WORKFORCE & POPULATION STRATEGIES FOR THE TRANSITION TO RENEWABLE ENERGY SYSTEMS

Pathways and Initiatives

MENTOR to IMPACT

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Developing strategic interventions and pathways - Quadrature of Competencies

The report titled *"Workforce & Population Strategies for the Transition to Renewable Energy Systems",* dated 27 March 2025, presented six essential bottlenecks that must be addressed to secure a competent workforce for the renewable energy transition. The bottlenecks describe the challenges of the future but do not specify how to overcome them.

- Bottleneck 1: Ageing Global North and Nascent Global South
- Bottleneck 2: Increased Gender Disparity in the Labour Market
- Bottleneck 3: People in Transition from Declining Industries and Migration
- Bottleneck 4: Lack of Skills Poses an Implementation Gap in the Green Energy Transition
- Bottleneck 5: Shortage of Trainers and VET Institutions which are Focusing on Renewable Energy
- Bottleneck 6: Silos across Administrations and Sectors

This report will present solutions, interventions, and pathways for addressing each of the bottlenecks necessary to ensure an effective transition.

To achieve this, the Quadrature of Competencies framework (see Figure 1), which provides a structured approach for identifying and implementing strategic interventions, is employed. This framework leverages the collective expertise of stakeholders, ensuring that initiatives are effective, scalable, and widely adoptable, thereby maximising their impact.

Disclaimer: Every country and region has its unique characteristics. Nevertheless, general tendencies, synergies, and opportunities can be identified across cultures, nations, and political or legislative systems. The pathways outlined in this document represent broad strategic approaches, which should be adapted to the specific national context.

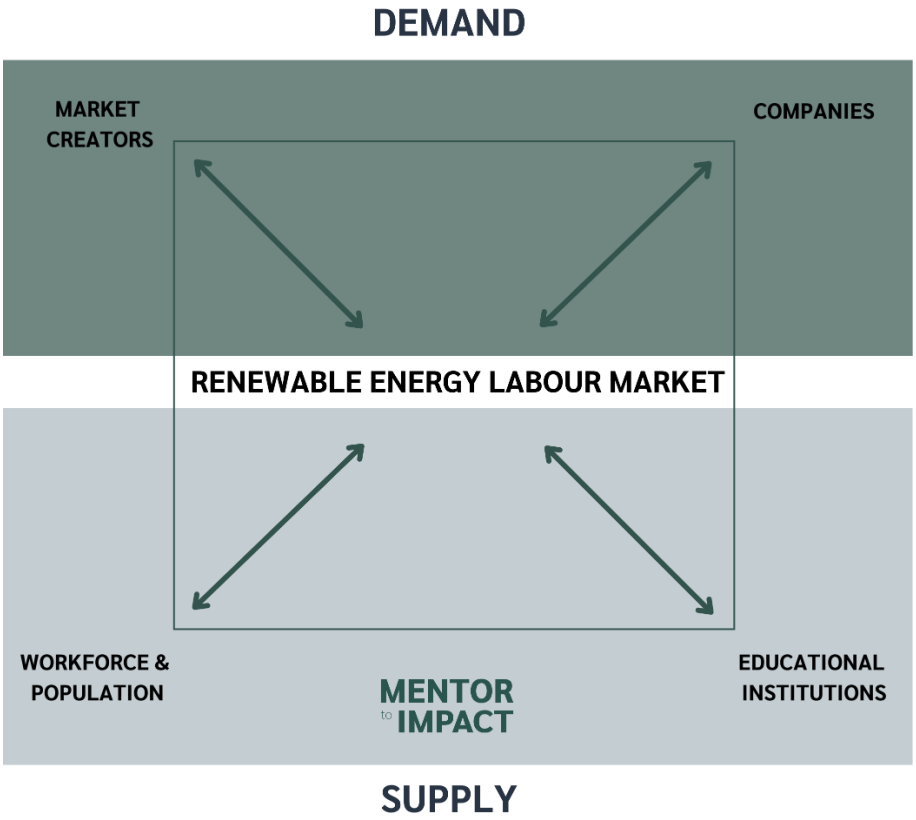


Figure 1. *Quadrature of Competencies*

The pathways presented in this report have been identified and designed to achieve deep and lasting impact across the renewable energy transition. By "deep impact," we refer to interventions that are **systemic** - addressing underlying structural challenges, **evaluative** - grounded in evidence and iterated through continuous learning, and **knowledge-based** - ensuring that insights and best practices are widely shared and applied. Further details on how these pathways deliver on these potentials are provided in the sections below.

Systemic potential: The Quadrature of Competencies framework serves as a strategic tool for identifying pathways and interventions that address systemic challenges. Central to its effectiveness is the active engagement of a diverse array of stakeholders, whose involvement enhances the framework's capacity to effect meaningful change. Engaging stakeholders at multiple levels fosters a comprehensive understanding of the system, enabling the development of interventions that are both inclusive and effective.

Addressing deficiencies within upstream systems is crucial for achieving a profound and sustainable impact. By fostering inclusive collaboration, the framework integrates a multitude of perspectives and expertise, ensuring that developed strategies are comprehensive and effective.

This inclusive approach enables diverse perspectives and expertise to contribute to the development and implementation of strategies, ensuring they are comprehensive and practical. Furthermore, interviews and expert contributions to the *"Workforce & Population Strategies for the Transition to Renewable Energy Systems"* report have clearly expressed a desire for increased cooperation across sectors and industries.

Evaluation potential: When there is a low degree of stakeholder involvement in concrete initiatives, it becomes essential to place a high emphasis on evaluation and the collection of best practice examples. This approach facilitates the development of scalable models that can be effectively disseminated and replicated by thoroughly evaluating initiatives and gathering insights from successful practices. A repository of knowledge can be created that serves as a foundation for future projects. This ensures that even with limited initial stakeholder involvement, the potential for broader engagement and impact can be achieved through the dissemination of proven strategies and models.

Evaluation plays a crucial role in this process. It allows for the identification of what works and what doesn't, providing valuable feedback that can be used to refine and improve future interventions. Systematic evaluation helps to establish evidence-based practices that can be scaled and adapted to different contexts, maximising their effectiveness and reach.

Knowledge potential: By focusing on upscaling and knowledge dissemination, it can be ensured that the learnings from individual initiatives are shared widely, encouraging broader adoption and adaptation. This helps create a more informed and prepared stakeholder base, capable of contributing to and benefiting from strategic interventions that strengthen the green energy transition.

The following work comprises Mentor to Impact's recommendations for strategic interventions in the supply chain to address the aforementioned deficiencies, along with inputs from subject matter experts on the role and contribution of each stakeholder. The interventions adhere to the principle that strategic initiatives must possess either **systemic potential, knowledge potential**, or **evaluation potential.**

The initiatives and pathways are a combination of Mentor to Impact's reflections and inputs from the experts who contributed to the *"Workforce & Population Strategies for the Transition to Renewable Energy Systems"* report. The experts have been engaged through a series of workshops during the spring and summer of 2025 with the following themes for discussion:

Workshop 1 on the 13th of May 2025

- Bottleneck 2: Increased Gender Disparity in the Labour Market
- Bottleneck 6: Silos across administrations and sectors

Workshop 2 on the 27th of May 2025

- Bottleneck 4: Lack of skills poses an implementation gap in the green energy transition
- Bottleneck 5: Shortage of trainers and VET institutions which are focusing on renewable energy

Workshop 3 on the 10th of June 2025

- Bottleneck 1: Ageing Global North and Nascent Global South
- Bottleneck 3: People in Transition from Declining Industries and Migration

While reading this report it is important to bear in mind that while every country and region has its own unique history, culture, and institutional framework, certain overarching tendencies, synergies, and opportunities can still be identified across different societies, nations, and political or legislative systems. These shared patterns

provide a valuable foundation for developing strategies that address common challenges and harness collective strengths.

The pathways outlined in this document are therefore intended as broad, high-level strategic approaches rather than prescriptive solutions. They should be viewed as adaptable frameworks, to be carefully tailored and contextualized considering each country's specific realities, priorities, and constraints. Successful implementation will depend on engaging local stakeholders, respecting cultural differences, and aligning with national policies and legislative systems.

Bottleneck 1: Ageing Global North and Nascent Global South

When examining the Global North and Global South, the Global North is characterised by a declining demographic, with an increasing number of elderly people and a decreasing youth workforce, whereas the Global South experiences a demographic dividend, meaning that its workforce is expected to increase significantly in the coming decades. Concerning the green energy transition, this development means there will be considerably fewer people to implement and roll out the green energy transition in the Global North. In the Global South, the transition is challenged by a general skills shortage, making it difficult to ensure the necessary competencies despite an ample labour supply.

As with other bottlenecks, cross-sector collaboration will be a key element in ensuring the development of national policies and initiatives that can help mitigate these challenges. Further, there is a demand for clear and transparent reduction pathways.

In the Global North, it becomes crucial to strategically increase the workforce through targeted policies that ensure the inclusion of vulnerable groups, as well as opportunities for upskilling through micro-credentials. It will be essential to secure seniors on the job market, as they are the growing demographic in the Global North. Increased flexibility, continuous development of skills and competencies, as well as recognition for the elders' experience and expertise, are all factors that can help prolong engagement on the job market and secure a valuable workforce.

Additionally, authorities and governments play a crucial role in ensuring transparency, which can form the basis for investment decisions in both technologies and education. At the same time, companies must be transparent and cooperative in establishing the right regulatory frameworks for skills development. It will be essential for educational institutions to incorporate knowledge and training in green energy technologies into their curricula. This creates an increased need for social partners to collaborate constructively across sectors. Here, organisations and trade unions have a special role, as they can act as facilitators and a link between the workforce and demand, thereby contributing to a balanced labour market.

In the Global South, many of the same mechanisms are also applicable. Here, a rapidly increasing workforce and a decreasing average age mean that it will be crucial to develop systemic educational policies and clear pathways to meet the needs of a growing population and the necessary skills demand. Cross-sector and cross-company collaboration with authorities and educational institutions will be essential in ensuring a match between the supply of educational offerings and demand. Additionally, short and concise courses through micro-credentials are an important step in ensuring accessible and affordable training programs.

Initial identification of strategic initiatives

Figures 2 and 3 reflect the initial initiatives identified by the report authors based on the Quadrature of Competencies. The complete list of initiatives is available in Appendix 1.

