly difficult for women with family responsibilities. In addition, there are the safety concerns mentioned above.

[235] Independent Power Producers Procurement Programme (IPPPP).

Introduction

The German-South African Energy Partnership in association with the Department of Mineral Resources and Energy is supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study of the utility-scale wind and solar energy sectors in South Africa.

Figure 47: The objectives of the study

To complete this study, a number of different reports have been commissioned including:

Report	Purpose
Literature Review	A summary of the literature on the state of gender representation in the international utility-scale wind and solar energy sectors
Status Quo (This Report)	A summary of the current state of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Academic Review	A summary of gender representation in academic courses and qualifications in South Africa related to the utility-scale wind and solar energy sectors
Data Analysis and Projection	An analysis of the available data on gender diversity in the utility-scale wind and solar energy sectors in South Africa as well as related projections of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Recommendations to improve Gender Diversity	A summary of recommendations to improve gender diversity in the utility-scale wind and solar energy sectors in South Africa

As indicated above the purpose of this report is to summarise the current state of gender diversity in the utility-scale wind and solar energy sectors in South Africa. The information in the report is drawn from existing literature and company data (where available) as well as from interviews and focus group discussions that were conducted with people active in the two sectors.

The chapters of this report are outlined below:

Methodology

- The methodology for the review and the limitations of this methodology are described.

Relevant Organisations

- The relevant organisations that are importance role players in promoting gender diversity in the utility scale solar and wind sectors

Women's Participation

- The available statistics on gender diversity for the utility scale wind and solar sectors in South Africa

Barriers

- Existing barriers to women's participation in in the utility scale wind and solar sectors are identified

Methodology

The purpose of this research phase was to answer the question "What is the current status of gender diversity in the South African utility scale Solar and Wind Energy Sector?" To answer this question Urban Earth conducted semi-structured interviews with key Informants, facilitated focus group discussions and implemented a direct market survey on gender diversity numbers with different stakeholder groups in South Africa.

The interviews and surveys explored a number of questions, including:

1. The gender distribution of employee numbers across different organisational levels in the wind and solar sector organisations

2. The barriers to entry into the wind and solar sector for women and non-binary people, and

3. Obstacles to ensuring equal opportunities once in the wind and solar sector for women and non-binary people.

The following tasks were undertaken for this work area:

Research methodology

Survey on Gender Diversity in the Workplace

Companies that are members of SAWEA and SAPVIA were targeted for a survey regarding statistics on gender diversity in the workplace. As SAWEA and SAPVIA were unable to share the contact details of their members for the purposes of this research, a covering letter and survey link was shared with SAWEA and SAPVIA to distribute to their members. As there were concerns that SAPVIA and SAWEA members may be daunted by the requirements of the survey, it was structured to align with the existing data requirements that larger companies are required to submit to the government regarding the race and gender of their employees in the form of Employment Equity Reports (known as EEA2 reports). This alignment made it easy for companies that have already compiled this EEA2 data to complete the survey. To encourage completion of the survey, links to the survey were sent several times and staff from SAPVIA, SAWEA and Urban Earth made phone calls and sent personal emails to contacts to encourage response. Despite this, the survey shared with SAWEA and SAPVIA member companies only yielded about a 11% response from all the contacted companies (25 responses of approximately 215 companies).

To compliment the limited information received from the surveys, existing public information was also collated. This included published data by the National Department of Employment and Labour in employment equity reports[236] and publicly available information about Directors of companies registered as SAWEA and SAPVIA members.

Semi-Structured interviews

A total of nine individual semi-structured interviews were conducted, with a cross-section of key stakeholders in the sector who provided insights into women and non-binary people's involvement in the utility-scale wind

[236] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

and solar energy value chains in South Africa. The interviews took place online (through Microsoft Teams and Zoom) and each interview lasted approximately one hour. The interviews focused on the following areas:

1) Barriers to entry and obstacles to ensuring equal opportunities for women and non-binary people once in the wind and solar sector.

2) Recommendations for ways to improve entry and retention of women and non-binary people in the wind and solar sector.

A list of questions that were asked during the semi-structured interviews is provided in Annex 2.1: Interview questions.

Focus group discussions

Three focus group discussions were facilitated with key stakeholders from the sectors. The focus groups included:

1. WE Connect members.
2. Human Resources Professionals in the wind and solar energy sectors.
3. SAWEA and SAPVIA Gender Diversity Working Group members.

The focus groups were run in an interactive, structured format to allow for as much input from the participants as possible. The focus groups took take place online (through Microsoft Teams) and lasted about one and a half hours. The two focus groups with WE Connect and SAWEA and SAPVIA members focused on:

- ⚥ Barriers to entry and obstacles to ensuring equal opportunities for women and non-binary people once in the wind and solar sector.
- ⚥ Recommendations for ways to improve entry and retention of women and non-binary people in the wind and solar sector The focus groups paid attention to the following areas:

A list of questions that were asked during the focus group discussions with the WE Connect members and with the SAWEA and SAPVIA Gender Diversity Working Group members is provided in Annex 2.2: Focus group questions for WE Connect members and SAWEA and SAPVIA Gender Diversity Working Group members.

The discussion with HR Professionals had a slightly different focus, this discussion focused on:

1) Feeder institutions and degrees for job categories within organisations in the wind and solar energy sectors.

2) Job categories in which women and men applicants dominate in the wind and solar energy sector.

3) Barriers that women experience which makes their retention in the wind and solar energy sector challenging.

4) Recommendations on ways to improve entry and retention of women in the wind and solar sector.

A list of questions that were asked during the focus group discussions with human resources professionals in the wind and solar energy sectors is provided in Annex 2.3: Focus group questions for human resources professionals.

Limitations of the study

The data gathered for the South African context is largely limited to the representation and diversity of women rather than a full analysis of all genders. Despite our recognition that gender diversity includes everyone in all their diversity including cis-women, cis-men, gender non-conforming people, non-binary people, and trans women and men, this understanding is relatively new globally and many sectors still understand gender, gender representation and gender diversity as limited to women and men. Indeed, the full definition is not widely used in the South African context yet, nor in the wind and solar sector broadly, and most data is still only available by the binary categories of women and men.

Relevant Organisations

This section of the report highlights the key organisations that can play a role in promoting gender diversity in the utility scale wind and solar sectors.

The South African Wind Energy Association | SAWEA

SAWEA is a non-profit organisation that was registered with the Department of Social Development in 2004, SAWEA envisages becoming a major contributor to social, environmental, and economic security.[237] Currently, SAWEA has 109 members, most of which are companies with a few individual members as well. SAWEA is a member-driven association that was established with the main purpose of realising the vision of the wind energy industry by achieving the following:[238]

- ⚥ Advocate for the implementation of South African energy policies which promote the country's vast wind resources.
- ⚥ Facilitate and promote the excellent practice of the associated localisation, socio-economic and economic development, and transformational areas of wind energy
- ⚥ Provide relevant information to current and potential investors who are interested in investing in South Africa's wind energy markets.
- ⚥ Provide up-to-date reliable information about the socio-economic contributions of the wind energy industry in South Africa as it relates to rural development and young girls and women.
- ⚥ Promote investment in wind energy in South Africa and the region.

The South African Photovoltaic Industry Association | SAPVIA

SAPVIA is a representative voice of South Africa's solar photovoltaic (PV) industry. It is a member-led organisation that was officially launched in 2010 to deliver a solar PV-powered future for South Africa.[239] SAPVIA provides information regarding the development, regulation and promotion of solar PV in South Africa and Sub-Saharan African countries.[240] SAPVIA advocates for harnessing solar power and capitalising on opportunities within the solar PV markets. SAPVIA consists of a diverse group of members across the entire Solar PV value chain which encompasses project development, construction, manufacturing, and operations and maintenance.[241] Currently, SAPVIA has over 107 members operating across the entire PV value chain. SAPVIA offers five different membership types that are designed for organisations with utility scale operations, organisations whose participation in the solar PV market is peripheral, organisations and individuals involved in small scale installations and individuals that are actively engaged in the solar PV job market and academia.[242]

SAWEA/SAPVIA Gender Diversity Working Group

SAWEA and SAPVIA collaborated to establish a Gender Diversity Working Group that aims to mainstream gender issues within the renewable energy sector by creating a platform and framework that will address gender diversity challenges within the sector.[243] The Gender Diversity Working Group was launched in 2021 and it collaborated with the non-profit organisation, WE Connect, to focus on women's empowerment and

[237] SAWEA, "South African Wind Energy Association | About."
[238] SAWEA.
[239] SAPVIA- The South African Photovoltaic Industry Association, "The Voice of Solar PV in South Africa."
[240] SAPVIA- The South African Photovoltaic Industry Association.
[241] SAPVIA- The South African Photovoltaic Industry Association.
[242] SAPVIA- The South African Photovoltaic Industry Association.
[243] SAPVIA- The South African Photovoltaic Industry Association, "Working Groups."

career advancement in the renewable energy sector.[244] The main goal of the Gender Diversity Working Group is to create a platform where women and non-binary people will have equal access to, and be considered for all, opportunities in the renewable energy sector.[245]

The Gender Diversity Working Group has two main programmes that promote the participation of women in the renewable energy sector these are, the Leadership Acceleration Programme and the Coaching and Mentorship Programme. The Leadership Acceleration Programme identifies women who are potential leaders and offers them the opportunity to join an accelerator programme which aims at bridging the female leadership gap in the renewable energy sector.[246]

The Coaching and Mentorship Programme is a programme led by WE Connect. This programme pairs mentors with female mentees to assist them in overcoming workplace challenges and in reaching career objectives.[247] The Gender Diversity Working Group also aims at looking beyond the professional space by including a Business Opportunities for Women programme that will provide women in entrepreneurship with the necessary support they need to establish themselves as fully fledged and well-respected entrepreneurs in the sector like their male counterparts.[248]

Women Energy Connect | WE Connect

WE Connect is a South African non-profit organisation that was launched in 2020. It was created with the aim to connect women and non-binary people who are participants in the renewable energy sector by assisting them with expanding their networks, developing opportunities for knowledge sharing, and connecting mentors with mentees for career advancement.[249]

WE Connect recognised that there is a lack of gender diversity and equality in both the renewable and the traditional energy industries, especially in leadership positions. As South Africa transitions from the use of fossil fuels to generate electricity to using renewable energy, WE Connect saw an opportunity to connect, nurture and facilitate the growth of women and non-binary people in the renewable energy sector.[250]

WE Connect runs an annual Mentorship Programme that addresses the lack of gender diversity and participation of women and non-binary people in South Africa's renewable energy sector.[251] The programme is open to women and non-binary mentees and women, men and non-binary people mentors who are participants in the renewable energy sector across the value chain.[252] The programme is designed and administered by KD Strategies and runs between May and December.[253]

Southern African Energy Efficiency Confederation - the Southern African Females in Energy Efficiency | SAFEE

In 2015, the Southern African Energy Efficiency Confederation (SAEEC) launched the South African Females in Energy Efficiency (SAFEE) as a division for operations driven by women in South Africa's energy sector. The platform was established with the objective to support and celebrate the role of women in the energy efficiency industry.[254] It consists of professional women from across southern Africa that are working towards energy

[244] SAPVIA- The South African Photovoltaic Industry Association.
[245] SAWEA, "South African Wind Energy Association | WOMEN IN LEADERSHIP."
[246] SAWEA.
[247] SAWEA.
[248] SAWEA.
[249] WEConnect, "WE Connect - Networking That Is Rooted in RE Growth."
[250] WEConnect.
[251] WEConnect.
[252] WEConnect.
[253] WEConnect.
[254] Lisa, "Southern-African-Females-in-Energy-Efficiency."

efficiency by investigating ways in which the waste of energy in businesses and homes can be reduced.[255] SAFEE develops, trains, and educates women on residential and commercial energy efficiency programmes.[256]

Women in Engineering | WomEng

WomEng is a global social enterprise that was established to develop high-skilled girls and women for the engineering and technology industries. Its head office is based in Johannesburg, South Africa. The core philosophy of WomEng is encouraging young girls and women to study STEM subjects (science, technology, engineering, and mathematics) from primary school to the university level.[257] WomEng has partnered with the Royal Academy of Engineering, De Beers Group, Motorola Solutions Foundation and the United Nations Education Scientific and Cultural Organisation to provide mentorship and leadership development opportunities for young girls and women to promote their participation in STEM fields.[258]

WomEng supports its partners in their pursuit to attract, develop, retain, and advance women in engineering globally. This social enterprise is highly experienced in assisting its partners with achieving gender parity in their engineering talent pipelines. Since WomEng was first launched as a subsidiary of WomHub in 2006, it has hosted projects in 24 countries, most of which are Sub-Saharan African countries, and has reached over 750,000 girls and women.[259] WomEng established several projects and programmes that help increase the representation and the participation of young girls and women in the engineering field globally (see Annex 2.4: Projects and Programmes by WomEng).[260]

Women's Energy Council

The Women's Energy Council is a global networking community that the Energy Council launched in 2014 to establish a platform that promotes a more inclusive and gender-diverse workforce in the oil, gas, and energy industries.[261] The Energy Council created this global network with the idea that a more inclusive workforce is key to enhancing business performance and plays a critical part in business strategy and planning. Although the Women's Energy Council is a global networking platform with international offices in London, Singapore, and Houston, it has a huge presence in South Africa with an office located in Cape Town.

The Women's Energy Council has created a platform where women can share lessons they have learnt and their experiences within their careers to build a network of like-minded industry professionals that will encourage mentorship and networking which are critical tools for women's empowerment.[262] The members of the Women's Energy Council are a diverse group of senior executives from around the world who are committed to promoting the inclusion and meaningful participation of women in the energy sector.[263]

Initiative for Social Performance in Renewable Energy | INSPIRE

The Initiative for Social Performance in Renewable Energy (INSPIRE) is a registered South African non-profit company with an independent board and secretariat. The organisation was launched in 2021 with the goal of advancing the field of social performance in South Africa's renewable energy.[264] Its broader goal is to become a leading capacity-building and best practice platform across the globe. The development of INSPIRE was

[255] Lisa.
[256] Lisa.
[257] WomEng, "WomEng | Women in Engineering."
[258] WomEng.
[259] WomEng.
[260] WomEng.
[261] Energy Council, "Women's Energy Council | Energy Council."
[262] Energy Council.
[263] Energy Council.
[264] INSPIRE, "INSPIRE | Initiative For Social Performance In Renewable Energy."

encouraged by Synergy Global Consulting with the founding support of Actis, Lekela Power and BTE Renewables. SAWEA and SAPVIA are INSPIRE'S implementation partners.[265]

INSPIRE has the following core objectives:[266]

- ⚥ Grow leadership for a just transition that's centred around people.
- ⚥ Maximise the economic development and transformation potential of projects and policies by building capacity in the renewable eco-system.
- ⚥ Build professionalism in the field of social performance in the renewable energy sector.
- ⚥ Driving best practice development in community engagement and development
- ⚥ Strengthen the impact of community development that the South Africa renewable energy procurement programme has.

INSPIRE is organised into the following four pillars of work:[267]

- ⚥ **Learning & Leadership,** this includes building the capacity of professionals and stakeholders in the renewable energy sector through training, leadership development, enabling professionalised practice and empowering internal change.
- ⚥ **Research & Innovation,** this includes supporting improved practices and policies by conducting action-orientated research and prototyping and incubating transformation-focused approaches and investments.
- ⚥ **Knowledge,** this includes deepening awareness and understanding of social performance in the sector by creating a knowledge platform for people who want to learn more about economic development in the Renewable Energy IPP Procurement Programme (REIPPPP).
- ⚥ **Partnerships,** includes engaging and networking with key stakeholders to drive transformation and collaboration in the renewable energy sector.

INSPIRE does not explicitly have a gender diversity agenda to improve women and non-binary people's participation in the renewable energy sector.

[265] INSPIRE.
[266] INSPIRE.
[267] INSPIRE.

Participation of Women in the utility-scale wind and solar sectors in South Africa

Context

Until recently energy generation and supply in South Africa has been dominated by Eskom which has largely relied on coal-fired power stations to produce electricity. However, over recent years there has been a growing movement towards renewable energy generation which has partly been driven by the need to reduce carbon emission from energy generation and partly by inadequate supply from Eskom which has resulted in ongoing load shedding in South Africa.

The purpose of this section of report is to understand the existing status quo with regards to gender diversity in the various job opportunities available in the utility-scale wind and solar sectors that have been created by the REIPPPP and other drivers of renewable energy. It should be noted that the information in this section is limited to information about the participation of women and men in the utility-scale wind and solar sectors in South Africa and does not include information on non-binary people. This is a result of limitations in existing data sources, as was noted in the limitations section.

Participation in the Independent Power Producer Procurement Programme

South Africa introduced a Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) in 2011 to procure renewable energy from the private sector for purchase by Eskom.[268] The *Integrated Resource Plan 2019*, that was promulgated by the DMRE in September 2019, proposes that out of the total electricity generation mix, 22.7% of electricity will be procured from wind, 10.6% from solar PV and 0.8% from concentrated solar power (CSP). The establishment of the REIPPPP resulted in the emergence of a utility-scale renewable energy sector in South Africa that did not previously exist.

The sector value chain includes many different activity areas, including project development, construction, manufacturing, finance, and operations and maintenance. The emergence of this utility-scale renewable energy sector has resulted in job creation in these different areas in South Africa. The REIPPPP estimated that by December 2021, at least 63,291 jobs (71,822 FTEs) in South Africa would be created.[269] FTE refers to the full-time equivalent employment created for one individual for one person-year.[270] [271] Of these jobs, 48,110 (76%) would be created during construction and 15,182 (24%) would be created during the operational phase of the projects.[272]

The construction phase of REIPPPP offers many job opportunities over shorter periods, while the operation phase requires fewer employment opportunities over extended periods.[273] The major beneficiaries of job opportunities created by the construction of REIPPs include black South African citizens, youth, and people

[268] Akinbami, Oke, and Bodunrin, "The State of Renewable Energy Development in South Africa."
[269] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[270] A person-year is equal to 230 effective person days of work (after non-productive days - e.g., leave, public holidays, etc. - have been subtracted).
[271] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[272] Independent Power Producers Procurement Programme (IPPPP).
[273] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview As at 31 December 2021."

from local host communities. Women on the other hand still need to be significantly empowered as they only account for 10% of the job opportunities created during the construction phase of REIPPPP projects.[274]

The REIPPPP aims at providing more employment opportunities for women, empowering women entrepreneurs through preferential procurement from women-owned businesses and encouraging more representation of women in top management positions in companies in the wind and solar energy sector.[275] The following are some of the targets that IPPs are either required or encouraged to meet to assist with increasing the participation of women in the renewable energy sector:[276]

- ♂ The REIPPPP aims for 12% to 20% of staff in the RE power plants to originate from SA local host communities which predominantly consist of women, this is to ensure that a fair number of the local women are beneficiaries of these RE projects.

- ♂ The REIPPPP aims for up to 5% of the procurement spend to be reserved exclusively for women-owned vendors or business owners.

- ♂ The REIPPPP aims for at least 12% of project shareholding to be reserved for black people, including women

- ♂ The REIPPPP aims for black people to account for at least 40% of top management positions, with a particular preference for black women.

Since the introduction of REIPPPPs in 2011, the following are some of the milestones that the REIPPPP achieved by June 2017 which have contributed to women's empowerment. By June 2017, 3,892 job opportunities were created for women.[277] Women accounted for 33% of the top management positions during the construction phase and women accounted for 31% of the top management positions during the operation phase.[278]

Participation of Women in Director Positions

Information regarding the directors of company boards is available through BizPortal which lists public information from Companies and Intellectual Property Commission (CIPC) registrations. As a result, it was possible to explore women's representation in the boards of directors of SAPVIA and SAWEA member companies and organisations.

Currently, SAPVIA lists 143 members in its service directory and SAWEA lists 109 members in its directory. As 29 companies belong to both organisations, the total sample size for this section of the report was 223 companies. Of the 223 companies in the sample, a total of 194 companies could be found on BizPortal. To verify that the company listed on BizPortal was the company listed in either the SAPVIA or SAWEA membership list the address of the company on BizPortal was compared to the address listed on the company's own website.

Once a company was identified on BizPortal the names of the company directors were captured in an excel sheet. In total, information on 638 Directors was captured in the excel sheet. An assumption about whether the person identified as female or male was then made for each company director based on first names as well as photographs of directors available on company websites, LinkedIn profiles and profiles found on Google. In

[274] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview As at 31 December 2021."
[275] Independent Power Producers Procurement Programme (IPPPP), "The REIPPPP Contribution: Women in Energy: Empowerment, Engagement and Employment."
[276] Independent Power Producers Procurement Programme (IPPPP).
[277] Independent Power Producers Procurement Programme (IPPPP).
[278] Independent Power Producers Procurement Programme (IPPPP).

a small number of cases it was not possible to make a reasonable assumption, in which case gender was noted as "unknown". We recognise this is not ideal, and we may have mis-gendered some people, nonetheless we believe in the absence of other data this was the best that approach possible.

Using data from the CIPC, a breakdown of gender representation of SAPVIA and SAWEA member companies is presented in Figure 48. The investigation revealed that 19% of directors were women and 80% were men. For 1 % of directors, their likely gender could not be assumed. These results reveal that women have limited participation in leadership positions in SAPVIA- and SAWEA-member companies.

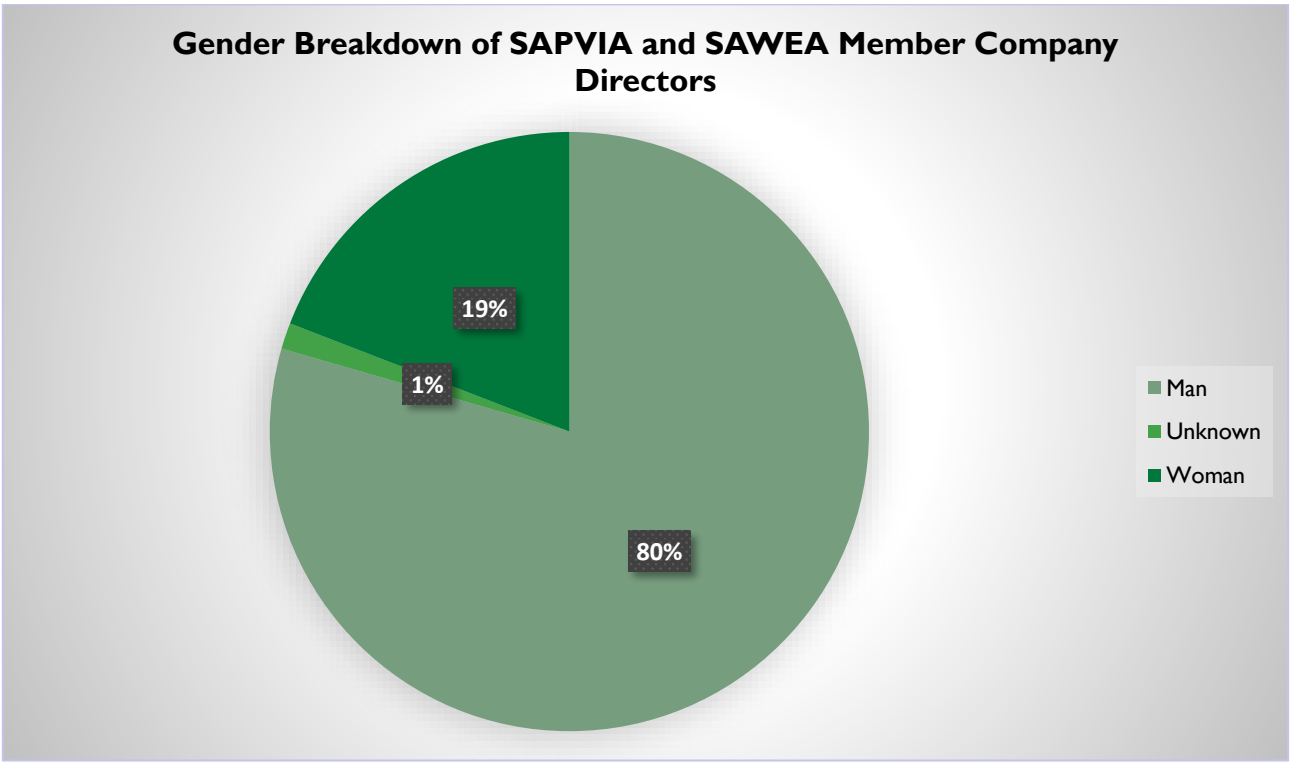


Figure 48: Gender Breakdown of SAPVIA and SAWEA Member Company Directors

Participation of women in the workforce

The South African government tracks participation in the workforce by race as well as gender (limited to women and men) based on reports submitted by employers. This data is published annually by the national Department of Employment and Labour in an employment equity report. For the last three the years the data has been broken down into 18 economic sectors as per the *Draft Employment Equity Regulations, 2018*.[279] One of these 18 economic sectors is "Electricity, Gas, Steam and Air Conditioning Supply"[280] and as a result, gender information is available for the broader energy sector in South Africa in the last three reports which includes the renewable energy sector. It should be noted however, that data remains disaggregated only by women and men and does not include non-binary people.

The size of the workforce, by gender, in South Africa's Electricity, Gas, Steam and Air Conditioning Supply sector over the past three years is shown in Figure 49. Women made up 33.2% of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply sector in 2021/22. However, it should be noted that the total size of the workforce, as well as the percentage of women in the workforce of the Electricity, Gas, Steam

[279] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."
[280] Previously, in the Commission for Employment Equity Annual Reports, electricity and gas had been combined with water under a broad economic sector, entitled "Electricity, Gas and Water".

and Air Conditioning Supply sector, decreased from 36.3% in 2019/20 to 33.6% in 2020/21.[281] The figure below shows that men make up the majority of the sector's workforce and that the size of the sector's workforce has decreased in consecutive years.

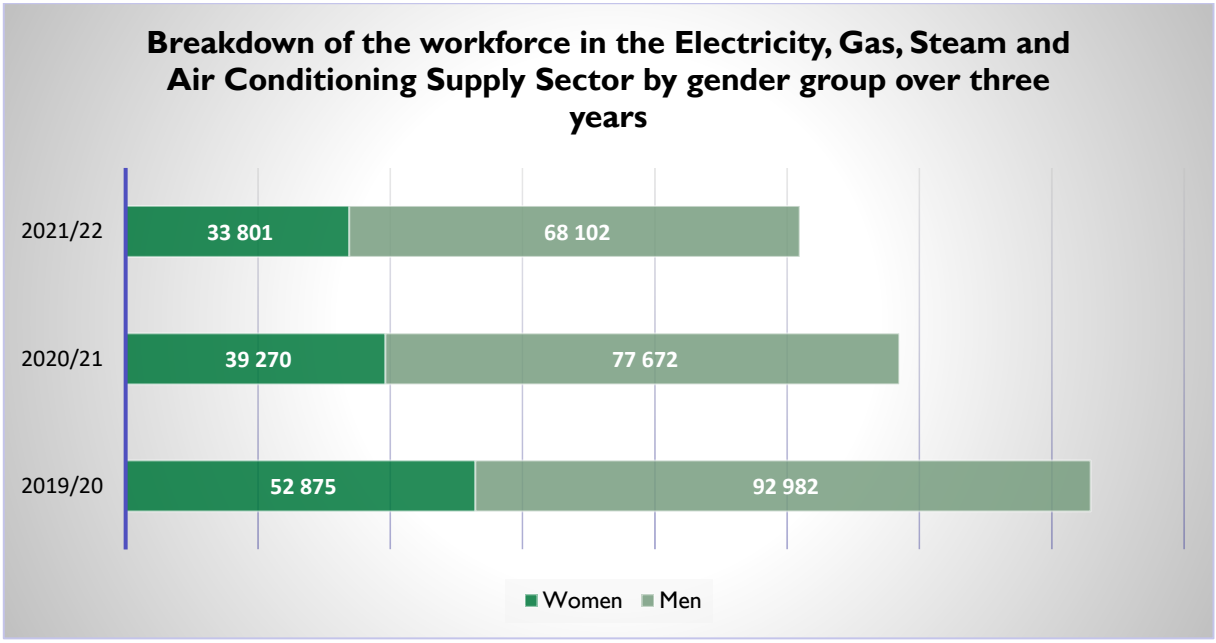


Figure 49: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years

Using data from the *22nd Commission for Employment Equity Annual Report 2021-22*, a breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply sector as percentages for 2021/22 is shown in Figure 31.[282] The vertical line in Figure 31 represents the percentage of women in the economically active population of South Africa (44.7%) in 2021/22.[283]

[281] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."
[282] DEL, "22nd Commission for Employment Equity Annual Report 2021-22."
[283] DEL.

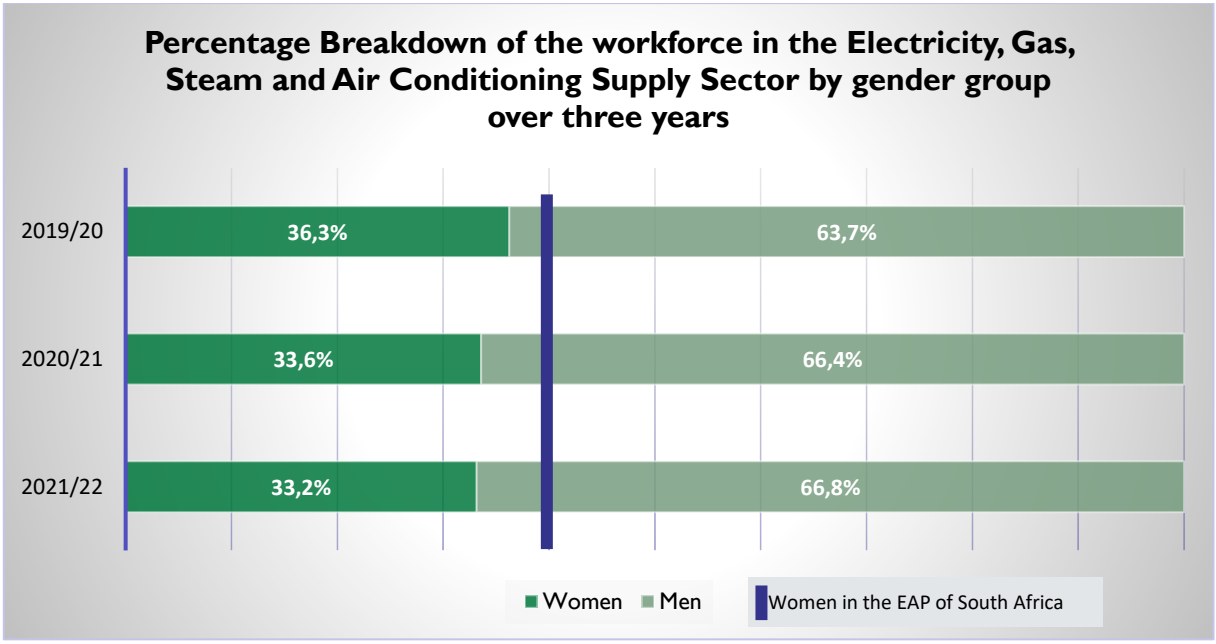


Figure 50: Percentage breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years with the economically active population (EAP) percentage of women in South Africa

In Figure 51, the workforce is broken down by women and men for six occupational levels (of permanent employees) from "Top Management" to "Unskilled" as well as temporary employees.[284] The vertical line in Figure 51 represents the percentage of women in the economically active population of South Africa (44.7%) in 2021/22.[285]

[284] DEL.
[285] DEL.

