

## Green Skills for Green Buildings and Solar PV

*The **Global Forum on Sustainable Energy (GFSE)** is a neutral multi-stakeholder platform that facilitates international dialogue on energy for sustainable development by taking into account the special interests and challenges of developing countries. GFSE aims to establish a sustainable world energy system from a social, economic, and environmental perspective.*

*GFSE contributes to both international discourse and information dissemination on sustainable energy. The multi-stakeholder platform plays a crucial role in facilitating sustainable energy projects by bringing together donors, investors, and project developers. Their interaction creates new opportunities and enhances existing initiatives in sustainable energy.*



**Authors:** Eva Janechova, Leonardo Barreto Gómez, Theodora Löw (GFSE Secretariat)

## Table of Contents

Introduction.....	3
Green Skills for renewable energy .....	4
Skills for the future .....	4
Cooperation between governments, companies and educational institutions.....	5
The European Year of Skills .....	6
Solar PV.....	6
EU Solar Skills partnership.....	9
International Solar cooperation .....	10
Cooperation between the University of Pretoria and Nepoworx on solar PV skills .....	9
Brazil’s RevoluSolar project .....	9
Green Skills in Sustainable Building Sector .....	11
Training women to build disaster-resilient homes .....	13
Green Jobs in the building construction sector in Zambia .....	13
The Green Building Workforce: Creating Jobs and Skill Development in India .....	14
Women in Green Building Leadership Award .....	15
The BUILD UP skills initiative .....	15
Green training for construction managers.....	15
Training construction workers on energy efficient building practices.....	16
Potential measures.....	16
Gender and green skills.....	17
The role of women as actors of change within the transition to the sustainable energy model .....	18
Women in renewable energy.....	18
Financial incentives for women to attend green skills training .....	20
Girls4rurals – Nepal .....	20
Energia Mujer – Chile .....	21
Conclusion .....	22

## Abstract

This policy brief addresses green skills requirements and measures in the green buildings and solar PV sectors. Green skills play a central role in the renewable energy transition and decarbonisation of the energy sector. The demand for green skills is increasing, resulting in a shortage of workforce in the energy market. It is crucial to take measures to mitigate the risk of skills shortages, support the new skill development, re- and upskill existing workforce and match market requirements with the skills qualifications. This policy brief provides a general overview of green skills in the energy sector, and further addresses green skills in the solar PV sector, in the sustainable building sector and the inclusion of women and importance of gender equality in the energy transition based on theoretical analysis, policy measures and best practice examples.

## Introduction

Green skills are crucial for fostering sustainable development. Green skilled workers advance the process of the renewable energy transition especially in the field of decarbonizing the energy sector. However, even as the current demand for green skilled workers is rising, a noticeable lack of green skilled workers represents the current state of play<sup>1</sup>.

Therefore, it is essential to implement measures to reduce the risk of skills shortages, support the development of new skills, reskill and upskill workers and harmonise training requirements and skills.<sup>2</sup> Collaboration between companies, authorities, training providers and other actors is key to qualify the skilled workforce necessary for the transition and match skilled workers to job opportunities.

There are linkages between the renewable energy technologies for onsite electricity generation and heating & cooling and energy efficiency technologies in the buildings sector. These linkages need to be well addressed during the qualification and training of the workforce, in order to guarantee an optimal performance of the combined systems.

Boosting investment in training and upskilling opportunities to make sure that workers acquire the skills demanded on the labour market, including digital and green skills, can be done, among others, through the following actions:<sup>3</sup>

- Promoting increased, and more effective and inclusive investment in training and upskilling.
- Making sure that skills are relevant for labour market needs
- Matching people's aspirations and skills with opportunities on the job market. A special focus should be activating more women and young people for the labour market.
- Attracting people with the skills needed to companies in the renewable energy sector
- Encourage stakeholders, local authorities and communities to promote training
- Encourage businesses and organisations to get involved in up- and re-skilling workers
- Spread good practices and success stories gathered across different training programmes

<sup>1</sup> BCG, 2023. Will a Green Skills Gap of 7 Million Workers Put Climate Goals at Risk?

<https://www.bcg.com/publications/2023/will-a-green-skills-gap-put-climate-goals-at-risk>

<sup>2</sup> <https://windeurope.org/newsroom/news/what-is-the-wind-industry-doing-on-skills-and-education-to-deliver-a-fair-transition/>

<sup>3</sup> European Commission, 2022: Commission kick-starts work on the European Year of Skills.

<https://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=10431&furtherNews=yes>

## Green Skills for renewable energy

Skills in the renewable energy sector have been evolving rapidly. The set of skills is diverse, and depends on the technology and the job requirements. Skills in the area of STEM (science, technology, engineering, mathematics) as well as problem-solving skills are important in the renewable industry. Besides technical skills, marketing and management skills, innovation skills, digital, sustainability and soft skills are necessary. Delivering these skills to people and matching people to jobs requires significant efforts. The process of qualifying a skilled workforce requires targeted training and educational programs, sound orientation for potential trainees and local employment ecosystems to match candidates with vacancies.<sup>4</sup> The renewable energies ecosystem is, however, very diverse and fragmented. Thus, cooperation between the industry, governments and training and educational institutions is necessary.

Training and educational programs for the renewable energy sector need to be improved and scaled up. Modular, up-to-date training is required, with changes to be integrated more rapidly to avoid obsolete curricula. Training also needs to respond to market needs and allow trainees to become employable. Training and educational programmes also need to become more accessible and inclusive, targeting the youth and women.

More efforts are needed to motivate women, young adults and teenagers as well as workers in other areas to get involved in the training and educational programmes required to grant a qualified future workforce for the renewable energy industry. The sector will also have to take into account people with advanced age and provide them with specific training programmes for up and re-skilling.

## Skills for the future

Anticipating future skills needs is an important element of the planning and design of training and educational programmes. Hence, a mapping of the skills needed will be essential by involving different institutions and sectors in identifying the skills requirements for the future.

This assessment of future skills should guide the development of new programmes of educational, certification and vocational training along with upskilling or reskilling programmes for the existing workforce.<sup>5</sup>

---

<sup>4</sup> Michael Bates, 2023: European Retraining Initiative Offers Solar Installation and Other Vocational Training to Millions <https://solarindustrymag.com/european-retraining-initiative-co-led-by-iberdrola-offers-solar-installation-and-other-vocational-training-to-millions>

<sup>5</sup> IEA, 2022: Skills Development and Inclusivity for Clean Energy Transitions. <https://iea.blob.core.windows.net/assets/953c5393-2c5b-4746-bf8e-016332380221/Skillsdevelopmentandinclusivityforcleanenergytransitions.pdf>



*Figure 1: Key elements of qualification programmes for renewable energy and energy efficiency*

To offer trainings that deliver valuable skills, several essentials will be necessary:

First and foremost, educators and trainers with expertise and experience must be at hand. They are at the heart of any training facility and will be those who not only teach but also encourage those learning and give them an example of what to strive towards. Additionally, facilities in which trainings can be held will be necessary. These should be accessible on a geographical, financial, and inclusive level for all those in training. A further important aspect is to ensure that the skills learned in training can be applied on the market. This can be achieved through cooperation between companies, educational institutions, and governments. It can happen in many different forms, be it through experienced experts in the energy sector acting as teachers in training facilities or through programs that allow those in training direct access to hands-on work experience.