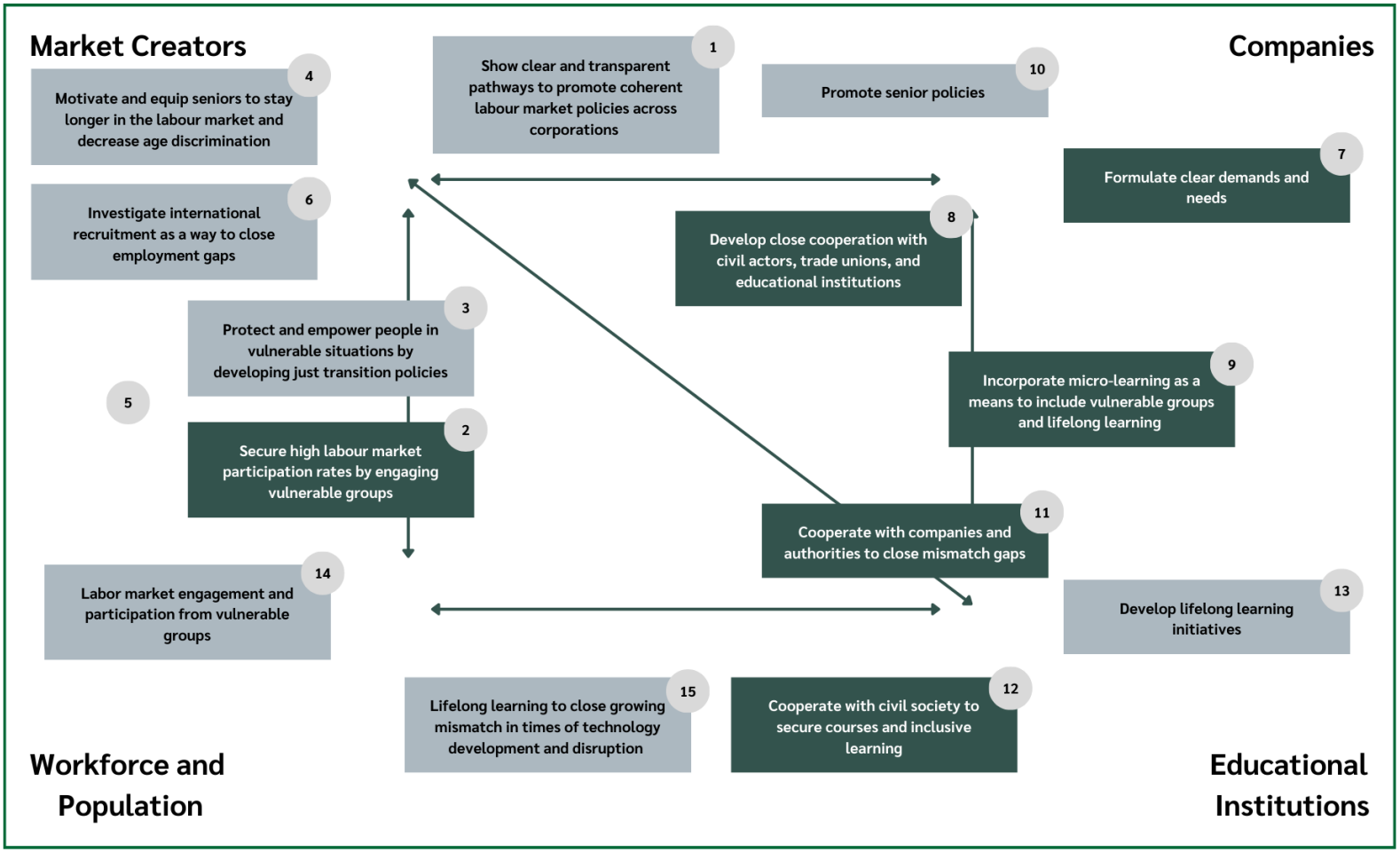


Figure 2. *Key stakeholder initiatives for the Ageing Global North bottleneck*

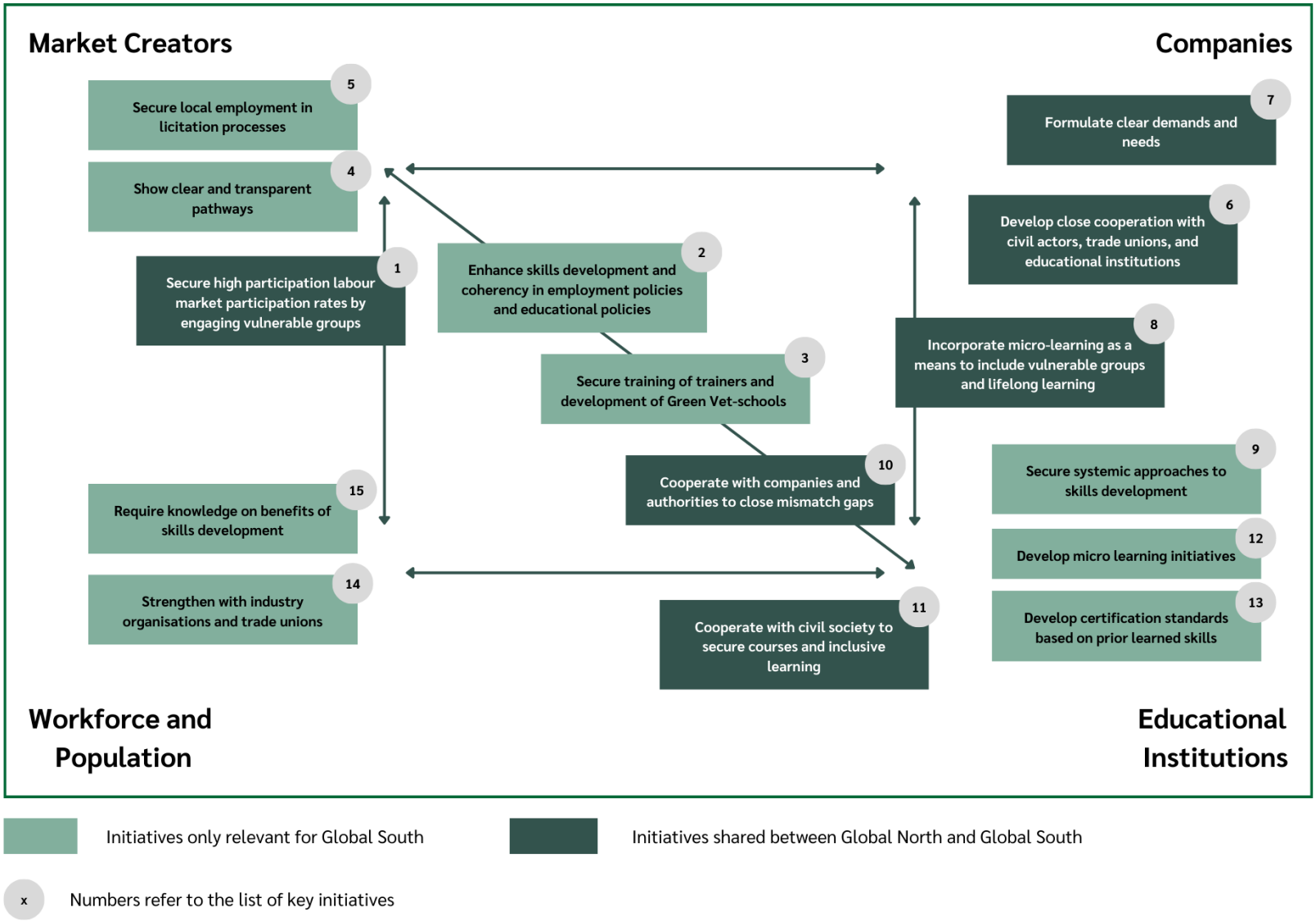


Figure 3. *Key stakeholder initiatives for the Nascent Global South bottleneck*

Strategic initiatives identified by experts

Strategic initiatives and responsibilities for each of the key stakeholders in the Quadrature of Competencies were identified by subject matter experts at Workshop 3 on June 10th, 2025.

All participants were asked to reflect on each stakeholder's role in developing a skilled workforce for a renewable energy labour market (see Figure 4).

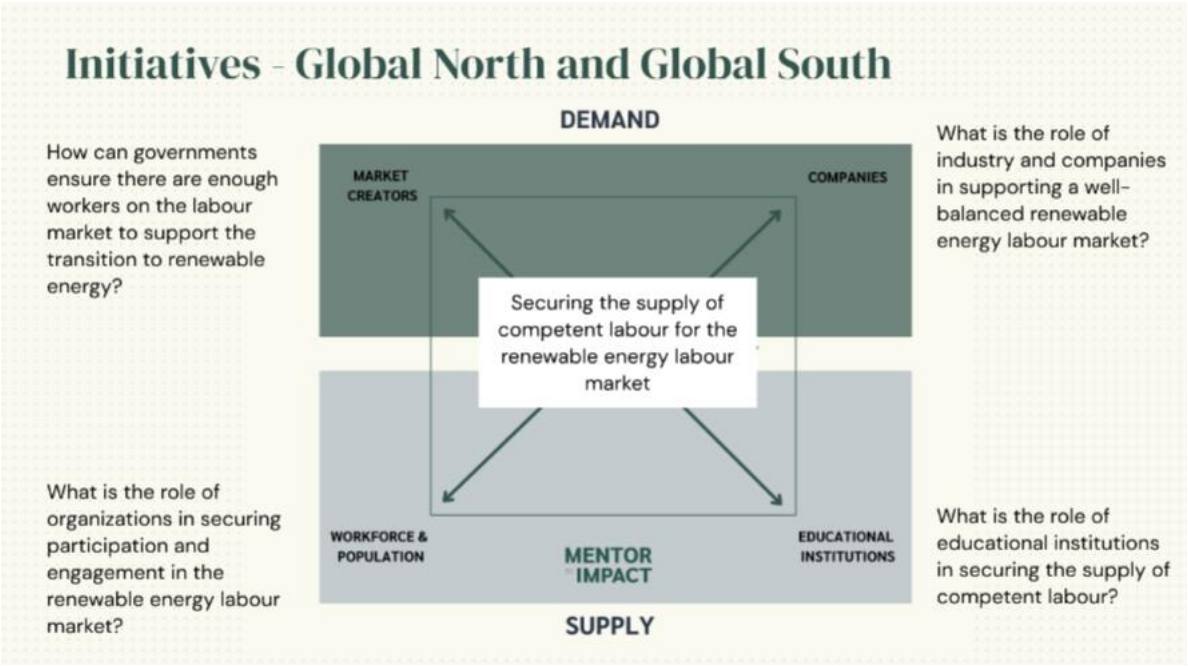


Figure 4. *Brainstorm questions for all stakeholders in the Quadrature of Competencies framework.*

Results

The following initiatives were developed during the workshop based on the prompts for each stakeholder in the Quadrature of Competencies framework.

How can governments ensure there are enough workers on the labour market to support the transition to renewable energy?

- Promoting the transition through ***regulation***, supporting payment for ***upskilling courses, salary compensation or subsidies.***
- ***Collaborating cross-nationally or regionally***, such as in the EU, to ensure a just transition, to secure mutual recognition of skills and prevent social dumping for migrant workers.
- Securing targeted training for workers.
- ***Making youth unemployment a priority*** by investing in educational infrastructure, involving trade unions, establishing pathways for young people and creating proactive labour market policies.

What is the role of organisations in securing participation and engagement in the renewable energy labour market?

- Protecting workers' ***quality of jobs and working conditions***, as a declining population can lead to the exploitation of migrant workers.
- Promoting ***collective bargaining***.
- ***Creating awareness*** among the population regarding reskilling opportunities.
- ***Engaging workers*** on the edge of the market.

What is the role of educational institutions in securing the supply of competent labour?

- Giving workers the possibility to ***reskill and upskill***.
- Securing ***systemic approaches*** to skills development.
- Develop ***micro-learning*** initiatives.
- Develop certification standards based on ***prior learned skills.***
- ***Collaborate with companies to secure knowledge on technologies and demand.***

What is the role of industry and companies in supporting a well-balanced renewable energy labour market?

- Allowing workers to take ***leave from work*** to pursue re- and upskilling opportunities.
- Providing ***incentives*** for workers to begin acquiring skills.
- Collaborate with educational institutes to secure transfer of technology knowledge.
- ***Making the workplace attractive for women***, by focusing on work-life balance, childcare infrastructure, and access to parental leave.

Discussion points at workshop

The following points were discussed in the workshop based on the identified initiatives.

- There is a wage disparity issue when transitioning into renewable energy, as workers in, e.g. the coal industry have been used to getting a lot of benefits and higher salary, which makes the renewable energy sector less attractive.

Strategic pathway: *Increase the supply of competent labour*

There is a need for strategically increasing the supply of competent labour. This can be achieved through the recognition of prior learned skills, inclusion of vulnerable groups and seniors, and easily accessible upskilling through micro-credentials.

Macro-level initiatives

Macro-level initiatives can facilitate collaboration among industry, government, organisations, and educational institutions. This can be achieved by initiating networks and further supporting research and knowledge sharing on what constitutes an inclusive work environment, as well as identifying potential opportunities for the development of micro-credentials.

The Global North will experience a lack of workforce and should therefore prioritise effective initiatives to engage both young people, and vulnerable groups and seniors on the labour market. Prioritising youth unemployment by investing in educational infrastructure, involving trade unions, establishing pathways for young people, and creating proactive labour market policies is a crucial macro-level intervention to ensure

the full engagement of the labour market. Likewise, macro-level initiatives must focus on keeping seniors as part of the workforce by introducing increased flexibility and establishing ways for them to continuously develop their skills and competencies. Ensuring that seniors are recognised for their expertise is another important factor for continuous engagement on the labour market.

Macro-level initiatives can also help deepen knowledge in this field by funding further research on the effectiveness of micro-skilling programs and the recognition of previously learned skills, as well as identifying where and on which technologies the implementation of micro-credentials could be a means to expand the labour pool beneficially.

Knowledge gap

Conducting an in-depth analysis of micro-skilling programs, the implementation of Recognition of Prior Learning (RPL) frameworks and initiatives to strategically increase the labour force for the green energy transition.

Strategic Initiatives

- **Framework for Recognition of Prior Learning (RPL):** Gather knowledge on how to address and promote recognition of prior learned skills and support systems that want to address this.
- **Equipping Vulnerable Groups through Micro-Skilling:** Developing micro-skilling programs targeted at vulnerable groups through cooperation between authorities, companies, and educational institutions.
- **Inclusive Workplaces for Seniors:** Focus on integrating senior individuals into the workforce while safeguarding against age discrimination.
- **Assisting vulnerable youth groups into employment:** The number of young people who are on the edge of the labour market is often higher than the general unemployment rate. Developing initiatives that target this group will therefore have the potential to increase the workforce significantly.