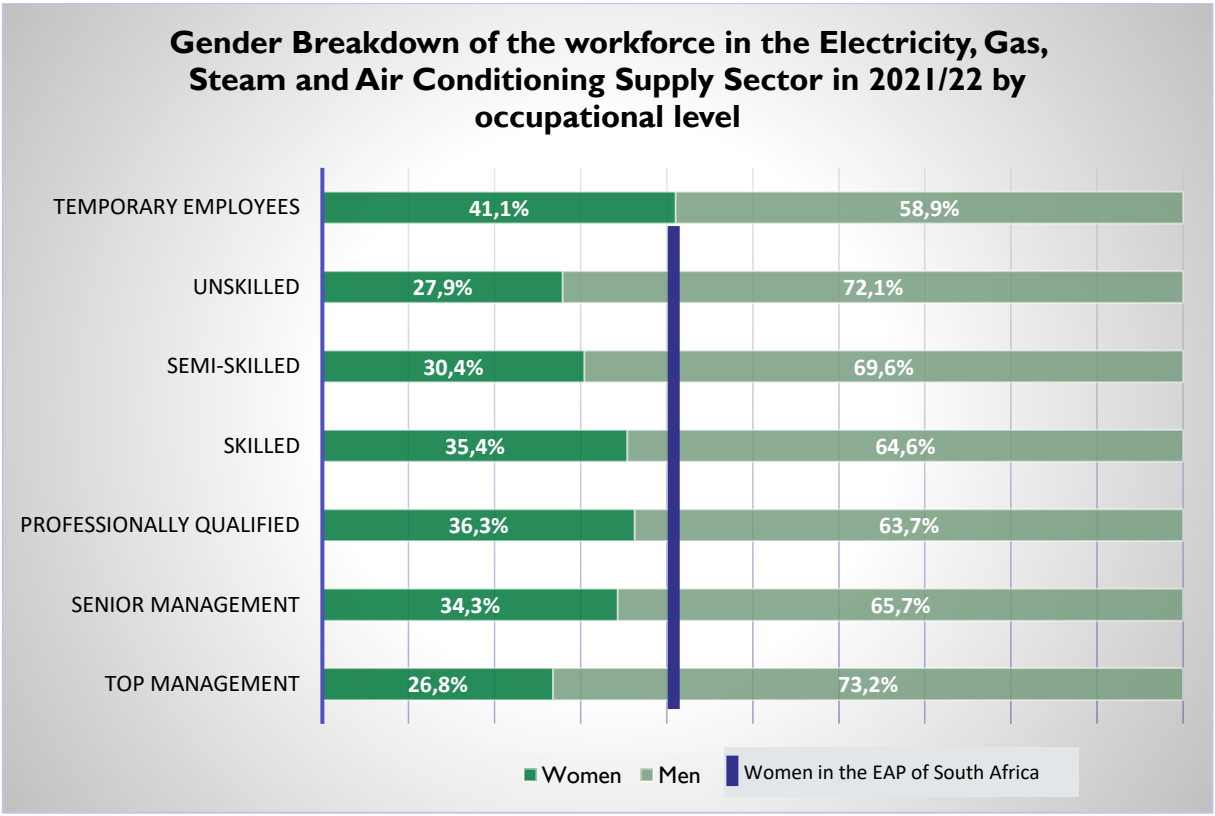


Figure 51: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector in 2021/22 by occupational level and gender group percentage contrasted with the economically active population (EAP) percentage of women in South Africa

A breakdown of the workforce numbers and percentages of the Electricity, Gas, Steam and Air Conditioning Supply sector for the past three years in terms of occupational level, temporary employees and women and men are shown in Table 17 .[286]

Table 17: Workforce profile for the Electricity, Gas, Steam and Air Conditioning Supply sector for 2021/22

Workforce Profile for 2021/22	Women	Women (%)	Men	Men (%)	Total
Top Management	201	26.8%	549	73.2%	750
Senior Management	618	34.3%	1,182	65.7%	1,800
Professionally qualified	4,222	36.3%	7,407	63.7%	11,629
Skilled	13,757	35.4%	25,052	64.6%	38,809
Semi-skilled	9,455	30.4%	21,610	69.6%	31,065
Unskilled	3,794	27.9%	9,784	72.1%	13,578
Total Permanent	32,047	32.8%	65,584	67.2%	97,631
Temporary employees	1,754	41.1%	2,518	58.9%	4,272
Grand Total	33,801	33.2%	68,102	66.8%	101,903

[286] DEL; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

Survey Results

A survey on gender diversity in the workplace in the utility-scale wind and solar energy sectors in South Africa was sent to the members of SAWEA and SAPVIA. In total, survey responses were received from 25 entities registered with SAWEA and/or SAPVIA. These responses were analysed to (1) better understand gender diversity in the workforce of entities that are active in the utility-scale wind and solar energy sectors, and (2) assess gender diversity at different organisational levels across the participating entities.

The survey responses showed that most of the entities that participated in the survey had relatively few employees, with most entities having between 0 and 49 employees (Figure 52).

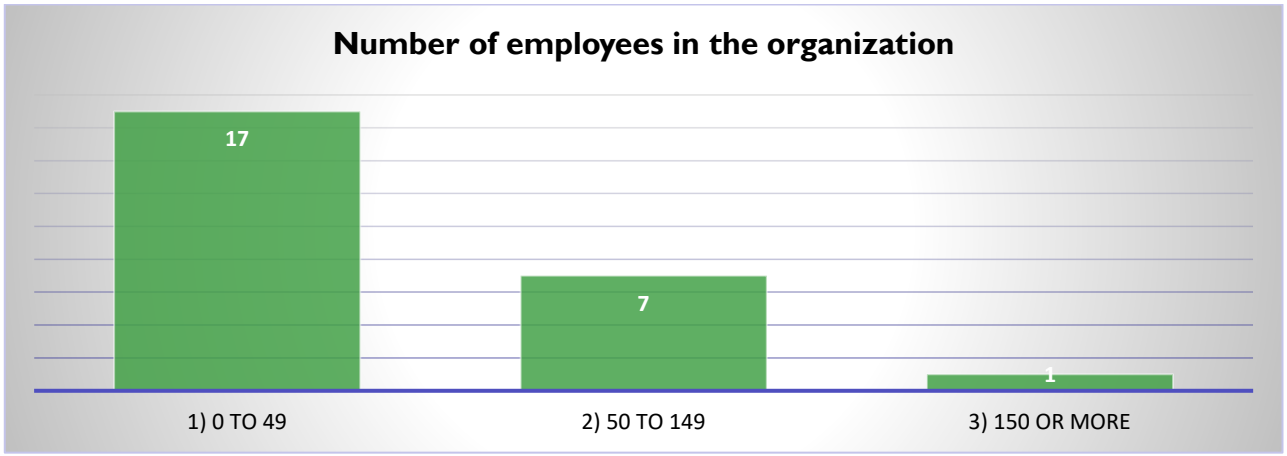


Figure 52: The range of employee numbers of surveyed companies

The entities that participated in the survey represented a variety of business activities across the wind- and solar-energy value chains including the development, construction, operation, and maintenance of solar and wind energy projects; residential and commercial installations; research and consultation; financing; and economic development (Figure 53). Some entities had more than one primary business activity. Also, more of the surveyed entities had a primary business activity linked to the wind energy sector than to the solar energy (Figure 53).

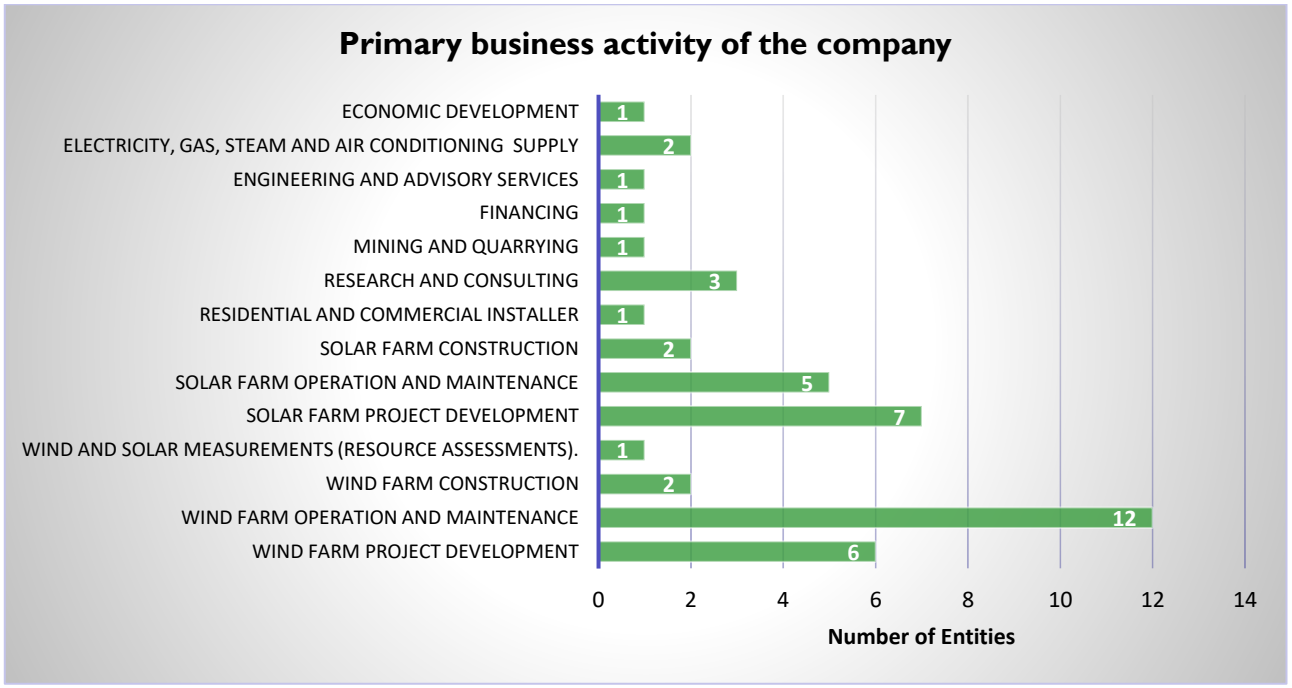


Figure 53: Primary business activity of surveyed companies

A breakdown of the total workforce of the entities by gender shows that women accounted for 33% of the workforce, while men made up the majority with 67% (Figure 54). These results are consistent with global statistics which estimate that women account for only 32% of the global energy sector's workforce, which includes oil, gas, renewables, etc. [287] The survey results are also consistent with the statistics from Sub-Saharan Africa where studies show that on average women account for 32% of the workforce in the renewable energy sector.[288] Furthermore, the wind and solar energy survey results are similar to the breakdown of the workforce in South Africa's electricity, gas, steam and air-conditioning supply sector for 2021/2022, in which women account for 33.2% of the workforce.[289]

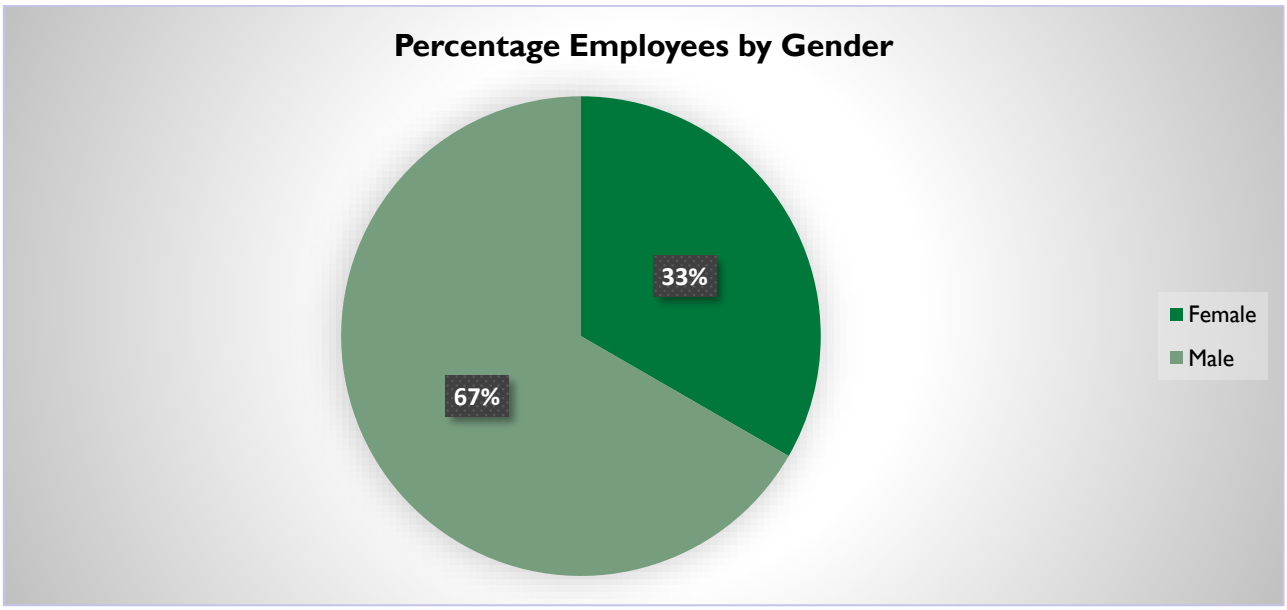


Figure 54: Percentage breakdown of employees, by gender of surveyed companies

A breakdown of the total workforce of the entities by gender and occupational level shows that apart from a slight increase in the percentage of women employed in top management positions, there is an overall trend that indicates that the number of positions occupied by women declines as the occupational level increases in seniority (Figure 55). The occupational levels of permanent employees are broken down into six levels from "Top Management" to "Unskilled", while temporary employees are shown separately. This overall trend is consistent with the trend in the South African Electricity, Gas, Steam and Air Conditioning Supply Sector (Figure 51), where there is a decline in the percentage of women employed as the occupational level increases in seniority. The survey results indicate that a lack of career progression of women to senior positions could be prevalent across many organisations in the utility-scale wind and solar energy sectors in South Africa.

[287] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[288] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[289] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

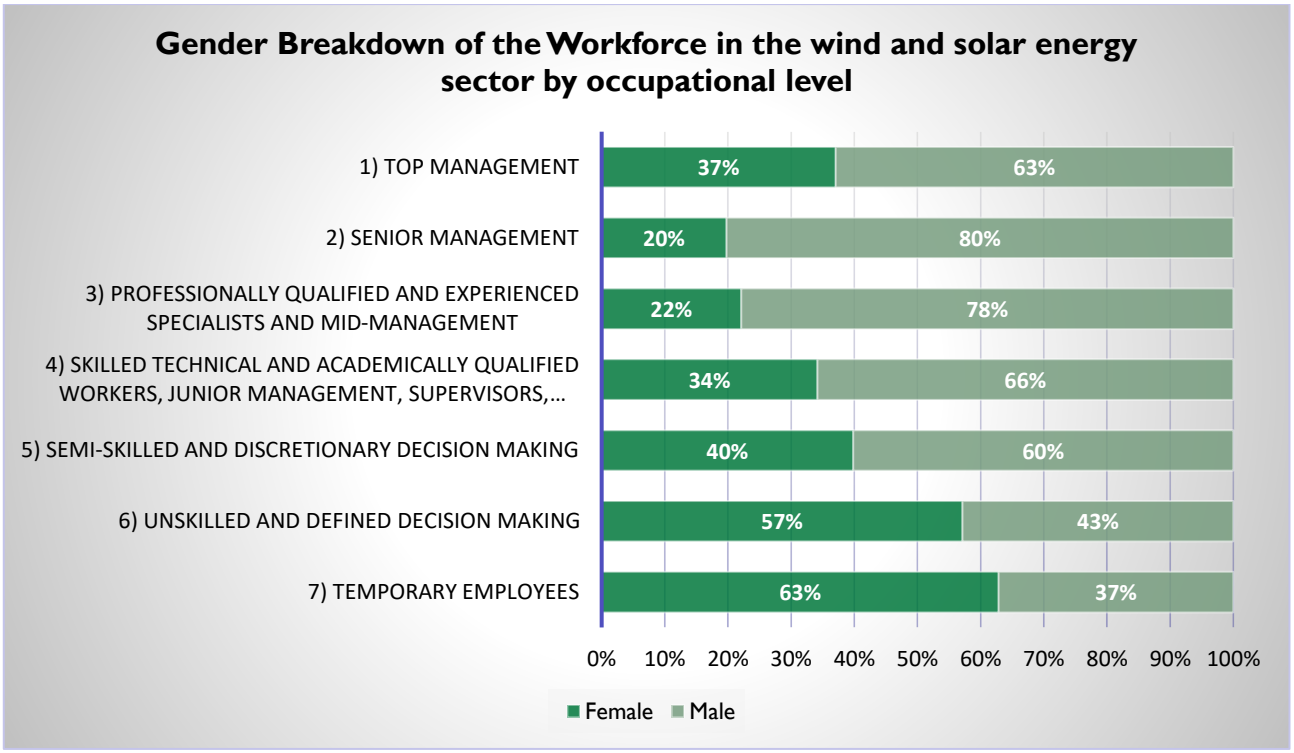


Figure 55: Percentage of employees, by gender and by different occupational levels of surveyed companies.

A breakdown of the total number of employees, by gender, at different occupational levels for the surveyed entities shows that the bulk of employment opportunities in the surveyed entities appears to be in junior management positions (skilled technical and academically qualified workers) and mid-management positions (professionally qualified and experienced specialists) (Figure 56). Both Figure 55 and Figure 56 indicate that men are employed more in senior occupational levels that have decision-making roles and responsibilities, while women are employed more in hierarchically lower occupational levels that only allow for very limited to no decision-making.

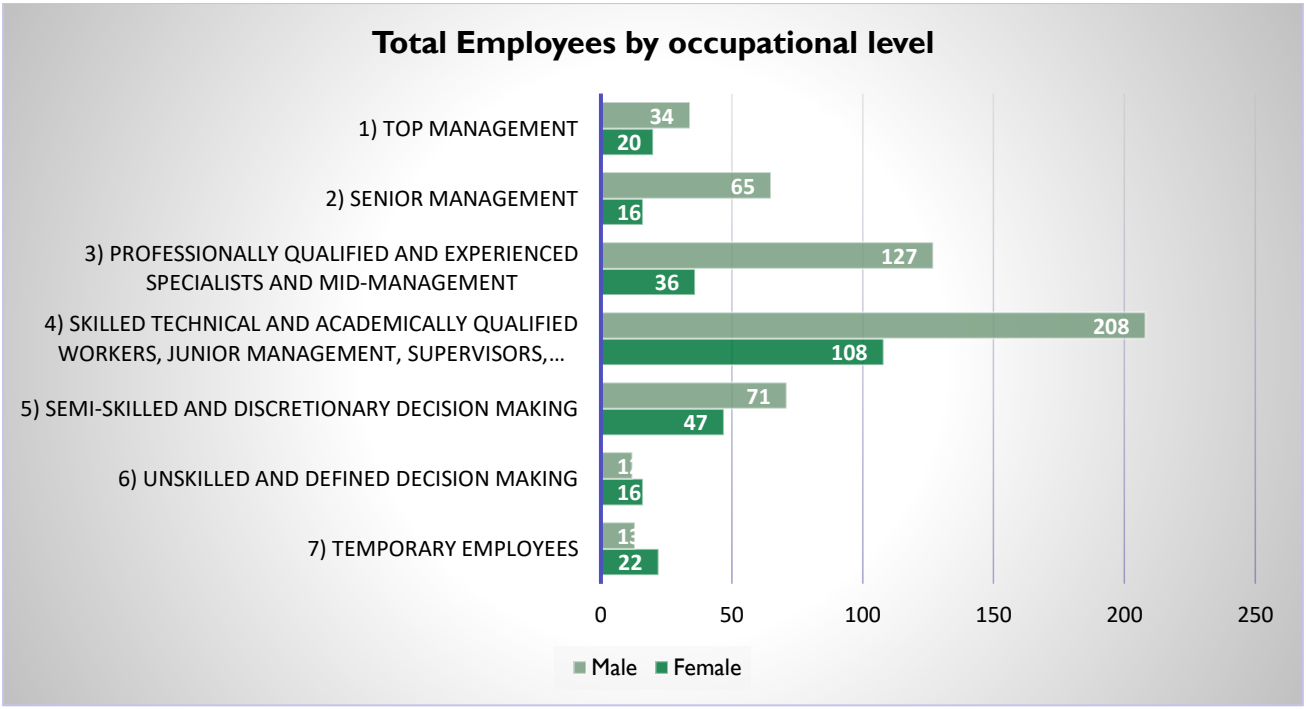


Figure 56: Total Employees by occupational level of surveyed companies

A breakdown by gender of new recruits over the past 12 months for both permanent and temporary positions in the surveyed entities shows that women account for only 31% of new recruits while men account for 69% of new recruits (Figure 57). This indicates that the existing workforce breakdown of around 33% women to 67% men (Figure 54) is being maintained by the current recruitment trends and there is an opportunity to address gender biases during the recruitment process.

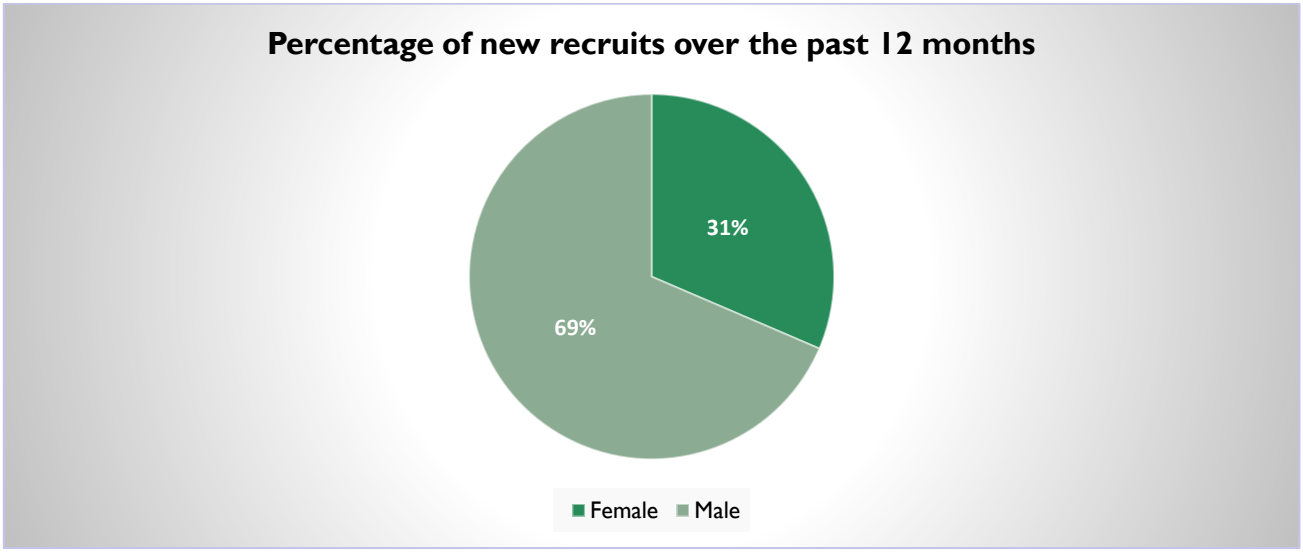


Figure 57: Percentage breakdown, by gender and of new recruits for both permanent and temporary positions over the past 12 months of surveyed companies

Furthermore, a breakdown by gender and occupational level of new recruits over the past 12 months for permanent and temporary positions in the surveyed entities shows that regardless of the occupational level, men account for a higher number of new recruits than women do (Figure 58). The breakdown also indicates that a lot of the recruits were concentrated in junior management positions, including skilled technical and academically qualified workers, and temporary positions (Figure 58). Although the number of recruits is fewer as you move towards top management positions because of fewer job posts available in senior management positions, more men are recruited into these positions than women (Figure 58).

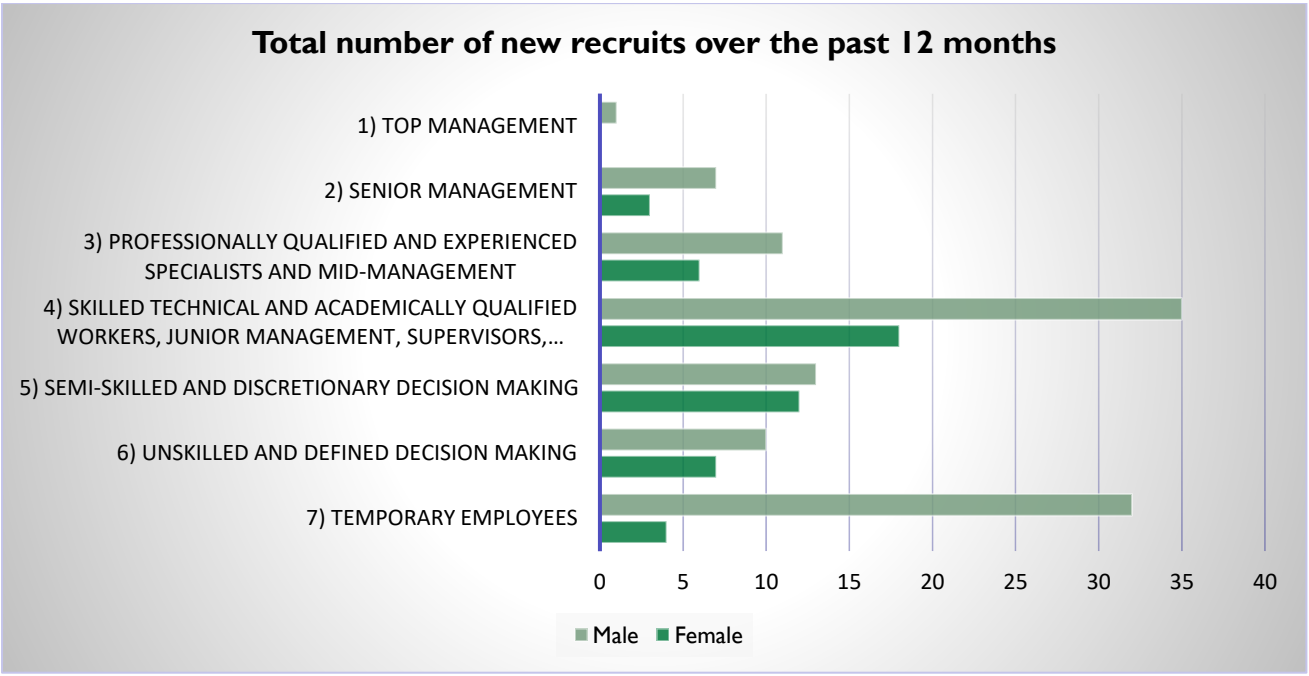


Figure 58: Total number of new recruits, by gender, at different occupational levels over the past 12 months of surveyed companies

A breakdown by gender of promotions over the past 12 months in the surveyed entities shows that women account for 37% of employees who were promoted, while men account for 63% of employees who received promotions (Figure 59). This is consistent with studies on renewable energy in Sub-Saharan Africa which indicate that women do not only experience barriers to entry in the wind and solar energy sectors, but that once in the sector women also experience barriers that hinder their retention and career advancement.[290]

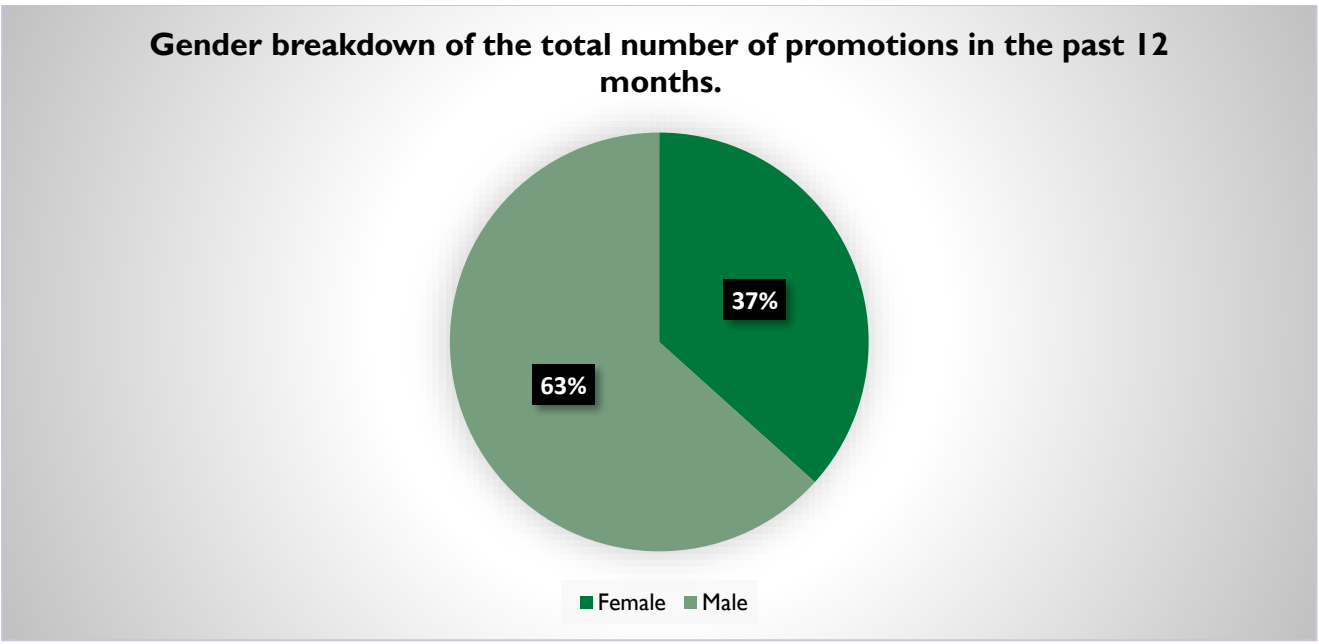


Figure 59:Percentage breakdown, by gender, of the promotions of surveyed companies over the past 12 months.

[290] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."

Furthermore, a breakdown by gender and occupational level of promotions over the past 12 months for permanent and temporary positions in the surveyed entities shows that men generally appear to receive more promotions than women (Figure 60). However, there were not sufficient responses to show any clear trends in the gender breakdown of promotions at each occupational level.