## Cooperation between governments, companies and educational institutions

Improving training programmes for sustainable energy systems requires governments working closely with companies and educational institutions to understand their needs, approaches and challenges. Strong partnerships between governments, companies, educational institutions and labour associations are necessary to develop and implement training strategies that deliver the skills required by the renewable energy and energy efficiency sectors. This includes anticipating and forecasting future training needs.

Collaboration between businesses and educational institutions should be strengthened to ensure that the youth develops marketable skills. This includes dual training programs that give young people access to apprenticeships and traineeships in companies while attending vocational school, as well as programs that link demonstration projects for renewables, educational programmes and policy development.

## The European Year of Skills

The European Commission declared 2023 as the European Year of Skills.<sup>6</sup> The European Year of Skills aimed at boosting investment in training and upskilling opportunities to make sure that workers acquire the skills demanded on the labour market, including digital and green skills through the following actions:

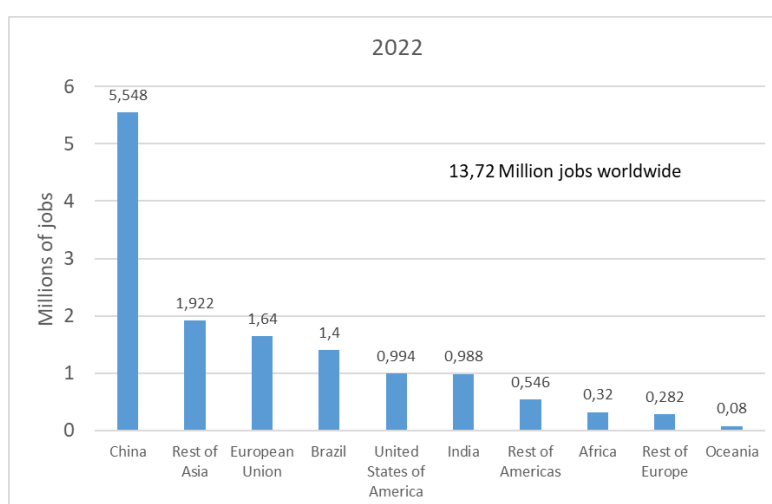
- Promoting increased, and more effective and inclusive investment in training and upskilling.
- Making sure that skills are relevant for labour market needs
- Matching people's aspirations and skills with opportunities on the job market. A special focus is given to activate more women and young people for the labour market.
- Attracting people from third countries with the skills needed by the EU

## Solar PV

Solar photovoltaic installations have been growing substantially in the past few years.<sup>7</sup> The contribution of PV to decarbonizing the energy mix is substantial. Solar PV saves about 1 100 Mt of CO<sub>2</sub>eq. This represents about 7.5% of the total global electricity and heat sector emissions.<sup>8</sup>

An estimated amount of seven million missing green workers are expected by 2030 worldwide, most of which are in short supply concerning the renewable energy sector, particularly in the field of solar power and photovoltaic installations.<sup>9</sup>

In 2022, the photovoltaic industry employed 4.9 million people, which represents a third of all jobs in the renewable energy sector worldwide (13.7 million).



<sup>6</sup> European Union, 2023. [https://year-of-skills.europa.eu/index\\_en](https://year-of-skills.europa.eu/index_en)

<sup>7</sup> BCG, 2023. Will a Green Skills Gap of 7 Million Workers Put Climate Goals at Risk? <https://www.bcg.com/publications/2023/will-a-green-skills-gap-put-climate-goals-at-risk>

<sup>8</sup> International Energy Agency Photovoltaic Power System Programme, 2022. Snapshot of Global PV Markets. IEA PVPS TCP. ISBN 978-3-907281-31-4. [https://iea-pvps.org/wp-content/uploads/2022/04/IEA\\_PVPS\\_Snapshot\\_2022-vF.pdf](https://iea-pvps.org/wp-content/uploads/2022/04/IEA_PVPS_Snapshot_2022-vF.pdf)

<sup>9</sup> BCG, 2023. Will a Green Skills Gap of 7 Million Workers Put Climate Goals at Risk? <https://www.bcg.com/publications/2023/will-a-green-skills-gap-put-climate-goals-at-risk>



Figure 2: Employment in the global renewable energy sector in 2022. Source: IRENA and ILO (2023), *Renewable energy and jobs: Annual review 2023*, International Renewable Energy Agency, Abu Dhabi and International Labour Organization, Geneva.  
<https://www.irena.org/Publications/2023/Sep/Renewable-energy-and-jobs-Annual-review-2023>

The proportion of women is 40%, which is almost two times higher than the proportion of women in the wind industry (21%) and the oil and gas sector (22%). It also exceeds the average proportion of women in all renewable energy sectors (32%). Therefore, the solar PV sector has a leading position in terms of gender balance.<sup>10</sup> Nevertheless, 35% represent non-technical positions such as marketing, distribution, sales etc. There is still great potential to integrate more women into the technical field of the solar energy sector.

Worldwide, China leads in the number of personnel employed throughout the solar photovoltaic value chain. In the year 2022, of the 4.9 million employees globally, 56% were concentrated in China. Capacity building targeted at manufacturing and construction of solar photovoltaic installations increases the number further, allowing for 260 000 green skilled workers to aid in the production of polysilicon, wafers, cells and modules.

The green skills required in manufacturing differ from those required for the deployment of solar PV. Skills for installation also differ depending on the size of the plants. For example, the installation of residential solar panels requires different skills than the installation of large-scale utility plants. The green skills of personnel required for operation and maintenance also differ<sup>11</sup>.

Two main kinds of professionals are needed for rooftop solar installations<sup>12</sup>.

- qualified electricians for the design and grid connection
- construction workers to install mounting structures and panels

Looking at the European Union, ambitious goals relating to renewable energy are being pursued, in order to comply with targets laid out in the European Green Deal and the REPowerEU plan. Therefore, the European Union’s European Centre for the Development of Vocational Training (CEDEFOP) oversees the European Skills Index<sup>13</sup>, a database which predicts Member States advancements in the field of green skills. Furthermore, the European Training Foundation (ETF) pursues efforts in building capacities for the need of green skilled workers in the European Union.

The EU solar PV capacity is increasing rapidly. The table below shows the installed capacity in the years 2021 to 2023.<sup>14</sup>

Table 1: Solar PV installed capacity in the EU. 2021-2023

Year	Installed Capacity (GW)
2021	164.19
2022	204.09
2023	259.99

<sup>10</sup> Irena, 2022: <https://www.irena.org/News/pressreleases/2022/Sep/Solar-PV-Employs-More-Women-Than-Any-Renewables>

<sup>11</sup> UNEVOC UNESCO, 2019: Solar Energy Demands Discussion  
[https://unevoc.unesco.org/pub/solar\\_energy\\_demands\\_discussion\\_paper1.pdf](https://unevoc.unesco.org/pub/solar_energy_demands_discussion_paper1.pdf)

<sup>12</sup> SolarPower Europe, 2023: EU Solar Jobs Report 2023. BRIDGING THE SOLAR SKILLS GAP WITH QUALITY AND QUANTITY.  
<https://www.solarpowereurope.org/insights/thematic-reports/eu-solar-jobs-report-2023-1>

<sup>13</sup> CEDEFOP, 2021: Get your Skills together Europe’s Green Deal  
<https://www.cedefop.europa.eu/en/news/get-your-skills-together-europes-green-deal>

<sup>14</sup> European Commission, 2024. Solar Energy. [https://energy.ec.europa.eu/topics/renewable-energy/solar-energy\\_en](https://energy.ec.europa.eu/topics/renewable-energy/solar-energy_en)

The solar workforce in the European Union grew by 39% to 648 100 workers by the end of 2022, from 466 000 workers in 2021. The rapid growth reflects the dynamics of the European solar market.<sup>15</sup>

The newly revised Renewable Energy Directive (EU/2023/2413) outlines initiatives to further advance the energy transition throughout the European Union, expanding on the manufacturing and implementation capacity of solar photovoltaic, especially integrated within residential buildings. Apart from the physical implementation and maintenance, the European Union aims to pursue green skill capacity building through the Solar Strategy.