Bottleneck 2: Increased Gender Disparity in the Labour Market

To overcome the barriers to female representation in the renewable energy labour market, it is crucial that educational systems and reforms incorporate the practical realities faced by women and generally create an enabling environment for them to train for renewable energy jobs.

At the government level, it is essential to create legislation that promotes women's opportunities to participate in the workforce and to develop non-discriminatory laws, e.g. ensuring transparent systems in terms of payment. It is also vital that the educators responsible for women's training are equipped with the right tools and resources to provide the necessary education.

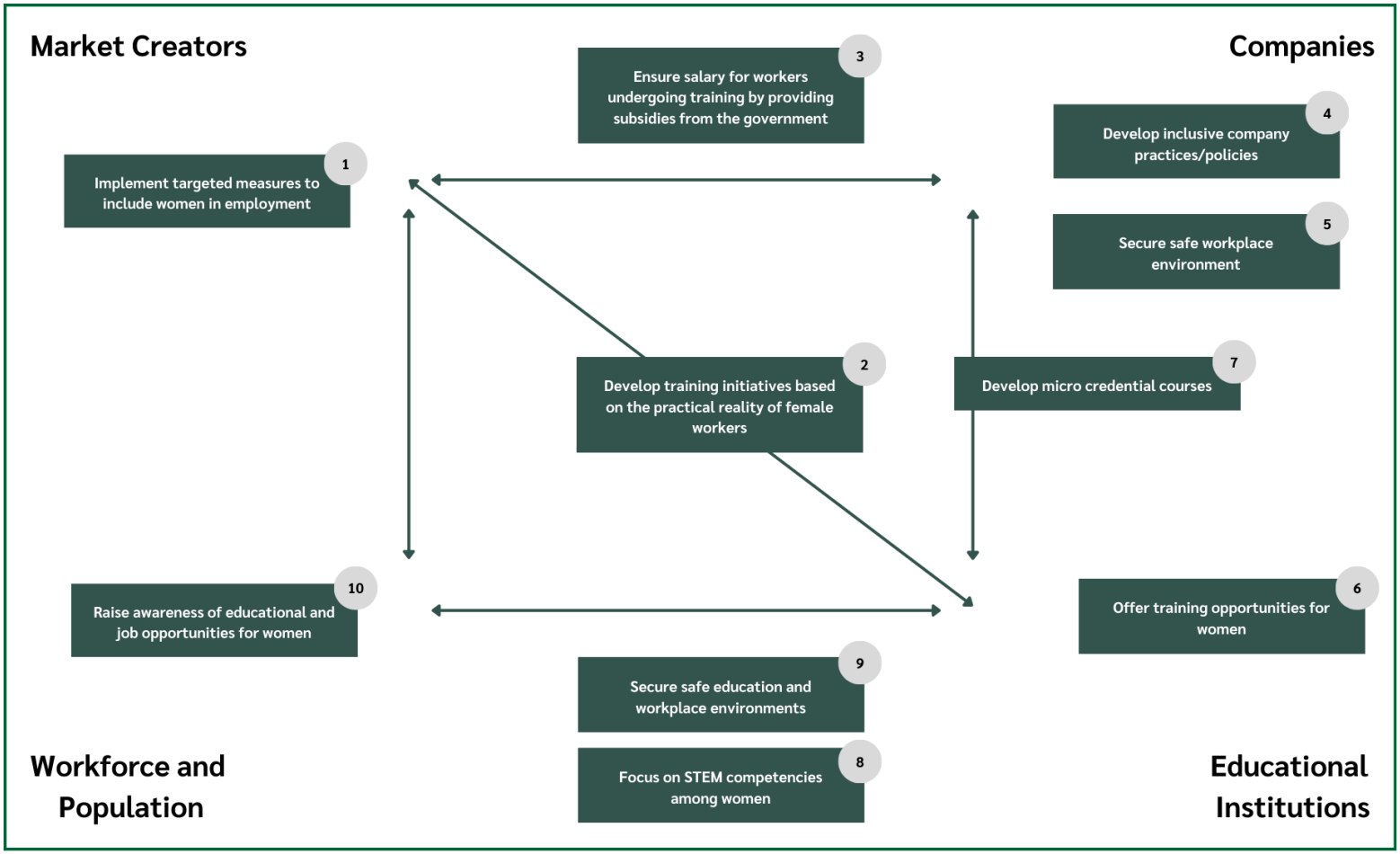
Additionally, companies and educational institutions must ensure that women are included in their target groups and workforce composition and collaborate to strengthen the position of women in the renewable energy labour market. From the government's side, it is crucial to implement non-discrimination policies and address the broader need to increase STEM skills among women, ideally promoting STEM education for women at an early age.

Furthermore, educational programs and physical environments must promote women's participation, including considerations such as sanitary conditions and secure facilities.

Overall, there is minimal knowledge on how to effectively increase women's participation in the green energy job market, so more research in this area is crucial.

Initial identification of strategic initiatives

Figure 5 reflects the initial initiatives identified by the report authors based on the Quadrature of Competencies. The complete list of initiatives is available in Appendix 2.



x Numbers refer to the list of key initiatives

Figure 5. *Key stakeholder initiatives for the Increased Gender Disparity in the Renewable Energy Labour Market bottleneck.*

Strategic initiatives identified by experts

Strategic initiatives and responsibilities for each of the key stakeholders in the Quadrature of Competencies were identified by subject matter experts at Workshop 1 on May 13th, 2025.

All participants were asked to reflect on each stakeholder's role in increasing female participation in the green labour market (see Figure 6).

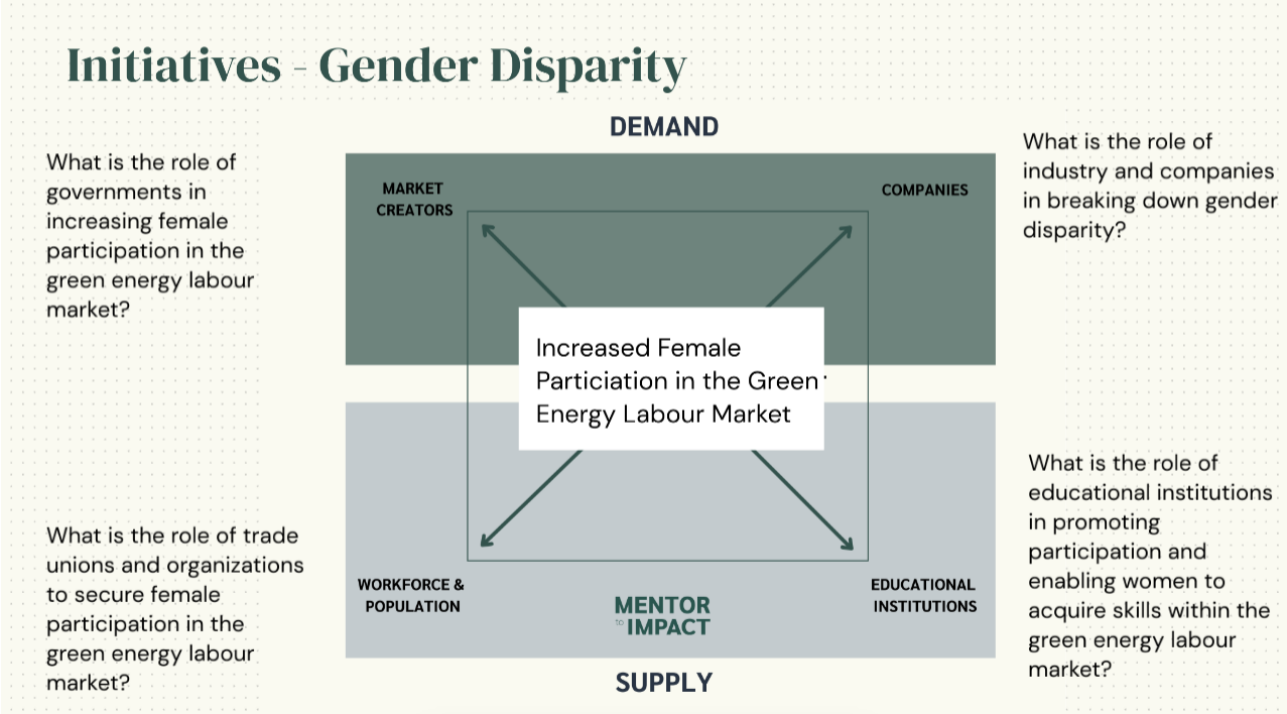


Figure 6. *Brainstorm questions for all stakeholders in the Quadrature of Competencies framework.*

Results

The following initiatives were developed during the workshop based on the prompts for each stakeholder in the Quadrature of Competencies framework.

What is the role of governments in increasing female participation in the green energy labour market?

- Developing and using ***transparent pay systems*** to ensure fair participation in the labour market.
- Ensuring adequate ***public services*** (care, transport, etc.).
- Developing ***inclusive policies***.
- Providing ***subsidies for workers*** during training.
- Fostering initiatives that aim at supporting ***girls/women in STEM*** (Science, Technology, Engineering, and Mathematics), beginning as a part of primary education.
- Conducting communication activities or campaigns to encourage women to work in traditionally ***male-dominated sectors*** (like energy).
- *Ensuring equal access to and tackling the financial disadvantages of* ***parental leave.***

What is the role of trade unions and organisations in securing female participation in the green energy labour market?

- Requesting information and consultation about ***equality strategies in companies.***
- Securing focus and dialogue on female role and strengths in renewable energy labour market.
- Negotiating equal opportunities through ***collective bargaining.***
- Creating a strong ***organisational presence*** in these new sectors to promote employers' and workers' rights.
- Displaying ***best practice*** examples.
- Raising awareness of ***education and job opportunities*** for women.

What is the role of educational institutions in promoting participation and enabling women to acquire skills within the green energy labour market?

- Securing ***cooperation*** between companies and schools.
- Training trainers to face and dissolve ***hidden biases*** towards women.
- Identifying ***pathways*** for females.
- Secure ***safe education environments.***
- Focus on ***STEM competencies*** among women.

What is the role of industry and companies in breaking down gender disparity?

- Upgrading predominantly female functions and occupations (salary enhancement, improvement of working conditions, skills validation, qualification recognition).
- Ensuring ***safe workplace environments.***
- ***Making the workplace attractive for women***, by focusing on work-life balance, childcare infrastructure and access to parental leave.
- Ensuring ***equal pay*** for equal jobs.
- ***Removing barriers*** to career progression.
- ***Cooperating*** with companies.
- Acknowledging and understanding the ***potential*** of female workers.

Discussion points from the workshop

The following points were discussed in the workshop based on the identified initiatives.

- There is a need to break down stereotypes in male-dominated fields by showcasing more success stories of e.g. women in the energy sector.
- Preventing precarious work should be an important part of the agenda, since this type of insecurity often affects women.
- It is important to discuss and combat gendered stereotypes regarding jobs from a very early age, e.g. in primary school, as these biases are very ingrained in the societal understanding.
- Quotas are a potential strategy for ensuring more women in e.g. boards.
- Ensuring women’s contributions is not only an issue for the green energy labour market. Enabling environments in educational institutions and companies have been shown to have a great effect.

Strategic pathway: *Increase female participation in the renewable energy labour market*

More information needs to be gathered on how to increase female participation in the renewable energy labour market. Due to the scarcity of information, knowledge, and projects with this specific focus, the ecosystem and relevant stakeholders should be involved in new initiatives to gain a better understanding of the potential and barriers, as well as how to create an enabling environment for female participation in the renewable energy labour market. There are transcending patterns worldwide, and cross-cooperation on a policy and macro-level, as well as vertical cooperation in specific regions, and concrete and targeted efforts to increase knowledge and secure evidence-based approaches should be employed. Finally, concrete actions regarding the training of trainers to eliminate hidden biases and ensure an inclusive environment are important elements of the overall strategy.

Macro-level initiatives

Macro-level political initiatives aimed at reducing gender disparity in the renewable energy labour market should include tangible policies and legislation, such as quotas, that secure women's contributions and participation in the labour market. To prevent discrimination against women, it is crucial to implement policies that ensure equal rights, including fair pregnancy and maternity benefits.

Women's access to training programs, which will qualify them for specialised jobs, is important to ensure on a political level. Likewise, it is vital to establish enabling environments for women at workplaces and educational institutions to support and further develop female workers. Dialogues between government, educational institutions and industry are an essential first step in developing these environments and encouraging collaboration across sectors.

Knowledge gap

There is a knowledge gap in women's participation in the energy workforce and renewable energy systems. One reason is the lack of comprehensive data on their employment in this sector. This scarcity of gender-disaggregated data hinders a complete understanding and integration of gender considerations into energy policies. To improve knowledge and policies, gender-focused research and data collection across the entire energy value chain should be prioritised, addressing women's needs and contributions comprehensively. Additionally, analysis should be conducted on women's opportunities in the energy transition, job prospects, and the creation of safe working and educational environments.