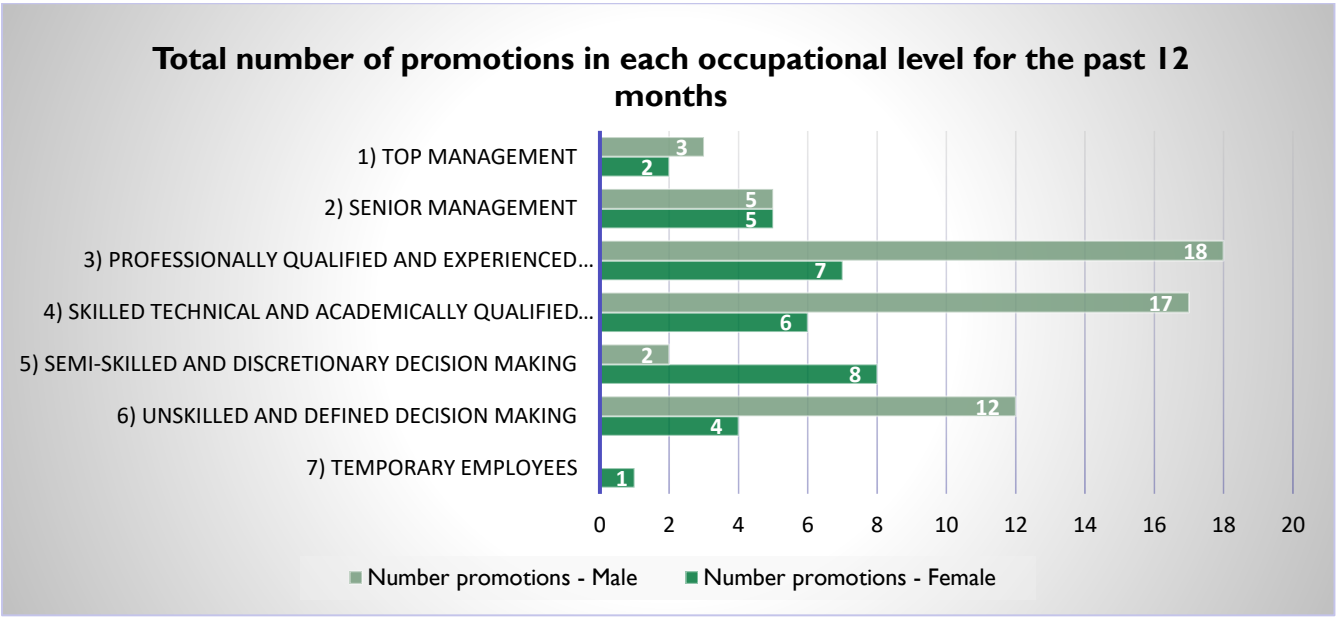


Figure 60: Total number of promotions, by gender, across different occupational levels over the last 12 months of surveyed companies

Barriers to participation for women and non-binary people in the utility-scale wind and solar energy sectors in South Africa

This section explores current barriers to equitable gender representation in the utility-scale wind and solar energy sectors in South Africa. The barriers listed in this section apply to both entry into the sector and career progression and retention within the sector, including women and non-binary people's direct experiences and perceptions and structural challenges.

Addressing barriers to entry into the wind and solar sectors is critical as improving the entry of women and non-binary people into the sector is a key step towards addressing gender diversity and retention within the sector. Once employed in the renewable energy sector, women experience numerous challenges that limit career progression and retention. Reasons for this include a lack of gender-responsive policies and plans within institutions and organisations[291] alongside social norms and workplace cultures that are often limiting for women and non-binary people, may be unsafe for women and some non-binary people and do not employ family-friendly policies.[292] [293]

The identified barriers are based on input receive from:

- ⚥ A series of individual semi-structured interviews conducted with women and non-binary people in the renewable energy sector.
- ⚥ Three focus group
    - Two focus groups on women, non-binary and people's experience in the sectors regarding gender diversity.
    - One focus group with human resource professionals examining their experiences in terms of recruitment of women and non-binary people.

Interviewees and participants representing different career stages, job roles and personal backgrounds, discussed their experiences, including barriers to entry and career progression that they have encountered or witnessed. As participants agreed to the interviews on the basis of anonymity, this section has been drafted to summarise the overall experiences that emerged from the interviews and focus groups. In some limited cases direct quotes have been included with no identifying details.

Most participants had not planned a career in the renewable energy space, but related work and recent opportunities allowed them to shift into this evolving sector, often in the middle stages of their careers. However, many of the interviewees in their early careers, have entered the renewable industry more intentionally, although for most they only identified the wind and solar sector during tertiary studies or early career internships.

Participants seemed to have experienced more personal or individual career challenges in the earlier stages of their career and more systematic barriers in their middle to senior level careers. This was highlighted by many participants, who cited that in their initial stages of their careers they recalled instances of "Imposter

[291] IRENA, *A Gender Perspective*.
[292] UN Women, "Call to Action"; IEA and CEEW, "A Look at India's Transition to Clean Energy."
[293] CFF and GIZ, "Solar Energy in Brazil."

Syndrome". The Harvard Business Review[294] defines imposter syndrome as "the collective feeling of inadequacy persisting despite evidence of progress and success".

> "Imposter syndrome is the collective feeling of inadequacy persisting despite evidence of progress and success"

Respondents also cited a sense of needing to work harder than male colleagues to prove they were worthy of being in a technical, male dominated industry. This was highlighted as a participant cited: "*There is a general feeling amongst women in this predominantly male sector, they feel like they need to overcompensate by being overachievers just to prove their worthiness to be part of the sector".* While in the middle to more senior career, challenges cited were more related to the lack of supportive policies and inclusive company culture, that may impede women and non-binary people's ability to advance.

Most respondents highlighted that men still dominate nearly all management positions and in cases where women do hold management positions, they are often in departments that involve work traditionally associated with "women's roles", such as Human Resources and Economic Development. Men also continue to lead the departments which are more technical and considered the core functions of companies. These experiences were further supported by the data on gender diversity among directors noted above in **Error! Reference s ource not found.**.

The participants represented very different personal backgrounds and experiences in terms of both gender and race. Therefore, entry and progression in the sector for white and black women and non-binary people was often very different owing to their varied backgrounds, social capital, financial position and secondary and tertiary educational experience. Although not the focus of this study, it is important to note the intersectionality of the multiple barriers, faced by black and minority genders in the industry.

Despite the numerous barriers raised, encouragingly all the participants showed high levels of passion and motivation for the work they are involved in, with many women and non-binary people citing that their work felt meaningful in a time of climate crisis and energy access challenges. A respondent that has recently entered the renewable energy role cited that it felt "*good to be in an industry that contributes to global decarbonisation which is a passion of mine.*" While a participant in a senior role stated, "*I have always wanted to be a part of the people who would make a difference and contribute towards mitigating climate change …"*

Women also indicated that the industry was evolving and that they were excited to be at the forefront of such change. Additionally, a few participants noted that they were encouraged by the current economic opportunities in energy investment and development, whilst the unique technology within the industry drew another participant into the sector.

Barriers to entry

Social norms and gender stereotypes discourage girls and young women from studying STEM-related subjects

"*Systemic barriers at basic education level prevent girls, particularly black, poorer girls, from entering university.*"

Participants highlighted that the crisis in basic education which frequently included very poor standards of education in the STEM subjects, limited girls (particularly from public schools) from graduating with sufficient

[294] Corkindale, "Overcoming Imposter Syndrome."

grades to enter STEM-related course at the tertiary level. Furthermore, gendered assumptions around women's roles and appropriate careers were reinforced during secondary education, often discouraging girls from studying STEM subjects during this phase, resulting in fewer women studying STEM disciplines at the tertiary level. These views were supported by the analysis undertaken on the diversity of women and men within STEM studies at the tertiary level, which found that more women than men are enrolling and graduating across all study areas in South Africa. However, fewer women are entering the market in the STEM fields, particularly, Maths, Engineering and Computer Science (Figure 61).

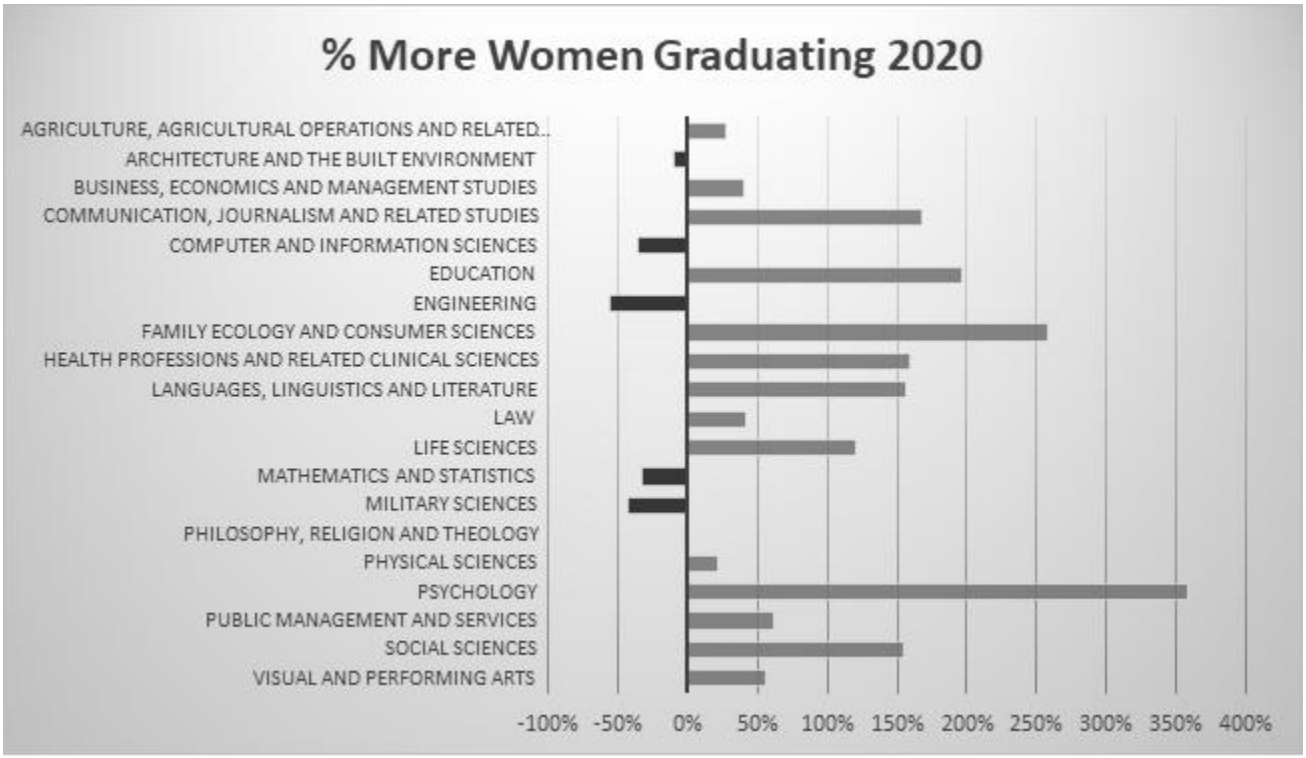


Figure 61: The percentage of women graduating relative to percentage of men graduate from different Classification of Educational Subject Matter (CESM) categories in South Africa in 2020

Where women overcame these stereotypes and pursued tertiary studies in STEM-related disciplines they still often experienced discrimination. One participant who is a recent engineering graduate mentioned that significantly more female students dropped out of her course then men, five women registered with her in her year and only one other graduated. Further, she has seen that even among those who graduated a number were no longer in the engineering profession.

Some participants noted that when women entered the male-dominated STEM courses at tertiary level they frequently experienced discrimination from male students as well as lecturers. "*As a [female] engineering student, I constantly had to work extra hard just to prove that I deserve to be there. There were times when female students would voice out their ideas or answer questions. It always felt like their voices were not appreciated as those of their male counterparts. Even some lecturers would make you feel you don't deserve to be there as a woman.*"

An interviewee, in her early career, experienced men perceiving her as someone who did not take her work seriously when she dressed smartly up and wore make-up. Women mentioned that there is also an assumption that you have to lose your femininity for your male classmates to take you seriously.

Woman and non-binary people experience barriers accessing funds

Participants noted that woman and non-binary people experience significant barriers accessing business opportunities for renewable energy development, including start-up funds, loans, and investors. Recently, there

have been some emerging opportunities for women, with a few new initiatives and funding support programmes targeting women business owners in the sector. Investment opportunities for women business owners are often perceived as riskier, a belief driven by historical biases. Investors generally place more confidence in men seeking funding than women due to the perceptions that men are better decision makers than women. This is further exacerbated as providers of capital are men, frequently putting women at a disadvantage.

However, interviewees stressed that despite very limited progress around women accessing funds, non-binary people, particularly openly trans and queer people experience significantly more severe barriers accessing funding and investor support. As an openly queer participant noted *"One of the biggest challenges I have experienced was getting access to funding for our business. A lot of potential investors were uncomfortable with funding our business due to the demographics of the business's management, which is 100% queer-owned, and 50% trans-owned."*

Lack of information about the wind and solar sectors as a career option

Many participants highlighted a lack of information about the solar and wind sector as a career path, which impact their subject choices at secondary school and the options which they considered for tertiary studies. Young people did not know about the wind and solar sector as a future career option and therefore did not consider choosing subjects or disciplines which would equip them to enter it. This was particularly relevant in the more technical roles of the sector, where STEM-related subjects are critical, whereas in roles such as human resources it was easier to shift sideways into the sector from other sectors.

It was noted that many universities still do not offer specific courses related to the wind and solar sectors and this extends to entry into the industry as students pursue studies unaware of the opportunities that exist in the renewable energy industry. This is especially true for recent female graduates that may then lack the relevant networks to find their way into the solar and wind sectors. Even female graduates from STEM-related fields mentioned being unaware of the opportunities, one participant who was a recent engineering graduate, mentioned that it was only towards the end of her 18-month internship that she learnt about the opportunities within the sector, through her mentor.

Recruitment and hiring practices biased towards men

Many participants mentioned that positions in the solar and wind sector often require many years of experience, which recent graduates and women wanting to shift from other careers may not have, especially for the technical positions. Not only does this limit women's opportunities to enter the sector, but it has been found that men are more likely to apply for jobs with experience and skill requirement beyond their current resume. It was highlighted by several people that women are less likely to apply for positions where they do not meet all the requirements, whilst their male counterparts apply for positions even if they only meet some of the job requirements. This may be attributable to insecurities that women have due to social norms and perceptions.

Participants in the HR focus group also highlighted that the wind and solar sector does not specifically target female or non-binary graduates to enter the sector, despite the lack of gender diversity, instead they focus simply on the skills the company needs, missing the opportunity to begin addressing diversity with their recruitment targets at entry level.

HR representatives expressed that since the Covid-19 pandemic, most women showing interest in participating in the wind and solar energy sectors are mostly interested in being employed by companies that offer flexible working hours. Although some companies offer this option, a lot of companies still have rigid working hours which are restrictive to a lot of working mothers who are primary caregivers in their homes. This is especially true for onsite positions, hence very few women apply for positions that require them to be onsite fulltime. Women and non-binary people rarely apply for positions that are onsite because organisations are not actively

working towards improving the conditions for onsite workers, especially in construction, and most of these working and onsite living conditions do not accommodate minority genders.

Barriers to progression and retention

As mentioned earlier there are two levels of barriers to ensuring gender diversity in the solar and wind sector, the first, addressed above, concerns barriers to entry. This section now reflects the views of participants about the barriers that women and non-binary people face once in the sector, in terms of career progression.

Lack of policies supportive of women and non-binary people's particular needs

There appears to be a dearth of policies at both company and sector level to meaningfully address the low participation of woman and non-binary people in the solar and wind sector. When participants were asked to talk about successful initiatives to support women and non-binary people to enter and then progress in the sector very little policy was mentioned. Indeed, one participant at a senior level indicated that *"At a company level, I am not aware of any initiatives that particularly support women in the technical side of the sector, and this is extremely disappointing. A lot of organisations don't step up and make commitments to training and supporting local women in their career".*

While there is a shortage of policies to support women in the sector, support for non-binary people appears to be completely silent. As one participant noted "... *while in a few cases there is a preference for women-owned and women-led businesses, there is no policy discussion at all about supporting non-binary people to lead and own businesses in the sector, there is no support for queer-owned, queer-led businesses*".

Most initiatives that were mentioned such as mentoring and supporting women to balance family responsibilities were informal and as such were not company policy. Participants indicated that where policies to support women's multiple roles did exist, they were sometimes hesitant to make use of these for fear of being perceived as "not delivering equal to their male colleagues".

Limited gender targets for Independent Power Producers in South Africa

Gender targets linked to the employment of women and the awarding of projects to women entrepreneurs in the utility-scale wind and solar energy sectors are limited. In most organisations in the utility-scale wind and solar energy sectors, gender employment targets and considerations are implied but they are not explicitly stated in company policies. There are some limited gender targets in the renewable energy sector. A report on the Independent Power Producers Procurement Programme (IPPPP) by the DMRE shows that there are some commitments made when there is preferential procurement with the focus on sub-contracting to empowered enterprises, black-owned enterprises, and women-owned enterprise.[295] In addition, some commitments and targets on the share of construction and operational procurement spend sourced from women-owned vendors for IPPs have been established. To date, five per cent of the total construction procurement spend was from women-owned vendors and six per cent of operational procurement spend was from women-owned vendors against a four per cent commitment and a five per cent target.[296]

Social norms and gender stereotypes continue to discourage women and non-binary people from the sector

Despite the wind and solar sector being a new industry, gendered norms continue to play a role in creating perceptions that this is not an appropriate sector for women, and it remains a male-dominated industry, particularly in the technical and senior management spaces. All participants mentioned the gendered challenges

[295] Independent Power Producers Procurement Programme (IPPPP), "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[296] Independent Power Producers Procurement Programme (IPPPP).

women must overcome to occupy technical posts and advance to senior levels. This was highlighted by a participant as - *"There are very few organisations which are exceptions to the norm, but in most organisations, I know of, including mine, the decision-making positions are reserved for men."* Another participant stated that: *"Women are usually placed in a box, there are unspoken biases where women are pushed into more administrative tasks and not in more technical roles. For example, women will be given tasks to write minutes, or organise events because they are perceived to be better at performing such tasks by virtue of them being women, even if it's not part of their job descriptions."*

Women also mentioned that men's opinions had "natural hierarchy" because of social norms about who was "naturally best for the job". Indeed, frequently men's views were considered over women's, with a participant in a focus group stating, "*Our [women's] ideas are almost always dismissed until a manager hears them coming from our male counterparts. It's almost as if they only buy into our ideas when another male colleague promotes them. You must have a male ally in the workplace for you to be taken more seriously in the sector*". Similarly, another interviewee in a senior position recalled instances where her contribution was not taken seriously unless supported by a male colleague. Furthermore, where women are in leadership, they often face expectations of failure, as one woman said "*Women in leadership positions that were previously reserved for men are already expected to fail before even doing the job. The people you manage already have a bad attitude; they are not supportive making it difficult for you to execute a lot of the plans you have for your department".*

Another participant mentioned that during her early career, she experienced clients making remarks on her appearance, suggesting that she appeared young and therefore less experienced and ill-equipped for the job.

These stereotypes further extend to non-binary people, there has been almost no transformation in the sector in relation to non-binary identities, and as a result almost no attempts made to ensure non-binary people are meaningfully included and accommodated across the sector. As a respondent stated, "*There is a lot of resistance in the sector to having dialogues around the inclusivity of non-binary people. Leadership in most organisations are older and more traditional men and therefore there is a lot of resistance to having conversations or trying to learn about the spectrum of gender and sexuality."* This can also lead to feelings of insecurity in the workplace and discourage suitable candidates from applying for promotion even when they meet requirements.

A few women also mentioned that there is a "boys club" in the wind and solar energy sectors that precludes women and non-binary people on many levels. Many of the companies are still overtly owned and run by men, and in addition, the men tend to know each other, play golf together, socialise at the bar together, etc., and this is where key discussions and informal decisions are taken – excluding the views and voices of women.

Women still experience explicit sexism

Numerous examples of explicit sexism were mentioned by interviewees and focus group participants. In some cases, this sexism was reinforced by gendered norms about what women should and should not do. One example involved a participant who experienced verbal sexual harassment from a former colleague. She was aware that other women had previously complained about similar behaviour from the colleague however, there had been no intervention from the workplace and the behaviour continued. Other examples have been mentioned under other barriers.

An interviewee who has recently entered the renewable energy industry stated that she had experienced situations where she was not treated as an equal or colleague but rather like a wife or a child who was expected to be submissive in the workplace. When she tried to address the issue, she would be called names and referred to as a stubborn employee. This belittlement has affected her confidence in her work and is likely to reduce her opportunities to take up more responsibility and advance in her career.

The section below also highlights examples of sexism related to motherhood.

Lack of, and poor support for, family-friendly policies

All participants mentioned the additional responsibilities that many women assume, either as primary parent and/or primary carer and homemaker and noted that these roles were not assumed by most men. Participants stated that these responsibilities placed additional pressures on women, often creating barriers to career progression. While some companies mentioned either formal or informal family-friendly policies supporting women, some have nothing. A few women mentioned a sense of fear and scepticism among women to make use of them where they do exist, especially if the company culture was unsupportive.

While some women experienced supportive colleagues who accommodated each other's family responsibilities, many examples were cited of unsupportive environments, and even direct discrimination, from men and some women, based on motherhood. This was supported by a participant who said *"There is a perception that women with young children won't be able to do the job required due to caregiving responsibilities. The source of this bias is not just from men, but also from women and it needs to be addressed."* An additional example was given where a woman CEO had told another woman she wouldn't be a good fit for a job, which she was otherwise qualified for, due to her having young children.

Other women spoke about choices they must make to accommodate their parenting responsibilities at the expense of promotion or being able to take on-site positions. One participant recounted the adjustments she had to make to accommodate her family responsibilities, she elected to work in the pre-construction phase of projects, rather than the construction phase of projects as this required travel and being on site frequently. Frequent travel would have been particularly challenging as she could not leave her family responsibilities for extended periods of time. Another interviewee supported this sentiment in her statement: "*Working in construction is extremely invasive regardless of the gender you identify as. This is worse for women who want to be mothers, work-life balance doesn't exist. If you are a mom, working in construction, your partner needs to be in a more static job or a stay-at-home parent. This is challenging as there are existing perceptions about women being primary caregivers and homemakers."*

Pregnancy was also mentioned as another barrier to career advancement for women in the sector, especially for women who are involved in fieldwork. Women mentioned that in some cases they are removed from projects immediately when they inform the organisation of their pregnancy, and in many cases, they are then not brought back onto the project after maternity leave. Essentially being side-lined once pregnant. This sentiment was captured particularly well in a statement by a participant "*The Renewable Energy sector is fast-paced and pregnant women are usually side-lined* [and] *they are treated as if they are sick people who would be incapable of performing their normal duties*". This form of sexism following maternity leave is often unsaid and reveals a lack of support for parenthood. One woman also mentioned how colleagues and management often make assumptions without consulting the women, like *"believing that you won't want to or won't be able to take on certain tasks, without having a conversation with you to find out how you feel and what type of support you would like as a woman returning from maternity leave".*

It was very striking that women and non-binary people face significantly more challenges with site-based positions then when working in office-based positions. Participants noted that for non-binary people the site-based positions could be very difficult as these were often in more rural, isolated places where there might not be other openly non-binary people and where conservative views about gender identity may be very pervasive. Whereas a number of people working in Cape Town and Johannesburg offices mentioned that staff in some of these spaces were more accommodating. Women with families, or considering motherhood also found site-based positions difficult as these rural locations often did have "good schools and clinics" etc. Indeed, a Human Resources professional noted that they have had instances where they have offered a site-based position to a woman who later turned it down after visiting the location and exploring options for her family.

Lack of health, safety and wellbeing in workplaces

Very few respondents, based in offices in main centres, indicated having experienced issues with a lack of health, safety and wellbeing. However, this was very different for women and non-binary people with site-

based positions, who mentioned many safety challenges. Site work can involve night shifts with additional safety concerns for women, with some women expressing concerns about working alone with men at night. Some women also mentioned that night shifts shared with men sometimes led to speculations about inappropriate relations. Furthermore, site accommodation is usually not gender segregated, which may deter women and non-binary people from applying for remote work.

There is also a concern among women whose work was predominantly site-based that women are made to feel unwelcome, "*Women who work on-site are constantly made to feel like they are not welcomed."*

Respondents also noted the prevalence of micro aggressions in their workplaces, particularly with on-site work. This is especially the case with women's clothing, including with personal protective equipment (PPE) where companies often do not supply all sizes and women often end up with poor fitting PPE. One woman clearly stated that, *"getting something as simple as PPE that is the correct fit and make for women is difficult."* This was further supported by a participant as she recounted that there were PPE manufacturers that make safety boots that are the correct fit for women however many organisations still offer safety boots that are a better fit for men and insist that they are "unisex".

Lack of mentorship and role models for women and non-binary people

A lack of accessible female mentors and role models was frequently highlighted by respondents. Women and non-binary people in their early careers cited this as a challenge when planning their careers without the necessary guidance. Furthermore, an interviewee highlighted that where support is given to women's career advancement in the sector it is often reserved for women in departments such as finance, human resources, and legal and not women in technical, engineering and construction roles.

There are very few formal, funded mentoring programmes for women and non-binary people run by the companies in the wind and solar sectors in South Africa. Frequent mention was made of the mentoring programme run by WE Connect. Many respondents stated that they had utilised WE Connect and felt it offered a critically important opportunity to support women in the sector. However, it is unfunded by the sector. Only one company was identified during interviews that had a formal, funded, mentoring programme. A number of participants mentioned that they had made a point of identifying a mentor for themselves as they recognised it would be very important to support their career growth in the sector – again this was not arranged by the company and depended upon the person's initiative and networks.

Gender pay gap – women still earn less

Despite this being a new sector, pay inequities between women and men continue. Participants mentioned that often one is not aware of what colleagues earn which enables pay gaps to continue uncontested. Furthermore, some women mentioned that the sector often made women feel they should be "grateful" for being "allowed" into the sector, which discouraged women from challenging these inequities. A participant who has also recently entered the industry identified that, "*The gender pay gap also exists and it is a very difficult issue to raise as a woman. Firstly, salaries are usually confidential so you might never even find out that you are being paid less than your male counterparts. Secondly, you are always made to feel like you should be appreciative that you have a job in this economy, despite not being fairly compensated like your male colleagues".*

Lack of STEM educational background, especially technical, limits career opportunities

While a few women in the sector do have a STEM background, many women without a STEM background have entered the renewable energy industry. For example, some of the participants in this study have environmental science, social science, and finance related backgrounds. However, even in cases where women have STEM backgrounds, many mentioned that not having the technical skills, particularly engineering, was a significant barrier.

One participant highlighted that although she had a science background, this background was not technical in nature, this has been a significant barrier, especially in her earlier career. Another respondent without a science background mentioned how this limited her also experienced this as a significant barrier to progressing in the sector, again particularly with the technical side. *"I have an economics and environmental management background and there are times I must work on the more technical stuff that is engineering based. This brings a lot of insecurities as the technical side of the sector is predominantly men,"*. The interviewee mentioned that this often led to her feeling the need to overcompensate with knowledge of the sector to prove her worthiness.

Opportunities for promotion to management for women and non-binary people are limited

Career progression, particularly into management for women and non-binary people in the wind and solar sectors is very limited. Several reasons have already been mentioned above. In addition, a participant noted that a lack of promotion opportunities for women and non-binary people is not only due to a lack of women candidates, but also related to the slow uptake of women in the sector during the recruitment process.

In more recent years, entry into the utility-scale wind and solar sectors in South Africa has become more difficult as the industry is becoming more established. When the industry was in its early stages there was more opportunity for entry for people without specific skills, however, now that skill requirements have increased, there are few women and non-binary people with the relevant skills. This is further limiting women and non-binary candidates with potential but who lack the required experience.

Participants also expresses that in instances where the retention and career advancement of women is supported, this support is mostly reserved for women in departments such as finance, HR, or administration. Apart from women's advancement in the sector being barely supported for women in technical engineering and construction roles, opportunities for career advancement are rarely there. For these reasons, most women in top management positions in the sector do not have an engineering background.

There is also the reality of a "boys club" in the wind and solar energy sectors that precludes women and non-binary people on many levels, *"Project leaders and managers who are men seem to gravitate towards male subordinates and hence give them the opportunity to do tasks that will accelerate their careers and open more doors for them."* Career growth opportunities are therefore inherently excluding women using this informal workplace practice.

Lack of feeder institutions and courses

Participants in the HR focus group highlighted that there were no specific feeder institutions or courses for entry into the renewable energy industry, this makes it more challenging when trying to target, and then support, women and non-binary people to enter the sector. However, a participant did note a programme offered at Stellenbosch University, that promotes women's participation in renewable energy.

On-site and remote work is very challenging for many women and non-binary people

To date, women only represent ten percent of the construction workforce from the total job opportunities created during the construction phase of IPPs.[297] Several interviewees stated that on-site work, which offers less stability and frequent travel, is often incredibly difficult for women with family responsibilities, especially children. In addition, there are the safety concerns mentioned above. This was supported by participants in the HR focus group who highlighted that women tend to apply for roles that are technical, but office based, rather than technical roles that include construction work.

[297] Independent Power Producers Procurement Programme (IPPPP).

On-site work requires extended time away from family responsibilities, and participants noted that men and young single women are more willing to occupy these posts compared to mothers and married women. Furthermore, young single women are often from disadvantaged backgrounds and would rarely refuse any work, hence they accept site work.

References

Akinbami, Olusola M., Samuel R. Oke, and Michael O. Bodunrin. "The State of Renewable Energy Development in South Africa: An Overview." *Alexandria Engineering Journal* 60, no. 6 (December 2021): 5077–93. https://doi.org/10.1016/j.aej.2021.03.065.

CFF and GIZ. "Solar Energy in Brazil: Which Are the Barriers and Opportunities for Women Professionals in the Field?" Berlin, Germany: C40 Cities Finance Facility and Deutsche Gesellschaft für Internationale Zusammenarbeit, 2021. https://www.globalwomennet.org/solar-energy-brazil/.

Corkindale, Gill. "Overcoming Imposter Syndrome." *Harvard Business Publishing* (blog), May 7, 2008. https://hbr.org/2008/05/overcoming-imposter-syndrome.

DEL. "20th Commission for Employment Equity Annual Report 2019-20." Pretoria, South Africa: Department of Employment and Labour, 2020. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2019%20-2020/20thCEE_Report_.pdf.

———. "21st Commission for Employment Equity Annual Report 2020-21." Pretoria, South Africa: Department of Employment and Labour, 2021. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2020-2021/21%20CEE%20Report.pdf.

———. "22nd Commission for Employment Equity Annual Report 2021-22." Pretoria, South Africa: Department of Employment and Labour, 2022. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2021/22nd%20CEE%20Annual%20Report.pdf.

Energy Council. "Women's Energy Council | Energy Council." *Women's Energy Council | Energy Council* (blog), 2020. https://energycouncil.com/how-it-works/womens-energy-council/.

IEA and CEEW. "Women Working in the Rooftop Solar Sector: A Look at India's Transition to Clean Energy." International Energy Agency & Council on Energy, Environment and Water, February 2019. https://iea.blob.core.windows.net/assets/67e60726-8659-4c58-aefd-c86bdaa5fc10/Women_working_in_the_rooftop_solar_sector.pdf.

IFC. "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees." International Finance Corporation, 2022. https://www.ifc.org/wps/wcm/connect/b089848b-2dd3-458b-85e1-5db3f04cb153/IFC135+-+E2E+Report_V5.pdf?MOD=AJPERES&CVID=o52j5wH.

Independent Power Producers Procurement Programme (IPPPP). "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021." Quarterly. Centurion, South Africa: DMRE, March 2022. https://www.ipp-projects.co.za/Publications.

———. "The REIPPPP Contribution: Women in Energy: Empowerment, Engagement and Employment," August 2017. https://sawea.org.za/wp-content/uploads/2018/03/Women-in-Energy-Feature-august-2017.pdf.

INSPIRE. "INSPIRE | Initiative for Social Performance In Renewable Energy." Inspire, 2021. https://inspire-excellence.net/.

IRENA. *Wind Energy: A Gender Perspective*. Abu Dhabi: International Renewable Energy Agency, 2020. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jan/IRENA_Wind_gender_2020.pdf.

IRENA and ILO. "Renewable Energy and Jobs – Annual Review 2021." Abu Dhabi, United Arab Emirates: International Renewable Energy Agency, 2021. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_823807.pdf.