The Solar Strategy was adopted in May 2022, outlining these targets<sup>16</sup>:

- expanding on solar energy production through the European Solar Rooftop Initiative, made possible by the implementation of photovoltaic installations on diverse buildings.
- integrating photovoltaic installations into areas, which showcase area constraints. This is made possible by incorporating photovoltaic installations in agricultural areas or by creating installations, which float on water.
- facilitating the feeding in process of solar generated energy into the energy network

Key actions to implement the EU Solar Energy Strategy are the following flagship initiatives:

- EU Solar Rooftops Initiative
- EU Solar Skills Partnership
- EU Solar Industry Alliance

Other actions include proposing a legislative initiative banning products made by forced labour from the EU single market. Forced labor contains work and services performed along the supply chain, which are demanded under threat and which the person does not provide voluntarily. The Commission has proposed a two-stage investigation procedure based on a risk-based approach. The proposal was presented in September 2022 and in January 2024 the Council of the European Union formalized its negotiating mandate.<sup>17</sup>



<sup>15</sup> SolarPower Europe, 2023. EU Solar Jobs Report 2023. <https://www.solarpowereurope.org/insights/thematic-reports/eu-solar-jobs-report-2023-1>

<sup>16</sup> European Commission, 2022: EU Solar Energy Strategy <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0221>

<sup>17</sup> Gorrissen Federspiel, 2024: Update on the EU's proposed ban on products made with forced labour <https://gorrissenfederspiel.com/en/update-on-the-eus-proposed-ban-on-products-made-with-forced-labour/>



## EU Solar Skills partnership

Solar PV has a significant potential to scale up in the EU. However, to reach the installed capacities needed until 2030, a qualified workforce is necessary. Thus, skilling and upskilling are of major importance. The European solar skills partnership aims to bridge the divide between the demand of green skilled workers needed in the manufacturing and installation process of photovoltaics.

This partnership will address the skills gap in the EU and promote the development of a skilled workforce in the solar energy sector. The EU Solar Skills Partnership develops an understanding of the concrete upskilling and reskilling measures needed. The skills partnership also fosters cooperation between industry, social partners, training providers and regional authorities in unlocking EU funding.

Member States are encouraged to analyse the skills gap in the solar sector and to develop corresponding training programs. The partnership will also aim at increasing the participation of women in the sustainable energy sector.

Solar PV manufacturing provides a small percentage of jobs today in the EU, due to the fact that manufacturing is less job intensive than capacity deployment and that there is little manufacturing capacity in the EU.

Most solar jobs are linked to annual PV installations. The solar rooftop segment is expected to deliver the bulk of jobs in the near future. Solar rooftop mandates could provide an opportunity for Member States to create additional local employment. An increase of utility-scale installations would also deliver more jobs but in a lower proportion than solar rooftop.<sup>18</sup>

One example of the current shortage are electricians. Today there is a bottleneck in the number of electricians required to install solar panels in the EU. Electrical contractors already report difficulties with recruiting. Electricians require a training of about 3 years. In contrast, rooftop solar PV installers can be trained with a programme lasting several weeks. In addition, the technical challenges electricians need to address, including digitalisation, are increasing.<sup>19</sup> The solution to this bottleneck in the number of qualified electricians requires coordinated action at the EU level.

Solar PV rooftop systems are also getting smarter – integrated system to steer the triangle in between the PV generator, storage device and the grid. Thus, digital skills are becoming more important.

SolarPowerEurope has published recommendations to bridging the skills gap.<sup>20</sup> Some of these recommendations are as follows:

- Launch an EU Observatory for Green Workers
- Launch a communication campaign for green jobs
- Develop a comprehensive EU standardised mapping of solar and renewable skills
- Launch an EU Solar Jobs Matrix, providing a skills set map and possible careers in the solar sector

---

<sup>18</sup> SolarPower Europe (2022): EU Solar Jobs Report 2022 – Addressing the solar skills challenge

<sup>19</sup> EuropeOn, Belgium: <https://europe-on.org/skills-4-climate/>

<sup>20</sup> SolarPower Europe, 2024. SolarPower Europe Position Paper on skills: Recommendations for bridging the gap. SolarPower Europe. Brussels, Belgium.  
[https://api.solarpowereurope.org/uploads/Solar\\_Power\\_Europe\\_Skills\\_Position\\_Paper\\_947e19bc4e.pdf?updated\\_at=2024-01-31T10:02:19.665Z](https://api.solarpowereurope.org/uploads/Solar_Power_Europe_Skills_Position_Paper_947e19bc4e.pdf?updated_at=2024-01-31T10:02:19.665Z)

## International Solar cooperation

Below is a best practice example from Africa that describes the collaboration between a university and the private sector to promote the green skills advancement in the solar PV sector.

### Cooperation between the University of Pretoria and Nepoworx on solar PV skills

The University of Pretoria features a collaborative platform called 'Future Africa', with the aim to tackle interdisciplinary issues. Throughout a 2021 launched project collaboration of Future Africa and Nepoworx PPP, an accredited solar PV training institution based in South Africa, the two sides committed to the advancement of green skilled workers throughout the solar PV field. The joint effort is expressed through a Memorandum of Understanding (MoU), showcasing the dedication of upscaling green skill capacities from both the public and the private sector.

The training programmes are tailored to expanding on solar PV green skills, with the additional objectives of overcoming unemployment, ensuring a just transition and guaranteeing energy supply, through implementing a planned capacity building plan of action over the duration of three years and reaching a proposed 900 youth and women workers.<sup>21</sup>

Brazil's RevoluSolar project offers a best practice example on how green skills training can be combined with support for marginalized groups.

### Brazil's RevoluSolar project

RevoluSolar is a Brazilian non-profit organization founded in 2015 with the aim of improving living conditions in the low-income communities of Babilônia and Chapéu Mangueira in Rio de Janeiro by providing solar energy. RevoluSolar's first solar cooperative was founded in 2021. The organization is financed by institutional investors and rents from the beneficiaries of solar energy. The solar systems are built, operated and maintained by professionals trained by RevoluSolar. Training includes also education of children and involvement of local community members at all stages of a project. Solar PV systems are installed to reduce energy costs, empower consumers and promote community sustainability.