Strategic Initiatives

- **Introducing quotas and legislative requirements**: Quotas can create a level playing field regarding females' participation; however, quotas alone cannot address deeper structural issues, such as occupational segregation, unequal pay, or the burden of unpaid care work. This requires targeted policies, legislative measures, and cultural change.
- **Enabling environments**: Create an enabling environment to decrease female disparity in the labour market. This could be achieved through policy reforms, increased access to education and training, childcare and family support, mentorship and networking, as well as flexible work arrangements.

- **Create awareness**: Communicate possibilities for females in the renewable energy labour market, starting as early as primary school.
- **Cross-sectoral cooperation**: Initiate cross-sectoral projects involving companies, schools, and organisations to encourage companies in creating inclusive and supportive workplace cultures that value diversity, provide equal opportunities for career advancement, and actively work to eliminate gender biases through, e.g. transparent pay schemes.
- **Concrete and targeted funding**: Direct concrete and targeted funding into existing programs targeting females.
- **Micro credentials**: Develop micro-credentials tailored explicitly for females.
- **Training of trainers**: Focus on training of trainers with an emphasis on reducing gender disparity.

Bottleneck 3: People in Transition from Declining Industries and Migration

Transition periods make people particularly vulnerable, highlighting the crucial need for skill development. These periods, especially when jobs are at risk due to declining industries or migration, require upskilling to ensure smoother transitions and better employment prospects in new sectors. For those losing jobs due to the renewable energy transition, clear development pathways are crucial. Micro-credentials can play a significant role here, as short and targeted courses provide tangible steps for transitioning into new jobs and opportunities. Market creators should develop policies to prevent social conflict, aid sectoral restructuring, and address declining workforces by implementing reskilling strategies. They must also address gender, social, and geographic disparities in green jobs, and support vulnerable regions and workers through targeted aid and services to facilitate transitions and create new green job opportunities.

Companies need to cooperate on retraining strategies and collaborate with educational institutions, organisations, and authorities. Educational institutions should develop reskilling initiatives, including micro-credential courses, tailor vocational training to new job opportunities, train trainers, and work with trade unions. Workforce and organisations should ensure workers' rights to reskilling initiatives, strengthen STEM competencies, and support groups most impacted by labour market shifts to reduce resistance and adjustment costs. There are potential conflicts regarding salary level and staying in the local community when transitioning from, e.g. jobs within the mining sector to the renewable energy labour market. Here, unions must aid workers in identifying opportunities within their local area and collaborate with industry to ensure fair wages.

Initial identification of strategic initiatives

Figure 7 reflects the initial initiatives identified by the report authors based on the Quadrature of Competencies. The complete list of initiatives is available in Appendix 3.

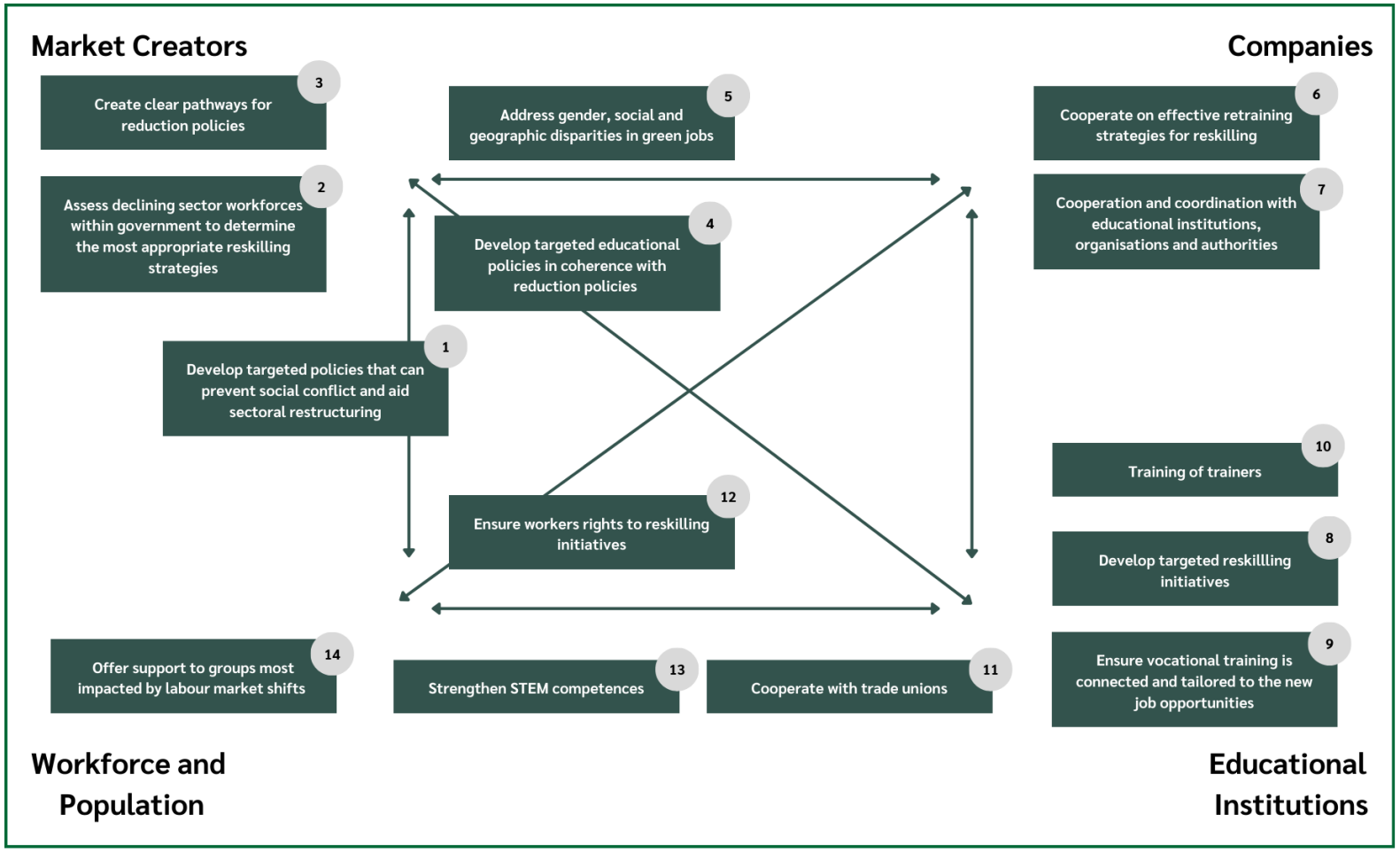


Figure 7. *Key stakeholder initiatives for the People in Transition from Declining Industries and Migration bottleneck*

Strategic initiatives identified by experts

Strategic initiatives and responsibilities for each of the key stakeholders in the Quadrature of Competencies were identified by subject matter experts at Workshop 3 on June 10th, 2025.

All participants were asked to reflect on each stakeholder's role in developing a skilled workforce for a renewable energy labour market (see Figure 8).

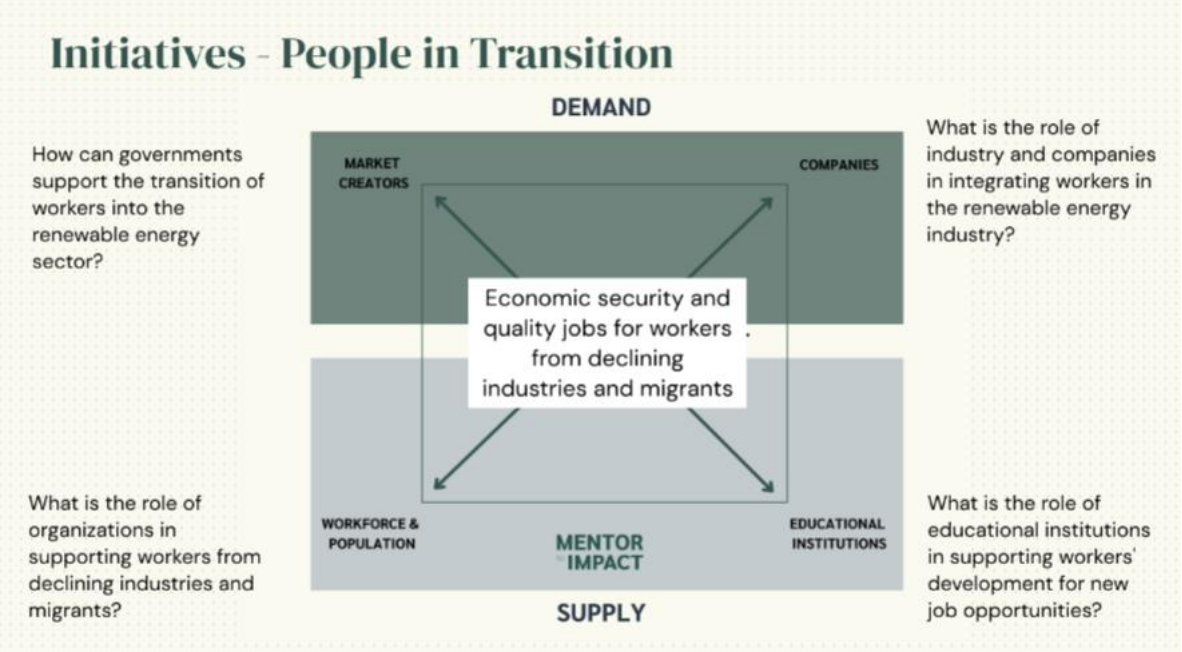


Figure 8. *Brainstorm questions for all stakeholders in the Quadrature of Competencies framework.*

Results

The following initiatives were developed during the workshop based on the prompts for each stakeholder in the Quadrature of Competencies framework.

How can governments support the transition of workers into the renewable energy sector?

- Making sure the workers' ***social systems*** are sustainable.
- Requiring companies to ***pay for training*** for their employees.
- Creating ***clear pathways*** for reduction targets and policies.
- ***Assessing declining sector workforces*** within government to determine the most appropriate reskilling strategies.
- Developing ***targeted policies*** that can prevent social conflict and aid sectoral restructuring.
- Facilitating ***public-private partnerships*** on educational initiatives.
- Being aware that ***job creation and job loss*** may not occur in the same regions.
- Governments need to prevent social backlash by ensuring new jobs are created in coal-intensive areas. This can be supported by:
    - Mapping new opportunities for investment by companies.
    - Actively directing job creation efforts to regions affected by the coal industry decline.

What is the role of organisations in supporting workers from declining industries and migrants?

- Developing a holistic understanding of the workers' situations when relocating, which are often specific to the local context. There might be issues related to, e.g. mortgages or childcare systems.
- Understanding that it might not be in the workers' interest to move, as they may be tied to the area for family or community-related reasons.
- Help map new business and job opportunities in local region.

What is the role of educational institutions in supporting workers' development for new job opportunities?

- Investing in ***upskilling courses*** for adult students who are currently on the job market.
- Prioritising ***local skills development.***
- Cooperating with local companies and governments to create ***strategic pathways for upskilling*** of those who are losing their jobs. Ensure ***vocational training*** is tailored to the new job opportunities.

What is the role of industry and companies in integrating workers into the renewable energy industry?

- Providing **market-competitive salaries** for renewable energy jobs.
- Supporting ***on-the-job training and development of workers*** to meet emerging standards and requirements of new technologies.
- Being transparent and cooperative with anticipated skills needs.

Strategic pathway: *Upskilling and reskilling to overcome vulnerability and increase support for the green energy transition*

It is crucial to ensure that people in transition—whether in declining or developing jobs, or those in a temporary state of transition—can build their skills to meet future or existing demands. This encompasses gathering knowledge and understanding what different renewable energy technologies require, both in terms of innovation, upscaling and dissemination. Another focus is to explore how existing skills can be most easily converted or transformed into applicable skills that meet the demand.

Macro-level initiatives

Macro-level initiatives can create a direct and local impact by funding educational and reskilling initiatives and just transition projects. These initiatives have the potential for more systemic impact if they can be scaled up and implemented in other regions or across sectors. One option is to develop micro-credential courses for people in transition, as they can provide a tangible and clear path to new job opportunities.

Macro-level initiatives can be used to create a deeper impact by establishing partnerships between educational institutions and industry for reskilling initiatives, as a focused effort on skills needed in the industry has a better chance of ensuring a just transition. On a more systemic level, these partnerships can take the form of educational powerhouses with cross-regional networks.