Lisa, Reynolds. "Southern-African-Females-in-Energy-Efficiency," 2015. http://www.energy.gov.za/files/WOESA/2015/limpopo/Southern-African-Females-in-Energy-Efficiency.pdf.

SAPVIA. The South African Photovoltaic Industry Association. "The Voice of Solar PV in South Africa." *The Voice of Solar PV in South Africa* (blog), 2021. https://www.sapvia.co.za/about/.

———. "Working Groups." *SAPVIA Working Groups* (blog), 2021. https://www.sapvia.co.za/working-groups/.

SAWEA. "South African Wind Energy Association | About." Blog. *The South African Wind Energy Association (SAWEA)* (blog), 2019. https://sawea.org.za/about/.
———. "South African Wind Energy Association | WOMEN IN LEADERSHIP: ACHIEVING AN EQUAL FUTURE IN THE RENEWABLE ENERGY SECTOR," 2021. https://sawea.org.za/women-in-leadership-achieving-an-equal-future-in-the-renewable-energy-sector/.
UN Women. "Women's Empowerment Principles Call to Action: Gender Equality in the Renewable Energy Industry." UN Women, 2020. https://www.weps.org/sites/default/files/2021-02/CALL_TO_ACTION_Gender_Equality_Renewable_Energy_Industry.pdf.
WE Connect. "WE Connect - Networking That Is Rooted in RE Growth," 2021. https://www.womenenergyconnect.org/.
WomEng. "#1MillionGirlsinSTEM — WomEng." Accessed July 19, 2022. https://www.womeng.org/work/1milliongirlsinstem.
———. "Africa Catalyst: Capacity Building for Women in Engineering Bodies in Sub-Saharan Africa." WomEng. Accessed July 19, 2022. https://www.womeng.org/work/africa-catalyst-capacity-building-for-women-in-engineering-bodies-in-sub-saharan-africa.
———. "Future Skills Programme." WomEng. Accessed July 19, 2022. https://www.womeng.org/work/future-skills-programme.
———. "GirlEng Technovation Camp." WomEng. Accessed July 19, 2022. https://www.womeng.org/work/girlengtechnovationcamp.
———. "Supporting Founders in Africa." WomEng. Accessed July 19, 2022. https://www.womeng.org/work/supporting-founders-in-africa.
———. "WomEng | Women in Engineering." WomEng. Accessed July 8, 2022. https://www.womeng.org/about-us.
———. "WomEng Southern Africa Fellowship." WomEng. Accessed July 19, 2022. https://www.womeng.org/work/southern-africa-fellowship.

Annexes

Annex 2.1: Interview questions

Below are the interview questions for the semi-structured interviews.

1. Introductory Questions

What is your name?

How long have you been working in the renewable energy sector?

What organisation do you work for?

2. Current Work

What is your job title?

And how long have you been in this role?

If you were doing something else in the company before what was that role?

What does your current job involve on a day-to-day basis?

3. Entry to the wind and/or solar sector

What did you study?

Did you experience any challenges being accepted to the course, or during your studies?

What attracted you to the sector?

How did you first enter the sector?

4. Career Support

What keeps you working in the sector?

What has helped your career the most?

In your experience what is being done to support building women and non-binary people's leadership and management in the sector?

5. Career Barriers

Please tell us about any barriers you have experienced during your career in this sector?

Why do you think you experienced these barriers?

What support would you have valued that you have not received?

6. Recommendations

What would you suggest can be done to attract more women and non-binary people into the sector?

What support would you recommend is put in place for women and non-binary people in the sector?

What existing initiatives in the sector are helpful and should be reinforced?

Annex 2.2: Focus group questions for WE Connect members and SAWEA and SAPVIA Gender Diversity Working Group members

Below are the questions for the focus group discussions with WE Connect members and with SAWEA and SAPVIA Gender Diversity Working Group members.

1. Introductory Questions

What is your name?

What organisation do you work for?

2. Current Work

What is your job title?

And how long have you been in this role?

What does your current job involve on a day-to-day basis?

3. Gender considerations in community development projects

Please tell us about some of the community development projects you have been supporting in the Solar and Wind sectors.

How have you gone about including gender in these initiatives?

4. Recommendations

What would you suggest can be done to gender diversity in the sector?

What existing initiatives in the sector are helpful and should be reinforced?

Annex 2.3: Focus group questions for human resources professionals

Below are the questions for the focus group discussions with human resources professionals.

1. Introductory Questions

What is your name?

How long you have worked in the renewable energy sector?

What is your job title?

2. Feeder Institutions and Degrees

Please share if there are any notable feeder institutions and degrees for job categories in your company.

3. Application Process

Please share your experience of the gender diversity of applications that you receive for different job categories.

Are there job categories where male applicants dominate?

4. Job Categories that Skew Towards Male Applicants

Why do you think these particular job categories have more male applicants?

5. Staying in the Sector

Please share any challenges that women and non-binary people specifically experience in the wind and/or solar sector that may make it less likely to retain them.

Please tell us about any existing initiatives or actions in your experience that have encouraged women and non-binary people's participation and career growth.

6. Benefits and Job Conditions

Are there any specific benefits and job conditions that are important to have in place in order to retain women and non-binary people in the sector?

7. Recommendations

What would you suggest can be done to attract, and then retain, more women and non-binary people into the sector?

8. Collecting data from companies

We need to access key data from the companies, the survey has been emailed with very few responses. Do you have any suggestions about how we can work with companies to get the survey completed?

9. In conclusion

Please share any final thoughts you may have about ways to improve representation of women and non-binary people in all roles within the wind and solar sectors.

Annex 2.4: Projects and Programmes by WomEng

Project/Programme	Description
♂ 1MillionGirlsinSTEM	This was first initiated in 2017, it is a 10-year global campaign that is aimed at reaching 1 million girls between the ages of 13 and 18 years through STEM education and awareness initiatives.[298] This initiative is in collaboration with the United Nations Educational, Scientific and Cultural Organization (UNESCO).[299]
♂ WomEng Southern African Fellowship	Is a programme tailored for top engineering and technology students who are in the final year of undergraduate studies or are full-time postgraduate students. The fellowship programme helps young graduates with developing leadership, innovation, and professional and employability skills that are required to ensure their success in the engineering and technology industry.[300] This programme runs annually as was first initiated in 2006 and has since partnered up with De Beers Group in 2019 and applications have been open to top students in South Africa, Namibia, and Botswana.[301]
♂ Future Skills Programme	This programme is online, self-paced and interactive course that upskilled and reskilled women in the engineering profession across Sub-Sharan Africa in preparation for the 4th Industrial Revolution.[302] The course runs for only one month (July 2021 – August 2021) with the intention of creating a sustainable support ecosystem for the engineering workforce to thrive through engineering education and emerging technologies.[303]
♂ Africa Catalyst: Capacity Building for Women in Engineering Bodies in Sub-Saharan Africa	This was initiated in 2018 in response to the lack of participation of women in engineering across the continent. The main aim of the initiative is to improve the capacity of engineering bodies to promote gender diversity, inclusion, and relevance within engineering in selected Sub-Saharan countries.[304] The main objectives of the project are to engage the entire engineering institution around diversity and inclusion, develop core leadership capabilities for women in the engineering bodies, build capabilities for women in the bodies, build local capacity and support for pipelining future women in engineering.[305]

[298] WomEng, "#1MillionGirlsinSTEM — WomEng."
[299] WomEng.
[300] WomEng, "WomEng Southern Africa Fellowship."
[301] WomEng.
[302] WomEng, "Future Skills Programme."
[303] WomEng.
[304] WomEng, "Africa Catalyst."
[305] WomEng.

Project/Programme	Description
⚥ **Supporting Founders in Africa**	Is an initiative by WomEng and WomHub that aims at working on how to make lasting, sustainable change and impact by understanding the needs and frustration of women founders.[306] WomEng understands that the true drivers ensuring an increase in the participation of women in the engineering sector lie within women having ownership of the industry.[307] The vision of this project is to create a sustainable support ecosystem for female entrepreneurs in the engineering and tech industries to thrive.[308]
⚥ **GirlEng Technovation Camp**	The camp aims at inspiring young girls aged 14 to 16 years to find interest in entering the STEM fields. These camps were first initiated by WomEng in 2012 and reached several girls across South Africa.[309] Some of the activities in the camps include the basics of coding, building, and testing robots and learning about Sustainable Development Goals (SDGs).[310] The beneficiary of this camp is mainly young girls from historically disadvantaged schools, with limited access to STEM-focused educational programmes including limited access to online resources.[311]

[306] WomEng, "Supporting Founders in Africa."
[307] WomEng.
[308] WomEng.
[309] WomEng, "GirlEng Technovation Camp."
[310] WomEng.
[311] WomEng.

Annex 3: Wind and solar energy-related courses in academic institutions in South Africa

Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa

Energy Partnership
Energiepartnerschaft
South Africa - Deutschland

mineral resources & energy
Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

SAWEA

SAPVIA
South African Photovoltaic Industry Association

Federal Ministry
for Economic Affairs
and Climate Action

Annex 3: Wind and solar energy-related courses in academic institutions in South Africa

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Acronyms

CESM	Classification of Educational Subject Matter
CRSES	Centre and Renewable and Sustainable Energy Studies
DHET	Department of Higher Education
HEMIS	Higher Education on Management Information System
PGCE	Post Graduate Certificate in Education
PMT	Project Management Team
SAPVIA	South African Photovoltaic Industry Association
SARETEC	South African Renewable Energy Technology Centre
SAWEA	South African Wind Energy Association
STEM	Science, Technology, Engineering, and Mathematics
TVET	Technical and Vocational Education and Training

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Executive Summary

The German-South African Energy Partnership in association with the Department of Mineral Resource and Energy is supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study on the utility-scale wind and solar energy sectors in South Africa.

A key research question in understanding the factors that drive gender diversity in the utility-scale wind and solar energy sectors is what role academic institutions play in promoting (or suppressing) gender diversity in the sector. The purpose of this report therefore is to provide a summary of gender representation in key academic feeder courses and qualifications in South Africa and to assess whether there is a need for interventions at the academic level to improve gender representation in the utility-scale wind and solar energy sectors in South Africa.

Methodology and limitations

The Higher Education on Management Information System (HEMIS) of the Department of Higher Education and Training (DHET) was used to collect enrolment and graduation data of all South African mainstream tertiary institutions. In addition to the DHET datasets attempts were made to source additional information from providers of short courses relevant to the utility-scale wind and solar energy sectors to determine gender representation in professional development courses. Interviews and focus groups were held with various stakeholders in the utility-scale wind and solar energy sectors in South Africa to try and determine which are the key qualifications and skills needed by the sector.

Tertiary Institution Assessment

Skills and qualification requirements

There were no clear preferences for specific qualifications requirements highlighted by the utility scale wind and solar energy sectors for the following reasons:

There are a wide variety of posts in the sector and the qualifications and skills vary depending on the type of job opportunity that is available.

There are very few specific qualifications available in wind and solar energy in South Africa.

Most job opportunities require generic qualifications (E.g., electrical engineering, rather than renewable energy engineering)

Experience in the sector is often seen as more important than qualifications.

National enrolment and graduation data assessment

A comparison of enrolment and graduation numbers by gender for Department of Higher Education and Training (DHET) Classification of Educational Subject Matter (CSEM) categories summed for the period 2010 to 2020 noted the following:

Women's enrolment and graduation was consistently higher for all CSEM categories across the country

Women dominate Graduation and enrolment numbers by gender for all institutions in the *Business, Economics and Management Studies* field, in the *Communication, Journalism and Related Studies*, *Life Sciences*, *Social Sciences*, and *Physical Sciences* fields.

However, graduation and enrolment in the *Computer and Information Sciences*, *Mathematics and Statistics* fields, and importantly, in the *Engineering* field, show a clear bias towards more men graduating than women.

This bias towards more men graduating in the STEM study areas is important for the utility-scale wind and solar energy sectors because it implies that there are fewer women entering the market with these qualifications.

Academic and short course providers offering specific wind and solar energy courses

Mainstream academic institutions offer almost no specific wind and solar related courses at the undergraduate level, however focused courses can be taken at the postgraduate level. A small portion of the focused postgraduate courses were focused on the business and management side of renewable energy projects. Some universities are also offering wind and solar energy focused research through faculty and departmental research groups and programmes. Many academic institutions also have continuous development programmes (CDP) and research centres that have focused wind and solar energy short courses on offer.

Outside of mainstream academic institutions qualifications, several short course providers and professional bodies offer a large range of focused wind and solar energy courses. However, there does not seem to be a consistent approach to categorising these courses into the DHET CSEM categories. The consequence for the utility-scale wind and solar energy sectors of this inconsistency in categorising wind and solar courses is that that it is not currently possible to assess the number of students graduating from "Renewable Energy" studies in South Africa.

Conclusion

The following conclusions relevant to the utility-scale wind and solar energy sectors in South Africa can be made from the above assessment:

There are no specific qualifications defined by the Department of Higher Education Classification of Educational Subject Matter (CSEM) system for renewable energy.

There are several stand-alone courses being developed by tertiary institutions in the wind and solar fields, but these are predominantly at a post-graduate level.

The utility-scale wind and solar energy sectors require a broad range of qualifications, that are not only limited to technical fields (e.g., renewable energy engineering).

Overall, more women are enrolling and graduating across all study areas in South Africa.

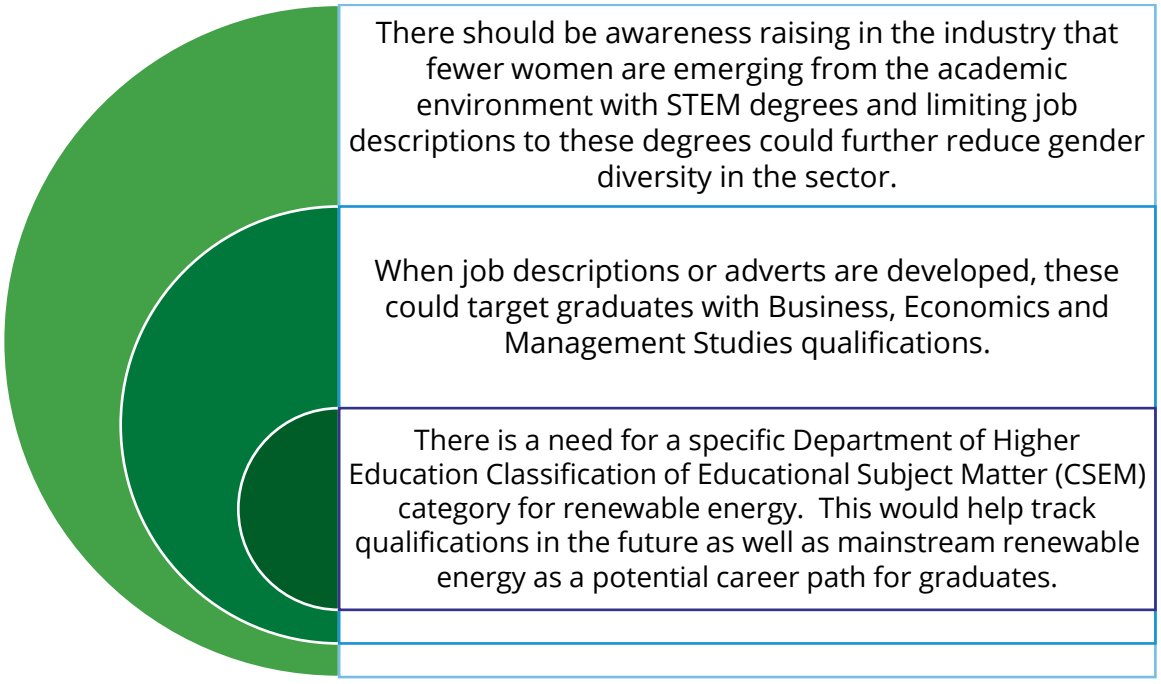
There has been an increasing trend over the past 10 years of more women enrolling and graduating across all study areas in South Africa.

There are, however, fewer women entering the market in the STEM fields, particularly, Maths, Engineering and Computer Science.

There are many more women entering the market with Business, Education and Health qualifications.

Next Steps

Potential interventions going forward for the sector could include:



Introduction

The German-South African Energy Partnership in association with the Department of Mineral Resources and Energy is supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study of the utility-scale wind and solar energy sectors in South Africa.

Figure 62: The objectives of the study

To complete this study, a number of different reports have been commissioned including:

Report	Purpose
Literature Review	A summary of the literature on the state of gender representation in the international utility-scale wind and solar energy sectors
Status Quo	A summary of the current state of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Academic Review (This Report)	A summary of gender representation in academic courses and qualifications in South Africa related to the utility-scale wind and solar energy sectors
Data Analysis and Projection	An analysis of the available data on gender diversity in the utility-scale wind and solar energy sectors in South Africa as well as related projections of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Recommendations to improve Gender Diversity	A summary of recommendations to improve gender diversity in the utility-scale wind and solar energy sectors in South Africa

A key research question in understanding the factors that drive gender diversity in the utility-scale wind and solar energy sectors is what role academic institutions play in promoting (or suppressing) gender diversity in the sector. The purpose of this report, therefore, is to provide a summary of gender representation in key

academic feeder courses and qualifications in South Africa and to assess whether there is a need for interventions at the academic level to improve gender representation in the utility-scale wind and solar energy sectors in South Africa. The report has several chapters as summarised below.

Context	An introduction to the purpose of the study
Methodology	The methodology for the review and the limitations of this methodology are described.
Assessment	A summary analysis of the data and the relevance to the wind and solar sector
Conclusion	Concluding remarks addressing the original research questions

Methodology and Limitations

The initial research requirements posed as part of this research activity were the following:

1. Assess the skills produced at higher education institutions that are relevant to the utility-scale wind and solar energy industries.

2. Assess the number of students entering and graduating from these higher education institutions, the gender split of these students, their levels of interest, and the courses they are participating in.

3. Assess the pipeline from school to employment, including the number of women participating in STEM-related university diplomas or degrees and other courses that are relevant to skill areas required for the renewable energy sector such as legal, finance, investment, etc.

The following section outlines the methodology used to conduct these assessments.

Assessment of existing courses and qualifications

The purpose of this assessment was to establish whether tertiary institutions in South Africa offer specific courses and qualifications relevant to the utility-scale wind and solar energy sectors. This assessment was done of tertiary institutions including Universities, Technikons, and Technical and Vocational Education and Training (TVET) colleges. The list of academic institutions is provided in Annex 3.1: List of Department of Higher Education Data Institutions. The assessment approach included accessing the official institutions' websites to establish relevant courses in the different facilities. All course levels on offer at academic institutions were assessed. The keywords: *energy, renewable energy, wind* and *solar* were also searched on the official institutions' websites to easily identify relevant courses and where necessary specific course outlines were examined to determine relevance to the sectors. Relevant courses identified were then captured into a database of wind- and solar-energy-related tertiary courses.

Data collection from mainstream higher education institutions

The Higher Education on Management Information System (HEMIS) of the Department of Higher Education and Training (DHET) was used to collect enrolment and graduation data of all South African mainstream tertiary institutions. The data include the number of students that enrolled and graduated in a particular year over the sample period from 2010 to 2020.

- Enrolment data of women and men students in higher education institutions can be accessed here: DHET enrolment data

- Graduate data of women and men students in higher education institutions can be accessed here: DHET graduate data

DHET Data by Institution

The data are provided by institutions including Universities, Technikons, and Technical and Vocational Education and Training (TVET) colleges. The list of academic institutions is provided in Annex 3.1: List of Department of Higher Education Data Institutions.

DHET Data by CSEM Categories

The data are grouped according to the South African Classification of Educational Subject Matter (CESM) categories. CSEM is a method of classification for all academic disciplines now offered at South African higher education institutions.[312] The data are provided in first-order and second-order categories. An example of these CSEM categories for the field of engineering is provided below and the full list of CSEM categories is provided in Annex 3.2: Department of Higher Education CSEM Categories.

1 First Order CSEM Category

08: Engineering

2 Second Order CSEM Category

080100: Aerospace, Aeronautical and Astronautical Engineering

080200: Agricultural/Biological Engineering and Bio-Engineering

080300: Architectural Engineering

080400: Biomedical/Medical Engineering

080500: Ceramic Sciences and Engineering

080600: Chemical Engineering

080700: Civil Engineering

080800: Computer Engineering

080900: Electrical, Electronics and Communications Engineering

081000: Engineering Mechanics

081100: Engineering Physics

081200: Engineering Science

081300: Environmental/Environmental Health Engineering

081400: Materials Engineering

081500: Mechanical and Mechatronic Engineering

081600: Metallurgical Engineering

081700: Mining and Mineral Engineering

081800: Naval Architecture and Marine Engineering

081900: Nuclear Engineering

082000: Ocean Engineering

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[312] DoE, "Classification of Educational Subject Matter."

082100: Petroleum Engineering

082200: Systems Engineering

082300: Textile Sciences and Engineering

082400: Materials Science

082500: Polymer/Plastics Engineering

082600: Construction Engineering

082700: Forest Engineering

082800: Industrial Engineering

082900: Manufacturing Engineering

083000: Operations Research

083100: Surveying Engineering

083200: Geological/Geophysical Engineering

089999: Engineering, Other

DHET Data by Qualification Types

The data is also grouped by qualification type. These types of qualifications range from an Undergraduate Diplomate or Certificate for 1 Year to a Doctorate. The full list of qualifications is provided in Annex 3.3: Short course providers offering wind and solar courses in South Africa.

Data collection from short course providers

Over and above the DHET datasets attempts were made to source additional information from providers of short courses relevant to the utility-scale wind and solar energy sectors to determine gender representation in professional development courses.

Data collection on skills and qualification requirements

Interviews and focus groups were held with various stakeholders in the utility-scale wind and solar energy sectors in South Africa to try and determine which are the key qualifications and skills needed by the sector. In particular, human resource personnel were asked what qualifications were mostly required when job adverts were posted and whether particular skill sets were relevant to the sector.

Data Processing

As can be seen from the description above, the student enrolment and graduation datasets provided by the DHET are very large. It was, therefore, necessary to summarise and filter this data to be able to assess gender representation relevant for the Utility-scale wind and solar energy sectors.

National data

The data was totalled for the entire country rather than analysed at an institutional level. Given that this study is national in focus and the fact that there is no data linking geographic job opportunities, it was agreed by the Project Management Team (PMT) that the academic analysis should remain at a national level.

Data grouped for first order CSEM Categories

The data was primarily assessed according to first-order CSEM categories. This is because there are no specific second-order CSEM categories that feed directly into the utility-scale wind and solar energy sectors. For example, the DHET does not have a CSEM category for Wind Farm operations.

Although many of the first-order course categories may not be considered relevant feeder courses for jobs in the renewable energy industry (e.g., Languages, Linguistics and Literature), findings from the Status Quo report and interviews and feedback from sector stakeholders have revealed that not all people working in the sector have science, technology, engineering, and mathematics (STEM) related backgrounds. Courses under the Professional and Administrative positions and Supporting Occupations job categories were therefore also included in the assessment.

Data grouped by level of qualification

The DHET data included seventeen different qualification types that students are enrolled in and graduating in. To analyse the data, the qualification types were grouped into five main categories including (1) courses less than three years, (2) three-year courses, (3) four-year courses, (4) postgraduate diplomas, and (5) postgraduate degrees (see Figure 63).

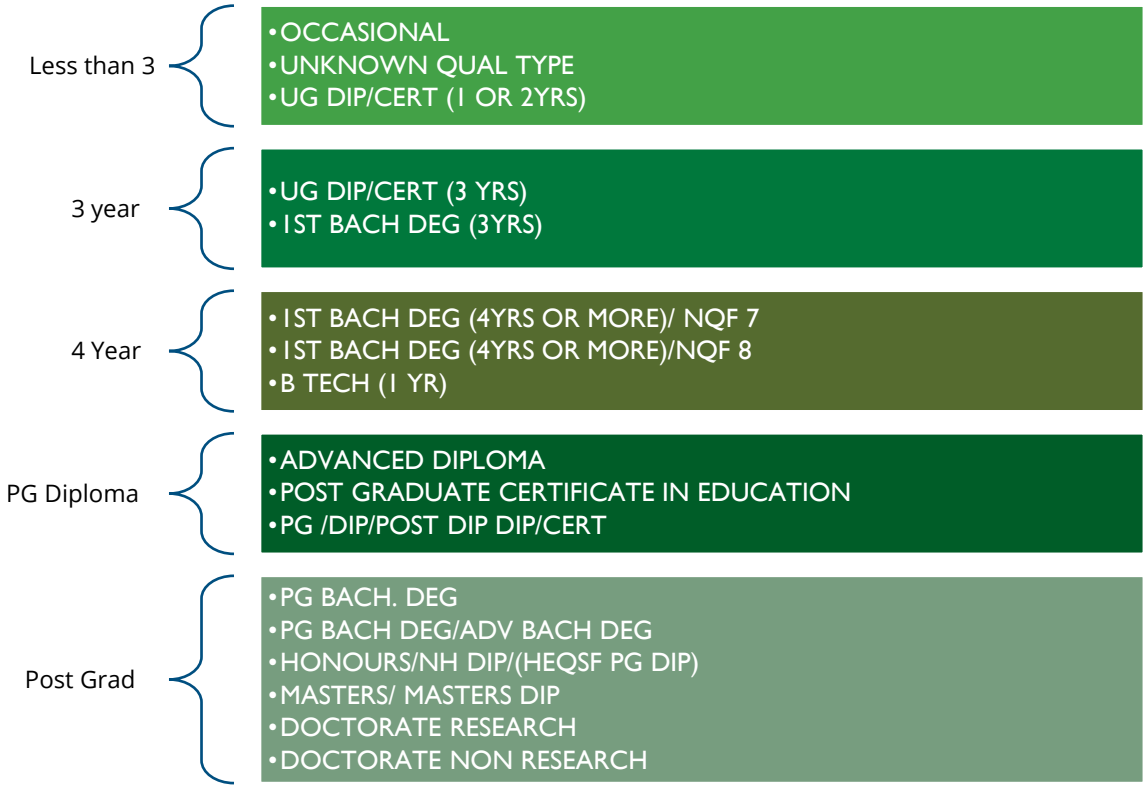

Figure 63: Qualification categorisation by groups.

For this research study, only three qualification group types were analysed, these include three-year courses, four-year courses, and postgraduate degrees. The data from the postgraduate diploma qualifications category were not included during analysis because this category mostly consists of students pursuing a Post Graduate Certificate in Education (PGCE) and this is not one of the relevant qualifications that feed into the renewable energy sector.

Limitations

The database was created from mainstream tertiary institutions and colleges, and this is not a representation of all tertiary institutions in South Africa. Short courses relevant to the utility-scale wind and solar sectors are not included in the DHET data and their enrolment and graduation data for men and women are not accessible to the public.

Tertiary Institution Assessment

As noted in the introduction to this report, the key research question for this is what role tertiary institutions play in promoting (or suppressing) gender diversity in the utility-scale wind and solar energy sectors in South Africa. To answer this question, it is necessary to assess whether women students emerging from academic institutions in South Africa have the types of qualifications and skills required by the sector. It is also important to understand what courses are on offer and whether these courses meet the requirements of the market. The following chapter unpacks this assessment in more detail.

Skills and qualification requirements

There were no clear preferences for specific qualifications requirements highlighted by Human Resources professionals in the utility wind and solar energy sectors during a focus group discussion. The following reasons were noted for this lack of preference:

1. There are a wide variety of posts in the sector including site managers, communications officers, finance, human resources, and researchers. The qualifications and skills vary depending on the type of job opportunity that is available.

2. There are very few specific qualifications available in wind and solar energy in South Africa. It is therefore not realistic to limit posts to have these types of qualifications requirements.

3. Most job opportunities require more generic qualifications. For example, a qualification requirement will more likely be electrical engineering, rather than renewable energy engineering.

4. Experience in the sector is often seen as more important than having the exact matching qualification.

Given this lack of preference in the sector for specific qualifications, it was resolved that an assessment of national enrolment and graduation data should focus on broad gender trends across all study areas. With regards to the Department of Higher Education (DHET) Classification of Educational Subject Matter (CSEM) categories, the focus would be on the following study areas:

- ⚥ 04: Business, Economics and Management Studies
- ⚥ 05: Communication, Journalism and Related Studies
- ⚥ 06: Computer and Information Sciences
- ⚥ 08: Engineering
- ⚥ 13: Life Sciences
- ⚥ 14: Physical Sciences
- ⚥ 15: Mathematics and Statistics
- ⚥ 20: Social Sciences

National enrolment and graduation data assessment

A comparison of enrolment and graduation numbers by gender for all the CSEM categories, across all mainstream academic institutions in South Africa and summed for the period 2010 to 2020 is shown in Figure 64. The graph indicates that women's enrolment and graduation were consistently higher for the entire period. Broadly speaking, this implies that there isn't a problem with the overall number of women enrolling and

graduating from tertiary institutions in South Africa.[313] In fact, the opposite is true. There are far more women graduating from tertiary institutions in South Africa than men.[314] Figure 65 shows how many more (in percentage) women are enrolling and graduating across all mainstream institutions in South Africa. Figure 65 also shows how the trend for this gender split has been increasing since 2010. In 2020, 74% more women graduated than men in mainstream institutions in South Africa. Figure 64 also shows a very high dropout rate. Where in 2020 more than 1 million students enrolled but there were only 230,000 graduates. This is not a direct comparison, because students who graduate in 2020 would have enrolled in different previous years. Nevertheless, it is an indication that only about 25% of students are managing to graduate.