In 2020, the total installed solar power generation capacity was 26 kWp, and the power generation made up ca. 35,000 kWh/year. This met the needs of the project's 36 households. In the last quarter of 2021, the installed capacity of 4 solar systems accounted for 38 kWp and energy production was about 23,000 kWh. The estimated annual savings for the families were approx. BRL 8,000 (EUR 1,448).

RevoluSolar also offers vocational training for solar installers and electricians. The educational and cultural program raises environmental and ecological awareness of children and youth to promote sustainable development among the next generation of community members.<sup>22</sup>

<sup>21</sup> Future Africa: Accelerators for Green Skills in Solar PV Energy Transition  
<https://www.futureafrica.science/news-events/all-news/item/accelerators%20for%20green%20skills%20in%20solar%20pv%20energy%20transition>

<sup>22</sup> IEA, 2022: Skills development and inclusivity for Clean Energy transitions



## Green Skills in Sustainable Building Sector

The global construction sector is responsible for 40% of energy consumption, 33% of greenhouse gas emissions, 30% of raw material consumption and 40% of waste generation worldwide. Taking into account the energy used for the production of the materials in the construction sector would render the building sector the prime emitter of greenhouse gases. The production of the basic building materials for most modern buildings - cement, steel, glass, aluminium and baked bricks - have very high environmental impacts, consume the most energy and cause the majority of GHG emissions in the construction sector. Thus, sustainable building materials positively affect both the thermal performance and the environmental impact of the building. Moving towards better, more climate-responsive building design and construction can ensure energy efficiency and limitations to GHG emissions for decades to come and avoid lock-in effects. Sustainable building design creates buildings that are environmentally responsible and resource efficient throughout a building's lifecycle. Thus, sustainable buildings should be designed based on approaches involving materials sustainability, energy efficiency and ecological considerations.

Promoting energy efficiency in the building sector is an integral part of climate strategies. Mandatory building energy efficiency codes (BEECs) and standards are regulatory tools that establish minimum levels of energy efficiency for different building types, and may comprehensively cover the design and construction of all energy systems.

Policy design should take into account that long-term, easily understandable policies provide more investment security. Relevant stakeholders should be involved in policy design and implementation. In addition, policies should especially support low-income households to reduce energy consumption and increase the share of renewable energies, in order to reduce CO<sub>2</sub> emissions. Collaborative action between decision makers, architects and building efficiency experts will be needed to ensure a holistic

and sustainable development of the building sector and to create an effective policy for the built environment.

In order to increase energy efficiency in the energy sector, the European Union has adopted new policy measures. The EU Energy Performance of Buildings Directive (EPBD) requires member states to ensure minimum energy performance requirements for buildings. The EPBD also defines, that all new buildings should meet near-zero energy demand i.e. be classified as near-zero energy buildings (NZEB). Near-zero energy buildings (NZEB) are buildings that demonstrate very high energy-efficiency and the low energy demand should be covered mostly by energy from renewable sources, which is preferably also produced locally. Low-energy and sustainable buildings are also needed in developing and emerging countries. The experience in the EU is useful for other countries. Austria, for example, has a good knowledge about energy efficient buildings and use of renewables that can be shared with other countries.

Currently, nearly zero-energy buildings (NZEB) are being promoted in several regions. In the long term, zero-emission buildings will be required. A zero emission building is defined as a building with a very high energy performance, with the very low amount of energy still required fully covered by energy from renewable sources and without on-site carbon emissions from fossil fuels.<sup>23</sup>

The implementation of both building concepts requires cross-sectoral and cross-specialty cooperation between construction crafts and renewable energy installers, planners and engineers. Yet, construction of high-quality buildings, especially in the residential sector, suffers from inadequate quality assurance during construction/renovation, a shortage of relevant and up-to-date skillsets and a shortage of qualified workforce.<sup>24</sup>

Construction workers, architects, installers, planners and engineers need to be trained for interdisciplinary work, particularly onsite, to guarantee a good performance of the building and a good matching between renewable heating and water heating systems, onsite electricity production and the building envelope.<sup>25</sup>

However, many workers lack the skills and knowledge when it comes to the requirements to achieve the nearly zero-energy buildings standard. Therefore, it is necessary to engage and inspire key stakeholders across the value chain to change their approach to construction to facilitate the implementation of NZEBs and close the building performance gap.

A number of barriers needs to be overcome:<sup>26</sup>

- Lack of time for training due to the fact that employers need their workers at the workplace and may not be willing to send them to training courses during their working time
- Lack of understanding of the importance of skilled workers
- Cooperation among construction crafts is scarce

---

<sup>23</sup> European Commission, 2021: Nearly zero-energy buildings. [https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/nearly-zero-energy-buildings\\_en](https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/nearly-zero-energy-buildings_en)

<sup>24</sup> NEWCOM, 2021: Enhancing and standardising skills for energy-efficient buildings. <https://cordis.europa.eu/article/id/430568-enhancing-and-standardising-skills-for-energy-efficient-buildings>

<sup>25</sup> NEWCOM, 2018: REPORT ON ANALYSIS OF MARKET BARRIERS TOWARDS CROSS-CRAFT SCHEMES Deliverable 6.1. [https://www.energyagency.at/fileadmin/1\\_energyagency/projekte/moderne\\_gebaude/newcom\\_report\\_on\\_analysis\\_of\\_the\\_market\\_barriers\\_towards\\_cross\\_craft\\_schemes.pdf](https://www.energyagency.at/fileadmin/1_energyagency/projekte/moderne_gebaude/newcom_report_on_analysis_of_the_market_barriers_towards_cross_craft_schemes.pdf)

<sup>26</sup> Trinomics and Visionary Analytics, 2018: Final report on the assessment of the BUILD UP Skills Pillar II Deliverable D4.4 Of the contract EASME/H2020/EE/2015/008 to 'Support for BUILD UP Skills EU exchanges and analysis on construction skills' for the Executive Agency for Small and Medium-sized Enterprises (EASME). <https://trinomics.eu/wp-content/uploads/2018/05/Final-report-on-the-assessment-of-the-BUILD-UP-Skills-Pillar-II.pdf>

- Beyond-the-own-craft thinking is not well anchored
- Investment in employee education is very low
- Construction companies and RES heating installers need to be convinced to invest in trainings for their workers

In addition, guidance for planners and architects is needed to help them consider the optimal combination of renewable energy sources, high efficiency technologies and district heating and cooling when planning, designing, building and renovating buildings.<sup>27</sup>

#### Training women to build disaster-resilient homes

The Asian Development Bank (ADB) together with Habitat for Humanity Fiji had a program in Fiji to train women to construct disaster-resilient homes. The program provided theoretical and practical carpentry training to 29 Fijian women through the Australia Pacific Training Coalition. APTC delivers Carpentry training to suit industry needs. These women were then able to earn Australian carpentry certifications. The training allowed women to compete in the traditionally male-dominated construction industry. The training is relevant in Fiji due to the vulnerability of the islands to rising sea levels and extreme weather events. Climate change is increasing the demand for environmentally friendly disaster-resilient houses in the country.<sup>1</sup>

### Green Jobs in the building construction sector in Zambia



The green jobs development program in Zambia aims to improve the competitiveness and sustainability of MSMEs (Micro, Small, and Medium Enterprises) in the construction sector. It will create at least 5,000 people-oriented green jobs, especially for young people, and improve the quality of at least 2,000 current jobs and consequently the livelihoods of approximately 8,000 households.