Knowledge gap

There is a gap in the literature on upskilling and reskilling pathways tailored for the green energy transition. Disparities in access to upskilling opportunities affect disadvantaged regions and low-skilled workers, highlighting the need for research on equitable training strategies. Effective policy implementation and stakeholder coordination are important, but the literature lacks exploration of best practices and challenges in this area. Mapping reskilling pathways for individuals in declining sectors or affected jobs, along with providing best practice examples, is crucial.

Strategic Initiatives

- **Development of just transition powerhouses**: Cross-regional networks on knowledge sharing of reskilling opportunities and learning materials must have access to industry insights to ensure that workers in transitioning industries can acquire new skills and adapt to emerging job markets.
- **Regional upskilling and just transition initiatives**: Supporting reskilling initiatives in local communities, with reskilling programs that are accessible, relevant, and aligned with market needs, such as micro-credential courses.
- **Enabling environments for reskilling in targeted areas:** This includes establishing regional training centres, partnerships with educational institutions and industries to create tailored programs. The development of digital learning platforms, mentorship programs, and providing financial incentives to support worker transitions can also support reskilling. Additionally, fostering cross-regional knowledge sharing, community engagement, and advocating for supportive policies can play a crucial role. This includes advocating for labour laws that protect workers' rights during transitions and promoting incentives for businesses to invest in employee development.

- **Development of green skills in refugee camps**: Initiatives can equip refugees and migrants with the necessary skills for the green energy transition, for example, by supporting green skills development in refugee camps.

Bottleneck 4: Lack of Skills Poses an Implementation Gap in the Green Energy Transition

The lack of skills for the green energy transition is evident across sectors, education systems, and businesses. To address this challenge, it is necessary to ensure the effective and rapid development of the workforce wherever possible.

The complexity of the labour shortage can only be addressed by rethinking certain aspects of existing education systems and encouraging cross-sector collaboration. At the same time, the enormous development of society results in a change from viewing education and work life as a stationary state to a dynamic state, where throughout life, workers must acquire new skills and competencies and sometimes change career paths along the way.

Therefore, market creators should support lifelong learning and develop national strategies that recognise prior learning (RPL). This involves creating an enabling environment for promoting flexibility in adult learning systems, e.g., through micro-credentials and other reskilling opportunities, and providing targeted funding for training institutions that focus on the skills needed for the renewable energy sector.

Companies need to invest in training and upskilling their workforce for green jobs, innovate to attract and retain workers, and contribute to the development of RPL initiatives, targeted micro-credentials, and technological understanding in collaboration with educational institutions.

Organisations can contribute by creating awareness among workers regarding the development of required skills in the industry, as well as benchmarking the current skills of the workforce to identify transferrable skills.

Educational institutions must develop and implement models for RPL, micro-credentials, revised and targeted curricula, etc. However, they will only succeed in this task if it is done in collaboration with companies, organisations, and trade unions.

Initial identification of strategic initiatives

Figure 9 reflects the initial initiatives identified by the report authors based on the Quadrature of Competencies. The complete list of initiatives is available in Appendix 4.

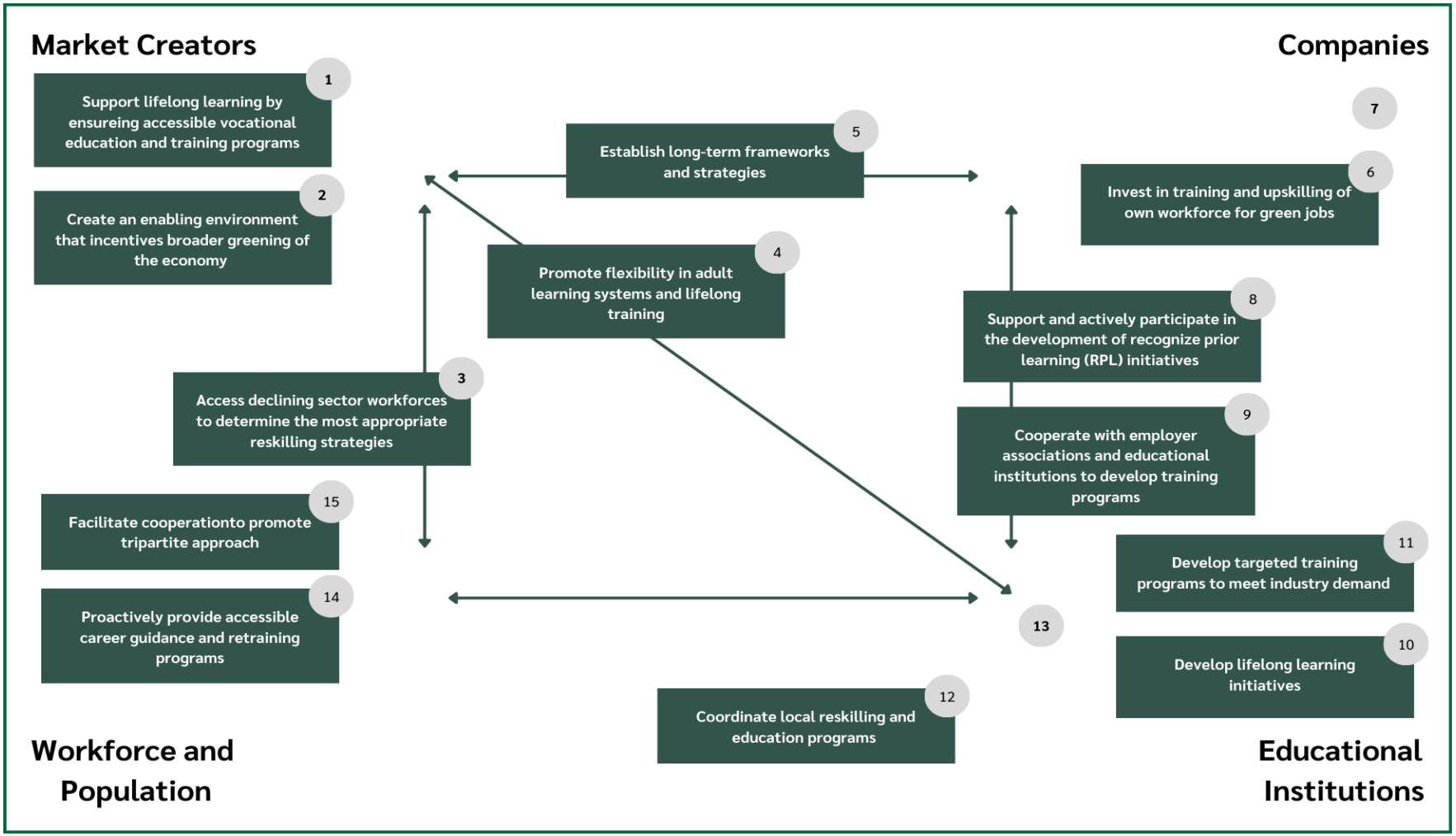


Figure 9. *Key stakeholder initiatives for the Lack of Skills Poses an Implementation Gap bottleneck*

Strategic initiatives identified by experts

Strategic initiatives and responsibilities for each of the key stakeholders in the Quadrature of Competencies were identified by subject matter experts at Workshop 2 on May 27th, 2025.

All participants were asked to reflect on each stakeholder's role in developing a skilled workforce for a renewable energy labour market (see Figure 10).

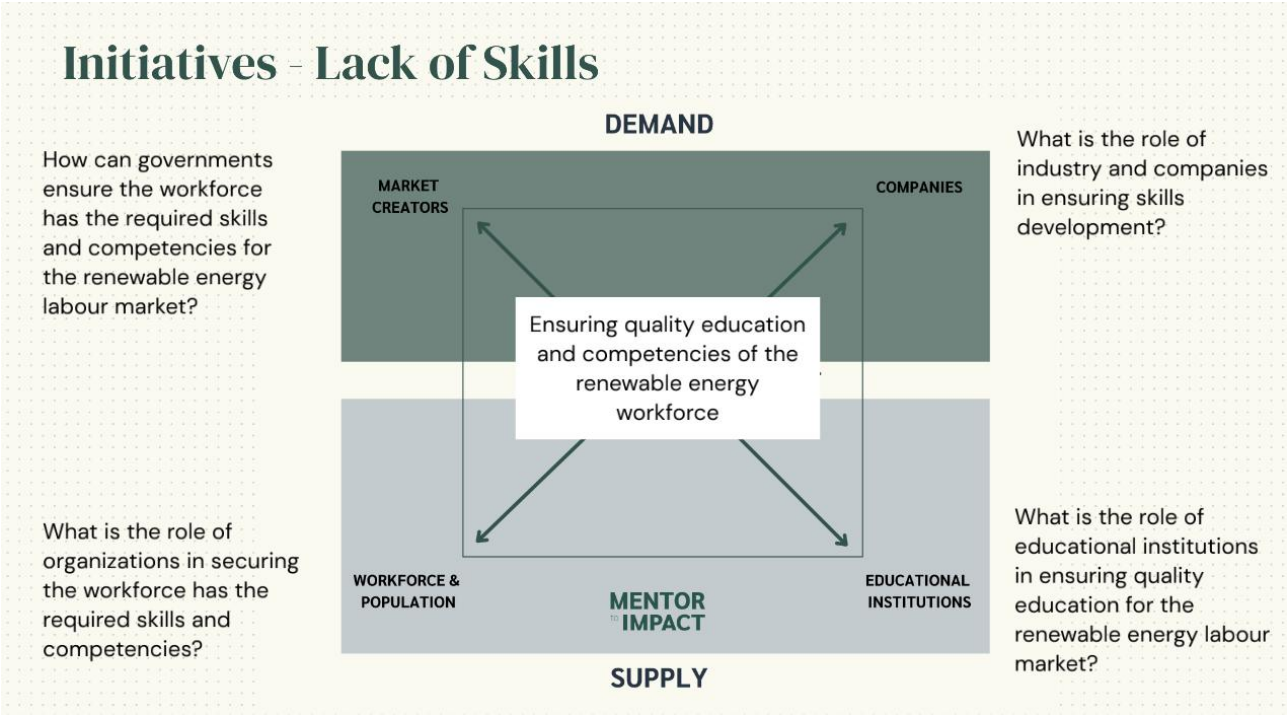


Figure 10. *Brainstorm questions for all stakeholders in the Quadrature of Competencies framework.*

Results

The following initiatives were developed during the workshop based on the prompts for each stakeholder in the Quadrature of Competencies framework.

How can governments ensure the workforce has the required skills and competencies for the renewable energy labour market?

- Creating ***enabling environments*** for new skills development, e.g. through policy changes that can facilitate this.
- Introducing ***new skill sets*** in all educational entities that the government controls. In many countries, the government is the main stakeholder in both higher education and VET.
- ***Providing targeted funding to training institutions*** focusing on skills needed for the renewable energy sector.

What is the role of organisations in securing the workforce that has the required skills and competencies?

- ***Creating awareness*** among workers that energy systems and technologies are changing, which leads to changes in the job market.

- ***Motivating*** workers to embrace new skills.
- Benchmarking current skills and competencies of the workforce and comparing them with the current competencies of the workforce to ***identify transferrable skills.***
- Representing workers in renewable energy industries.

What is the role of educational institutions in ensuring quality education for the renewable energy labour market?

- ***Collaborating closely with industry*** to ensure an updated curriculum.
- Upgrading the current educational offering to ***include needed skills for the renewable energy market***.
- Developing ***targeted and specific curriculum for vocational skills***, e.g. micro-credential courses.

What is the role of industry in ensuring skills development?

- Providing ***insight into needed skills for new technologies (skills mapping)*** and offering these insights to educational institutions, organisations and government/authorities. This work could be done through industry clusters to ensure that the mapping accurately represents the market.
- ***Developing curriculum*** in collaboration with educational institutions.
- Ensuring ***attractive and stable conditions*** for workers in the renewable energy industry.

Discussion points at workshop

The following points were discussed in the workshop based on the identified initiatives.

- Governments are the most important stakeholders for facilitating dialogue between industry, educational institutions and organisations, as they supervise the educational sector and decide on long-term plans for skills development.
- Furthermore, the market needs to be clear and transparent for companies to invest and set long-term goals. This will also enable companies to identify anticipated skill needs and coordinate with educational institutions accordingly.
- If skills are seen to reduce risk and increase economic efficiency, this can also serve as a motivator for companies to invest in educational initiatives beyond their own immediate needs.

Strategic pathway: *Support skills development, and dissemination of training opportunities*

The mismatch of skills within the renewable energy sector affects governments, industries, educational institutions, and organisations, as a lack of skills within the workforce is often a hindrance to realising renewable energy projects. This shortage can occur at both a technocratic level, where local development or infrastructure projects cannot be realised due to insufficient knowledge on how to develop effective licitation processes, and at the blue-collar level, where we see examples of how infrastructure projects are hindered due to a lack of skilled labour.