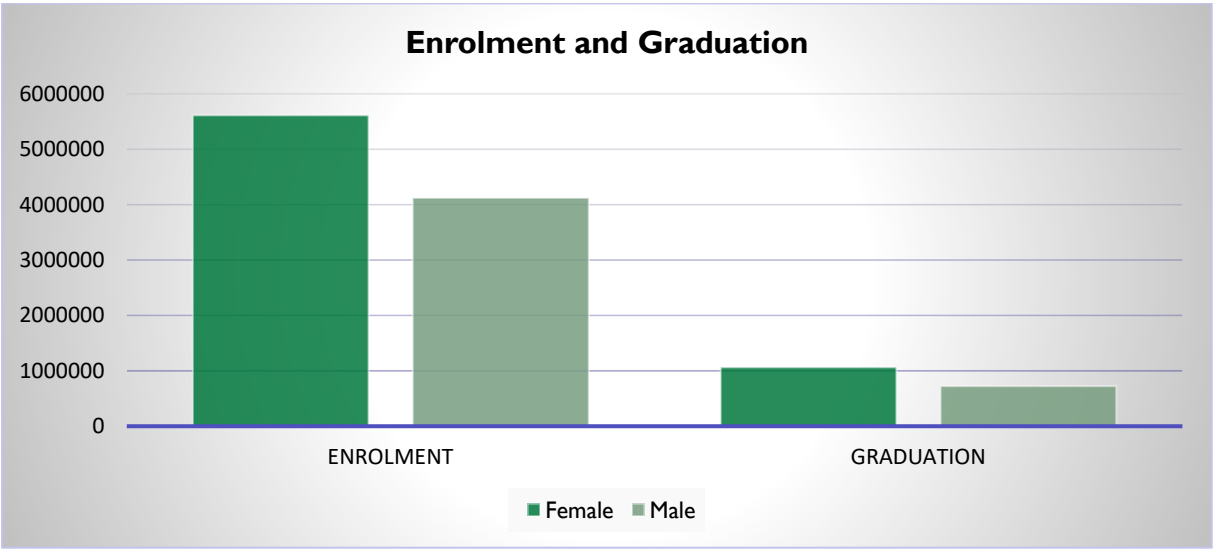

Figure 64: Comparison of enrolment and graduation data for female and male graduates for the sample period

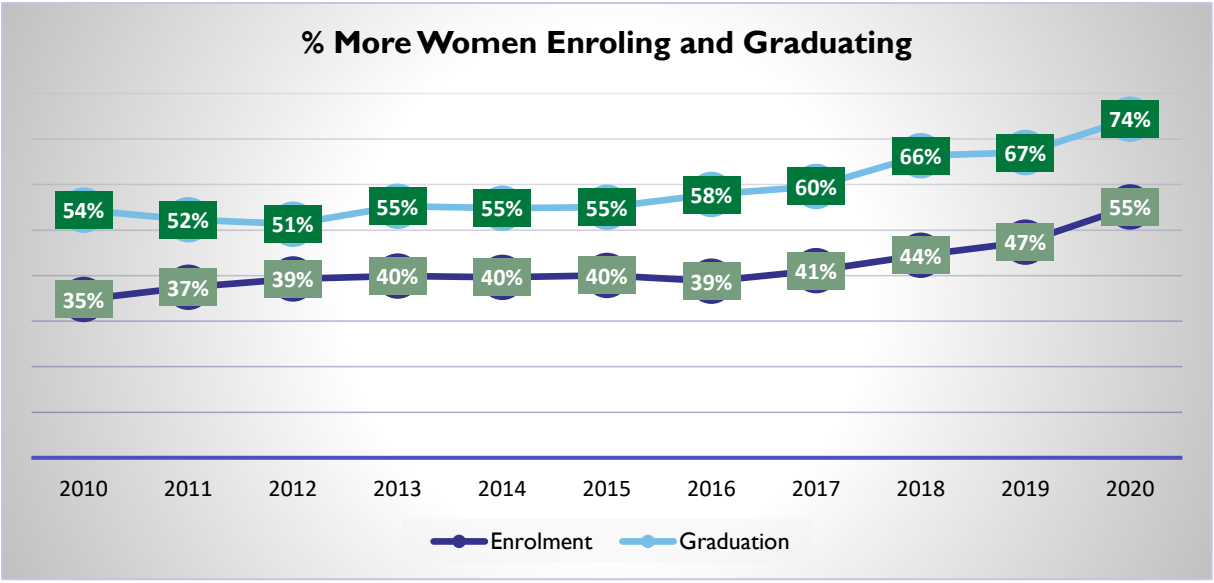

Figure 65: The percentage of women that are enrolling and graduating across all mainstream tertiary institutions in South Africa (from 2010 to 2020) over and above male enrolment and graduation levels

Disaggregating this high-level data into years and different qualification groups shows a similar picture. Figure 66 presents enrolment numbers per year for all mainstream institutions in South Africa. The graph shows that

[313] DHET, "Department of Higher Education and Training Annual Report 2019 - 2020."
[314] DHET, "Department of Higher Education and Training Annual Report 2016 - 2017."

women have been enrolling in higher numbers than men across all qualification groups over the ten-year sample period.

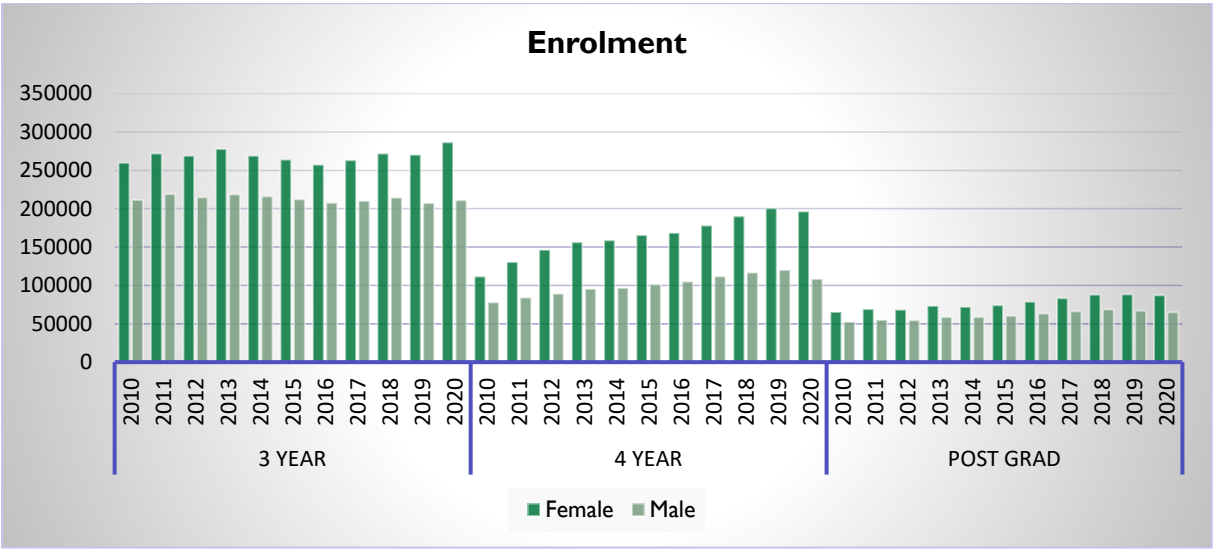

Figure 66: Enrolment by Year, Gender and Qualification Group

This bias towards women is also evident in the graduation data for the ten-year period. Figure 67 shows consistently higher numbers (and Figure 68, percentage) of women than men graduating from academic institutions in South Africa. Figure 68 also shows there is a trend from 2010 to 2020 of an increasing percentage of women graduating from tertiary institutions, for 3-year degrees, 4-year degrees and post-graduate studies.

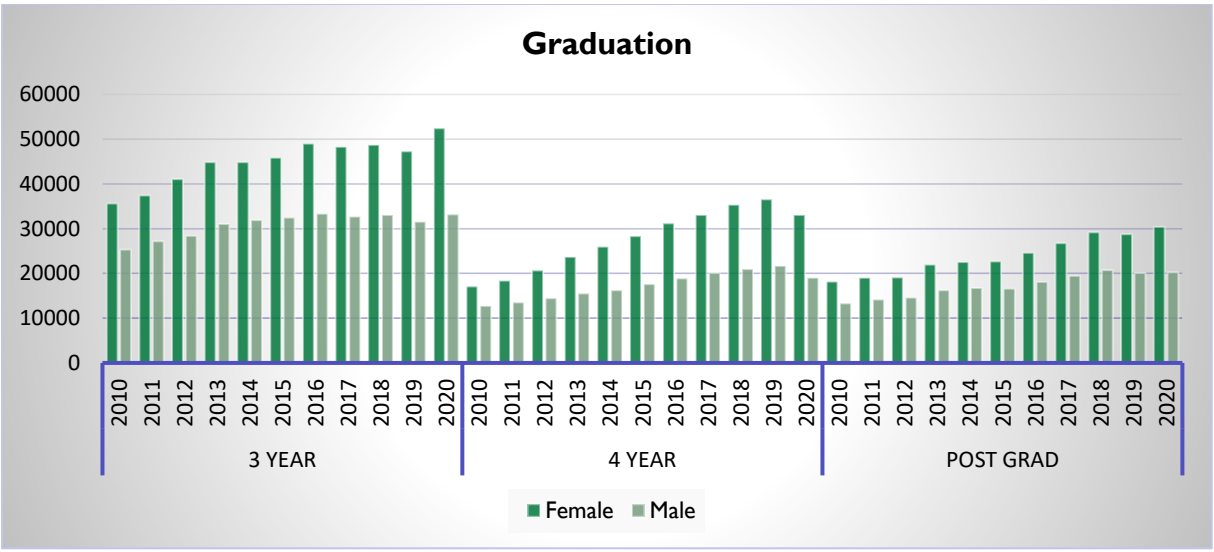

Figure 67: Graduation by Year, Gender and Qualification Group (3-year, 4-year and post graduate)

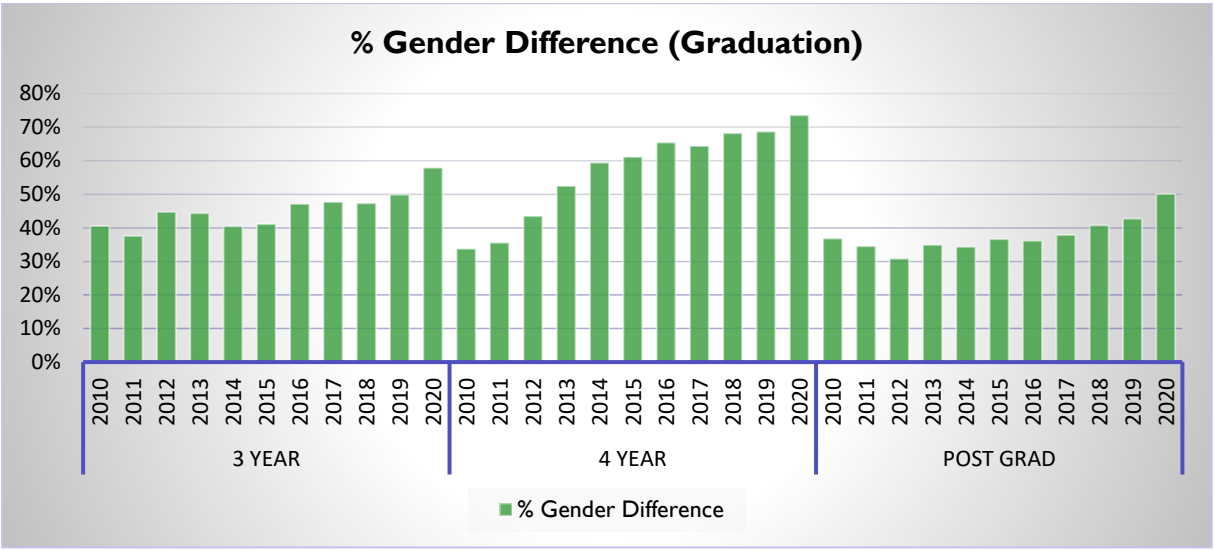

Figure 68: Percentage more women graduating than men

Specific Study (CSEM) Areas

However, an analysis of the DHET data at a finer scale shows a slightly different picture with regard to gender representation, depending on the study area that is being assessed. The following set of graphs looks at the main CSEM categories listed above and summarises graduation data over time for the main groups of qualifications. Figure 69 shows graduation numbers by gender for all institutions in *the Business, Economics and Management Studies* field. Women dominate this field in all groups of qualifications, and this seems to be increasing in the post-graduate space in more recent years. Similar trends can be seen in the *Communication, Journalism and Related Studies* (Figure 70), *Life Sciences* (Figure 71) and *Social Sciences* (Figure 72) fields. The bias toward women graduating is also present in the *Physical Sciences* field (Figure 73), but there is an interesting trend in the post graduate data, where men used to dominate graduating in the Physical sciences 10 years ago, but women do now.

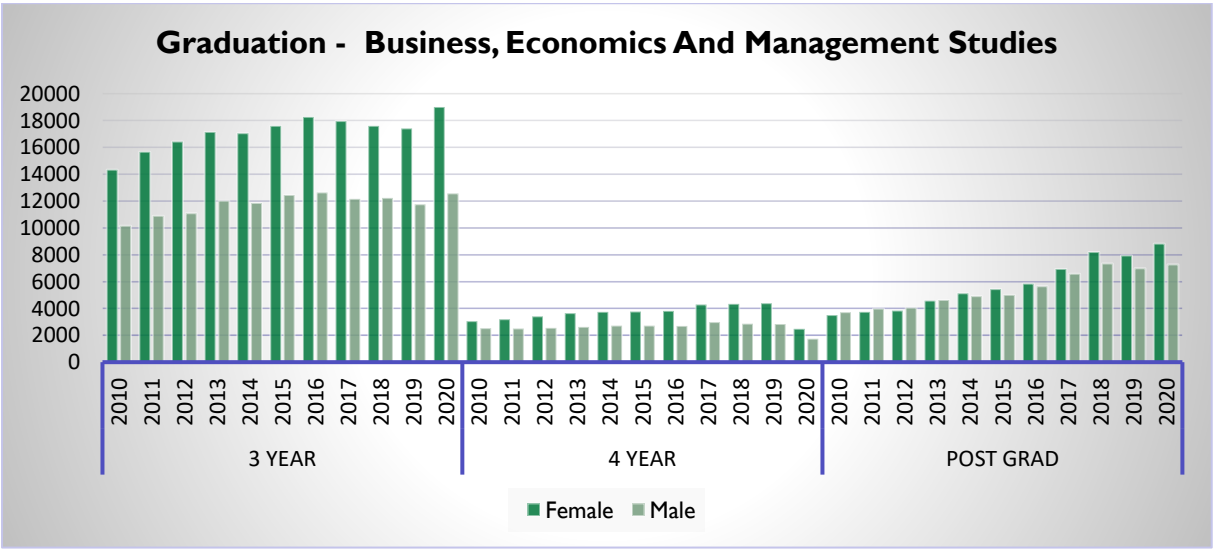

Figure 69: Graduation for all institutions in the Business, Economics and Management Studies Field

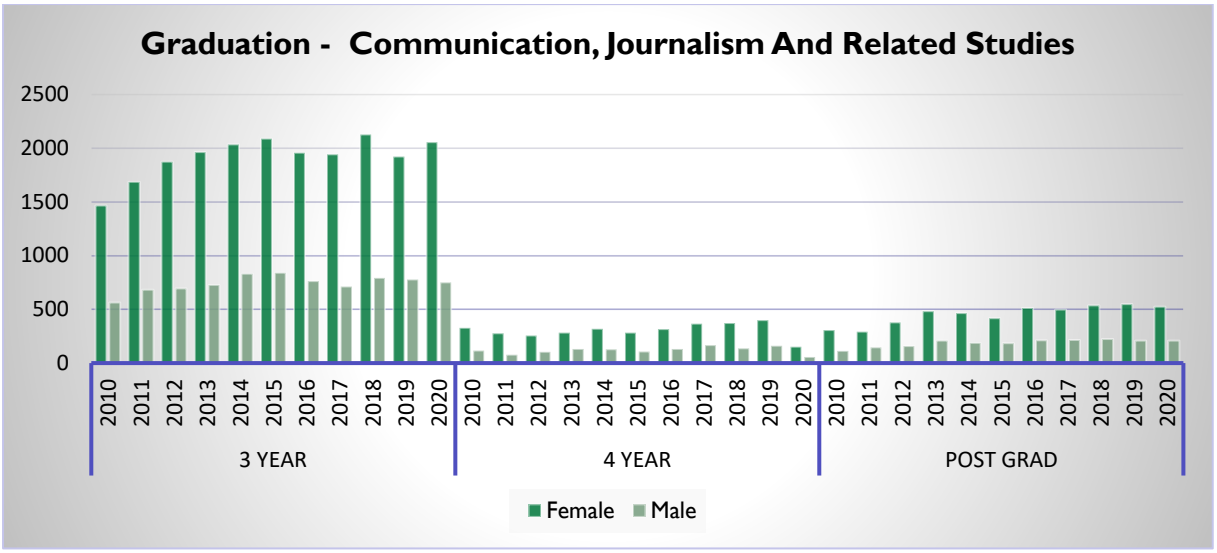

Figure 70: Graduation for all institutions in the Communication, Journalism and Related Studies field

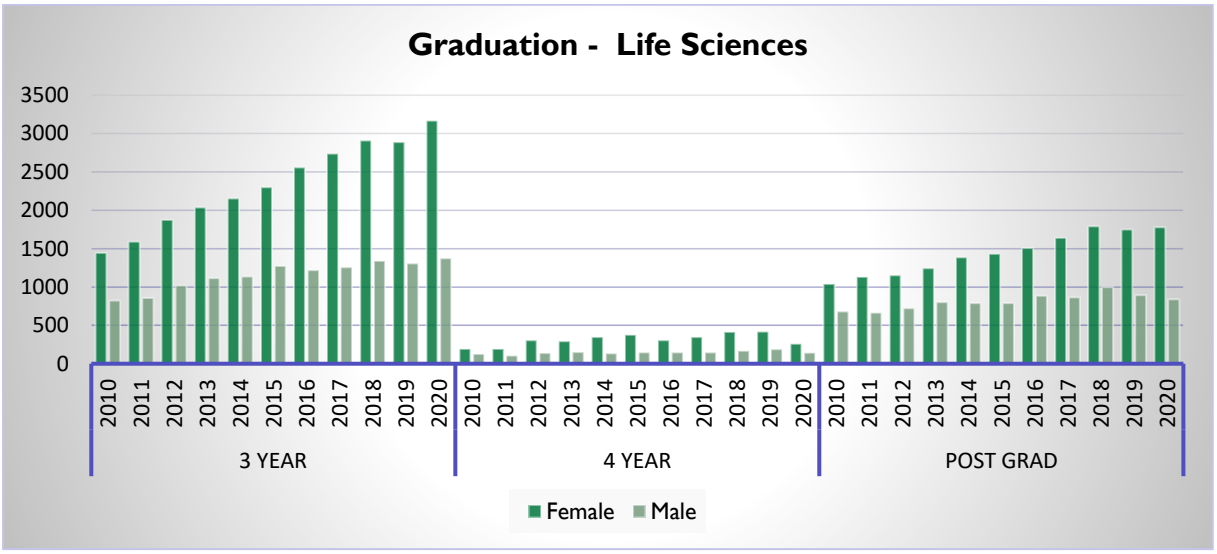

Figure 71: Graduation for all institutions in the Life Sciences field

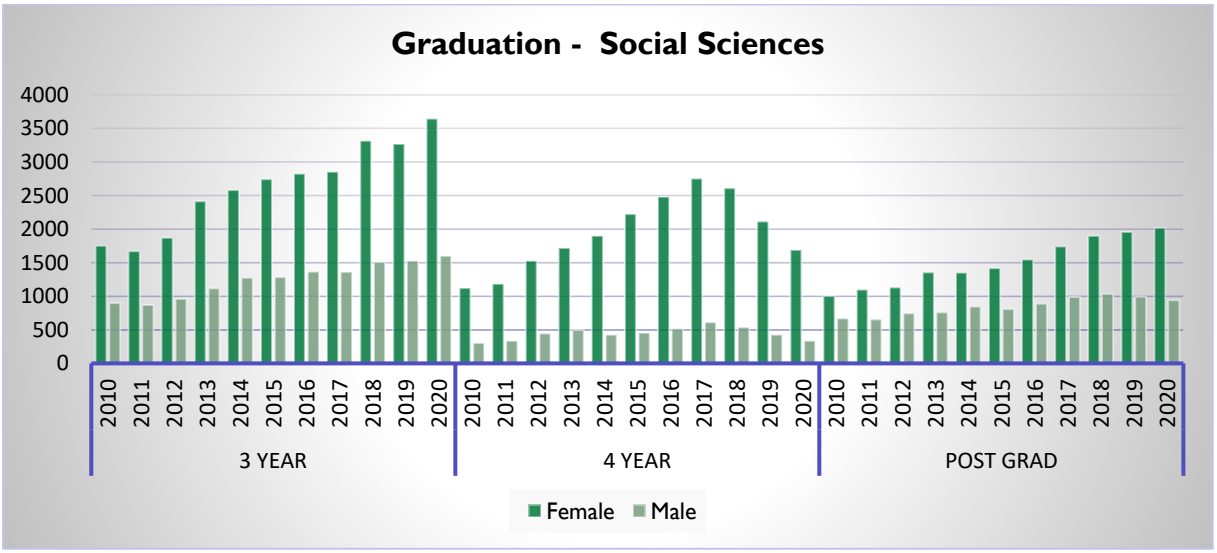

Figure 72: Graduation for all institutions in the Social Sciences field

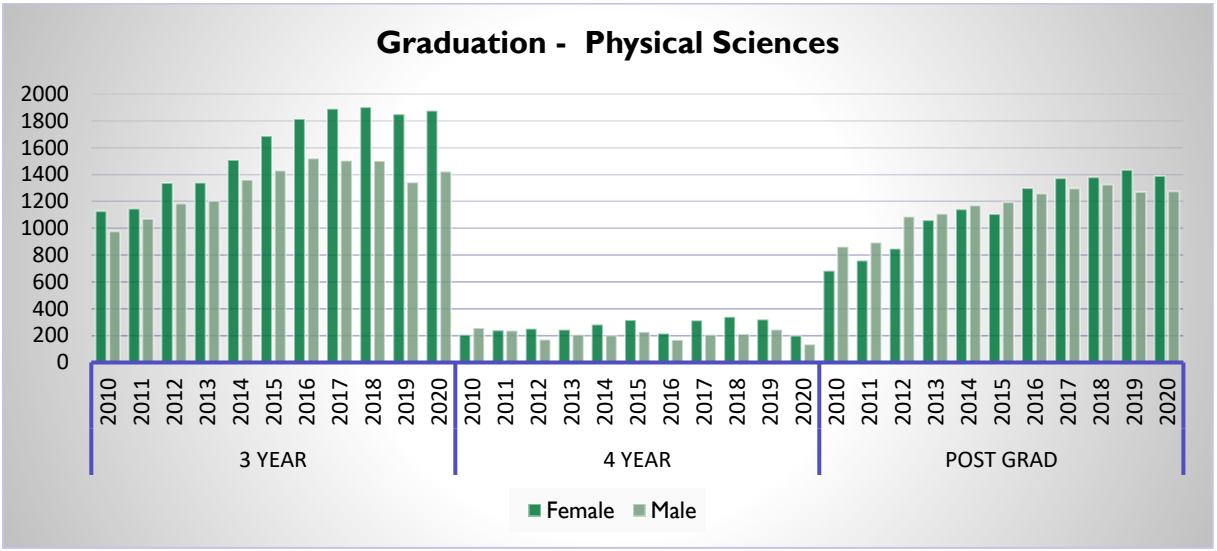

Figure 73: Graduation for all institutions in the Physical Sciences field

However, this picture starts to change when the STEM study areas are assessed. Graduation in the *Computer and Information Sciences* field (Figure 74), *Mathematics and Statistics* field (Figure 75), and importantly, in the *Engineering* field (Figure 76), show a clear bias towards more men graduating than women. This is also true of enrolment, where there are far fewer women enrolling in these types of courses.

This bias towards more men graduating in the STEM study areas is important for the utility-scale wind and solar energy sectors because it implies that fewer women are entering the market with these qualifications. When entry-level posts with STEM qualifications are advertised it is more likely that men will apply, simply because there are more men with these qualifications entering the market.

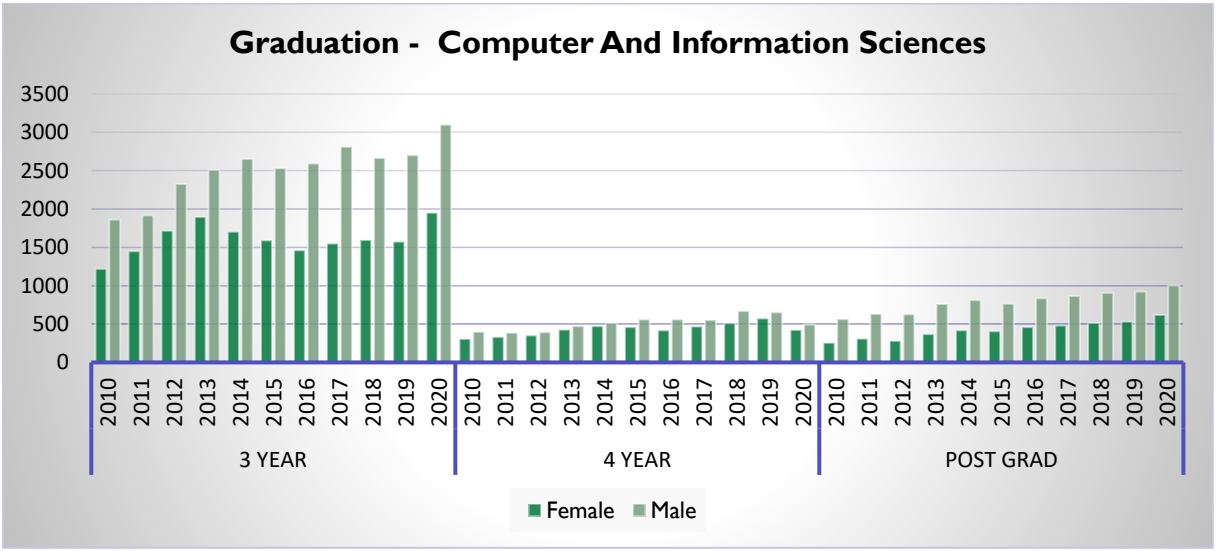

Figure 74: Graduation for all institutions in the Computer and Information Sciences field

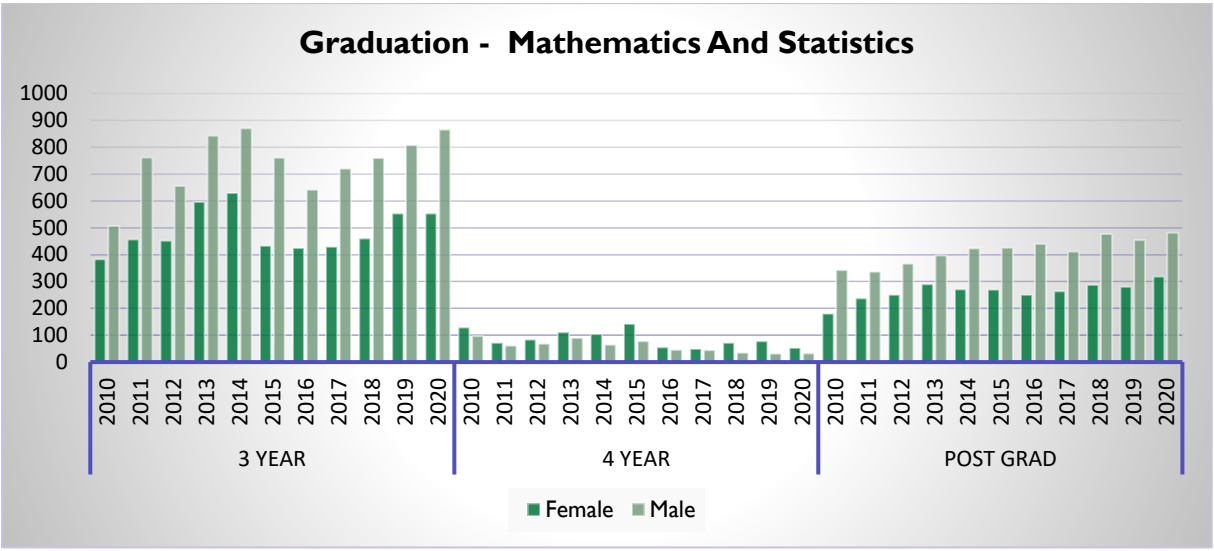

Figure 75: Graduation for all institutions in the Mathematics and Statistics field

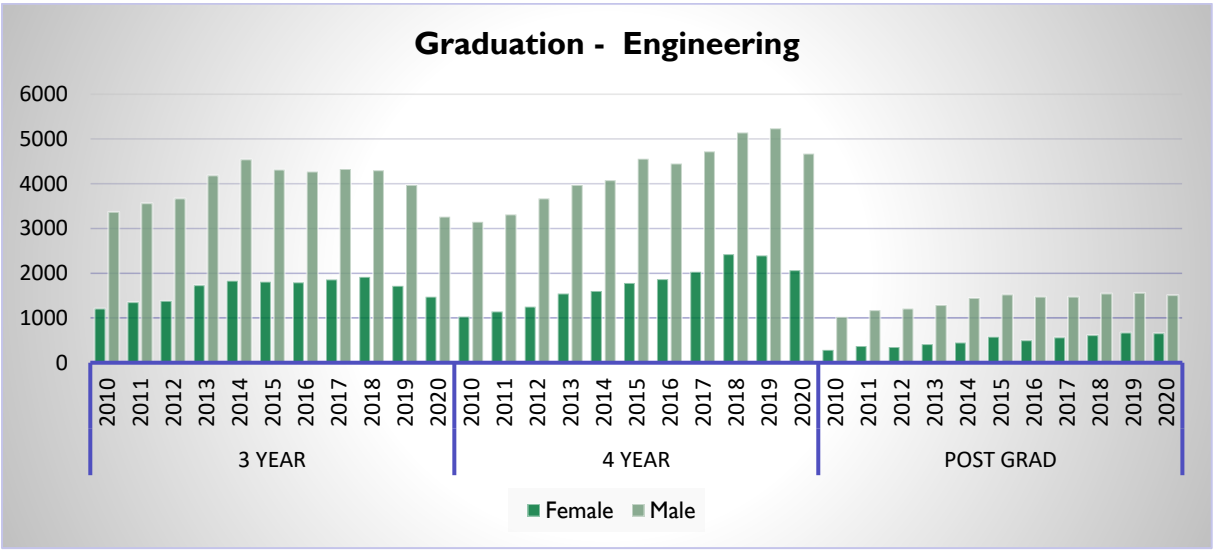

Figure 76: Graduation for all institutions in the Engineering field

Graduation across all study areas

If the data across all CSEM study areas are compared in terms of absolute numbers, there are also some potentially relevant observations for the utility-scale wind and solar energy sectors.

Figure 77 provides a summary of all graduates across all CSEM categories for 2020, split by gender. This graph shows that some CSEM categories, such as *Business, Economics and Management Studies*, have far more graduates entering the market than do other study areas. This is important for the utility-scale wind and solar energy sectors because this is the category of qualification where women entering the market outnumber men. When job requirements are specified for new entries, particular attention should be paid to the qualifications in this CSEM category (Business, Economics and Management Studies) if the intention is to target women applicants.