The focus is on increasing local capacity and household incomes. The program should be implemented through the value chain development approach, private sector promotion and sustainable housing for inclusive green growth and job creation in the construction sector. The program uses a multi-dimensional intervention approach to achieve sustainable market transformation in the Zambian building industry. There are three main objectives of the program:

#### Shaping attitudes and mind-sets

Through awareness raising activities, the program intends to motivate key stakeholders in the construction sector and the broad public to change their mindsets towards more environmentally friendly ones and promote the benefits of green buildings.

<sup>27</sup> Ecofys et al., 2013: Towards nearly zero energy buildings Definition of common principles under the EPBD Final report.



### Greening of policy framework

The program promotes a sector-specific legal framework to meet the market demand for sustainable building services, technologies, materials and products.

### Capacity building for MSMEs

The program aims to build/enhance the capacity of local MSMEs in the sustainable building in Zambia through:

- Green enterprise development services
- Skills development and;
- Creating a supportive and growth-oriented framework for MSMEs

The USD 12 million green jobs program in Zambia was implemented through strategic partnerships from 2013-2018.<sup>28</sup>

One of the challenges faced by the program was the incorporation of occupational safety and health by increasing awareness among companies to make them understand it as an investment, teaching occupational safety and health in technical and vocational training institutions and changing regulations and promoting the adoption of the ILO Convention 167 on Safety and Health in Construction.<sup>29</sup>

## The Green Building Workforce: Creating Jobs and Skill Development in India

Green building projects are a strong driver of economic growth and job creation in India. According to the Indian Green Building Council (IGBC), the implementation of sustainable building practices has led to a significant increase in demand for (green) skills in the building sector.

The link between green building initiatives, job creation and green skill development is central to tackle the challenges of India's growing urbanization and the country's environmental issues. The rapid growth of cities increases energy consumption and the use of natural resources. Integrating sustainability into the construction industry is therefore of crucial importance.

The green building movement in India is rising - In the past ten years, the number of registered green building projects in India has risen by an impressive 20% compared to the previous year.

The implementation of green building initiatives has led to the creation of a variety of skilled professions - from sustainable architects and green building consultants to energy auditors and renewable energy technicians. The green building movement has created about 3 million jobs in India in the past five years, which represents a significant growth in employment.

Numerous case studies in India have led to positive outcomes in sustainable development for example projects like Mahindra World City in Chennai and the Suzlon One Earth campus in Pune.

---

<sup>28</sup> [https://www.ilo.org/global/topics/green-jobs/projects/africa/WCMS\\_209922/lang--en/index.htm](https://www.ilo.org/global/topics/green-jobs/projects/africa/WCMS_209922/lang--en/index.htm)

<sup>29</sup> Green Jobs Programme, 2015, Promoting occupational health and safety in the building construction sector in Zambia. Republic of Zambia, United Nations Zambia and Ministry of Foreign Affairs of Finland. [https://www.ilo.org/wcmsp5/groups/public/---ed\\_emp/---emp\\_ent/documents/publication/wcms\\_360974.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_360974.pdf).



Collaboration between companies, educational institutions and vocational training centers has been particularly effective in creating a skilled workforce. The increase in green building projects has widespread impacts that exceed environmental protection. The creation of green jobs reduces poverty and drives economic growth.<sup>30</sup>

Women make up only 12% of the construction workforce. It is therefore important to promote the integration of women in the construction industry.<sup>31</sup>

### Women in Green Building Leadership Award

The World Green Building Council has launched awards for leadership in green buildings. It has established a Women in Green Building Leadership Award as an own award category to recognize inspiring female leaders. The building sector is a male-dominated industry. Therefore, such an award category encourages female leadership.<sup>32</sup> Today, more women have stepped up to take on corporate leadership positions. However, female leadership needs support and resources. Senior female leaders can serve as role models for young women.<sup>33</sup>

## The BUILD UP skills initiative

The EU BUILD UP skills initiative launched in 2011 is an EU-promoted initiative on continuous “education and training of craftsmen and other on-site construction workers and systems installers in the building sector”, to deliver building renovations offering high-energy performance as well as new Nearly Zero-Energy Buildings (NZEBS) and the inclusion of resource efficiency considerations.<sup>34</sup> BUILD UP Skills has supported road-mapping exercises in many countries with a focus on skills for the building sector. The initial BUILD UP Skills projects focussed on on-site workers and craftspeople (‘blue-collar’ professionals). More recently, the focus has been expanded to mapping the skills needs for ‘white-collar’ professions (e.g. architects, designers, engineers, building managers, product manufacturers, etc.) and updating the skills needed for blue-collar professionals, in order to more comprehensively reflect the needs of the building value chain.

Below, some of the EU-funded best practice projects that have developed and implemented effective training programs will be elaborated.

## Green training for construction managers

Training programs of the EU-funded ingREeS project (Setting up Qualification and Continuing Education and Training Scheme for Middle and Senior Level Professionals on Energy Efficiency and Use of Renewable Energy Sources in Buildings) aimed to achieve two objectives:

<sup>30</sup> <https://www.linkedin.com/pulse/green-building-workforce-creating-jobs-skill-development-sood/>

<sup>31</sup> Infrastructure Sustainability Council. <https://www.iscouncil.org/women-in-sustainable-construction/>

<sup>32</sup> Vietnam Investment Review, 2022: Vietnamese CEO earns Women in Green Building Leadership accolade. <https://vir.com.vn/vietnamese-ceo-earns-women-in-green-building-leadership-accolade-98147.html>

<sup>33</sup> <https://worldgbc.org/article/women-in-green-buildings-paving-the-way-for-the-rise-of-female-leadership/>

<sup>34</sup> <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/life-2021-cet-buildskills>

- Provide knowledge about energy efficiency and the use of renewable energy sources in building sector and
- conduct analysis of the lacking skills and build them up.

The project developed national qualification standards and training programs on the integration of renewable energy sources in buildings, focusing in particular on Czech and Slovakian construction managers. The trainings consisted of a combination of in-person classes, distance learning and practical cases. At the end of the program, participants had to pass an online test to obtain an official certification. The program focused on innovation, accessibility of the training and the quality and value of the content. Over 900 mid-level and senior experts and managers received the certification. Based on the feedback from participants, over 60% of the information was completely new and the rest of the information provided a deeper understanding. Participants will use this information in their daily work, which will improve the quality of buildings and ensure the achievement of energy goals.<sup>35</sup>

## Training construction workers on energy efficient building practices

The EU-funded BUStoB project (BUILD UP Skills to Business) focused on closing the skills gap in the Netherlands. The main goal of the project was to develop training modules covering a wide spectrum of topics in the construction sector. The project also created new strategies to stimulate the workforce participation in the training courses.

The project developed quick skill assessments. “These assessments help raise awareness among the workforce about the importance of energy-efficient building design, identify skill gaps and promote the need for training,” as explained by the project coordinator.<sup>36</sup> These quick skill assessments serve to assess the need to participate in a training and choose the training that is most suitable.

