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Accelerating the Clean Energy Transition by Empowering Women

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Executive Summary:

The World Meteorological Association recently announced that 2023 has been the warmest year on record. The planet is already experiencing the impacts of anthropogenic climate change and these effects will only continue to worsen as society continues to pump greenhouse gas emissions into the atmosphere. In order to stop global temperature rise and protect the planet for future generations, the world needs to initiate a swift transition away from the burning of fossil fuels to renewable energy forms, such as solar and wind power. The climate crisis has not and will not affect all people equally and therefore the clean energy transition demands principles of equity. One way to support a just transition is to incorporate diverse perspectives from a wide variety of backgrounds into the conversation. This report explores the unique approaches that women bring to the dialogue and the multitude of reasons why female voices are essential to a more sustainable future.

Key Findings:

- 1. There is a lack of women in the renewable energy industry and this may have ramifications on society's ability to achieve progress.
- 2. There are two sectors in particular within the clean energy field that are disproportionately male dominated: trade careers and technical careers.
- 3. As the renewable energy industry grows, it will inevitably require more employees, from a variety of disciplines, to take jobs within the industry. There is significant untapped potential in the applicant pool if women are being overlooked for these roles or not applying at all.
- Renewable energy firms are usually more progressive and therefore offer progressive employment opportunities, including programs specifically geared towards increasing female representation within the field.
- 5. Fostering connections and improving communication is the key to expanding female voices in the industry and expediting the clean energy transition.

- Discourse on the renewable energy transition must be transparent and accessible to all. These conversations must be representative of the population and diverse on the basis of gender, race, ethnicity, sexuality, and other identities.
- Sustainable development cannot be achieved without components of care. A just transition *must* be accompanied by greater care for the planet and for those who are working to protect it.

Introduction:

This project grew out of the personal interest of the author. At the outset, this research project was initially designed to explore the greatest obstacles to the implementation of solar energy in Massachusetts. I began with an investigation into the different utility types, the challenges of grid modernization, and the structure of the Massachusetts electrical grid. However, when I began to seek out contacts in the solar field with whom to connect, I could not help but notice the overwhelming lack of female experts in the field. From there, I decided to pivot the direction of my research and instead focus on the role of women in the renewable energy field. This led me to the following research questions:

• Is there a lack of female representation in the clean energy sector?

If there is...

- Does the lack of women in the industry contribute to stagnancy in the renewable energy transition?
- How can women feel empowered and inclined to get more involved in the industry?

To answer these questions, I employed a mixed-method research approach, reviewing existing literature on the subject and conducting interviews with female experts currently in the renewable energy field:

Sierra Dall is the founder, President, and CEO of the <u>Municipal and State Energy Edge</u> <u>Forum</u> (MSEF). MSEF is an online, invitation-only forum for experts in the renewable energy field to connect, learn, and collaborate on innovative solutions to renewable energy challenges. Dall founded the forum back in 2008 after coming to understand the acute threat posed by climate change. Through the forum, she aims to unite business, government, higher education, and utilities together to develop synergistic solutions to the climate crisis.

Lynn Arthur is the founder of <u>PeakPower Long Island</u> (PPLI), a member of the Southampton Town Sustainability Committee, and a member of the MSEF. Arthur created PPLI as a subcontractor for the Town of Southampton, with a goal to facilitate energy efficiency for Long Island residents. She also spearheaded Long Island's first community choice aggregation program (CCA), which allows municipalities to independently decide from where to source electricity, opening the door for increased use of renewable energy.

Amanda Campbell is a Training Operations Manager at <u>Solar Energy International</u> (SEI) and a member of SEI's Women in Solar Power program working group. Founded in 1991, SEI aims to educate, engage, and empower people to take part in the renewable energy transition ("Our Organization" 2023). In 2022, SEI began offering a Women's Solar Electric Lab Week in Paonia, Colorado with a goal to foster connections between women of all experience levels in the solar energy field.

Supplemental information for this report was sourced from a combination of academic literature, government and non-governmental organization (NGO) reports, and the media. All together, this evidence provides a broad, but by no means comprehensive, view of the role of women in the clean energy field.

Background:

According to the U.S. Bureau of Labor Statistics (BLS) 'green jobs' are those "that produce goods or provide services that benefit the environment or conserve natural resources" (U.S. Bureau of Labor Statistics, n.d.). These occupations may entail work to reduce fossil fuel use, eliminate greenhouse gas emissions, improve energy efficiency, or expand networks of renewable energy (Women's Bureau 2012). More progressive definitions of green jobs have emphasized the reciprocal relationship of care that must exist between the planet and its stewards. Novello and Carlock (2019) add that in addition to protecting the environment, 'green jobs' must also provide employees with higher wages, better workplace quality, and a strong commitment to diversity and inclusion. In order to achieve a just transition to renewable energy, the green economy must reflect principles of ecological and social sustainability. Accordingly, it is incredibly important that the green labor force be representative of society and thus listens to the voices of women.