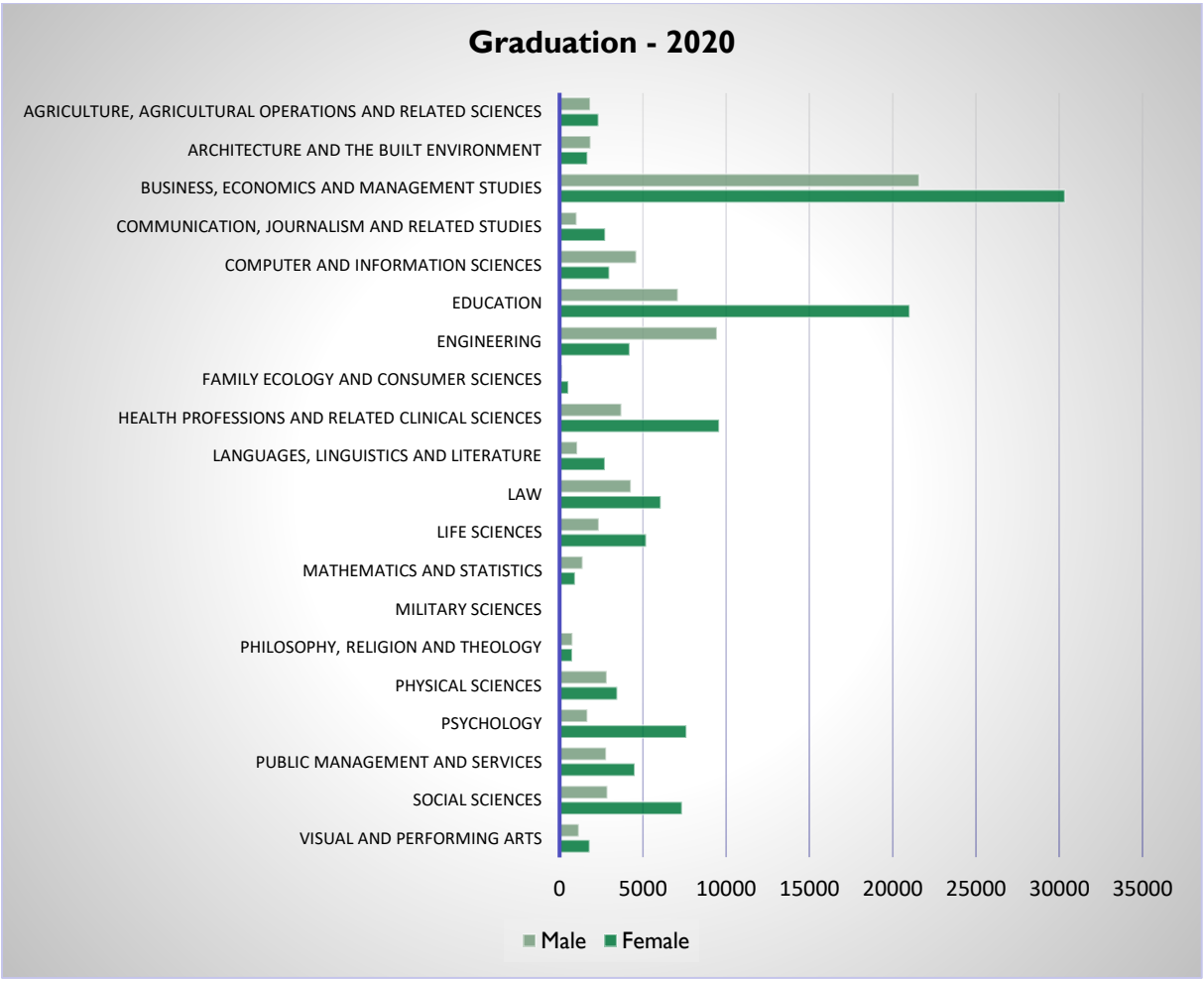

Figure 77: Graduation for all institutions in 2020 for 3-year, 4-year and post graduate qualifications

Further interrogation of the *Business, Economics and Management Studies* CSEM 1st-order category shows that there are higher numbers of women graduating across most of its second-order CSEM categories (Figure 78). Figure 78 shows the number of graduates for the different second-order CSEM study areas with the *Business, Economics and Management Studies* CSEM category. *Accounting and Related Services*, *Business Administration, Management and Operations* and *Human Resource Management and Services* all stand out as study areas where there are higher numbers of women graduating and entering the market.

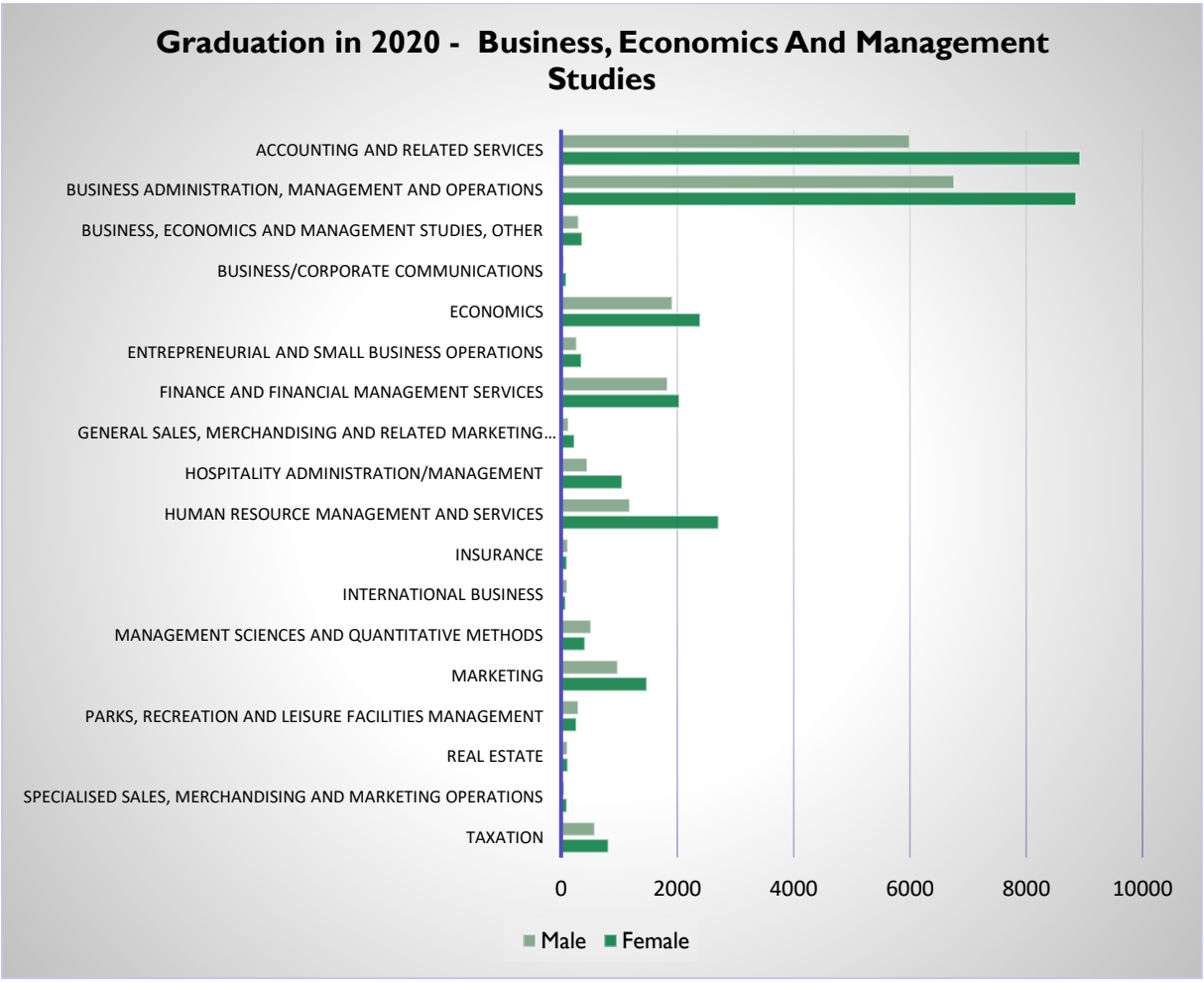

Figure 78: Graduation in 2020 per Second Order CSEM with the Business, Economics and Management Studies for 3-year, 4-year and post graduate qualifications

Academic and short course providers offering specific wind and solar energy courses

As noted above, the DHET does not have a specific CSEM qualification for wind or solar energy. Nevertheless, a number of tertiary institutions in South Africa offer courses and qualifications specific to the utility-scale wind and solar energy sectors.

Mainstream academic institutions offer almost no specific wind and solar-related courses at the undergraduate level; however, focused courses can be taken at the postgraduate level. An example of this is noted in the University of Johannesburg's (UJ) offering of Energy Studies. A small portion of the focused post-graduate courses were focused on the business and management side of renewable energy projects, for instance, the Renewable Energy Finance and Policy on offer at the Nelson Mandela University (NMU). Some universities are also offering wind and solar energy-focused research through faculty and departmental research groups and programmes. This can be seen in the Solar Energy Research Group with the Department of Physics at the University of Pretoria (UP), which is focused on solar PV design. Many academic institutions also have continuous development programmes (CDP) and research centres that have focused on wind and solar energy short courses on offer.

Outside of mainstream academic institutions, a number of short course providers and professional bodies offer a large range of focused wind and solar energy courses. The African Institute of Electrical Engineers (SAIEE) Training Academy and the Southern African Energy Efficiency Confederation (SAEEC) are examples of professional bodies offering further professional development linked to wind and solar energy. Courses on

offer through short course providers often require relevant recognition of prior learning such as qualifications and experience. Courses are also associated with CPD points that are relevant for professionals registered with statutory bodies, such as the Engineering Council of South Africa. Few courses are available for non-technical professionals or candidates with no background in the (renewable) energy sector. These courses are largely available online, however, hybrid and contact courses are also available while some contact courses are offered at specific locations. For example, the Wind Energy course from CRSES is only on offer at Stellenbosch University. Institutions offering renewable energy, wind and solar energy-related short courses are summarised in Annex 3.3: Short course providers offering wind and solar courses in South Africa.

Although not the focus of this study, there are also a number of programmes at institutions that offer support for entry into and progression in the utility-scale wind and solar energy sectors . These include programmes at both traditional academic institutions and short course providers. Programmes include those that promote the uptake of STEM-related courses at university and programmes for furthering professional development in established careers.

It was not possible to get data on the number of students enrolling or graduating (or the gender split of these students) from these short course providers. For the mainstream tertiary institutions offering solar and wind-related courses, there does not seem to be a consistent approach to categorising these courses into the DHET CSEM categories. For example, some institutions offer courses through the engineering faculty, while other institutions offer them through the environmental faculty. It should be noted that there are 2nd Order CSEM categories for "Petroleum Engineering" and for "Nuclear Engineering", but none for "Renewable Energy Engineering". The consequence for the utility-scale wind and solar energy sectors of this inconsistency in categorising wind and solar courses is that it is not currently possible to assess the number of students graduating from "Renewable Energy" studies in South Africa.

In terms of the institutions offering short solar and wind courses relevant to the utility-scale wind and solar energy sectors, none of these institutions appears to make their enrolment and graduation data open to the public. In response to information requests, institutions expressed reluctance to share information on their course participants citing confidentiality concerns. However, one institution did indicate that women attendees of their short course made up 31% of the total 124 attendees from January to August 2022.

Conclusion from tertiary institutional assessment

As outlined above, this study intended to:

1. Assess the skills produced at higher education institutions that are relevant to the utility-scale wind and solar energy industries.

2. Assess the number of students entering and graduating from these higher education institutions, the gender split of these students, their levels of interest, and the courses they are participating in.

3. Assess the pipeline from school to employment, including the number of women participating in STEM-related university diplomas or degrees and other courses that are relevant to skill areas required for the renewable energy sector such as legal, finance, investment, etc.

The following section outlines what the data tells us from each of the assessment areas.

Assess the skills produced at higher education institutions that are relevant to the utility-scale wind and solar energy industries.

As highlighted above, there is a wide range of skills and qualifications needed by the sector. These include technical qualifications such as engineering and modelling as well as support functions such as finance, human resources and communications. Given that many graduates are entering the market every year in South Africa, there appears to be an adequate supply of qualified people who could potentially be absorbed by the utility-scale wind and solar energy industries.

Assess the number of students entering and graduating from these higher education institutions, the gender split of these students, their levels of interest, and the courses they are participating in.

In 2020, more than 1 million students enrolled in qualifications in mainstream tertiary institutions across all fields of study. In the same year, there were slightly more than 237,000 students who graduated (Table 18). There is a marked gender split in this data, with 55% more women enrolling and 74% more women graduating across all fields. This gender different is evident over the entire 10-year period that was assessed (Figure 68).

Table 18: Enrolment and Graduation data for all mainstream tertiary institutions in 2020

Group	Female	Male	Total	% Gender Difference
Enrolment	665,629	429,088	1,094,718	55%
Graduation	151,170	86,685	237,856	74%

Figure 77 shows graduation numbers in 2020 across all mainstream tertiary institutions. The first-order CSEM category with the highest number of students who graduated in 2020 (51,923) is *Business, Economics and Management Studies*. Within this CSEM category, there are significantly more women graduating than men. This is true for the entire 10-year period that was assessed. Within the *Business, Economics and Management Studies* CSEM category the following second-order CSEM category qualification areas are very popular:

1. Accounting And Related Services,
2. Business Administration, Management and Operations and

3. Human Resource Management and Services

Assess the pipeline from school to employment, including the number of women participating in STEM-related university diplomas or degrees and other courses that are relevant to skill areas required for the renewable energy sector

In general, more women are enrolling and graduating across all study areas in South Africa. However, fewer women are entering the market in the STEM fields, particularly, Maths, Engineering and Computer Science. Figure 79 clearly shows that in almost all fields in 2020 there were far more women graduating except in the following fields, where there were more men.

1. Philosophy, Religion and Theology (2% more men)
2. Architecture and the Built Environment (10% more men)
3. Mathematics and Statistics (33% more men)
4. Computer and Information Sciences (35% more men)
5. Military Sciences (43% more men)
6. Engineering (56% more men)

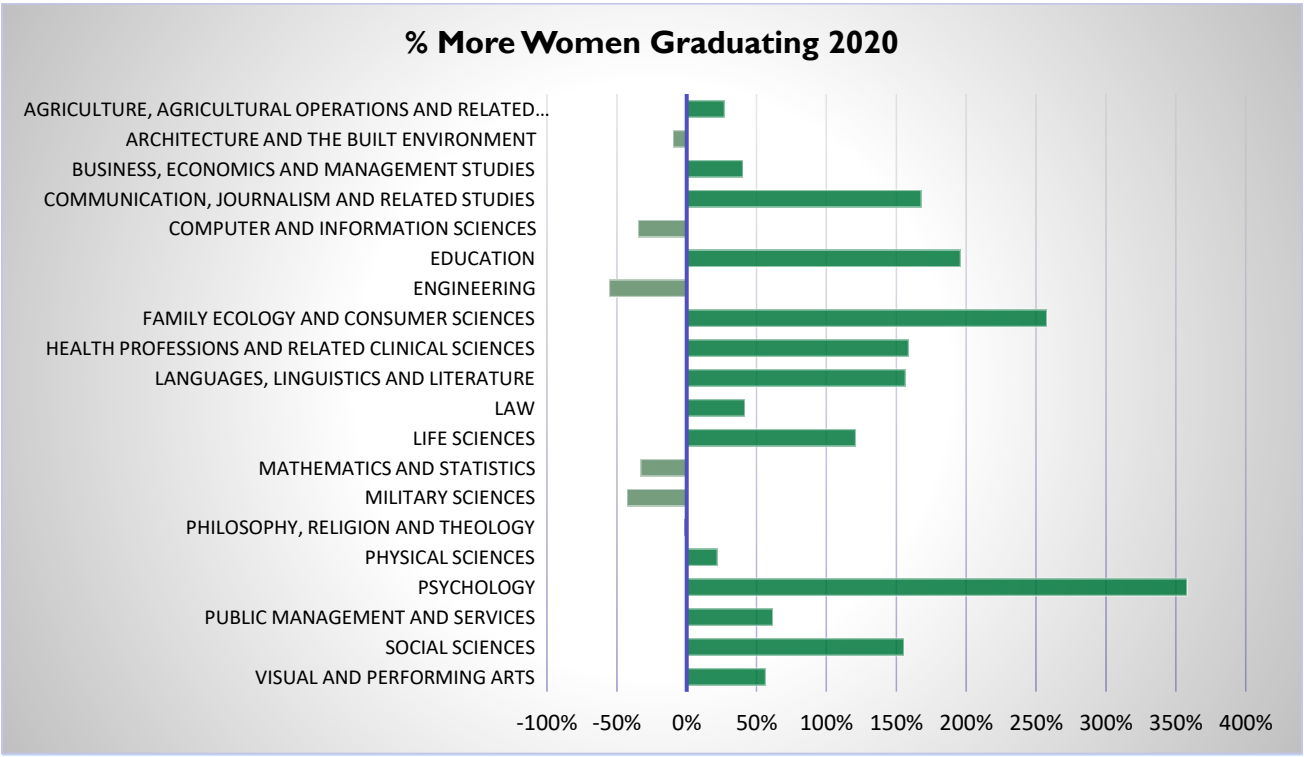

Figure 79: Percentage more women graduating than men in 2020

However, the sector does not only need STEM-related qualifications. It is therefore encouraging to see that there are many more women entering the market with non-technical qualifications, in particular with Business, Education and Health qualifications. Of these, business qualifications are more relevant to the utility-scale wind and solar energy sectors. When organisations are attempting to employ women who are entering the utility-scale wind and solar energy sectors, they could focus on graduates with Business, Economics and Management Studies qualifications.

References

DHET. "Department of Higher Education and Training Annual Report 2016 - 2017." Vote 15. Pretoria: Department of Higher Education and Training, 2017. http://www.dhet.gov.za/Commissions%20Reports/DHET%20Annual%20Report%202016%20-%202017.pdf.

———. "Department of Higher Education and Training Annual Report 2019 - 2020." Annual Report. Pretoria: Department of Higher Education and Training, 2020. http://www.dhet.gov.za/Commissions%20Reports/DHET%20Annual%20Report%2019-20.pdf.

DoE. "Classification of Educational Subject Matter." Pretoria, South Africa: Department of Education, August 2008. https://www.dhet.gov.za/Management%20and%20Information%20Systems/CESM%20August%202008.pdf.

Annexes

Annex 3.1: List of Department of Higher Education Data Institutions

1. Cape Peninsula University of Technology
2. Central University of Technology, Free State
3. Durban University of Technology
4. Mangosuthu University of Technology
5. Nelson Mandela University
6. North West University
7. Rhodes University
8. Sefako Makgatho Health Science University
9. Sol Plaatje University, Northern Cape
10. Tshwane University of Technology
11. University of Cape Town
12. University of Fort Hare
13. University of Free State
14. University of Johannesburg
15. University of Kwazulu-Natal
16. University of Limpopo
17. University of Mpumalanga
18. University of Pretoria
19. University of South Africa
20. University of Stellenbosch
21. University of Venda
22. University of Western Cape
23. University of Witwatersrand
24. University of Zululand
25. Vaal University of Technology
26. Walter Sisulu University

Annex 3.2: Department of Higher Education CSEM Categories

First and Second Order CESM Categories
01: Agriculture, Agricultural Operations and Related Sciences
010100: Agricultural Business and Management
010200: Agricultural Mechanisation
010300: Agricultural Production Operations
010400: Applied Horticulture and Horticultural Business Services
010500: International Agriculture
010600: Animal Sciences
010700: Food Science and Technology
010800: Plant Sciences
010900: Soil Sciences
011000: Forestry and Wood Sciences
019999: Agriculture, Agricultural Operations and Related Sciences, Other
02: Architecture and The Built Environment
020100: Architecture, General
020200: City/Urban, Community and Regional Planning
020300: Building/Construction Site Management
020400: Environmental Design/Architecture
020500: Interior Architecture and Design
020600: Landscape Architecture
020700: Architectural History and Criticism
020800: Architectural and Built Environment Technology
020900: Quantity Surveying
029999: Architecture and The Built Environment, Other
03: Visual and Performing Arts
030100: Dance

First and Second Order CESM Categories
030200: Design and Applied Arts
030300: Drama/Theatre Arts
030400: Film/Video and Photographic Arts
030500: Fine and Studio Art
030600: Music
039999: Visual and Performing Arts, Other
04: Business, Economics and Management Studies
040100: Business Administration, Management and Operations
040200: Accounting and Related Services
040300: Business/Corporate Communications
040400: Economics
040500: Entrepreneurial and Small Business Operations
040600: Finance and Financial Management Services
040700: Hospitality Administration/Management
040800: Human Resource Management and Services
040900: International Business
041000: Management Sciences and Quantitative Methods
041100: Marketing
041200: Real Estate
041300: Taxation
041400: Insurance
041500: General Sales, Merchandising and Related Marketing Operations
041600: Specialised Sales, Merchandising and Marketing Operations
041700: Parks, Recreation and Leisure Facilities Management
049999: Business, Economics and Management Studies, Other
05: Communication, Journalism and Related Studies

First and Second Order CESM Categories
050100: Communication and Media Studies
050200: Journalism
050300: Radio, Television and Digital Communication
050400: Public Relations, Advertising and Applied Communication
050500: Publishing
059999: Communication, Journalism and Related Studies, Other
06: Computer and Information Sciences
060100: Computer and Information Sciences
060200: Computer Programming
060300: Data Processing and Information Science
060400: Computer Business Systems Analysis
060500: Data Entry/Microcomputer Applications
060600: Computer Science
060700: Computer Software and Media Applications
060800: Computer Systems Networking and Telecommunications
060900: Computer/Information Technology Administration and Management
061000: Management Information Systems and Services
069999: Computer and Information Sciences, Other
07: Education
070100: Foundations Of Education
070200: Teaching, Leading and Researching in Early Childhood Education and Development Contexts
070300: Teaching; Leading and Researching in Schooling Contexts (Grade R and Foundation Phase)
070400: Teaching; Leading and Researching in Schooling Contexts (Inter-Mediate Phase)
070500: Teaching; Leading and Researching in Schooling Contexts (Senior Phase)
070600: Teaching; Leading and Researching in Schooling Contexts (Further Education and Training (FET) Phase)
070700: Teaching, Leading and Researching in Community and Adult Education and Training Contexts

First and Second Order CESM Categories
070800: Teaching; Leading and Researching in Technical and Vocational Education and Training (TVET) Contexts
070900: Teaching, Leading and Researching in Higher Education
071000: Teaching and Learning Support
071100: Educational Management and Leadership
071200: Educational Assessment, Evaluation and Research
071300: Special Needs Education
071400: Other Fields of Study in Education
079999: Education, Other
08: Engineering
080100: Aerospace, Aeronautical and Astronautical Engineering
080200: Agricultural/Biological Engineering and Bio-Engineering
080300: Architectural Engineering
080400: Biomedical/Medical Engineering
080500: Ceramic Sciences and Engineering
080600: Chemical Engineering
080700: Civil Engineering
080800: Computer Engineering
080900: Electrical, Electronics and Communications Engineering
081000: Engineering Mechanics
081100: Engineering Physics
081200: Engineering Science
081300: Environmental/Environmental Health Engineering
081400: Materials Engineering
081500: Mechanical and Mechatronic Engineering
081600: Metallurgical Engineering
081700: Mining and Mineral Engineering

First and Second Order CESM Categories
081800: Naval Architecture and Marine Engineering
081900: Nuclear Engineering
082000: Ocean Engineering
082100: Petroleum Engineering
082200: Systems Engineering
082300: Textile Sciences and Engineering
082400: Materials Science
082500: Polymer/Plastics Engineering
082600: Construction Engineering
082700: Forest Engineering
082800: Industrial Engineering
082900: Manufacturing Engineering
083000: Operations Research
083100: Surveying Engineering
083200: Geological/Geophysical Engineering
089999: Engineering, Other
09: Health Professions and Related Clinical Sciences
090100: Chiropractic
090200: Communications Disorders Sciences and Services
090300: Dentistry, Advanced Dentistry and Oral Sciences
090400: Dental Support Services and Allied Professions
090500: Health and Medical Administrative Services
090600: Medicine
090700: Medical Clinical Sciences
090800: Nursing
090900: Optometry

First and Second Order CESM Categories
091000: Osteopathic Medicine/Osteopathy
091100: Pharmacy, Pharmaceutical Sciences and Administration
091200: Podiatric Medicine/Podiatry
091300: Public Health
091400: Rehabilitation and Therapeutic Professions
091500: Veterinary Medicine
091600: Veterinary Biomedical and Clinical Sciences
091700: Medical Illustration and Informatics
091800: Dietetics and Clinical Nutrition Services
091900: Bioethics/Medical Ethics
092000: Alternative and Complementary Medicine and Medical Systems
092100: Somatic Bodywork and Related Therapeutic Services
092200: Movement and Mind-Body Therapies and Education
092300: Energy and Biologically Based Therapies
092400: Medical Radiologic Technology/Science (Radiography)
092500: Clinical Technology
092600: Medical Laboratory Sciences
099999: Health Professions and Related Clinical Sciences, Other
10: Family Ecology and Consumer Sciences
100100: Family and Consumer Sciences
100200: Family and Consumer Economics and Related Studies
100300: Foods, Nutrition and Related Services
100400: Housing and Human Environments
100500: Human Development, Family Studies and Related Services
100600: Apparel and Textiles
109999: Family Ecology and Consumer Sciences, Other

First and Second Order CESM Categories
11: Languages, Linguistics and Literature
110100: Linguistic, Comparative and Related Language Studies and Practices
110200: English Language and Literature
110300: Afrikaans Language and Literature
110400: isiNdebele Language and Literature
110500: Sepedi Language and Literature
110600: Sesotho Language and Literature
110700: Siswati Language and Literature
110800: Xitsonga Language and Literature
110900: Setswana Language and Literature
111000: Tshivenda Language and Literature
111100: isiXhosa Language and Literature
111200: isiZulu Language and Literature
111300: Other African Languages and Literature
111400: Dutch Language and Literature
111500: European Languages and Literature (Excluding Dutch)
111600: Asian Languages and Literature
111700: Middle/Near Eastern and Semitic Languages and Literature
111800: Classics and Classical Languages and Literature
111900: South African Sign Language (SASL)
112000: Comparative African Languages and Literatures
119999: Languages, Linguistics and Literature, Other
12: Law
120100: International Aspects of Law
120200: Perspectives on Law
120300: Mercantile Law

First and Second Order CESM Categories
120400: Private Law
120500: Public Law
120600: Formal Law
120700: Legal Profession
129999: Law, Other
13: Life Sciences
130100: Biology, General
130200: Biochemistry, Biophysics and Molecular Biochemistry
130300: Botany/Plant Biology
130400: Cell/Cellular Biology and Anatomical Sciences
130500: Microbiological Sciences and Immunology
130600: Zoology/Animal Biology
130700: Genetics
130800: Physiology, Pathology and Related Sciences
130900: Pharmacology and Toxicology
131000: Biomathematics and Bioinformatics
131100: Biotechnology
131200: Ecology, Evolution, Systematics and Population Biology
139999: Life Sciences, Other
14: Physical Sciences
140100: Physical Sciences, General
140200: Astronomy and Astrophysics
140300: Atmospheric Sciences and Meteorology
140400: Chemistry
140500: Geography and Cartography
140600: Geology and Earth Sciences/Geosciences

First and Second Order CESM Categories
140700: Physics
149999: Physical Sciences, Other
15: Mathematics and Statistics
150100: Mathematics
150200: Applied Mathematics
150300: Statistics
159999: Mathematics and Statistics, Other
16: Military Sciences
160100: Defence Organisation and Resource Management
160200: Military Human Resource Management and Development
160300: Military Technology and Applied Physical Science
160400: Military Security Studies
160500: Military Professional Development
169999: Military Sciences, Other
17: Philosophy, Religion and Theology
170100: Philosophy
170200: Religion
170300: Theology
179999: Philosophy, Religion and Theology, Other
18: Psychology
180100: Psychology, General
180200: Clinical Psychology
180300: Cognitive Psychology and Psycholinguistics
180400: Community Psychology
180500: Comparative Psychology
180600: Counselling Psychology

First and Second Order CESM Categories
180700: Developmental and Child Psychology
180800: Educational Psychology
180900: Environmental Psychology
181000: Research Methodology for Psychology
181100: Forensic Psychology
181200: Geropsychology
181300: Health/Medical Psychology
181400: Industrial and Organisational Psychology
181500: Personality Psychology
181600: Physiological Psychology/Psychobiology
181700: Psychometrics and Applied Psychological Assessment
181800: Social Psychology
189999: Psychology, Other
19: Public Management and Services
190100: Human Services
190200: Community Organisation and Advocacy
190300: Public Administration
190400: Public Policy Analysis
190500: Criminal Justice and Corrections
199999: Public Management and Services, Other
20: Social Sciences
200100: Anthropology
200200: Archaeology
200300: History
200400: Library Science/Librarianship
200500: Museology/Museum Studies

First and Second Order CESM Categories
200600: Political Science and Government
200700: Sociology
200800: Social Work
200900: Development Studies
209999: Social Sciences, Other
999999: Unknown

Annex 3.3: Short course providers offering wind and solar courses in South Africa.