A total of 76 short e-learning courses were developed as part of the project, covering topics such as quality management, Nearly-Zero Energy Buildings (NZEB) technologies and interdisciplinary competencies. Many of these courses are available online. In addition to assessment tools, the app also provides free access to all BUStoB e-learning modules and specific overviews of other learning possibilities. These online tools play a crucial role in the Dutch National Energy Agreement's agenda in the human capital area. The training modules will also be available in the Build Up Skills advisor app. The BUStoB training courses contribute to the development of green building skills.<sup>37</sup>

## Potential measures

Potential measures to develop a qualified workforce on green buildings include:

1. Awareness raising about the importance of a qualified workforce for different target groups (e.g. construction companies, installers, architects)
2. Cooperation with stakeholders in academia, companies, training institutions and local governments to identify the competences that are needed
3. Develop a competence matrix for green buildings, on-site renewable energy technologies and relevant digital skills

---

<sup>35</sup> [https://cinea.ec.europa.eu/system/files/2021-06/ZZAD18001ENN.en\\_.pdf](https://cinea.ec.europa.eu/system/files/2021-06/ZZAD18001ENN.en_.pdf)

<sup>36</sup> CORDIS EU Research Results European Commission, 2019: Build UP Skills to business. Training construction workers on energy-efficient building practices. <https://cordis.europa.eu/article/id/227566-training-construction-workers-on-energy-efficient-building-practices>

<sup>37</sup> Research EU, European Union, 2018: New skills for the construction sector to achieve European energy targets. [https://cinea.ec.europa.eu/system/files/2021-06/ZZAD18001ENN.en\\_.pdf](https://cinea.ec.europa.eu/system/files/2021-06/ZZAD18001ENN.en_.pdf)

4. Develop quick skills assessments that can be used onsite to quickly assess the skill gaps of a person and provide orientation to the person about suitable trainings
5. Provide financial incentives for the qualification to increase the interest of construction companies in allowing employees to be trained
6. Promote occupational health and safety in the construction of green buildings
7. Provide a database of qualification schemes including the skills that can be obtained from attending a specific qualification<sup>38</sup>
8. Creating a digital skills certificate for construction workers that could be used to demonstrate qualifications and courses attended
9. Prepare training materials and promote online learning resources to equip construction workers with the necessary green skills
10. Entrepreneurial initiatives that will help individuals and companies identify business opportunities in the green buildings sector
11. Promotion of green building careers among young women through role models, platforms, events, and career advice
12. Programmes combining training, demonstration projects, technology platforms and awareness raising

## Gender and green skills



A framework for a just energy transition ensures that the rights of disadvantaged groups are complied with and that the drivers of gender inequality in the energy transition are addressed and reduced. It aims to distribute the benefits of the energy transition evenly and increase a long-term participation of disadvantaged groups across the energy value chain. Raising awareness and implementing regulatory measures to foster gender equality as well as improving transparency for equal representation of women and men in the sustainable energy value chain are essential.

<sup>38</sup> HORIZON results booster, 2022: Skills for Green Digital Buildings: A new step-by-step approach for Upskilling on Sustainable Energy for design, construction and facility management professionals and workers.  
[https://hp4all.eu/wp-content/uploads/2022/12/hp4all\\_policy\\_booklet.pdf](https://hp4all.eu/wp-content/uploads/2022/12/hp4all_policy_booklet.pdf)

## The role of women as actors of change within the transition to the sustainable energy model

Women can enter the energy sector as agents of change, whether as energy entrepreneurs, energy policy makers or employees. However, decision-makers are not sufficiently aware of gender-specific impacts of energy policy and do not recognize their importance.

There are numerous studies that prove that women tend to prioritize issues such as healthcare, the environment, climate change, sustainability and social wellbeing more than men. Women are more likely to buy eco-labelled products, pay more attention to green purchasing and energy-efficiency and support climate change initiatives. Additionally, women are also willing to accept higher prices for eco-friendly products and are more inclined to change their behavior in order to achieve sustainability goals. Women also represent a major target group of energy consumers.

A global study of 72 countries came to the conclusion that only 6% of ministerial positions, which are responsible for national energy policies and programs, are held by women. The implementation of a more gender-equal energy policy is crucial. There are examples from South Africa and Uganda where women have been in leading positions in energy ministries and it has brought very positive results. There is evidence that women are more likely to represent women's interests than men.

Gender has a major impact on social interactions, opportunities as well as access to and control over resources and decision-making<sup>39</sup>. Gender is part of the broader socio-cultural context and intersects with other socio-cultural aspects such as social class, religion, ethnicity, age, sexual orientation and disability. It also refers to the social roles attributed to women and men and the often unconscious perceptions of what is appropriate for women and men in a particular social context. Gender transformation accelerates gender equality by challenging and addressing unequal gender relations and supporting women's empowerment. Justice and equality must be an integral part of the transition to a low-carbon society that addresses the drivers and roots of inequality. Energy justice aims at improving access to energy, jobs and economic opportunities in the energy sector, while contributing to poverty reduction, improvement of livelihoods and inclusion of women and youth.<sup>40</sup>

### Women in renewable energy

The energy sector is highly male-dominated. Men are overrepresented in particular in technical positions. Women in the energy sector are usually represented in lower-skilled positions such as administration and communication with limited decision-making power. Women account only for 22% of the total workforce in the fossil fuel energy sector and for 32% in the renewable energy sector. One explanation for the higher representation of women in the renewable energy sector than in the oil and gas sector comes from research that has shown that women are more likely to take up employment opportunities in newly emerging than in long-established sectors. Although the proportion of women in the renewable energy sector has increased, it still remains very low but has great potential for improvement. The results of the IRENA survey are less encouraging when the type of position is taken into account. In the companies included in the survey, 46% of administrative positions, 28% of

---

<sup>39</sup> UN WOMEN, 2002: Progress of the World's Women 2002, Volume 2: Gender Equality and the Millennium Development Goals <https://www.unwomen.org/en/digital-library/publications/2002/1/progress-of-the-world-s-women-2002-volume-2-gender-equality-and-the-millennium-development-goals>

<sup>40</sup> GGKP Sohna Ngum, Luisa Kim, 2023: Working paper: Powering a gender-just energy transition. [https://www.greenpolicyplatform.org/sites/default/files/downloads/resource/FINAL\\_230315\\_GGKP\\_Gender\\_Report%5B13%5D\\_0.pdf](https://www.greenpolicyplatform.org/sites/default/files/downloads/resource/FINAL_230315_GGKP_Gender_Report%5B13%5D_0.pdf)

technical personnel and 32% of senior management posts were held by women. Just energy transition plays an important role in overcoming gender gaps, which have been institutionalized and can promote greater justice in society.

The solar photovoltaics sector employs more women than other renewable energy sectors. 40% of the full-time positions in the solar PV sector at the global level are filled with women. However, there are differences between different areas (see table below).

Table 2: Share of jobs for women in the solar PV sector in 2022.