According to the International Renewable Energy Agency (IRENA) and the International Labor Organization (ILO), there are 13.7 million jobs in the clean energy industry globally (IRENA and ILO 2023). Within those jobs, the ratio of women to men is 8 to 17. In other words, women make up just 32% of all renewable energy employees around the world. For comparison, women account for almost 40% of the global workforce (World Development Indicators 2023). Data from 2015 reveals that in Organization of Economic Cooperation and Development (OECD) countries, which includes the United States, Canada, and Germany, revealed that women held only 25% of all jobs in renewables, and most positions were in non-technical, administrative, or public relations roles (Baruah 2016). Based on this data alone, it is evident that women are disproportionately absent from careers in the renewable energy industry. Interviewees echoed this notion; women are either noticeably absent from the field (Campbell 2023), or one must specifically seek them out in order to obtain their input (Arthur 2023; Dall 2023). Women are being excluded from the renewable narrative and will continue to be as the industry grows.

Box 1: Technical and Executive Positions in Solar

The gender discrepancy is especially prominent for positions that entail highly technical or executive work. Women have higher representation in the solar field than in other clean energy sectors, accounting for 40% of all solar employees (IRENA and ILO 2023). However, women disproportionately fill roles related to administrative duties (58%), compared to other career areas (See Figure 1). For solar careers related to STEM (science, technology, engineering, and mathematics), women comprise just 32% of the workforce. Moreover, only 17% of all senior management roles in the solar field are filled by women. Amanda Campbell of SEI has observed this disparity in the real-world, noticing that there are far more women on the administrative side of solar work than in technical positions. Those that are involved in the design and implementation of solar energy and have a deeper understanding of the math and physics behind the equipment are less likely to be women (Campbell 2023). The gendered

skew in the position type breakdown is likely to extend to other sectors of renewable energy as well.



Figure 1: Share of Women in Specific Solar PV Roles

Renewable energy is a key component in humanity's fight against climate change and the transition is inevitable. Already, the clean energy sector is expanding rapidly; 2022 witnessed a 7.8% increase in the number of jobs within the industry from the year prior (IRENA and ILO 2023). Yet the growth of clean energy employment risks exacerbating the existing gender gap. Baruah (2016) describes this phenomenon:

Although there is tremendous potential to create employment in the [renewable energy] sector almost everywhere in the world, there is a growing concern that women, who are already drastically underrepresented in the sector, will become even more marginalized if gender equity policies and programs are not proactively planned and implemented.

The United Nations reports that women are disproportionately affected by the impacts of climate change (UN Women). Sustainable development, defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," calls for principles of equality and justice (Brundtland 1987). If the renewable energy transition is to be sustainable, it must support those who are most vulnerable to the consequences of climate change, including women.

Barriers to Entry:

If current demographics are any indication, the unbalanced gender dynamics of clean energy jobs are unlikely to change without fundamental shifts in societal thinking. To fix this problem, we first must know: why are women less involved than men in the renewable energy field? Research points towards four main barriers to entry:

1. Lack of visibility

The current lack of women in top positions (Box 1) may deter aspiring women from applying to similar or less-experienced roles. The intimidation association with entering a highly male-dominated space can have a corresponding emotional toll (Campbell 2023).

2. Fewer opportunities for Women in STEM

It is widely known that society tends to guide women away from STEM pathways from a young age onwards. Studies show that negative stereotypes about gender and STEM begin to affect girls as early as elementary school and become especially prominent during adolescence (Kuak 2021). In 2018, only 36% of all STEM-related Bachelor's degrees at American institutions were awarded to women. In general it has been found that "women's self-perception and societal perceptions of women's incompetence" discourages women from pursuing technical careers (Baruah 2016). This extends to technical and vocational education and training (TVET), which can help prepare

individuals for specialized and trade occupations in renewables (Kwuak 2021). If women are unable to acquire TVET or a STEM education, they may find it harder to break into the energy industry.