Institutions offering renewable energy-, wind- and solar-related course are shown below:

	Course name	Institution name		Location	Renewable Energy relevance	Key skills
1	South African Photovoltaic Industry Association (SAPVIA) Green Card Assessment	South African Renewable Energy Technology Centre (SARETEC)	Cape Peninsula University of Technology (CPUT)	Cape Town, Bellville	Solar	Solar PV installation
2	Solar PV Installer Course	SARETEC	CPUT	Cape Town, Bellville	Solar	Solar PV installation
3	Wind Turbine Service Technician Qualification	SARETEC	CPUT	Cape Town, Bellville	Wind	Servicing and maintenance
4	Global Wind Organisation's (GWO) Basic Safety Training	SARETEC	CPUT	Cape Town, Bellville	Wind	Health and safety
5	GWO Basic Technical Training	SARETEC	CPUT	Cape Town, Bellville	Wind	Servicing and maintenance
6	Basics of Solar PV Systems	SARETEC	CPUT	Online	Solar	General Planning of PV System
7	Solar PV Small Grid-Tied System Basic Design	SARETEC	CPUT	Online	Solar	General Planning of PV System
8	Renewable Energy Finance and Policy	Unit for Continuing Education	Nelson Mandela University (NMU)	MNU	Renewable energy	Financial structuring for renewable energy projects
9	Renewable Energy Technology	Unit for Continuing Education	NMU	MNU	Renewable energy	Renewable energy systems
10	Sustainable Management	Graduate School of Technology Management	University of Pretoria	UP	Renewable energy	Sustainable management

	Course name	Institution name		Location	Renewable Energy relevance	Key skills
11	Smart Grid Technology	Centre and Renewable and Sustainable Energy Studies (CRSES)	Stellenbosch University (SU)	SU	Renewable energy	Grid technology
12	Power System Analysis	CRSES	SU	University of the Witwatersrand	Renewable energy	Power load flows
13	Advanced Photovoltaic Systems	CRSES	SU	Engineering Faculty, Stellenbosch University	Solar	Grid technology
14	Wind Energy	CRSES	SU	Engineering Faculty, Stellenbosch University and online	Wind	Wind technology
15	Energy Storage Systems	CRSES	SU	Engineering Faculty, Stellenbosch University and online	Renewable energy	Grid technology
16	Solar Thermal Energy Systems	CRSES	SU	Engineering Faculty, Stellenbosch University and online	Solar	Solar PV technology
17	Smart Grid Communications	CRSES	SU	Engineering Faculty, Stellenbosch University and online	Renewable energy	Communication technology
18	Renewable Energy Systems	CRSES	SU	Engineering Faculty, Stellenbosch University and online/University of Pretoria	Renewable energy	Renewable energy systems
19	Power System Asset Management	CRSES	SU	To be confirmed	Renewable energy	Planning and operations
20	Power System Data Analytics	CRSES	SU	Engineering Faculty, Stellenbosch	Renewable energy	Data management

	Course name	Institution name		Location	Renewable Energy relevance	Key skills
				University and online		
21	Long-term Power System Planning	CRSES	SU	Engineering Faculty, Stellenbosch University and online	Renewable energy	Planning and operations
22	Distribution Customer Concepts	CRSES	SU	Engineering Faculty, Stellenbosch University and online	Renewable energy	End user operations
23	Distribution Network Planning and Operations	CRSES	SU	TBC	Renewable energy	Planning and operations
24	Power System Operations	CRSES	SU	Engineering Faculty, Stellenbosch University and online	Renewable energy	Planning and operations
25	Power System Flexible Operations	Department of Mechanical Engineering	University of Cape Town (UCT)	Department of Mechanical Engineering and online	Renewable energy	Planning and operations
26	Anatomy of Wind Turbines	South African Institute of Electrical of Engineers (SAIEE) Training Academy	Professional organisation	In house and online	Wind	Wind technology
27	Fundamentals of Developing Renewable Energy Plants	SAIEE Training Academy	Professional organisation	In house and online	Renewable energy	Renewable energy systems
28	Photovoltaic Solar Systems	SAIEE Training Academy	Professional organisation	Online	Solar	Solar PV installation
29	Advanced Short Course in System Engineering: A	University of South Africa (UNISA)	UNISA	Online	Renewable energy	Renewable energy systems

	Course name	Institution name		Location	Renewable Energy relevance	Key skills
	Hard Systems Perspective					
30	Certificate in Solar PV Quality Assurance	Association for Renewable Energy Practitioners	Professional organisation	Online	Solar	Solar PV systems
31	Certified Energy Manager (CEM)	Southern African Energy Efficiency (SAEE) Confederation	Professional organisation	Online	Renewable energy	Renewable energy systems
32	Certified Energy Auditor	SAEE Confederation	Professional organisation	Online	Renewable energy	Renewable energy systems
33	Certified Renewable Energy Professional (REP)	SAEE Confederation	Professional organisation	Online	Renewable energy	Renewable energy systems
34	Certified Business Energy Professional (CBEP)	SAEE Confederation	Professional organisation	Online	Renewable energy	Renewable energy systems
35	Certified Industrial Energy Professional Training Program	SAEE Confederation	Professional organisation	Online	Renewable energy	Renewable energy systems
36	Fundamental Principles to Energy Management Training (FEMT)	SAEE Confederation	Professional organisation	Online	Renewable energy	Renewable energy systems
37	Energy Management Systems	SAEE Confederation	Professional organisation	Online	Renewable energy	Renewable energy systems
38	PQRS Excel Course	SAEE Confederation	Professional organisation	Online and hybrid	Solar	Solar PV design and installation
39	PQRS The Exceed Course	SAEE Confederation	Professional organisation	Online and hybrid	Solar	Solar PV design and installation

	Course name	Institution name		Location	Renewable Energy relevance	Key skills
40	Training Course: Solar PV Excite	PQRS Solar PV Products and PV Systems	Private	Online	Solar	Solar PV installation
41	Sales Course: Solar PV Products and PV Systems	PQRS Solar PV Products and PV Systems	Private	Online	Solar	Solar PV sales
42	STC Installers Course	Solar Training Centre SA	Training Centre	NMU	Solar	Solar PV installation
43	SSEG Technical and Financial Course	Solar Training Centre SA	Training Centre	NMU	Renewable energy	Financial structuring for renewable energy projects
44	Energy Efficiency and Sustainability	UCT and GETSmart	University	Online	Renewable energy	Renewable energy systems

Institutions offering renewable energy-, wind- and solar-related degrees and diplomas are shown below:

	Course name	Institution name	Location	Renewable Energy relevance	Key skills
1	Diploma in Mechanical Engineering (Renewable Energy)	CPUT	Bellville Campus	Renewable energy	Renewable Energy technology
2	Higher Certificate in Renewable Energy Technologies	Central University of Technology (CUT)	Bloemfontein Campus	Renewable energy	Renewable Energy technology
3	Bachelor of Science Honours in Energy Studies	University of Johannesburg (UJ)	Johannesburg	Renewable energy	Renewable Energy technology
4	Master of Energy Studies	UJ	Johannesburg	Renewable energy	Renewable Energy technology

	Course name	Institution name	Location	Renewable Energy relevance	Key skills
5	Doctorate in Energy Studies	UJ	Johannesburg	Renewable energy	Renewable Energy technology

Institutions offering renewable energy-, wind- and solar-related research programmes are shown below:

	Programme name	Department name	Institution	Renewable Energy relevance	Key skills
1	Advanced Machines Energy Systems (AMES)	Machines and Power Electronics	UCT	Renewable energy	Renewable technology systems
2	Solar Energy Research Group	Department of Physics	University of Pretoria (UP)	Solar	Solar PV design
3	Materials for Energy Research Group (MERG)	Physics, Chemistry and Engineering Departments	University of the Witwatersrand	Renewable Energy	Renewable technology systems

Annex 4: Data Analysis & Projections

Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa

Energy Partnership
Energiepartnerschaft
South Africa - Deutschland

mineral resources & energy
Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

SAWEA

SAPVIA
South African Photovoltaic Industry Association

Federal Ministry
for Economic Affairs
and Climate Action

Annex 4: Data Analysis & Projections

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Acronyms

AGENT	Advancing Gender in the Environment (a ten-year program launched by USAID in 2014 and implemented by the IUCN)
BAU	Business as usual
C3E	Clean Energy, Education, and Empowerment
CEEW	Council on Energy, Environment and Water
CFF	Climate Finance Facility
DMRE	Department of Mineral Resources and Energy (National)
DOE	Department of Energy (Merged with the Department of Mineral Resources in 2019 to form the DMRE)
DPSA	Department of Public Service and Administration (National)
EAP	Economically active population
GWEC	Global Wind Energy Council
GWNET	Global Network for the Energy Transition
IEA	International Energy Agency
IFC	International Finance Corporation
ILO	International Labour Organisation
IPP	Independent Power Producers
IRENA	International Renewable Energy Agency
IUCN	International Union for Conservation of Nature
OECD	Organisation for Economic Co-operation and Development
PV	Photovoltaic
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SAPVIA	South African Photovoltaic Industry Association
SAWEA	South African Wind Energy Association
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
STEM	Science, Technology, Engineering, and Mathematics
TCFD	Task Force on Climate-related Financial Disclosures
UN	United Nations
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WEGE	Women Empowerment and Gender Equality

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Executive Summary

The German-South African Energy Partnership in association with the Department of Mineral Resources and Energy is supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study of the utility-scale wind and solar energy sectors in South Africa. This report presents an analysis of the data on gender diversity in the utility-scale wind and solar industries in South Africa and projections of future gender diversity in the sectors.

Projections

Assumptions about the baseline

The key points of data that were used as part of this assessment in relation to the number of women employed in the wind and solar energy sectors in South Africa are summarised below.

- **63,291 employment opportunities** have been created through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) up to 31 December 2021.[315]
- **48,101** (76%) of these job opportunities were created during construction phase of the REIPPPP projects and 15,190 (24%) were created during the operational phase of the projects.[316]
- 10% (**4,810**) of the construction-related jobs were taken up by women.[317]
- This is an increase from the **3,892 jobs held by women in 2017**, when women accounted for 9% of the total job opportunities.[318]
- The number of women working in operational jobs under the REIPPPP is unknown. However, women accounted for **33,801 posts (33.2%) in the workforce** of the broader Electricity, Gas, Steam and Air Conditioning Supply sector in South Africa in 2021/22.[319] Also, as stated in the *Status Quo Report*, the utility-scale wind and solar energy sample survey returned that a similar percentage (33%) of the workforce in the surveyed companies were women.
- It can, therefore, be assumed that **33% (or 5,013 jobs)** of the 15,190 operational job opportunities in the utility-scale wind and solar energy sectors are taken up by women.
- The assumed baseline for the end of 2021 is, therefore, that **4,810 construction jobs (10%)** and **5,013 operational jobs (33%)** in the utility-scale wind and solar energy sectors were **occupied by women**.

There are two important riders associated with this baseline. These are that:

1. The baseline uses the REIPPPP employment numbers only as its basis and does not consider wind and solar energy jobs created outside of the REIPPPP.

[315] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[316] IPP Office.
[317] IPP Office.
[318] IPP Office, "The REIPPPP Contribution: Women in Energy: Empowerment, Engagement and Employment."
[319] DEL, "21st Commission for Employment Equity Annual Report 2020-21."

2. The REIPPPP jobs data also includes small hydro, landfill gas, and biomass. However, these projects are an order of magnitude smaller than wind and solar.[320]

3. The jobs reported by the REIPPPP are for a period from 2016 to 2021 and a number of the people working in the construction jobs are no longer employed in those jobs.

Assumptions about the future

The *Integrated Resource Plan 2019* (IRP 2019) requires renewable energy generation capacity of **26,630 MW by 2030** consisting of 17,742 MW of wind energy, 8,288 MW of solar PV energy, and 600 MV of CSP energy.[321]

According to the REIPPPP, **5,661 MW** of renewable energy generation capacity was operational by the end of 2021.[322] Therefore, in the **nine years** between the end of 2021 and the end of 2030, **20,969 MW** – or **2,330 MW per year** – in **new renewable energy capacity** needs to be added to the electricity network to meet the requirements of the IRP 2019. The annual requirement of 2,330 MW is equal to **41%** of the entire renewable energy generation capacity added by the REIPPPP up to the end of 2021.

The addition of 41% of the current installation capacity every year to 2030 was used to estimate the potential changes in the number of construction and operational jobs in the utility-scale wind and solar energy sectors over the next nine years. This was achieved by assuming there is a direct relationship between the number of jobs created and the new generation capacity added to the grid.

Scenarios

Using the assumptions from above, it was possible to make broad projections in terms of gender diversity in the utility-scale wind and solar energy sectors up to 2030. These projections were split between operation and construction job opportunities as these are different types of job opportunities and the REIPPPP data is collected according to these two categories. The projections are split between business-as-usual (BAU) scenarios and 50% women representation target scenarios (Table 19).

Table 19: Estimated Wind and Solar Energy Sector Gender Scenarios in South Africa

Scenario	Summary
Business-as-usual gender diversity projections in operational jobs	If these opportunities align with the IRP targets and there are no additional gender diversity interventions, then it is anticipated that the number of operational jobs for women will increase to 23,580 by 2030 (see Table 22).
Business-as-usual gender diversity projections in construction jobs	If these opportunities align with the IRP targets and there are no additional gender diversity interventions, then it is anticipated that the number of construction jobs remain in the region of 2,000 jobs per year by 2030. These job opportunities are anticipated to be mostly contract work, lasting only for one year (see Table 23).
50% women representation target in operational jobs	If a target of 50% representation is set for all operational jobs in the sector, it was possible to estimate the number of additional job opportunities that can be created for women by 2030. By 2030, there is the potential for as many as 12,149 additional operational job opportunities for women if this 50% representation target is achieved (as the Figure 80 shows).

[320] Of the 5,661 MW of operational renewable energy generation capacity, 2,923 MW was from wind energy, 2,212 MW was from solar PV, 500 MW was from CSP, and 26 MW was from small hydro, landfill gas, and biomass.
[321] DoE, "IRP 2019," 42.
[322] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."

Scenario	Summary
50% women representation target in construction jobs	As with the operational job opportunities, there are also construction job opportunities for women if gender parity is reached in the sector. Given that women are only represented in 10% of the current construction job opportunities, increasing to 50% representation creates many additional construction opportunities for women. Table 25 shows that there could be almost 8,000 additional construction jobs could be created for women every year if a 50% gender representation target is reached. The data (see Table 25) also clearly illustrates that these number of construction jobs are not anticipated to increase over time, as they are typically transient in nature.

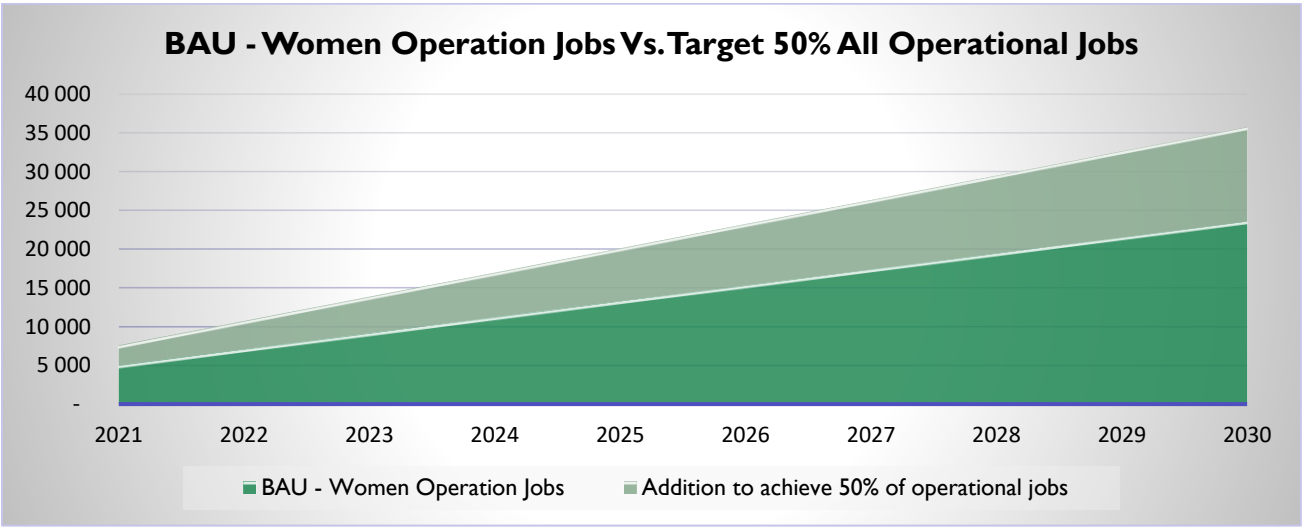

Figure 80: Business as usual (BAU) - Women Operation Jobs Vs. Target 50% All Operational Jobs in the utility-scale wind and solar energy sectors

When operation and construction job opportunities are compared with each other, it is clear that in the short term, women could potentially occupy around 10,000 construction and 10,000 operational jobs in the utility-scale wind and solar energy sectors if gender parity was to be reached quickly. However, in the long term, there is significantly more potential for women in operational jobs in the sectors. As the figure below shows, by 2030, if 50% gender job parity is reached in both construction and operating jobs in the utility-scale wind and solar energy sectors, there may be significantly more women in operational jobs than in construction jobs.

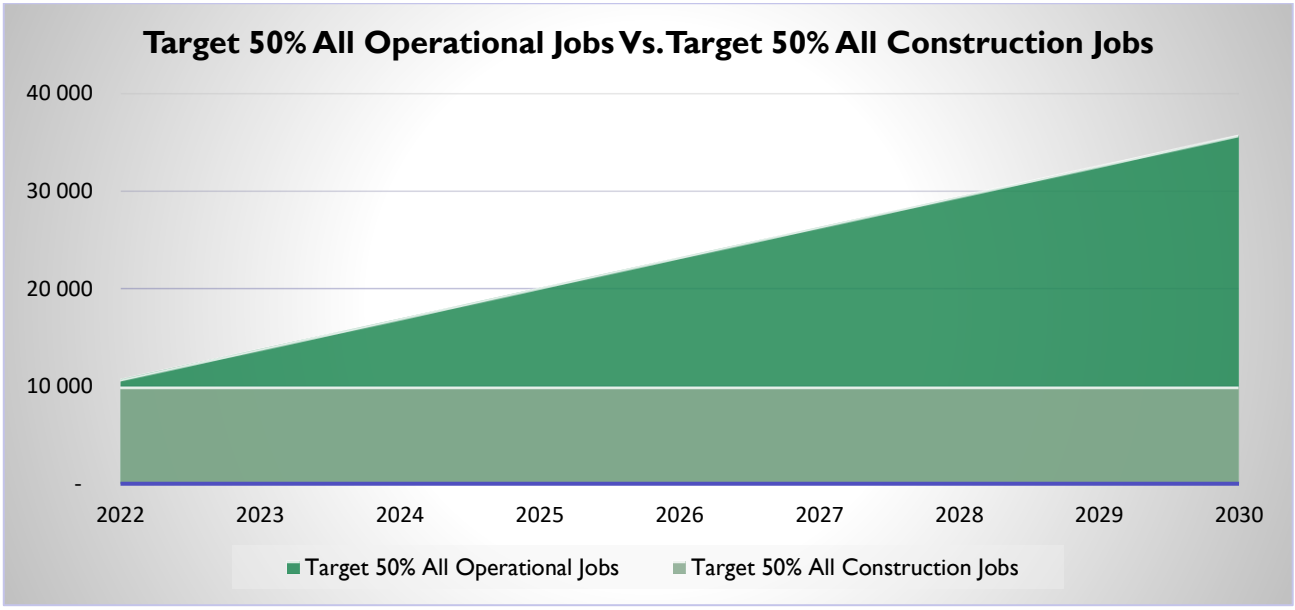

Figure 81: Target 50% All Operational Jobs Vs. Target 50% All Construction Jobs in the utility-scale wind and solar energy sectors

Conclusion

The main conclusion from this research is that in the long term there will be significantly more job opportunities in the operational phase of wind and solar energy farms. This is because construction jobs are temporary in nature, while operations jobs are more long-term. As more wind and solar farms come online, there will be cumulatively more job opportunities for women in operating these farms.

Focus therefore needs to be placed on interventions that create a conducive working environment for women in the operations of wind and solar energy farms in the future. This is not to say that there are no interventions required to improve gender representation in the construction phase of wind and solar farms. However, in terms of prioritising intervention areas, the focus needs to be on operational job opportunities for women in the utility-scale wind and solar energy sectors in South Africa.

Introduction

The German-South African Energy Partnership in association with the Department of Mineral Resources and Energy is supporting the South African Wind Energy Association (SAWEA) and the South African Photovoltaic Industry Association (SAPVIA) to conduct a gender diversity study of the utility-scale wind and solar energy sectors in South Africa.

Figure 82: The objectives of the study

To complete this gender diversity study, several different reports have been commissioned including:

Report	Purpose
Literature Review	A summary of the literature on the state of gender representation in the international utility-scale wind and solar energy sectors
Status Quo	A summary of the current state of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Academic Review	A summary of gender representation in academic courses and qualifications in South Africa related to the utility-scale wind and solar energy sectors
Data Analysis and Projection (This Report)	An analysis of the available data on gender diversity in the utility-scale wind and solar energy sectors in South Africa as well as related projections of gender diversity in the utility-scale wind and solar energy sectors in South Africa
Recommendations to improve Gender Diversity	A summary of recommendations to improve gender diversity in the utility-scale wind and solar energy sectors in South Africa

This report presents an analysis of the data on gender diversity in the utility-scale wind and solar industries in South Africa and projections of future gender diversity in these sectors. The objective of this report is to develop projections based on the wind and solar allocation in the *Integrated Resource Plan 2019* to understand the potential gender diversity in in employment in the South African wind and solar energy markets.

Summary of available data on which to base projections

The available data that were analysed for this report were from the following sources:

Each of these data sources is summarised below.

Integrated Resource Plan 2019

The *Integrated Resource Plan 2019* (IRP 2019) was promulgated by the national Department of Mineral Resources and Energy in October 2019.[323] The IRP 2019 is an electricity infrastructure development plan for South Africa for the period, 2019-2030.[324] It is based on "least-cost electricity supply and demand balance, taking into account security of supply and the environment (minimise negative emissions and water usage)".[325] Essentially, the IRP 2019 is South Africa's procurement plan for energy generation capacity until 2030. The IRP 2019 replaces the previous plan, the IRP 2010, which was promulgated in 2011.[326]

The IRP 2019 provides a clear indication of the intention to expand renewable energy generation capacity in South Africa from a **2019 baseline of 3,754 MW** (1,980 MW of wind energy, 1,474 MW of solar photovoltaic (PV) energy, and 300 MV of concentrated solar power (CSP)) to **26,630 MW by 2030** (17,742 MW of wind energy, 8,288 MW of solar PV energy, and 600 MV of CSP).[327] Based on these indicated increases in renewable energy generation capacity, wind energy will account for 22.5% of South Africa's total installed energy capacity in 2030, solar PV will account for 10.5%, and CSP will account for 0.8%.[328]

REIPPPP Employment Opportunities

The Independent Power Producers (IPP) Office produced a report in 2017 outlining the progress of that the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) had made towards gender empowerment.[329] At this time, it was noted that **3,892 employment opportunities had been**

[323] DoE, "IRP 2019."
[324] DoE.
[325] DoE, 8.
[326] Van der Poel and Felekis, "What You Need to Know."
[327] DoE, "IRP 2019," 42.
[328] DoE, 42.
[329] IPP Office, "The REIPPPP Contribution: Women in Energy: Empowerment, Engagement and Employment."

created for women through the REIPPPP.[330] This was equal to **9% of the total employment opportunities** that had been created through the REIPPPP by 2017.[331]

According to the IPP Office's quarterly overview report for the quarter ending in December 2021, the REIPPPP had created a total of **63,291 job opportunities** by the end of December 2021.[332] Of these, 48,110 (76%) were created during the construction phase of renewable energy projects and 15,182 (24%) during the operational phase of these projects.[333] The same quarterly report also presented employment equity information including gender employment information, but only for the construction phase.[334] By December 2021, the IPP Office reported that **only 10% of REIPPPP employment opportunities in the construction phase were taken up by women.**[335] No information was published on the employment of women in the operational phase of REIPPPP projects.

In the IPP Office's quarterly overview report for the quarter ending in December 2021, it was stated that as of 31 December 2021, **5,661 MW** of renewable energy generation capacity from 85 independent power producers had already been connected to the national electricity grid and was operational.[336] The **5,661 MW** of operational capacity was equal to 89.5% of the procured capacity (6,323 MW) as of 31 December 2021.[337] Of the **5,661 MW** of operational renewable energy generation capacity, **2,923 MW was from wind energy**, **2,212 MW was from solar PV**, **500 MW was from CSP**, and 26 MW was from small hydro, landfill gas, and biomass.[338]

Energy Sector Employment Statistics

Employment statistics for the energy sector are presented in greater detail in the *Status Quo Report*, another of the reports in the *Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa* series of reports. Below are a few key points based on the information in the *Status Quo Report*.

There is relatively good gender representation in the workplace data for South Africa, due to mandatory employment equity reporting. However, this data is limited to large sectors in the overall economy. Renewable energy forms part of the large "Electricity, Gas, Steam and Air Conditioning Supply sector" and data for this sector has been report for the last three years.

The size of the workforce, by gender, in South Africa's Electricity, Gas, Steam and Air Conditioning Supply sector over the past three years is shown in Figure 83.

[330] IPP Office.
[331] IPP Office.
[332] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[333] IPP Office.
[334] IPP Office.
[335] IPP Office.
[336] IPP Office.
[337] IPP Office.
[338] IPP Office, 11.

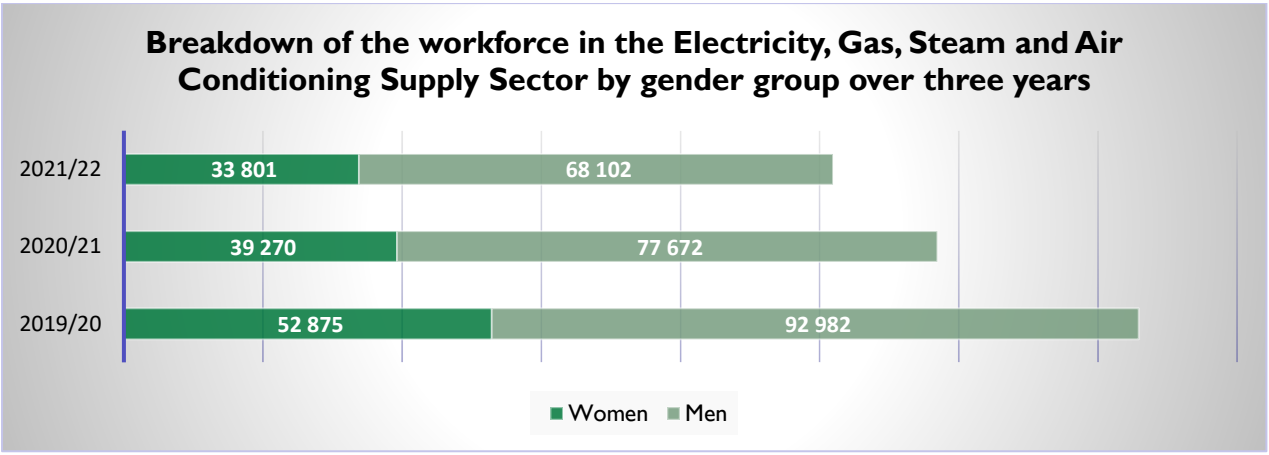

Figure 83: Breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years

Women made up 33.2% of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply sector in 2021/22. However, it should be noted that the total size of the workforce, as well as the percentage of women in the workforce of the Electricity, Gas, Steam and Air Conditioning Supply sector, decreased from 36.3% in 2019/20 to 33.6% in 2020/21.[339] The figure below shows that men make up the majority of the sector's workforce and that the size of the sector's workforce has decreased in consecutive years.

Using data from the *22nd Commission for Employment Equity Annual Report 2021-22*, a breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply sector as percentages for 2021/22 is shown in Figure 84.[340] The vertical line in Figure 84 represents the percentage of women in the economically active population of South Africa (44.7%) in 2021/22.[341]

[339] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."
[340] DEL, "22nd Commission for Employment Equity Annual Report 2021-22."
[341] DEL.

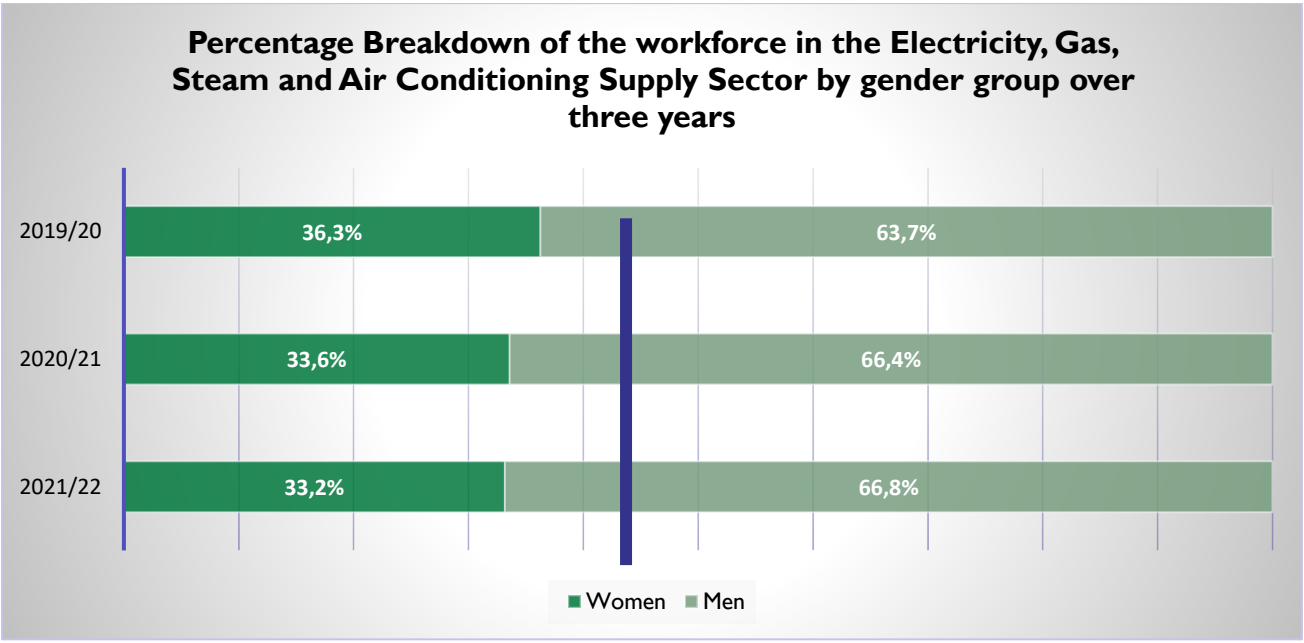

Figure 84: Percentage breakdown of the workforce in the Electricity, Gas, Steam and Air Conditioning Supply Sector by gender group over three years with the economically active population (EAP) percentage of women in South Africa

A breakdown of the workforce numbers and percentages of the Electricity, Gas, Steam and Air Conditioning Supply sector for the past three years in terms of occupational level, temporary employees for women and men are shown in the Table 20.[342]

Table 20: Workforce profile for the Electricity, Gas, Steam and Air Conditioning Supply sector for 2021/22

Workforce Profile for 2021/22	Women	Women (%)	Men	Men (%)	Total
Top Management	201	26.8%	549	73.2%	750
Senior Management	618	34.3%	1,182	65.7%	1,800
Professionally qualified	4,222	36.3%	7,407	63.7%	11,629
Skilled	13,757	35.4%	25,052	64.6%	38,809
Semi-skilled	9,455	30.4%	21,610	69.6%	31,065
Unskilled	3,794	27.9%	9,784	72.1%	13,578
Total Permanent	32,047	32.8%	65,584	67.2%	97,631
Temporary employees	1,754	41.1%	2,518	58.9%	4,272
Grand Total	33,801	33.2%	68,102	66.8%	101,903

[342] DEL; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

Gender Diversity of Directors of Wind and Solar Energy Companies

The data on gender diversity of directors and the methods used to collect and analyse these data are detailed in the *Status Quo Report*, another of the reports in the *Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa* series of reports. Below are a few key points based on the information in the *Status Quo Report*.[343]

In their service directories, SAPVIA and SAWEA had a combined total of 223 member companies (excluding duplicates – 29 companies are members of both organisations). Of the 223 companies in the sample, a total of 194 companies could be found on BizPortal. An analysis of the gender representation of the directors of these 194 companies found that 19% of directors were women and 80% were men. (The likely gender of the remaining 1% of directors could not be assumed.) These results reveal that women have limited participation in leadership positions in SAPVIA- and SAWEA-member companies.

Results of Company Survey

A survey was circulated to entities who were member of SAPVIA and SAWEA to collect data for the *Status Quo Report*, another of the reports in the *Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa* series of reports. Information about the survey is detailed in the *Status Quo Report*.[344]

In total, 25 entities from across the wind and solar energy sectors completed the survey. From the survey, it was determined that women account for 33% of the workforce in the utility-scale wind and solar energy sectors in South Africa, while men account for 67% of the workforce.

The results from the survey are consistent with global statistics which estimate that women account for only 32% of the energy workforce, which includes oil and gas, renewables, and wind power markets.[345] The survey results are also consistent with the statistics from Sub-Saharan Africa (SSA) where studies show that on average women account for 32% of the workforce in the renewable energy sector.[346] Furthermore, the wind and solar energy survey results are similar to the breakdown of the workforce in South Africa's electricity, gas, steam and air-conditioning supply sector for 2021/2022, which shows that women account for 33.2% of the workforce in this sector.[347]

Graduation from Feeder Degrees

The data relating to enrolments at and graduations from South African tertiary institutions and the methods used to collect and analyse these data are detailed in the *Academic Review Report*, another of the reports in the *Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa* series of reports. Below are a few key points based on the information in the *Academic Review Report*.

The enrolment and graduation data show that many more women than men are enrolling for degrees and graduating with degrees between 2010 to 2020. The data also show that there is a large difference between the number of women and men who enrol in a degree and the number of people who graduate. For graduates across all CSEM categories for 2020, the CSEM category with the most graduates was "Business, Economics and Management Studies". This is important for the utility-scale wind and solar energy sectors because this is the category of qualification where women entering the market outnumber men. However, there were fewer

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[343] Urban Earth, "Status Quo of Gender Diversity."
[344] Urban Earth.
[345] IRENA and ILO, "Renewable Energy and Jobs – Annual Review 2021."
[346] IFC, "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees."
[347] DEL, "22nd Commission for Employment Equity Annual Report 2021-22"; DEL, "21st Commission for Employment Equity Annual Report 2020-21"; DEL, "20th Commission for Employment Equity Annual Report 2019-20."

women than men who graduated with degrees in science, technology, engineering, and mathematics (STEM) fields. This was particularly so in the fields of mathematics, engineering and computer science.

Projections

This section of the report provides a summary of the current or baseline gender representation as well as projections of future gender diversity in the utility-scale wind and solar energy sectors in South Africa.