Area	Share of jobs
Senior management	17%
Management	30%
STEM	32%
Other non-technical	35%
Other technical	38%
Administration	58%

Source: IRENA, 2023: A decade of progress. Renewable jobs in Detail.<sup>41</sup>

Main reasons for gender gaps in the energy sector are:

- Lack of suitable qualifications and skills due to gender-specific disparities in energy-related education and trainings.
- Persisting gender stereotypes, e.g. perceiving the energy sector as an exclusively male dominated field
- Obstacle in achieving a good work-life balance (not sufficiently suitable employment conditions such as flexible working hours etc.)
- Insufficient career opportunities and mentoring programs for women
- Perception of gender roles and the nature of the renewable energy sector
- Employment practices and policies in recruitment

Lack of support from parents, teachers and the general social pressure due to existing stereotypes has a negative impact on girls' intention to choose a career in the renewable energy sector. The number of women studying subjects related to renewable energy is gradually increasing. Although the gender gap in STEM education is slowly narrowing, not all women with a STEM university degree start a career in the energy sector. Several factors such as gender stereotypes, lack of mentoring and career opportunities may be possible explanations. Women are facing more employment barriers in the sector than men e.g. suitable employment conditions such as flexible working hours to enable care work, etc. When women enter non-traditional professions, they are often disadvantaged as they are competing with men who have much better professional networks. In addition, women tend to apply for jobs only if they fulfil all the requirements, while men apply even if they only partially fulfil the requirements. The other aspect is gender discrimination by companies in the recruitment process. More women are applying to study engineering, which is closely linked to the increasing gender equality in technical professions in the field of renewable energies. There is also an upward trend in the number of qualified female applicants for technical jobs.

<sup>41</sup> IRENA, 2023: A decade of progress. Renewable jobs in Detail.<sup>41</sup> <https://www.irena.org/Digital-content/Digital-Story/2023/Sep/A-decade-of-progress-Renewables-jobs-on-the-rise/detail>

Measures to get women to study subjects that can be applied in the renewable energy and energy efficiency sector include:

- providing more information about renewable energy careers
- student-centred participatory strategies.
- strategies for improving girls’ self-confidence with the focus on their specific interests and learning styles
- Providing girls informal and experiential learning spaces
- Mentoring of young women

### Financial incentives for women to attend green skills training

With support from the Government of Japan, UNDP is partnering with the Skill Council for Green Jobs (SCGJ) in India to increase the size of the workforce with green skills. The SCGJ works as an interface between industry, academia and policy to addresses skill requirements. Training with a focus on electric vehicle charging infrastructure, solar photovoltaic (PV) and solar thermal is offered. The number of women in such trainings is low primarily due to financial and social barriers that prevent them from being able to get skilling and employment opportunities. To address this, an incentive of 2,500 Indian Rupees (USD 30) was offered to each woman who participated in the training. The incentive helped women to be independent from their families and be able to pay for expenses like travel and food during the training. This helped them get permission from their families to attend the trainings. Out of the 1,000 participants who completed the trainings, 29% were women.<sup>42</sup>

### Girls4rurals – Nepal

The Rural Development Initiative “Girls4rurals” was established in 2018 with the goal to educate and train young girls from the Himalayas to implement renewable energy technologies, e.g. by working as distributors of solar PV systems. Girls4rurals uses a digital platform to bring Nepali girls living in rural communities together to share their knowledge and experiences. One of the programs educates young people about the benefits of renewable energy that they can spread the knowledge and innovation to their communities. Another program promotes induction stoves in rural areas to reduce indoor air pollution.<sup>43</sup>

It is necessary to dispel gender-specific myths about technical and managerial jobs in the renewable energy and energy efficiency sectors. This is also linked to girls feeling that they belong to a minority, which is often a barrier for their participation. Encouraging women to consider renewable energy subjects as a field of study requires a conscious, proactive strategy from the university. This involves raising awareness among teaching staff, university recruitment and promotion departments and also making university curricula more women-friendly by recognising girls interests.<sup>44</sup>

<sup>42</sup> UNDP, 2023: Gung-ho over green skills: Empowering young women to create a sustainable future.

<https://www.undp.org/india/stories/gung-ho-over-green-skills-empowering-young-women-create-sustainable-future>

<sup>43</sup> IEA, 2022: Skills development and inclusivity for clean Clean Energy transitions.

<https://iea.blob.core.windows.net/assets/953c5393-2c5b-4746-bf8e-016332380221/Skillsdevelopmentandinclusivityforcleanenergytransitions.pdf>

<sup>44</sup> FEEM Committee, 2019: Women, Gender equality and the energy transition in the EU.

[https://www.europarl.europa.eu/RegData/etudes/STUD/2019/608867/IPOL\\_STU\(2019\)608867\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2019/608867/IPOL_STU(2019)608867_EN.pdf)



## Energia Mujer – Chile

In 2018, the Chilean government has started a public-private partnership to develop and implement a strategy to promote greater participation of women in national green energy transition. The following factors led to the adoption of this initiative: Women represented only 23% of employees in the energy sector and earned on average 24% less than men. Women accounted only for 18% of company boards, 10% of CEOs and 18% of managers. 73% of companies also did not offer flexible working hours.

Based on these results, the "Energia + Mujer" program was launched. The stakeholders agreed on the implementation of the public-private plan, which consists of 10 objectives, 14 measures and 40 specific actions. The aim is to reduce the barriers women face in pursuing a career in the energy sector, establish gender equality and provide training workshops for employees to raise awareness of gender inequality as well as find solutions for better integration of women in the clean energy sector. More than 70 companies, associations and institutions in the energy sector have joined the initiative to tackle gender inequality for more than 26,000 employees.

The initiative consists of several phases. It began with an awareness-raising campaign and analysis in the period from 2016 to 2018, which led to the development/establishment of a plan in 2019. The implementation phase lasted from 2020 until 2022. This is followed by establishment of measurements from 2022 until 2026 and monitoring of progress in the period 2027-2030. From 2031, the program will focus on continuous improvement.

The Ministry of Energy publishes annual reports on the results of the program. According to the 2021-2022 annual report, around 50% of participating companies implemented a paid primary career's leave. The number of female CEOs is also increasing (+1.2%) and women are more strongly represented on boards (+1.3%). Women currently account for around 40% of all managers. The gender pay gap has been reduced by 0.7%. 717 specific actions were carried out within the ten objectives, bringing the total number of activities implemented by companies in the 2020-2021 period to more than 1 500. In July 2022, the first Gender and Human Rights Office of the Ministry of Energy was established to monitor the public-private plan and promote the gender equality objectives of the national energy policy.<sup>45</sup>

A non-exhaustive list of measures to facilitate the participation of women in the renewable energy and energy efficiency sectors includes the following:

### 1. Identify gaps in skills and knowledge of women

Identifying gaps in skills and knowledge of women helps developing training programs that address their specific needs.

### 2. Provide a range of green career options for job hunters

In the fields of renewable energy, green buildings and energy efficiency, there are opportunities for women, many of whom can start where they are by combining existing skills with green skills.<sup>46</sup> A

<sup>45</sup> IEA, 2022: Skills development and inclusivity for clean Clean Energy transitions.

<https://iea.blob.core.windows.net/assets/953c5393-2c5b-4746-bf8e-016332380221/Skillsdevelopmentandinclusivityforcleanenergytransitions.pdf>

Ministerio de Energia, Chile, 2020: Plan "Energia+Mujer": Un Sector Energético Inclusivo.