3. Threat of Harassment

Unfortunately, women may face heightened risk of harassment in highly male-dominated spaces. While sexual harassment is an issue faced all too often by women across the laborforce, the problem is particularly serious in trade jobs, such as those worked by electricians working on renewable energy projects (Renwick 2023). The BLS reports that only 2% of all electricians identify as female, leading to a highly masculine work culture. Women are often presumed less competent in non-traditional occupations, leading to a higher likelihood of sexual exploitation (Baruah 2016). Trepidation of such a workplace environment may act as a disincentive to women looking to enter the industry.

4. Childcare Challenges

Women often take on roles outside of the professional workplace that can be a barrier to certain careers. Women who are the primary caregivers for their children may struggle to be employed in on-the-ground jobs (Campbell 2023). Childcare options, especially those that are most affordable, are usually designed with traditional nine to five jobs in mind (Renwick 2023). Energy related careers, particularly those in the field, are more likely to follow a non-traditional work schedule, which could require women to find alternative childcare during the early morning or late night hours of work. The lack of support available for caregivers is an obstacle to female involvement in the industry.

These four obstacles have the potential to stand in the way of female aspirations in the renewable energy field. They may prevent women from joining the green workforce, remaining in the industry, or being promoted to higher level positions. These systemic barriers pose a significant challenge for sustainable development, as they limit the scope of the net-zero conversation.

Opportunities:

Society inadvertently places hurdles in front of women who are or want to be involved in the renewable energy transition. If they can manage to overcome those obstacles, however, the opportunities for growth are numerous.

Because green jobs represent a wide range of occupations and position-types, there are **multiple points of entry** for women looking to get involved. Little experience is required for many entry-level positions within the energy industry and on-the-job training and apprenticeships are often encouraged (Women's Bureau 2012). The energy industry also seeks out employees with a **wide range of skills**. The diversity of careers available within the field means that there is likely to be a position for everyone, regardless of specific qualifications or experience. From entry-level to senior management positions, there are abundant **chances to learn and grow** within the field (Arthur 2023). These opportunities are also conducive to strong **upward mobility** (Women's Bureau 2012). A background in one corner of the industry is likely to improve one's prospect at securing higher-level positions or a role in another.

As the renewable energy industry grows, the number of jobs available will also continue to expand. Green employers are already **hiring en masse** and new position types will emerge as energy technology adapts to meet the needs of our rapidly changing future (Arthur 2023). Innovative approaches to the renewable transition lend themselves to progressive occupational opportunities (Dall 2023). Moreover, STEM careers, such as those in clean energy, are likely to be **higher paying jobs** than those in other industries. It has been found that women in STEM jobs earn up to 33% more than other career paths (Baruah 2016). Renewable energy firms are also more likely to hire full-time employees, which contributes to above average salaries for their employees (Baruah 2016). In 2016, Brookings found that average hourly wages for green jobs are at least \$2 higher than the national average (Novello and Carlock 2019). The U.S. Women's Bureau has identified that green jobs are a key way to expand earning potential for women (Women's Bureau 2012). These careers may lead to upward social and economic mobility for women.

Box 2: Life Satisfaction and Green Jobs As Second Careers

Participating in the green economy may lead to a heightened sense of fulfillment in life. Contributing to an industry that exists to protect and improve the environment can be a source of pride for many women (Women's Bureau 2012). For mothers who come to understand the impacts that climate change can have on their children, a career in renewable energy can be a means of taking part in the effort to preserve the planet for future generations (Dall 2023). Moreover, the Women's Bureau reports that green jobs are often a second career for women, who wish to make a positive difference in the world after leaving their previous job (Women's Bureau 2012). In fact, this was the case for two of this report's interviewees.

- Lynn Arthur began her journey in renewables after retiring from an accomplished career at IBM (Arthur 2023). It was there that she gained the technical and managerial skills to thrive in her second career in clean energy. Her past experience gave her the confidence to succeed in the sustainability world, where she has been able to effect change at the local and state levels.
- Sierra Dall has been an environmentalist since college where she led a successful campaign to ban the use of the pesticide DDT from campus and found her way back to renewable energy as a second career. Founding the MSE Forum reminded her of the impact that a single person can have on the world and allowed her to follow her passion for the environment.

I'm doing exactly what I want to be doing right now. I couldn't ask for a better life or a better career than I have right now because I'm doing what I should have been doing all along. But I didn't know that I was capable of doing this. So I held myself back for a long time and I didn't take the risk. Take that risk! Try it, see what happens, and grow from it. You'll make mistakes and learn from it."

- Sierra Dall, Municipal and State Energy Edge Forum

Female Voices Are Essential:

The numerous advantages for women of entering a green occupation are outweighed only by the manifold benefits to society. Women are integral to the renewable energy transition and may be able to expedite its development. As the implementation of clean energy becomes more widespread, the industry will require more employees, especially for specialized and technical roles. It is important that women are given the same opportunities as men to land these positions and contribute to the energy revolution.