Assumptions about the baseline

When developing projections into the future, it is important to establish a baseline. Once the baseline is in place it is possible to apply certain assumptions about how this baseline will change over time. However, developing a baseline for gender representation in the utility-scale wind and solar energy sectors in South Africa is not a simple task. Currently there are not clear or accurate data on how many women are employed in utility-scale wind and solar energy sectors in South Africa. This is because the sectors are relatively new, and the data are not collected in any meaningful way on a regular basis for the utility-scale wind and solar energy sectors. It is therefore not possible to say with certainty what the current gender diversity baseline is in the sector. However, it is possible to estimate this baseline based on other indirect data that are available.

The key points of data that are available in relation to the number of women employed in the wind and solar energy sectors in South Africa are summarised below.

- **63,291 employment opportunities** have been created through the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) up to 31 December 2021.[348]
- **48,101** (76%) of these job opportunities were created during construction phase of the REIPPPP projects and 15,190 (24%) were created during the operational phase of the projects.[349]
- 10% (**4,810**) of the construction-related jobs were taken up by women.[350]
- This is an increase from the **3,892 jobs held by women in 2017**, when women accounted for 9% of the total job opportunities.[351]
- The number of women working in operational jobs under the REIPPPP is unknown. However, women accounted for **33,801 posts (33.2%) in the workforce** of the broader Electricity, Gas, Steam and Air Conditioning Supply sector in South Africa in 2021/22.[352] Also, as stated in the *Status Quo Report*, the utility-scale wind and solar energy sample survey returned that a similar percentage (33%) of the workforce in the surveyed companies were women.
- It can, therefore, be assumed that **33% (or 5,013 jobs)** of the 15,190 operational job opportunities in the utility-scale wind and solar energy sectors are taken up by women.
- The assumed baseline for the end of 2021 is, therefore, that **4,810 construction jobs (10%)** and **5,013 operational jobs (33%)** in the utility-scale wind and solar energy sectors were **occupied by women**.

[348] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[349] IPP Office.
[350] IPP Office.
[351] IPP Office, "The REIPPPP Contribution: Women in Energy: Empowerment, Engagement and Employment."
[352] DEL, "21st Commission for Employment Equity Annual Report 2020-21."

There are two important riders associated with this baseline. These are that:

1. The baseline uses the REIPPPP employment numbers only as its basis and does not consider wind and solar energy jobs created outside of the REIPPPP.

2. The REIPPPP jobs data also includes small hydro, landfill gas, and biomass. However, these projects are an order of magnitude smaller than wind and solar.[353]

3. The jobs reported by the REIPPPP are for a period from 2016 to 2021 and a number of the people working in the construction jobs are no longer employed in those jobs.

An estimated baseline data indicates that women occupied 4,810 construction jobs (10%) and 5,013 operational jobs (33%) in the utility-scale wind and solar energy sectors in South Africa as of the end of 2021

Assumptions about the future

Once a baseline is established, it is important to understand what the key drivers of change will be for this baseline. In the utility-scale wind and solar energy sectors in South Africa, the key driver will be the extent to which new renewable energy generation capacity comes online as part of the energy mix for South Africa. The *Integrated Resource Plan 2019* (IRP 2019) provides a strategic energy road map and outlines the anticipated increase in renewable energy generation capacity in South Africa. The IRP 2019 requires renewable energy generation capacity of **26,630 MW by 2030** consisting of 17,742 MW of wind energy, 8,288 MW of solar PV energy, and 600 MV of CSP energy.[354]

According to the REIPPPP, **5,661 MW** of renewable energy generation capacity was operational by the end of 2021.[355] Therefore, in the **nine years** between the end of 2021 and the end of 2030, **20,969 MW** – or **2,330 MW per year** – in **new renewable energy capacity** needs to be added to the electricity network to meet the requirements of the IRP 2019. The annual requirement of 2,330 MW is equal to **41%** of the entire renewable energy generation capacity added by the REIPPPP up to the end of 2021.

The addition of 41% of the current installation capacity every year to 2030 can be used to estimate the potential changes in the number of construction and operational jobs in the utility-scale wind and solar energy sectors over the next nine years. This can be achieved by assuming there is a direct relationship between the number of jobs created and the new generation capacity added to the grid.

Operational Jobs

From the above summary the number of construction and operational jobs in the utility scale wind and solar sectors in 2021 are known. To estimate the growth in operational jobs, it is reasonable to assume that the number of operational jobs will increase at the same or similar rate to the increase of MW added to the grid. This is because the job opportunities are similar across different wind and solar farms and the job opportunities

[353] Of the 5,661 MW of operational renewable energy generation capacity, 2,923 MW was from wind energy, 2,212 MW was from solar PV, 500 MW was from CSP, and 26 MW was from small hydro, landfill gas, and biomass.
[354] DoE, "IRP 2019," 42.
[355] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."

are retained during the operational phase of the plants. The REIPPPP office in fact notes that "During the operations period it is anticipated that employment numbers will remain relatively constant".[356]

To estimate future operational job opportunities, it is therefore possible to increase the baseline number for the total operational jobs (15,190) by the same 41% over the nine years from the end of 2021 to the end of 2030. In this way it is possible to estimate the potential number of jobs created in the market for this period.

Construction Jobs

Construction jobs are different to operational jobs in that they tend to only be available during the construction phase of the farms and "will taper off by the end of the construction period".[357] These job opportunities are therefore more temporary in nature. Construction jobs are also different from operational jobs in that there are currently significantly more construction jobs compared to operational jobs (76% vs 24% respectively).

It is also possible to estimate the number of construction jobs using the same growth same 41% growth percentage used for operational jobs. However, the calculation needs to consider that the job opportunities are not cumulative but that they only last for a specific period. For this assessment, it is assumed that construction jobs will last for 1 year. Based on this assumption and the fact that the total number of construction jobs are known in 2021 (48,101) and the increase of 41%, it is possible to estimate that there will be on average 19,798 construction jobs in the utility-scale wind and solar energy sectors every year if the IRP targets are achieved.

The projection of the potential number of jobs created in the renewable energy sector is shown in Table 21. It is worth noting that construction jobs are much higher in 2021 because this includes all construction jobs of the entire REIPPPP to date.

Table 21: Summary of projected job numbers in the utility-scale wind and solar energy sectors in line with the IRP targets

Year	RE Capacity	Total Operation Jobs	Total Construction Jobs
2021	5,661	15,190	48,101
2022	7,991	21,442	19,798
2023	10,321	27,694	19,798
2024	12,651	33,946	19,798
2025	14,981	40,198	19,798
2026	17,311	46,450	19,798
2027	19,641	52,702	19,798
2028	21,971	58,954	19,798
2029	24,301	65,206	19,798
2030	26,631	71,458	19,798

[356] IPP Office.
[357] IPP Office.

As with the baseline calculations, there are important riders associated with these calculations. These are:

1. It is unclear if the IRP targets will be reached by 2030. There may be more or less renewable energy connected to the grid by 2030.

2. The number of job opportunities will not be linear, but most likely start slowly as the REIPPP comes back online and then increase over time as the REIPPP programme scales up.

3. There are economies at scale, which means there will likely be less job opportunities as companies become more efficient at developing renewable energy installations.

Nevertheless, we can assume that there may be as many as **19,798 construction job opportunities** and **71,458 operational job opportunities** in the utility-scale wind and solar energy sectors **by 2030**.

Scenarios

Using the assumptions from above, it is possible to make some broad projections in terms of gender diversity in the utility-scale wind and solar energy sectors up to 2030. These projections need to be split between operation and construction job opportunities as these are different types of job opportunities and the REIPPPP data is collected according to these two categories. The projections are split between business-as-usual (BAU) scenarios and 50% women representation target scenarios.

Business-as-usual gender diversity projections in operational jobs

As noted above, the current number of women in operational jobs in the utility-scale wind and solar energy sectors is estimated at a little over 5,000, which is about 33% of the currently available operational jobs. If these opportunities align with the IRP targets and there are no additional gender diversity interventions, then it is anticipated that the number of operational jobs for women will increase to 23,580 by 2030 (Table 22).

Table 22: Business as usual scenario gender diversity projections in operational jobs in the utility-scale wind and solar energy sectors

Year	Total Projected Operational Job	Business as Usual - Women Operational Jobs	% of All Operational Jobs
2021	15,190	5,013	33%
2022	21,442	7,076	33%
2023	27,694	9,139	33%
2024	33,946	11,202	33%
2025	40,198	13,265	33%
2026	46,450	15,328	33%
2027	52,702	17,391	33%
2028	58,954	19,454	33%
2029	65,206	21,517	33%

Year	Total Projected Operational Job	Business as Usual - Women Operational Jobs	% of All Operational Jobs
2030	71,458	23,580	33%

Business-as-usual gender diversity projections in construction jobs

The number of construction job opportunities taken up by women by December 2021 in the utility-scale wind and solar energy sectors is estimated at 4,810, which is about 10% of the total construction job opportunities. If these opportunities align with the IRP targets and there are no additional gender diversity interventions, then it is anticipated that the number of construction jobs remain in the region of 2,000 jobs per year by 2030. As noted above, these job opportunities are anticipated to be mostly contract work, lasting only for one year (Table 23).

Table 23: Business as usual scenario gender diversity projections in construction jobs in the utility-scale wind and solar energy sectors

Year	Total Projected Construction Jobs	Business as Usual - Women Construction Jobs	% of All Construction Jobs
2021	48,101	4,810	10%
2022	19,798	1,980	10%
2023	19,798	1,980	10%
2024	19,798	1,980	10%
2025	19,798	1,980	10%
2026	19,798	1,980	10%
2027	19,798	1,980	10%
2028	19,798	1,980	10%
2029	19,798	1,980	10%
2030	19,798	1,980	10%

50% women representation target in operational jobs

If a target of 50% representation is set for all operational jobs in the sector, it is possible to estimate the number of additional job opportunities that can be created for women by 2030. Table 24 provides a summary of the annual number of additional operational job opportunities that can be created for women in the utility-scale wind and solar energy sectors if a 50% representation target is achieved. By 2030, there is the potential for as many as 12,149 additional operational job opportunities for women if this 50% representation target is achieved (Figure 85).

Table 24: 50% women representation target in operational jobs in the utility-scale wind and solar energy sectors

Year	Total Projected Operational Job	BAU - Women Operation Jobs	Target 50% All Operational Jobs	Addition to achieve 50% of operational jobs
2021	15,190	5,013	7,595	2,582
2022	21,442	7,076	10,721	3,645
2023	27,694	9,139	13,847	4,708
2024	33,946	11,202	16,973	5,771
2025	40,198	13,265	20,099	6,834
2026	46,450	15,328	23,225	7,897
2027	52,702	17,391	26,351	8,960
2028	58,954	19,454	29,477	10,023
2029	65,206	21,517	32,603	11,086
2030	71,458	23,580	35,729	12,149

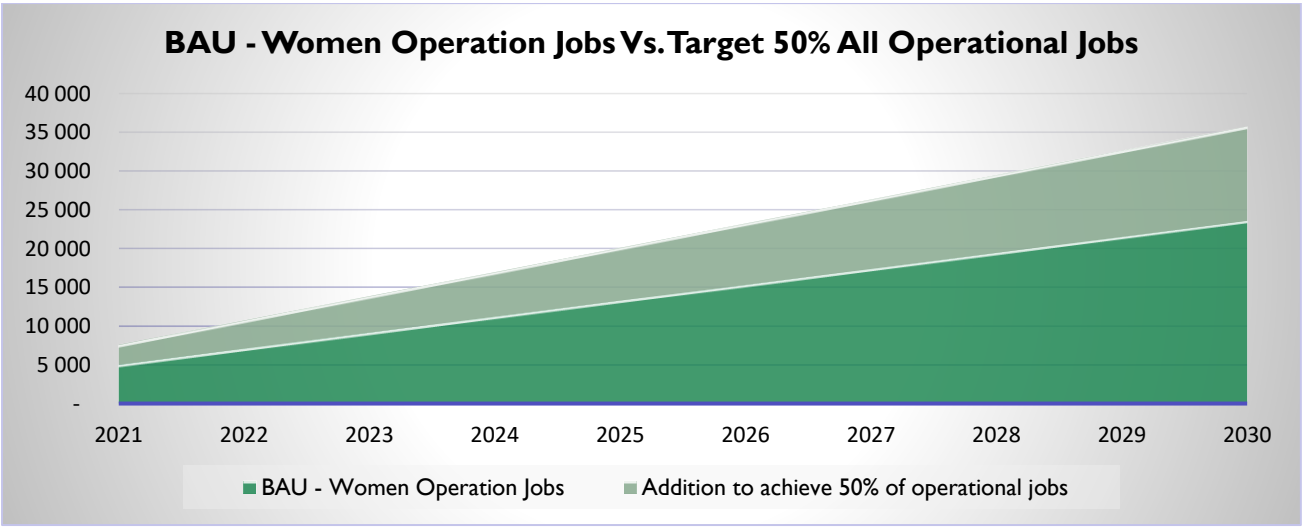

Figure 85: Business as usual (BAU) - Women Operation Jobs Vs. Target 50% All Operational Jobs in the utility-scale wind and solar energy sectors

50% women representation target in construction jobs

As with the operational job opportunities, there are also construction job opportunities for women if gender parity is reached in the sector. Given that women are only represented in 10% of the current construction job opportunities, increasing to 50% representation creates many additional construction opportunities for women. Table 25 shows that there could be almost 8,000 additional construction jobs could be created for women every year if a 50% gender representation target is reached. Table 25 also clearly illustrates that these number of construction jobs are not anticipated to increase over time, as they are typically transient in nature.

Table 25: 50% women representation target in operational jobs in the utility-scale wind and solar energy sectors

Year	Total Projected Construction Jobs	BAU - Women Construction Jobs	Target 50% All Construction Jobs	Addition to achieve 50% of construction jobs
2021	48,101	4,810	24,051	19,241
2022	43,849	4,385	9,899	7,919
2023	39,596	3,960	9,899	7,919
2024	39,596	3,960	9,899	7,919
2025	39,596	3,960	9,899	7,919
2026	39,596	3,960	9,899	7,919
2027	39,596	3,960	9,899	7,919
2028	39,596	3,960	9,899	7,919
2029	39,596	3,960	9,899	7,919
2030	39,596	3,960	9,899	7,919

When operation and construction job opportunities are compared with each other, it is clear that in the short term, women could potentially occupy around 10,000 construction and 10,000 operational jobs in the utility-scale wind and solar energy sectors if gender parity was to be reached quickly. However, in the long term, there is significantly more potential for women in operational jobs in the sectors. Figure 86 shows that by 2030, if 50% gender job parity is reached in both construction and operating jobs in the utility-scale wind and solar energy sectors, there may be significantly more women in operational jobs than in construction jobs.

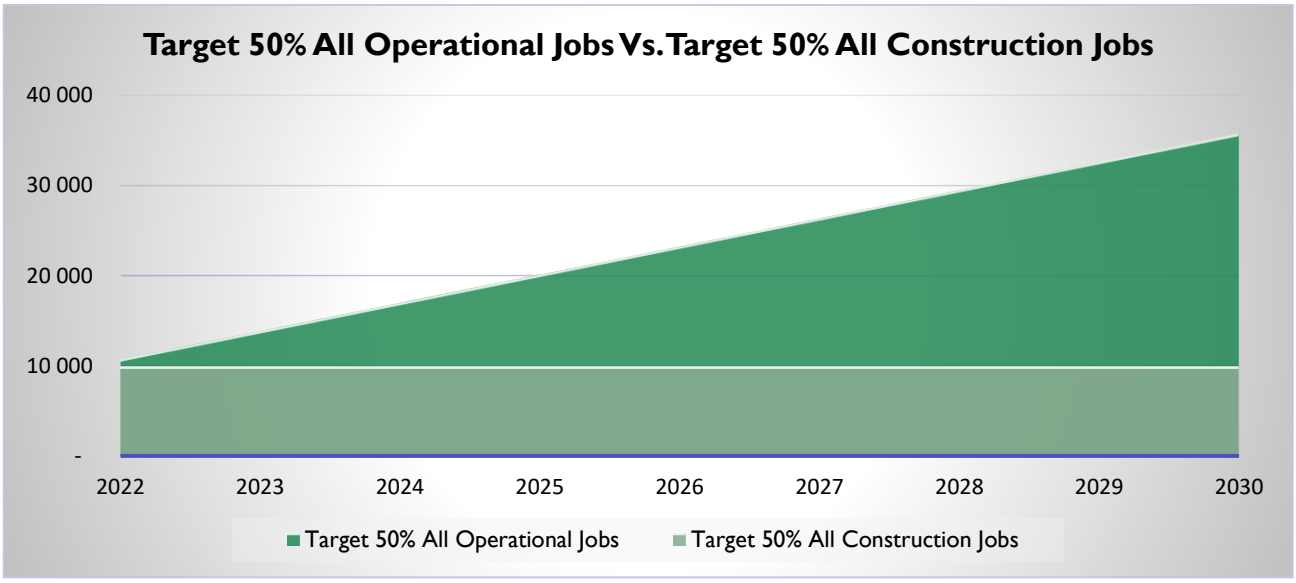

Figure 86: Target 50% All Operational Jobs Vs. Target 50% All Construction Jobs in the utility-scale wind and solar energy sectors

Factors that impact the future gender diversity of the utility-scale wind and solar energy sectors in South Africa

The data discussed above and in the preceding reports have highlighted that gender diversity in the utility-scale wind and solar energy sectors in South Africa varies depending on:

- Seniority – The data on the gender diversity of directors of companies in the utility-scale wind and solar energy sectors in South Africa show that senior positions are predominantly occupied by men.[358] This is reinforced by the broader energy sector employment statistics as well as by the results from the company survey undertaken as part of this research.[359]

- Technical Nature of the position – While there is no strong data for South Africa on this point, the International Literature Review highlighted that technical posts in the utility-scale wind and solar energy sectors in South Africa are predominantly occupied by men, and feedback from interview and focus groups covered in the Status Quo Report confirm this is the case.[360] In addition, the information on graduates with feeder degrees clearly shows that far more men than women graduate with engineering degrees.361 Engineering degrees are a key feeder into technical positions in the sector.

- Site Work – Figures from the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) indicate that only 10% of construction jobs created by the REIPPPP are occupied by women.[362] This is further reinforced by feedback from interviews and focus groups.[363]

The following sections, therefore, examine factors that would impact the participation of women in the utility-scale wind and solar energy sectors in South Africa in general and the specific factors that would impact women's participation in these three focus areas listed above.

General Factors

A summary of general factors that impact the participation of women in the utility-scale wind and solar energy sectors in South Africa are listed in the table below. These factors come from the *Status Quo Report*, another of the reports in the *Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa* series of reports. In the *Status Quo Report*, these factors are explained in greater detail.

Factor	Explanation
Lack of information about the utility-scale wind and solar energy sectors	Young people did not know about the utility-scale wind and solar energy sectors as a future career option and therefore did not consider choosing subjects or disciplines which would equip them to enter it. This was particularly relevant in the more technical roles of the sector, where STEM-related subjects are critical.

[358] Urban Earth, "Status Quo of Gender Diversity."
[359] Urban Earth.
[360] Urban Earth.
[361] Urban Earth.
[362] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."
[363] Urban Earth, "Status Quo of Gender Diversity."

Factor	Explanation
as career options	
Lack of feeder institutions and courses	Participants in the HR focus group highlighted that there were no specific feeder institutions or courses for entry into the renewable energy industry, this makes it more challenging when trying to target, and then support, women and non-binary people to enter the sector. However, a participant did note a programme offered at Stellenbosch University, that promotes women's participation in renewable energy.
Recruitment and hiring practices biased towards men	The utility-scale wind and solar energy sectors do not specifically target female or non-binary graduates to enter the sector, despite the lack of gender diversity, instead, they focus simply on the skills the company needs. Also, positions in the utility-scale wind and solar energy sectors, especially technical positions, often require many years of experience, which recent graduates and women wanting to shift from other careers may not have. Also, men are more likely to apply for jobs with experience and skill requirements beyond their current résumé. Women, more than men, are interested in flexible working hours, however, few companies in the wind and solar energy sectors offer flexible working. Women and non-binary people rarely apply for positions that are onsite because organisations are not actively working towards improving the conditions for onsite workers, especially in construction.
Lack of policies supportive of women and non-binary people's particular needs	There is a dearth of policies at both the company and sector levels to meaningfully address the low participation of women and non-binary people in the utility-scale wind and solar energy sectors.
Limited gender targets for Independent Power Producers in South Africa	In most organisations in the utility-scale wind and solar energy sectors, gender targets and considerations are implied but they are not explicitly stated in company policies. However, the renewable energy sector does have limited gender targets. Some commitments are made to gender targets where there is preferential procurement with the focus on sub-contracting to empowered enterprises, black-owned enterprises, and women-owned enterprises.[364]
Social norms and gender stereotypes continue to discourage women and non-binary people from the sector	Gendered norms continue to play a role in creating perceptions that the utility-scale wind and solar energy sectors are not appropriate sectors for women, and they remain male-dominated sectors, particularly in the technical and senior management spaces. Women must overcome gendered challenges to occupy technical posts and advance to senior levels. Furthermore, there is a perception in the sectors that men's opinions had a "natural hierarchy" because of social norms about who was "naturally best for the job". In addition, the "boys club" remains a reality as many of the companies are still owned and run by men, and these men tend to know and socialise with each other. While socialising with each other, men hold discussions and informal decisions are taken while excluding the views and voices of women.
Women still experience explicit sexism	Numerous examples of explicit sexism were mentioned by women working in the utility-scale wind and solar energy sectors in South Africa during focus group discussions and semi-structured interviews that were part of this research. These examples involved *inter*

[364] IPP Office, "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021."

Factor	Explanation
	alia unequal treatment and belittlement because the person is a woman, verbal sexual harassment, and sexism related to motherhood.
Lack of, and poor support for, family-friendly policies	While some companies mentioned either formal or informal family-friendly policies supporting women, some have nothing, and a few women mentioned a sense of fear and scepticism among women to make use of them where they do exist, especially if the company culture was unsupportive. In addition, many examples were cited of unsupportive environments, and even direct discrimination, from men and some women, based on motherhood. Other women spoke about choices they have to make to accommodate their parenting responsibilities at the expense of promotion or being able to take site positions. Pregnancy was also mentioned as another barrier to career advancement for women in the sector, especially women who are involved in fieldwork. It was very striking that women and non-binary people face significantly more challenges with site-based positions than when working in office-based positions.
Gender pay gap as women still earn less	Despite the utility-scale wind and solar energy sectors being relatively new, pay inequities between women and men to continue. Participants mentioned that often one is not aware of what colleagues earn, which enables pay gaps to continue uncontested. Furthermore, some women mentioned that the utility-scale wind and solar energy sectors often made women feel they should be "grateful" for being "allowed" into the sector, which discouraged women from challenging these inequities.
Opportunities for promotion to management for women and non-binary people are limited	Career progression, particularly into management for women and non-binary people in the utility-scale wind and solar energy sectors is very limited. Partially, this is related to the slow uptake of women in the utility-scale wind and solar energy sectors during the recruitment process. In more recent years, entry into the utility-scale wind and solar energy sectors has become more difficult as the industry is becoming more established and skill and experience requirements have increased. Participants also expresses that in instances where the retention and career advancement of women are supported, this support is mostly reserved for women in departments such as finance, HR, or administration. There is also the reality that the "boys club" is still real and precludes women and non-binary women on many levels.

Factors impacting gender diversity at senior levels

The table below lists some factors that impact gender diversity at senior levels in the utility-scale wind and solar energy sectors in South Africa.

Factor	Explanation
Women and non-binary people experience barriers to accessing funds	Participants noted that women and non-binary people experience significant barriers to accessing business opportunities for renewable energy development, including start-up funds, loans and investors. Investment opportunities for women business owners are often perceived as riskier, a belief driven by historical biases. This is further exacerbated as providers of capital are men, frequently putting women at a disadvantage. However, interviewees stressed that despite very limited progress around women accessing funds, non-binary people, particularly openly trans and queer people experience significantly more severe barriers to accessing funding and investor support.

Factor	Explanation
Lack of mentorship and role models for women and non-binary people	A lack of accessible female mentors and role models was frequently highlighted by respondents. Furthermore, an interviewee highlighted that where support is given to women's career advancement in the utility-scale wind and solar energy sectors, it is often reserved for women in departments such as finance, human resources, and legal and not women in technical, engineering and construction roles. There are very few formal, funded mentoring programmes for women and non-binary people run by companies in the utility-scale wind and solar energy sectors in South Africa.

Factors impacting gender diversity in Technical Jobs

The table below lists some factors that impact gender diversity in technical jobs in the utility-scale wind and solar energy sectors in South Africa.

Factor	Explanation
Social norms and gender stereotypes discourage girls and young women from studying STEM-related subjects	Participants highlighted that the crisis in basic education which frequently included very poor standards of education in STEM subjects, limited girls (particularly from public schools) from graduating with sufficient grades to enter STEM-related courses at the tertiary level. Furthermore, gendered assumptions around women's roles and appropriate careers were reinforced at the secondary level, often discouraging girls from studying STEM subjects at the secondary level, resulting in fewer women in the STEM disciplines in tertiary studies. Where women overcame these stereotypes and pursued tertiary studies in STEM-related disciplines they often experienced discrimination. Some participants noted that when women entered the male-dominated STEM courses at the tertiary level they frequently experienced discrimination from male students as well as lecturers.
Lack of a STEM educational background, especially technical, limits career opportunities	While a few women in the utility-scale wind and solar energy sectors do have a STEM background, several women without a STEM background have entered the renewable energy industry. For example, some of the participants in this study have environmental science, social science, and finance-related backgrounds. Furthermore, even in cases where women have STEM backgrounds, many mentioned that not having the technical skills, particularly engineering, was an additional barrier. Lacking technical skills appeared as a significant barrier.

Factors impacting gender diversity in Site Work

The table below lists some factors that impact gender diversity at on-site jobs in the utility-scale wind and solar energy sectors in South Africa.

Factor	Explanation
Lack of health, safety, and wellbeing on site	Women and non-binary people who held site-based positions in the utility-scale wind and solar energy sectors mentioned many safety challenges, while very few office-based respondents reported that they had experienced issues with a lack of health, safety, and well-being. Women working on site also stated that night shifts held additional safety concerns for women. Furthermore, site accommodation is usually not gender segregated, which may deter women and non-binary people from applying for remote work. Women whose work was predominantly site-based also stated that they had felt consistently

Factor	Explanation
	unwelcome on site. Respondents also noted the prevalence of micro-aggressions in their workplaces, particularly with on-site work. This is especially the case with women's clothing, including personal protective equipment (PPE) where companies often do not supply all sues and women end up with poor-fitting PPE.
On-site and remote work is very challenging for many women and non-binary people	To date, women only represent ten per cent of the construction workforce from the total job opportunities created during the construction phase of projects undertaken by Independent Power Producers.[365] Several interviewees stated that on-site work, which offers less stability and frequent travel, is often incredibly difficult for women with family responsibilities, especially children. In addition, there are safety concerns for women and non-binary people (noted above) relating to on-site and remote work.

[365] IPP Office.

Conclusion

The purpose of this report is to assess the future growth in the South African utility-scale wind and solar energy markets and what this growth could mean for gender representation in the sector. The utility-scale wind and solar energy sectors are expected to see significant growth in the next decade, in line with the projections outlined in the *Integrated Resource Plan 2019*. However, the utility-scale wind and solar energy sectors also currently suffer from relatively poor gender representation with only approximately 33% posts in the operational phase of projects being taken up by women and 10% in the construction phase. There is clearly room for improvement in the utility-scale wind and solar energy sectors in terms of gender representation.

Improving gender representation will take time and there are a range of different factors that will drive this change. The key question is which of these factors need to be focussed on in the short, medium, and long term given the potential growth in the sector.

Given that women are very badly represented in the construction phase of wind and solar farms, it may be tempting to focus on the construction phase in particular. This can be achieved, for example, through interventions that pay attention to improving on-site conditions during the construction phase and making these environments more accommodating to women.

However, the data shows that in the long term there will be significantly more job opportunities in the operational phase of wind and solar farms. This is because construction jobs are temporary in nature, while operations jobs are more long-term. As more wind and solar farms come online, there will be cumulatively more job opportunities for women in operating these farms.

Focus therefore needs to be placed on interventions that create a conducive working environment for women in the operations of wind and solar farms in the future. There are a range of activities that can achieve this transition in the operational phase of solar and wind farms. These are unpacked in detail in the final report of this research programme, *Recommendations to improve Gender Diversity 2022*. This is not to say that there are no interventions required to improve gender representation in the construction phase of wind and solar farms. However, in terms of prioritising intervention areas, the focus needs to be on operational job opportunities for women in the utility-scale wind and solar energy sectors in South Africa.

References

DEL. "20th Commission for Employment Equity Annual Report 2019-20." Pretoria, South Africa: Department of Employment and Labour, 2020. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2019%20-2020/20thCEE_Report_.pdf.

———. "21st Commission for Employment Equity Annual Report 2020-21." Pretoria, South Africa: Department of Employment and Labour, 2021. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2020-2021/21%20CEE%20Report.pdf.

———. "22nd Commission for Employment Equity Annual Report 2021-22." Pretoria, South Africa: Department of Employment and Labour, 2022. https://www.labour.gov.za/DocumentCenter/Reports/Annual%20Reports/Employment%20Equity/2021/22nd%20CEE%20Annual%20Report.pdf.

DoE. "Integrated Resource Plan 2019." Pretoria, South Africa: Department of Energy, October 2019. http://www.energy.gov.za/IRP/2019/IRP-2019.pdf.

IFC. "Women's Participation in Renewable Energy Workforce in Sub-Saharan Africa: Identifying Barriers and Opportunities for Women as Leaders and Employees." International Finance Corporation, 2022. https://www.ifc.org/wps/wcm/connect/b089848b-2dd3-458b-85e1-5db3f04cb153/IFC135+-+E2E+Report_V5.pdf?MOD=AJPERES&CVID=o52j5wH.

IPP Office. "Independent Power Producers Procurement Programme (IPPPP): An Overview - As at 31 December 2021." Quarterly. Centurion, South Africa: Independent Power Producers Office, March 2022. https://www.ipp-projects.co.za/Publications.

———. "The REIPPPP Contribution: Women in Energy: Empowerment, Engagement and Employment." Centurion, South Africa: Independent Power Producers Office, September 2017. https://sawea.org.za/wp-content/uploads/2018/03/Women-in-Energy-Feature-august-2017.pdf.

IRENA and ILO. "Renewable Energy and Jobs – Annual Review 2021." Abu Dhabi, United Arab Emirates: International Renewable Energy Agency, 2021. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_823807.pdf.

Urban Earth. "Status Quo of Gender Diversity." Unpublished Draft. Study on Gender Diversity in the Wind and Solar Energy Industries in South Africa, September 2022. https://ueptyltd.sharepoint.com/:w:/s/GIZStudyonGenderDiversity/EW4Z9Zdmv1NCo5Bdps8qo1QBr5ZUAEBEVLbGJ_03B2j_6Q?e=1nd0G1.

Van der Poel, J., and A. Felekis. "What You Need to Know: South Africa's Integrated Resource Plan 2019." *Miningreview.Com* (blog), October 21, 2019. https://www.miningreview.com/energy/what-you-need-to-know-south-africas-integrated-resource-plan-2019/.

www.energypartnership.org.za