[https://energia.gob.cl/sites/default/files/documentos/parte\\_ii\\_energia\\_mas\\_mujer\\_ministerio\\_de\\_energia\\_chile\\_paper\\_esp.pdf](https://energia.gob.cl/sites/default/files/documentos/parte_ii_energia_mas_mujer_ministerio_de_energia_chile_paper_esp.pdf)

<sup>46</sup> Public Policy Associates, Incorporated, in partnership with Wider Opportunities for Women, 2010: Industry Sector Opportunities: Women Working in Green Construction & Energy Efficiency Fact Sheet. Part of the U.S. Department of Labor, Women's Bureau's "A Woman's Guide to Green Jobs".

<https://www.govinfo.gov/content/pkg/GOVPUB-L36-PURL-gpo13087/pdf/GOVPUB-L36-PURL-gpo13087.pdf>

portfolio of possible jobs needs to be shown to these women to provide them with orientation about possible career paths and opportunities in the sector and attract them to green jobs.

### **3. Design and implement gender-responsive policies**

Policies and programmes to develop green skills should be gender-responsive and sufficient financial resources allocated to support women that want to receive green skills training.

### **4. Mentorship**

A clean energy transition requires drawing from a diverse talent pool. Mentorships are particularly necessary for young women to promote their careers in the clean energy sector. Women in senior positions can offer mentorships and serve as role models for young women. Equal opportunities for women and men should be promoted.

### **5. Financial incentives for women attending green skills training**

Women typically face problems to pay for training and related costs, such as transportation and food. Women also have less access to finance to support expanding their businesses after receiving training. This prevents them from participating in skills training. Offering cash grants conditional on attendance and financial capital to use upon completion of training can help overcome these barriers.

### **6. Addressing sexual harassment**

Sexual harassment leads to high job turnover and work absenteeism. Skills training programs need mechanisms to prevent, respond to, and report cases of sexual harassment and abuse.

### **7. Support childcare**

Childcare is an important pre-condition for women to be able to attend training. Adequate access to childcare facilities should be provided to support working mothers and facilitate training attendance.

### **8. Support female leadership**

Today, more women have risen to take on corporate leadership positions. However, female leadership needs support and resources. Senior female leaders can serve as role models for young women.<sup>47</sup>

### **9. Improve gender indicators**

Revising Monitoring & Evaluation frameworks for vocational training and educational programmes to collect and analyse sex-disaggregated gender statistics and develop indicators that can be communicated to policy makers.<sup>48</sup>

## Conclusion

Taken together, green skills are one of the foundations of a sustainable energy system. However, as demand is increasing rapidly, the supply of green skilled workers is lagging behind. This is due to a diverse set of reasons, ranging from lack of suitable qualification, lack of quality in training and education and lack of awareness of the opportunities in the green skills sector.

---

<sup>47</sup> World Green Building Council, London.

<https://worldgbc.org/article/women-in-green-buildings-paving-the-way-for-the-rise-of-female-leadership/>

<sup>48</sup> UNIDO and GIZ, 2024: Women in green industry. <https://www.unido.org/sites/default/files/unido-publications/2023-11/Women%20in%20Green%20Industry.pdf>

The driving force behind the urgency of advancing the sustainable global energy transition is the shift away from fossil fuels to renewable energy. The sustainable energy transition is under way, showcasing a paramount need for bridging the gap between supply and demand of the workforce. Numerous countries and institutions have launched initiatives to further accelerate the process of green skill education and training but the size of the qualified workforce in existing labour markets is still too small. Moreover, the quality and accessibility of green skills training needs to be improved. In addition, awareness raising for potential trainees about available qualifications, incentives and job opportunities is necessary.

Training and educating a qualified workforce is key to achieve the global targets of tripling renewable energy capacity and doubling energy efficiency by 2030 agreed at COP28. This policy brief describes numerous initiatives and projects targeted at the green skill capacity building on a global scale, which aim to advance the sustainable energy transition.

A number of barriers needs to be overcome, including:

- Lack of time for training due to the fact that employers need their workers at the workplace and may not be willing to send them to training courses during their working time
- Lack of understanding of the importance of skilled workers
- Investment in employee education is very low.

The building sector is the prime emitter of greenhouse gases and it is also accounting for 40% of energy consumption and waste generation worldwide. To mitigate this enormous environmental impact of the building sector, it is necessary to move towards environmentally responsible and resource efficient buildings, which are based on approaches involving materials sustainability, energy efficiency and other ecological considerations.

Several policies aim to regulate and promote the energy efficiency and eco-friendly performance of buildings. Mandatory building energy efficiency codes (BEECs) and standards are regulatory tools that establish minimum levels of energy efficiency for different building types. The EU Energy Performance of Buildings Directive (EPBD) requires Member States to meet minimum energy performance requirements for buildings and determines that all new buildings should be classified as nearly zero energy buildings (NZEB). The EU initiative BUILD UP Skills, launched in 2011, is an EU-funded initiative for the continuous education and training of the workforce in the construction sector.

At international level, there are also numerous Green Skills initiatives in the building sector. These are presented via best practice examples from Zambia and India. The green jobs program in Zambia was created to improve the competitiveness and sustainability of MSMEs in the construction sector. It will create at least 5,000 people-oriented green jobs and the livelihoods of approximately 8,000 households. The implementation of green building initiatives has led to the development of a large number of green skilled professions. The green building movement has created about 3 million jobs in India in the past five years, which represents a significant increase in employment. Best practice examples with positive results in sustainable development are for example projects such as Mahindra World City in Chennai and the Suzlon One Earth Campus in Pune.

Projects to train and educate people in green skills showcase a combination of elements. For example, projects located in rural areas, such as Girls4rurals, integrate capacity building in remote locations, in addition to establishing tailor-made programmes to increase women in the work force. Therefore,

remote areas gain access to sustainable renewable energy while affiliating women with this area of expertise.

Other projects emphasise creating capacity building on a regional level. This is showcased through Brazil's RevoluSolar project, which integrates the local community in the establishment and continuous maintenance of solar photovoltaic installations. Therefore, low-income communities are provided with sustainable renewable energy, in addition to training programmes leading to new jobs in the work force.

Innovation is also seen throughout receiving recognition for sustainable energy through the bestowal of awards. The aforementioned Women in Green Building Leadership Award, endorsed by the World Green Building Council, acknowledges efforts in the building sector driven by women to integrate green building mechanisms. That being said, diversifying the workforce by focusing on strengthening equal access to the green skills workforce for all is crucial to the sustainable energy transition.

Some recommendations to bridge the skills gap in the green buildings and solar PV sectors are as follows:

- Launch a communication campaign for green jobs in the green buildings and solar PV sectors
- Develop a comprehensive mapping of solar and green buildings skills
- Launch a Jobs Matrix, highlighting possible careers in the solar PV and energy efficient buildings sectors and the required skills
- Develop entrepreneurial initiatives that will help individuals and companies identify business opportunities in the green buildings and solar PV sectors
- Attracting women to green buildings and solar PV sectors through support measures, mentoring, role models, providing more information about potential career paths etc.
- Programmes combining training, demonstration projects, technology platforms, and awareness raising

**Imprint**

**Authors:** Eva Janechova, Leonardo Barreto Gómez, Theodora Löw

Published and produced by: Global Forum on Sustainable Energy, c.o. Österreichische Energieagentur – Austrian Energy Agency  
Mariahilfer Straße 136, A-1150 Vienna

E-Mail: [gfse@energyagency.at](mailto:gfse@energyagency.at)

Internet: <http://www.gfse.at>