It is therefore essential to develop enabling environments for upskilling and securing the recognition of prior learned skills among workers, even if they do not have a recognised certification in the country or region where they are needed.

Macro-level initiatives

Macro-level initiatives can contribute to projects that align multiple stakeholders in finding common ground for recognising skills. There is a need to gather and facilitate alignment between educational institutions, industry and government representatives in the efforts to create a framework for recognising prior learned skills. This could be achieved through a tripartite approach, where the state acts as a facilitator of dialogue between companies, educational institutions, and relevant organisations.

Creating a transparent market, where companies can predict developments in the green energy sector, is necessary to provide the industry with the best possible conditions for meeting future skills demand.

There is a need for further research into the skills needed for the green energy transition. Macro-level initiatives can aid market creators in crafting efficient educational policies by supporting research into the future skills demand. Furthermore, systemic impact can be created by investing in upskilling government technocrats, as a well-informed technocratic level in government will help ensure greener investment projects in the future.

Knowledge gap

Analysing skill demands across various infrastructure projects in different parts of the world to strategically address skill requirements and gain a comprehensive understanding of existing gaps.

Strategic Initiatives

- **Training of technocrats/government officials/authoritative representatives**: Develop networks and learning programs for technocrats and government officials to acquire knowledge on, e.g. taxonomies, licitations, and infrastructure to accelerate the transition to a system based on renewable energy.
- **Tripartite approach and skills councils:** On a governmental level facilitate alignment between educational institutions, industry, and government representatives to create a framework for recognizing prior learning and identifying new skills.

- **Promote STEM competencies in the primary school system:** Increase general and basic STEM competencies in primary education systems.
- **Develop Micro-credentials:** Support lifelong learning initiatives using micro-credentials as building blocks.
- **Mutual recognition of skills across borders and regions:** This applies explicitly to Europe**,** where there is a need for central alignment on mutual recognition of skills. Though this agenda is widely discussed, no entity has claimed it within their mandate to address this issue.
- **Development of curricula and training opportunities**: Support educational institutions in developing training programs that can be disseminated across regions and borders. These should be developed in close collaboration with the renewable energy industry.
- **Green Centres of excellence at universities:** Promote cooperation between companies and universities to secure employability among students. This is especially imperative for the Global South.
- **Benchmark skill and competencies of the current workforce:** By benchmarking current skills, transferrable skills can be identified for workers seeking to change career paths. The benchmarking of current skills can also form the basis for programs which support RPL initiatives.

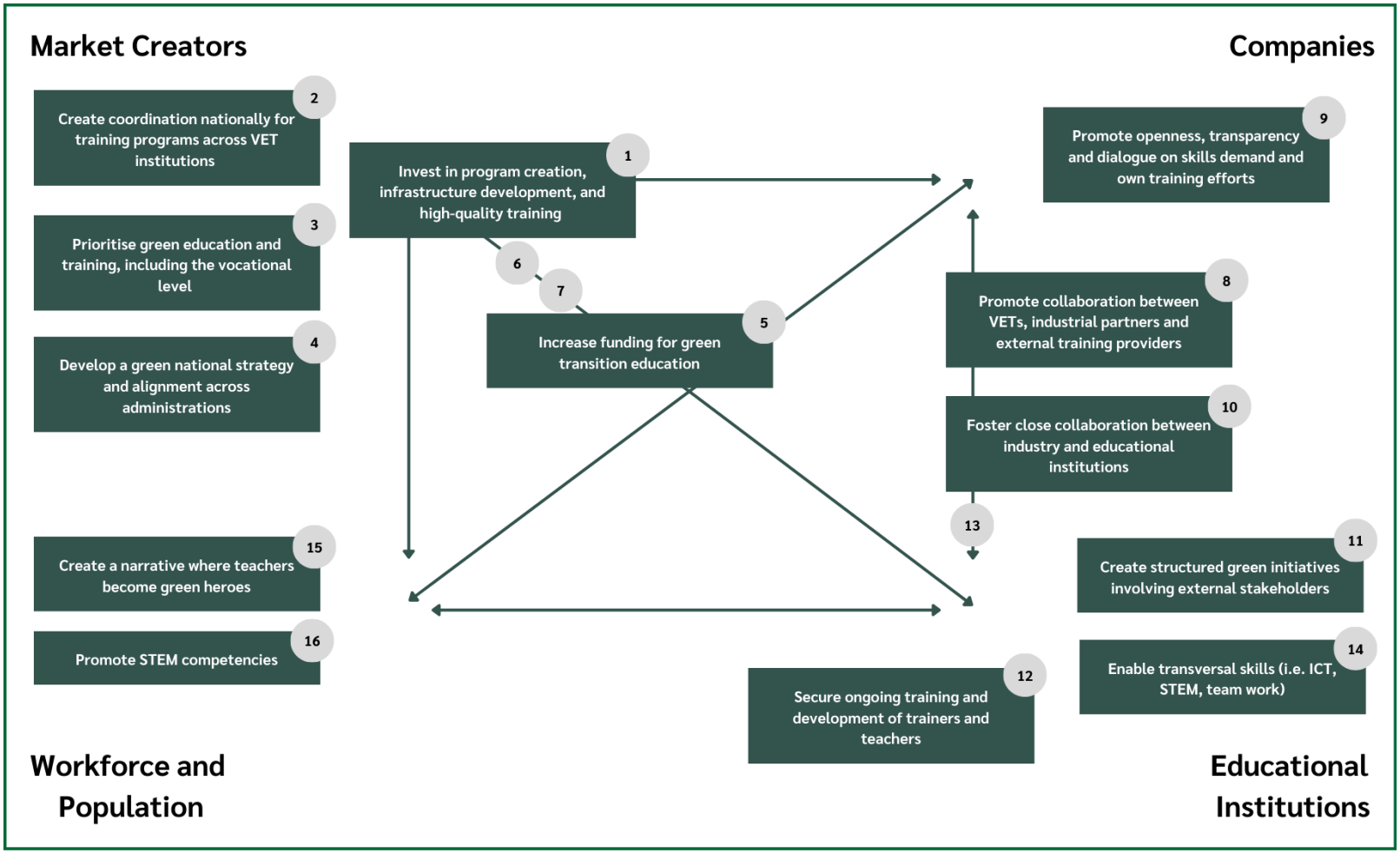
Bottleneck 5: Shortage of Trainers and VET Institutions that Focus on Renewable Energy

It is a global problem that there is a significant shortage of trainers for the green energy transition, affecting all educational levels. However, the demand is particularly high for skilled and unskilled workers. The lack of trainers and educators can hinder strategic efforts to upskill the workforce until the right trainers are educated and secured.

This shortage can manifest both as a concrete lack of trainers and on a more institutional level, where the necessary structures are not in place to ensure vocational institutions. Addressing this issue requires existing teachers to be educated and trained in emerging technologies, where collaboration with companies is crucial. Funding must be secured to equip schools with the necessary learning environments, including the required equipment. Cross-sector and company collaboration must ensure the essential development. At the same time, structural frameworks and investments must be secured by the government, requiring holistic and cross-policy thinking. Organisations can contribute to the training of trainers by lobbying for collective funds and promoting training as an alternative to retirement.

Initial identification of strategic initiatives

Figure 11 reflects the initial initiatives identified by the report authors based on the Quadrature of Competencies. The complete list of initiatives is available in Appendix 5.



x Numbers refer to the list of key initiatives

Figure 11. *Key stakeholder initiatives for the Shortage of Trainers and VET Institutions bottleneck*

Strategic initiatives identified by experts

Strategic initiatives and responsibilities for each of the key stakeholders in the Quadrature of Competencies were identified by subject matter experts at Workshop 2 on May 27th, 2025.

All participants were asked to reflect on each stakeholder's role in developing a skilled workforce for a renewable energy labour market (see Figure 12).

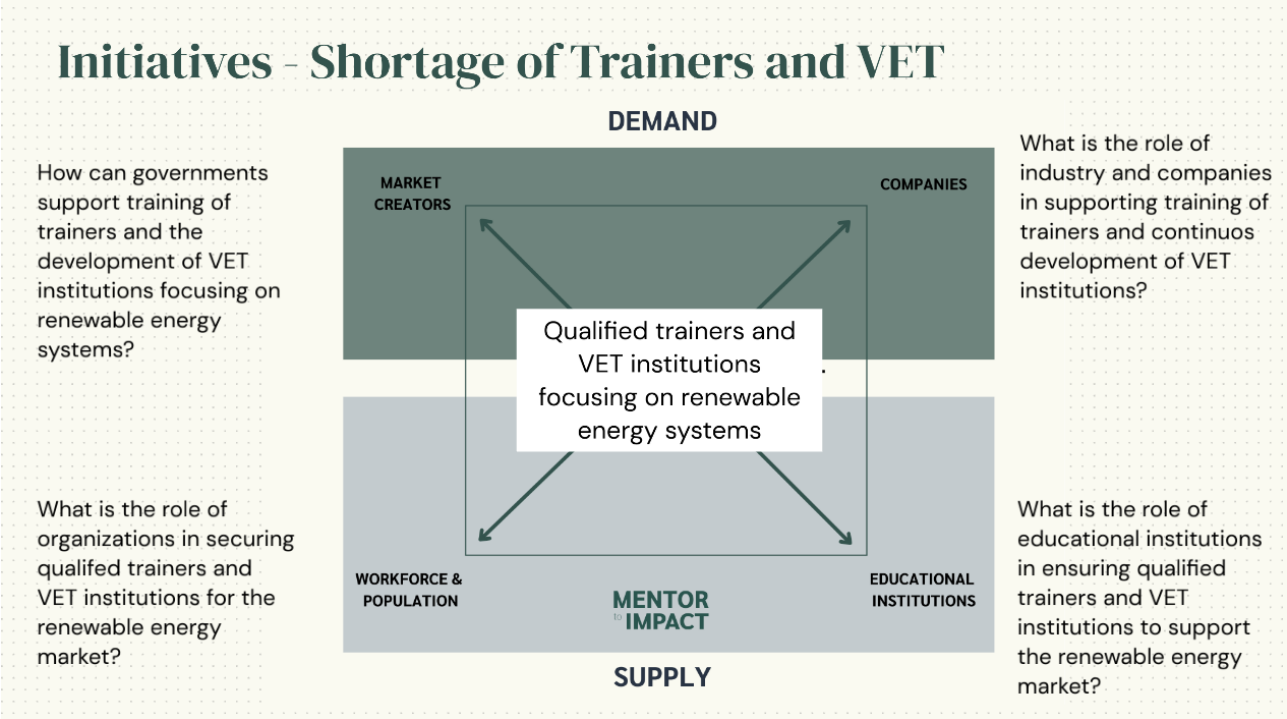


Figure 12. *Brainstorm questions for all stakeholders in the Quadrature of Competencies framework.*

Results

The following initiatives were developed during the workshop based on the prompts for each stakeholder in the Quadrature of Competencies framework.

How can governments support the training of trainers and the development of VET institutions focusing on renewable energy systems?

- Create ***coordination nationally*** for training programs across VET institutions.
- Promoting and/or financing **dialogue between training institutions and companies** to share knowledge and develop curricula and training programs for teachers.
- ***Prioritising green energy education***, including the vocational level.
- ***Reimbursing companies*** when they are providing upskilling opportunities for their employees.
- ***Creating guidelines*** for workers who want to participate in skills development.
- ***Identifying opportunities*** for teachers to visit companies and update their skills.

What is the role of organisations in securing qualified trainers and VET institutions for the renewable energy market?

- Promoting ***STEM*** competencies.
- Creating a narrative where teachers become "***green heroes"***.
- Lobbying for ***collective funds and incentivising training***, where it is needed.
- Promoting ***training as an alternative to retirement.***

What is the role of educational institutions in ensuring that qualified trainers and VET institutions to support the renewable energy market?

- *Secure* ***ongoing training and development*** *of trainers and teachers.*
- Providing a consensus-based ***curriculum on new skills*** that supports the renewable energy market.
- ***Upgrading the competencies of current trainers***, e.g. through close collaboration with industry.

What is the role of industry and companies in supporting the training of trainers and the continuous development of VET institutions?

- ***Promote openness, transparency and dialogue*** on skills demand and own training efforts.
- Providing both ***internal and external training*** opportunities.
- Prioritising percentage of revenue or surplus on ***skills development initiatives***.
- Promote ***collaboration*** between VETs, industrial partners and external training providers.

Strategic pathway: *Increase supply of trainers within the renewable energy sector*

There's a recognised need for support and guidance in teacher training for skills in the renewable energy industry. Current approaches are fragmented and rely on individual VET institutions' initiatives. It is therefore necessary to strategically increase the number of trainers for the renewable energy transition, both in the Global North and the Global South.