The traditional energy system is designed to be hierarchical and has historically been dominated by men up-and-down the corporate ladder. In the transition to clean energy, women have a crucial role to play in transforming the system into a network prepared for the future. Evidence suggests that there are different factors that can trigger innovative behaviors amongst women and men. A study by Pons, Ramos, and Ramos (2016) identifies that innovative behaviors tend to manifest in women due to intrinsic variables, including confidence, empowerment, and social support, and in men due to external job pressures. This is reflected by the observations of Amanda Campbell, during SEI's Women's Only Lab Week. She reports that, compared to the strategies used during SEI's regular mixed-gender programs, women are more likely to develop ideas as a team. Men can have a tendency to approach challenges from a top-down perspective and often designate an unofficial leader who takes charge of the problem-solving process (Campbell 2023). Women, on the other hand, frequently work collaboratively from the bottom-up and employ strategies of open communication to complete tasks. This type of thinking may be key to approaching some of society's most pressing challenges.

"The more equity and opportunity there is for both sides of the gender spectrum, and everywhere in between, the better it is for everyone in the industry. These opportunities have the potential to create a world with a healthier balance of ideas that plan for a future that ensures everyone is included"

- Amanda Campbell, Solar Energy International

It is essential that the renewable energy dialogue be diverse and inclusive of people of all genders, identities, and backgrounds. This is a fundamental step to ensuring that the transition is truly sustainable. As Lynn Arthur describes, in the fight against climate change "a rising tide will lift all boats," and it is therefore essential to listen to the voices of anyone with something important to say. From this point of view, there is little downside to cooperation. Stakeholder engagement and community involvement are vital components of expanding the discourse on clean energy. A just transition must be one that emphasizes the importance of care for people and the planet.

Key to Empowerment:

How can women dismantle the obstacles in the path to success in the renewable energy industry? What is the key to empowerment? Research points towards two primary factors that allow women to thrive in green jobs: **communication and connections**. Below are five points of advice for women looking to enter the renewable energy sector and feel empowered in doing so:

- 1. Do not be afraid to speak up. Women have the power to amplify each other's voices, simply by speaking up themselves. One way to accelerate the clean energy transition is to improve the flow of communication between individuals, organizations, corporations, and governments, something in which women can play a prominent role (Dall 2023). As this report has previously established, female perspectives are incredibly important amidst male-dominated conversations.
- 2. Never stop learning. Knowledge is the key to being heard and respected, and there is never a shortage of opportunities to learn new things just by speaking to others in the field (Arthur 2023). Education may also lead you to connect with others who complement your greatest assets and can teach you something new (Women's Bureau 2012).

"Determine what specific area you want to go into and learn as much as you can about that topic or issue. Find the people who also specialize in that area and connect with them."

- Lynn Arthur, PeakPower Long Island

- **3.** Establish connections with people who share your background. Seek out the women in leadership positions and at all levels of the industry who are pursuing a similar career path as you or are already doing the work you hope to do (Campbell 2023). Finding a strong network of support can be key to feeling comfortable and empowered at work (Women's Bureau 2012). There are a variety of programs and forums out there for clean energy professionals to share their experience and expertise and some are geared specifically towards female experts
- 4. Engage in mentorship programs. One-on-one mentoring, either in a formal or informal setting, that begins as early as high school and continues throughout the college and early professional years can be a transformative experience (Wang and Tietjen 2023). As a mentee you may receive meaningful advice on how to achieve everything you want in your green career. As a mentor, you have the opportunity to share all you have learned as a successful woman in the renewable energy field.
- 5. Go after your dreams. All three of this project's interviewees indicated that while progress on the energy transformation is slow, it is undoubtedly happening (Arthur 2023; Campbell 2023; Dall 2023). As the renewable sector grows, the voices of women will have the power to move mountains towards progress.

"It took me too many years before I finally realized I was able to do what I'm doing...Don't be afraid to do it. Take a risk! Go for it! And follow your passion." — Sierra Dall, Municipal and State Energy Edge Forum

Conclusion:

Climate change is the greatest threat humanity has ever faced and we are running out of time. Society is making strides towards renewable energy through both political and economic channels. Yet progress often begins at the grassroots level, with one person or a small group of people demanding a better tomorrow. These initiatives invite everyone and anyone to take part in accelerating the renewable energy transformation; the more voices calling for change, the better. If we can emphasize the power of collaboration and support for women — and for everyone — we may be able to put society on a better path towards a cleaner, greener future.

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