Macro-level initiatives

Macro-level initiatives must ensure that representatives from all relevant stakeholders within the educational system, industry, and government are aware of the need for qualified trainers. This can be achieved by supporting and promoting the creation of network collaborations, knowledge sharing, and the development of strategic initiatives. VET schools and universities have the potential for broad outreach and should therefore be a strategic focus.

There is significant potential to be gained by motivating individuals who are approaching retirement to become instructors or trainers. Not only do they possess extensive experience and professional expertise, but this is also a way to strengthen the workforce, ultimately benefiting society as a whole. This requires the development of effective senior policies at the national level, making it financially, and preferably also socially, attractive to remain in the workforce for a few additional years. Furthermore, it must be ensured that these individuals are upskilled with the necessary pedagogical and didactic competencies, so they are capable of teaching their subject effectively.

Further mapping is needed to elevate the issue at the governmental and industry levels. Trainer development programs and additional research can help identify best practice examples and highlight programs with more systemic potential.

Knowledge gap

Knowledge and analysis on the training of trainers for the green energy transition are scarce. While many projects include trainers as a natural component, few address the specific issue of training trainers and the resulting shortage. It is therefore important to prioritise in-depth analyses of existing training-of-trainers initiatives, cross-sector cooperation on training of trainers, and lessons learned to identify best practices, areas for improvement, and the extent of the lack of trainers at both universities and VET institutions.

Strategic Initiatives

- **Green Trainers Alliance:** Convene relevant actors (companies, existing projects, educational institutions and authorities) in networks aimed at knowledge sharing and potentially assisting in securing further funding.
- **Building Centres of Excellence:** Establish centres of excellence at technical universities or VET schools in cooperation with authorities and companies.
- **Training of Teachers at VET Schools:** Secure training of teachers at existing VET schools through close cooperation with companies.
- **Training of Teachers at Universities:** Provide direct funding to selected universities with global dissemination potential.
- **Shared Platform for Trainers:** Create a platform for trainers with materials and funding

opportunities.

- **Concrete and Targeted Funding:** Direct funding into existing development programs.
- **Programs to transition seniors working in the green energy industry to trainer positions:** Develop programs to guide and incentivise workers approaching retirement to become trainers or instructors.

Bottleneck 6: Silos Across Administrations and Sectors

In our interconnected world, breaking down silos and fostering centralised cooperation on regional practices for skill development is paramount. Market creators must harmonise qualification systems across jurisdictions to facilitate the recognition and portability of skills, promoting workforce mobility and economic integration. Integrating social, educational, climate, and labour policies into a unified framework ensures comprehensive and sustainable solutions. Horizontal cooperation in climate policy aligns efforts across government levels and stakeholders, optimising resources and amplifying the effectiveness of climate action. Goals for the energy transition must be clear and transparent.

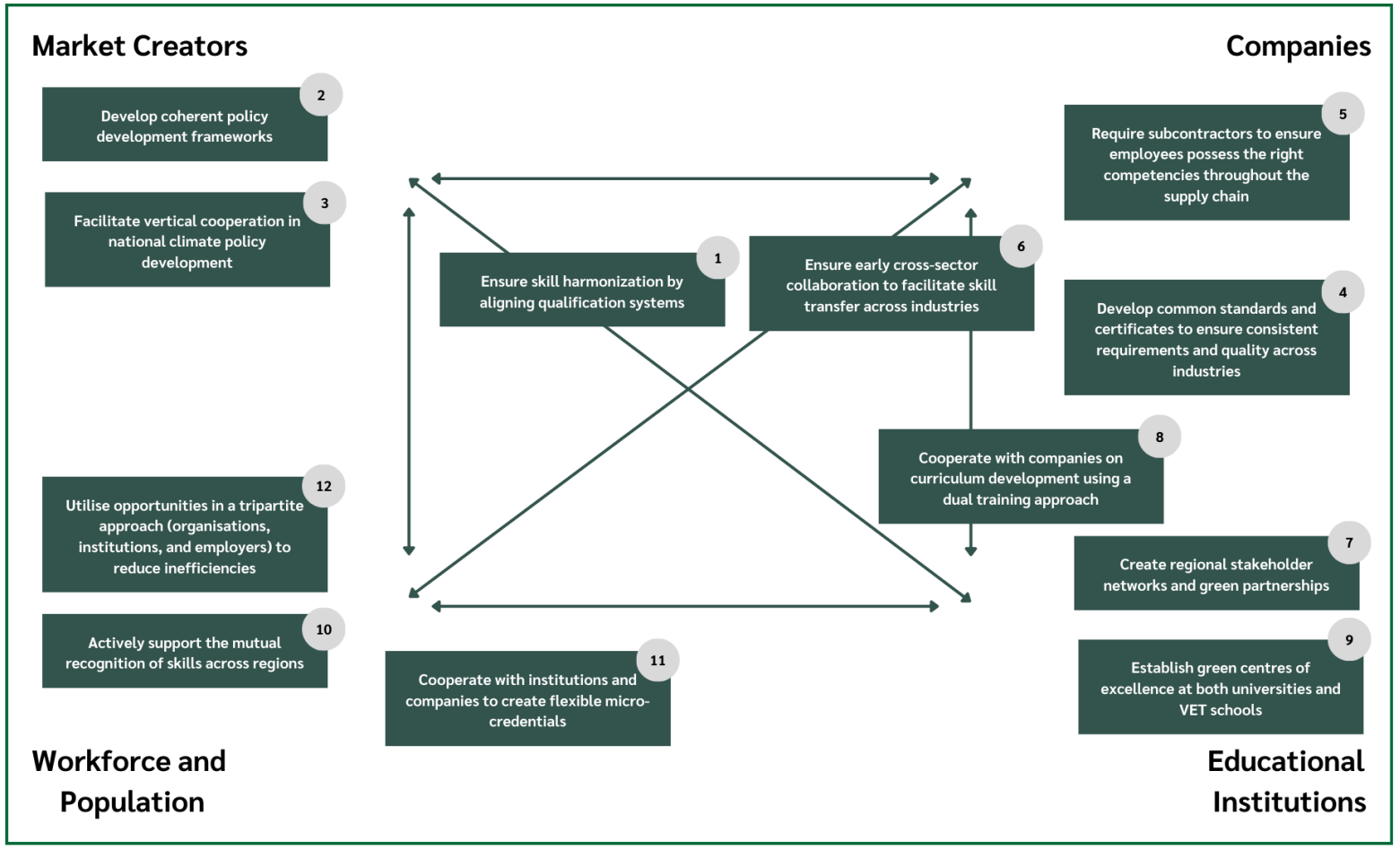
The position of organisations such as industry clusters, trade unions, and chambers of commerce in the renewable energy market needs to be strengthened, as their current influence is fragmented. These relevant organisations should be involved in skills planning and contribute to facilitating dialogue between educational institutions and industry.

For companies, centralised cooperation to develop common standards and certificates ensures consistent requirements and quality across industries. This can be achieved by establishing requirements for subcontractors regarding skills development. Early cross-sector collaboration drives innovation by facilitating the transfer of skills and knowledge within the workforce.

Educational institutions play a crucial role in this centralised approach. Cooperation on curriculum development through a dual training approach ensures that education is both relevant and practical, thereby bridging the gap between education and employment. Establishing centres of excellence fosters innovation in renewable energy and technologies, while supporting mutual recognition of skills enhances employability and bridges skill gaps. Flexible micro-credentials cater to evolving workforce needs, and a tripartite approach aligns stakeholders towards common goals, optimising resources and driving cohesive progress.

Initial identification of strategic initiatives

Figure 13 reflects the initial initiatives identified by the report authors based on the Quadrature of Competencies. The complete list of initiatives is available in Appendix 6.



x Numbers refer to the list of key initiatives

Figure 13. *Key stakeholder initiatives for the Silos across Sector and Administrations bottleneck.*

Strategic initiatives identified by experts

Strategic initiatives and responsibilities for each of the key stakeholders in the Quadrature of Competencies were identified by subject matter experts at Workshop 1 on May 13th, 2025.

All participants were asked to reflect on each stakeholder's role in developing a skilled workforce for a renewable energy labour market (see Figure 14).

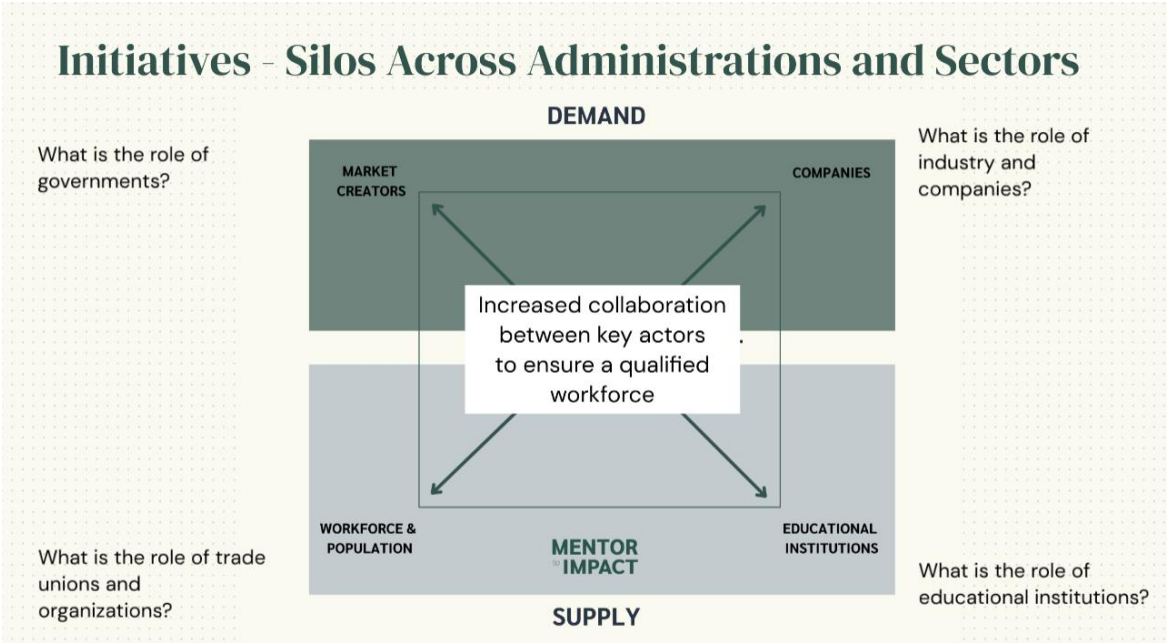


Figure 14. *Brainstorm questions for all stakeholders in the Quadrature of Competencies framework.*

Results

The following initiatives were developed during the workshop in response to the prompts for each stakeholder within the Quadrature of Competencies framework.

How can we avoid silos in government, and how can the government collaborate with other stakeholders?

- The president or prime minister needs to establish this as a priority and define it as a collaborative responsibility across ministries.
- Motivating cross-sector cooperation, e.g. ***tripartite dialogues with companies, schools and organisations.***
- Creating coherent policies and ***clear climate/energy goals.***
- Ensuring ***transparency*** in national energy reduction plans.
- Creating ***skills mapping*** at a regional level to address the energy transition and develop corresponding strategies.
- **Working across policy portfolios**: Energy, industry, employment and finance, to ensure policies towards workforce development are holistic.

What is the role of organisations (industry clusters, trade unions and chambers of commerce, e.g.)*?*

- **The market for renewable energy compared to fossil fuels is an emerging market sector**. This means that there is not yet a strong foundation of organisations, industry clusters, and trade unions, as there is in the more established fossil fuel sector. As a result, there is generally a lower level of protection for workers' rights and wages, making it less attractive to work in these sectors.
- Requesting and actively contributing to ***skills anticipation***.
- Facilitating the ***dialogue between schools and companies.***
- Actively supporting ***mutual recognition of skills*** across regions.
- Utilising opportunities in a ***tripartite approach*** (organisations, institutions and employers).

What is the role of educational institutions?

- Developing ***planning instruments*** that consider market trends, industrial needs, and political priorities and allow for projecting the demand and supply of qualified workforce. Most of the time, governmental institutions struggle to manage the complexity of planning VET across heterogeneous territories.
- Establishing green ***centres of excellence*** at both universities and VET schools.
- Creating ***regional stakeholder networks and green partnerships*.**

What is the role of industry and companies?

- Establishing ***strong cooperation with schools.***
- Companies can finance training and guarantee jobs for those who engage in training.
- Providing stable and decent working conditions.
- Developing ***common standards and certificates*** to ensure consistent requirements and quality across industries.
- Ensuring early ***cross-sector collaboration*** to facilitate skills transfer.

Discussion points at workshop

The following points were discussed in the workshop based on the identified initiatives.

- A tripartite system can be effective but should be expanded even further than it is today, by focusing on joint skills, intelligence and skills planning. Governments facilitate tripartite dialogues and include other key stakeholders such as the industry, educational institutions and unions.

Strategic pathway: *Breaking down silos and fostering cross-cooperation*

The purpose of this pathway is to break down existing silos in both vertical and horizontal systems. This means increasing collaboration across administrative units and policy levels and ensuring that the ecosystem behind skills development and the workforce works together effectively. The focus is therefore to ensure that the relevant qualifications are in place to promote cooperation across different administrations in the legislative and executive systems and to ensure close collaboration between businesses and educational institutions regarding the development of skills.

Macro-level initiatives

Macro-level initiatives can be used to facilitate collaboration and thereby break down silos. This can be achieved by initiating tripartite dialogues, where stakeholders from various sectors and institutions come together to discuss skills development plans and define common standards for skills development.

Macro-level political initiatives, where all key stakeholders are involved, can support policymaking across changing governments and contribute to breaking down silos across government departments. Specifically, all political initiatives, such as renewable energy, should be evaluated from both an employment and educational standpoint, in terms of job creation and educational demands. This evaluation should form the basis for dialogue with relevant stakeholders.

Another important role for macro-level initiatives is to facilitate collaboration across industry clusters and establish a network where strategic decisions regarding skills development can be made in collaboration with the industry and the educational system. The strategic dialogue for each cluster needs to address upcoming developments in the labour market and ensure a qualified workforce for this new job market. The dialogue between industry and educational stakeholders will aid policymakers in making informed decisions on policy development in the labour market.

Knowledge gap

In-depth analysis of best practice examples of cooperation between sectors, including educational institutions, industry and public authorities, analysing strategies and initiatives for cross-sector corporations that have managed to create an enabling environment for ensuring a skilled workforce is needed.

Strategic Initiatives

- **Encourage big manufacturers to enforce demands on subcontractors**: Big manufacturers can create systemic effects by requiring training standards from their subcontractors.
- **Shared industry standards**: Cross-cooperation is needed in the development of shared industry standards.
- **Regional development projects:** Foster cooperation and co-financing of regional projects, where all parts of the development are documented, and the need for skilled labour and specific skills is developed – e.g. district cooling, renewable energy, development of transmission systems.
- **Increased cooperation between universities, industry and government:** Develop targeted training to meet technology demands.
- **Clear and transparent reduction goals:** For effective cooperation across stakeholders, goals for the energy transition need to be clearly defined.

- **Strengthen unions in the renewable energy sector:** Union representation in renewable energy is currently fragmented and weak.
- **Utilizing a tripartite approach and skills councils:** Facilitate dialogue between organizations, employers, and institutions. At the governmental level, foster alignment between educational institutions, industry, and government representatives to create a framework for recognizing prior learning and identifying new skills.
- **Equipping technocrats and government officials with skills and networks to implement decisions:** Ensure a holistic mindset among government officials and capabilities for working across industry to aid an accelerated energy transition.

Appendix 1: Stakeholder Initiatives – Ageing Global North and Nascent Global South

Global North

Market creators

1. Show clear and transparent pathways to promote coherent labour market policies across corporation
2. Secure high participation labour market participation rates / engaging vulnerable groups
3. Protect and empower people in vulnerable situations by developing just transition policies
4. Motivate and equip seniors to stay longer in the labour market - decrease age discrimination
5. Make strategic use of digital help when possible
6. Investigate international recruitment as a way to close employment gaps

Companies

7. Formulate clear demands and needs
8. Develop close cooperation with civil actors, trade unions, and educational institutions
9. Incorporate micro-learning as a means to include vulnerable groups and lifelong learning
10. Promote senior policies

Educational institutions

11. Cooperate with companies and authorities to close the mismatch gap
12. Cooperate with civil society to secure courses and inclusive learning
13. Develop lifelong learning initiatives

Workforce and population

14. Labour market engagement and participation from vulnerable groups
15. Lifelong learning to close growing mismatch in times of technology development and disruption

Global South

Market creators

1. Secure high labour market participation rates / engaging vulnerable groups and females
2. Enhance skills development and coherency in employment policies and educational policies
3. Secure training of trainers and development of Green Vet-schools
4. Show clear and transparent pathways
5. Secure local employment in licitation processes

Companies

6. Develop close cooperation with civil actors, trade unions, and educational institutions on local anchoring
7. Formulate clear demands and needs
8. Incorporate micro-learning as a means to include vulnerable groups

Educational institutions

9. Secure systemic approaches to skills development
10. Cooperate with companies and authorities to close mismatch gaps
11. Cooperate with civil society to secure courses and inclusive learning
12. Develop micro learning initiatives
13. Develop certification standards based on prior learned skills

Workforce and population

14. Strengthen cooperation with industry organisations and trade unions
15. Require knowledge on the benefits of skills development

Appendix 2: Stakeholder Initiatives – Increased Gender Disparity in the Renewable Energy Labour Market

Market Creators

1. Implement targeted measures to include women in employment
2. Develop training initiatives based on the practical reality of female workers

Companies

3. Ensure salary for workers undergoing training by providing subsidies from the government
4. Develop inclusive company practices and policies
5. Secure a safe workplace environment

Educational Institutions

6. Offer training opportunities for women
7. Develop micro-credential courses
8. Focus on STEM competencies among women

Workforce and Population

9. Secure safe education and workplace environments
10. Raise awareness of educational and job opportunities for women

Appendix 3: Stakeholder Initiatives – People in Transition from Declining Sectors and Migration

Market creators

1. Develop targeted policies that can prevent social conflict and aid sectoral restructuring
2. Assess declining sector workforces within government to determine the most appropriate reskilling strategies
3. Create clear pathways for reduction policies
4. Develop targeted educational policies in coherence with reduction policies
5. National governments should address gender, social, and geographic disparities in green jobs and support and empower vulnerable regions and workers to acquire necessary skills, with targeted aid for at-risk workers, services facilitating their transition to new local employment opportunities, and measures assisting firms in creating new green jobs.

Companies

6. Cooperate on effective retraining strategies for reskilling
7. Cooperation and coordination with educational institutions, organisations and authorities

Educational Institutions

8. Develop targeted reskilling initiatives
9. Ensure vocational training is connected and tailored to the new job opportunities
10. Training of trainers
11. Cooperation with trade unions

Workforce and organisations

12. Ensure workers' rights to reskilling initiatives
13. Strengthen STEM competences
14. Offer support to groups most impacted by labour market shifts to reduce resistance and adjustment cost

Appendix 4: Stakeholder Initiatives – Lack of Skills Poses an Implementation Gap

Market creators

1. Support lifelong learning by developing national strategies that recognise prior learning (RPL) and ensure accessible vocational education and training programs
2. Create an enabling environment that incentivises broader greening of the economy
3. Assess declining sector workforces to determine the most appropriate reskilling strategies
4. Promote flexibility in adult learning systems and lifelong training
5. Establish long-term frameworks and strategies - integrating demand-side incentives for renewable energy adoption and supply-side backing for manufacturing.

Employers

6. Invest in training and upskilling of own workforce for green jobs
7. Invest in innovation and enhance local appeal to retain and attract workers
8. Support and actively participate in the development of recognised prior learning (RPL) initiatives
9. Cooperate with employer associations and educational institutions to develop training programs

Institutions

10. Develop lifelong learning initiatives
11. Develop targeted training programs to meet industry demand for critical and highly specialised positions
12. Coordinate local reskilling and education programs to meet demand and support local development initiatives
13. Increase general STEM competencies

Workforce and institutions

14. Proactively provide accessible career guidance and retraining programs to facilitate economic transitions
15. Facilitate cooperation with companies, governments and educational institutions to promote a tripartite approach.

Appendix 5: Stakeholder Initiatives – Shortage of Trainers and VET Institutions

Market Creators

1. Significant investments are needed for program creation, infrastructure development, and equitable access to high-quality training.
2. Create coordination nationally for training programs across VET institutions
3. Prioritise green education and training, also at the vocational level
4. Develop a green national strategy and alignment across administrations
5. Increase funding for renewable energy transition education, especially by incorporating sustainability and environmental education into curricula
6. Close the salary gap og create other incentives
7. Mutual recognition of skills

Companies

8. Collaboration between VETs, industrial partners, and external training providers to identify and address the upskilling needs of educational staff, delivering effective training programs that integrate sustainable development practices into teaching
9. Openness, transparency, and dialogue on skills demand and own training efforts
10. Foster closer collaboration between educational institutions and companies to develop vocational training programs that meet industry demands.

Educational Institutions

11. Create structured green initiatives involving external stakeholders.
12. Secure ongoing training and development of trainers and teachers to ensure they stay updated with the latest technologies and industry practices. This approach ensures that the curriculum remains relevant and aligned with labour market needs.
13. Update existing programs and create new ones to address emerging green technologies
14. Enabling transversal skills (i.e. ICT, STEM, teamwork)

Workforce and Population

15. Creating a narrative where trainers become green heroes

16. Increased STEM competencies

Appendix 6: Stakeholder Initiatives – Silos across Sectors and Administrations

Market Creators

1. Harmonise and align qualification systems across different jurisdictions (countries or regions) to facilitate the recognition and portability of skills and qualifications
2. Integrate social, educational, climate, and labour policies into coherent policy development frameworks to ensure comprehensive and effective policymaking.
3. Facilitate vertical cooperation in national climate policy development to enhance collaboration between different levels of government and stakeholders.

Companies

4. Large companies collaborate to develop common standards and certificates to ensure consistent requirements and quality across industries.
5. Companies should require subcontractors to ensure employees possess the right competencies throughout the supply chain.
6. Ensure early cross-sector collaboration to facilitate skill transfer across industries, promoting adaptability and innovation in the workforce.

Institutions

7. Create regional stakeholder networks and energy partnerships to track demand development and promote sustainability
8. Cooperate with companies on curriculum development using a dual training approach to ensure relevant and practical education.
9. Establish renewable energy centres of excellence at both universities and VET schools, with VET
10. Providers implementing structured energy initiatives involving external stakeholders.

Workforce and population

11. Actively support the mutual recognition of skills across regions.
12. Cooperate with institutions and companies to create flexible micro-credentials.
13. Utilise opportunities in a tripartite approach (organisations, institutions, and employers) to reduce inefficiencies.

Contribution experts

A range of interviews have been conducted to supplement the quantitative findings gathered from literature and data. These interviews provide lived experiences within different areas related to ensuring a skilled workforce for the energy transition. There are representatives from unions, organisations, NGOs, industry and government among the participants, which provides different perspectives. Excerpts from some of the interviews have been included in the description of the six bottlenecks and the workshops, while other interviews have provided more general background information.

Africa

Danish Industry
Jesper Friis
Head of the Partnership and Policy Development Team
(This interview focused on the education programs Jesper Friis has been developing in Kenya, Tanzania and Jordan)

Sam Tambani Research Institute (SATRI)
Dr Martin Kaggwa
Executive Research Director

Tanzania Union of Industrial and Commercial Workers (TUICO)
Lisungu Magnus Mapunda
Senior Education Secretary and Organiser

Brazil

Green Economy Secretariat of Brazil
Director of New Economies
Lucas Ramalho

High level government official (anonymous)

National Development Bank of Brazil
Marta Bandeira de Freitas
Manager of Sustainability

Qualifica PAC (Commission in Brazilian Government)
Rogerio de Veiga
Deputy Secretary for Public Policies Monitoring

Europe

European Federation of Building and Wood Workers (EFBWW)

Slavica Uzelac
Policy Officer

Elnet (Denmark)
Johannes Bruun
Director of International Electricity Market Development

Greater Poland Center for Social Economy
Przemyslaw Piechocki
President of the Management Board

Instrat
Michał Hetmański
CEO and Co-founder

IndustriALL Europe
Isabelle Barthes
General Secretary

Corinna Zierold
Head of Just Transition Coordination

European Trade Union Confederation (ETUC)
Esther Lynch
General Secretary

Ben Lennon
Advisor

Neighborhood Lab
Ofri Earon
Founder

Divers
Duygu Cakir
Project manager and international advisor

Arbejderbevægelsens Erhvervsråd
Sofie Holme Andersen
Chief economist

Global Wind Alliance
Ralph Savage
Chief Stakeholder Relations Officer

India

Self Employed Women Association (SEWA)
Manali Shah
National Secretary

TKTMS (construction workers union from South India)
Ponkumar Ponnuswamy
President