

# Strategic Recommendations and Roadmap for Regional Solar PV and SHC Qualification and Certification Frameworks in the ECOWAS Region

**PROJECT TITLE:** “Development of regional solar energy qualification frameworks and curricula in ECOWAS, EAC and the Pacific Community”

**PROJECT REFERENCE:** Structuring of an International Network of Solar Technology and Application Resource Centres (UNIDO Project ID: 190370)



## Executive Summary (EN)

The "Strategic Recommendations and Roadmap for Regional Solar PV and SHC Qualification and Certification Frameworks in the ECOWAS Region" document provides an in-depth analysis and a structured plan for improving the standards for capacities and processes in solar energy training and certification within the Economic Community of West African Countries (ECOWAS). This document is part of a larger initiative focused on developing robust solar energy qualification frameworks across various regions, including the East African Community (EAC), ECOWAS, and the Pacific Community (SPC). The essence of this document lies in recognising the critical need for high-quality standards in the solar industry, which is vital for ensuring long-term sustainability and building trust in solar markets, especially in developing regions.

The document delves into the specific challenges developing countries face in the solar sector. It highlights the urgent need for reliable and specialised qualification and certification schemes to enhance consumer confidence and ensure quality solar installations. The document strongly emphasises the importance of regional harmonisation and collaboration. It suggests that aligning qualification and certification standards across the ECOWAS region can improve cross-border learning and provide quality solar services.

The strategic recommendations presented are comprehensive, focusing on improving both solar photovoltaics (PV) and solar thermal training frameworks. These recommendations address various needs, from promoting local manufacturing and skill development to targeting installations in critical sectors.

Moreover, the document underscores the pivotal role of regional bodies like the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) in leading these initiatives. By adopting these strategies, ECREEE can reinforce solar qualification and accreditation in West Africa. Actionable steps toward establishing a robust regional framework for qualifications and certifications in solar technology are highlighted, underscoring the need for continuous improvement and adaptation to technological and environmental changes.

Implementing these recommendations is projected to advance the inclusivity and technological prowess of the solar industry in the ECOWAS region, contributing to a more sustainable and equitable energy future. The document positions this initiative as a catalyst for sustainable growth, technological adaptation, and resilience in solar PV and solar heating and cooling (SHC) qualifications and certifications, in alignment with inclusive and environmentally conscious practices. The recommendations furthermore include the development of industry-driven qualifications, a competency-based approach to training, integration of soft skills, and a focus on continuous review and improvement. They also address the need for inclusive frameworks considering gender equality, digital transformation, and climate change adaptation.

The roadmap developed under this framework lays out a multi-phase approach aimed at establishing a resilient and sustainable solar energy sector within the West African Community. It describes a detailed and systematic progression through stages designed to build capacity, implement standards, evaluate effectiveness, and ensure the continuous adaptation of the solar industry to new technologies and methodologies. In terms of implementation, the document advocates for effective communication strategies and awareness campaigns to highlight the importance and benefits of solar certification. It underscores the need for a holistic approach that aligns quality frameworks with national and regional policies, emphasizing regular assessments, updates, and the flexibility to adapt to new developments.

Overall, the roadmap provides a comprehensive guide for making the solar industry in the ECOWAS region more inclusive, technologically advanced, and resilient. It envisions contributing to a sustainable and equitable energy future by integrating these strategic areas into the design of solar energy qualification and certification frameworks.

In summary, the document presents a thorough set of recommendations and a strategic roadmap for advancing solar PV and SHC qualifications and certifications in the ECOWAS region, positioning the solar industry for sustainable growth, technological adaptation, and resilience in alignment with inclusive and environmentally conscious practices. This roadmap is aligned with the ECOWAS Regional Certification System for Sustainable Energy Skills (Renewable Energies and Energy Efficiency) implemented by ECREEE and its Partners.

## Résumé exécutif (FR)

Le document "Recommandations stratégiques et feuille de route pour les cadres régionaux de qualification et de certification en énergie solaire PV et CRS dans la région de la CEDEAO" fournit une analyse approfondie et un plan structuré pour améliorer les normes et les pratiques en matière de formation et de certification en énergie solaire au sein de la Communauté Economique des Etats de l'Afrique de l'Ouest (CEDEAO). Ce document fait partie d'une initiative plus large axée sur le développement de cadres de qualification solides dans le domaine de l'énergie solaire dans diverses régions, y compris la CAE, la CEDEAO et la Communauté du Pacifique. L'essence de cette feuille de route réside dans la reconnaissance du besoin critique de normes de haute qualité dans l'industrie solaire ; ce qui est vital pour assurer la durabilité à long terme et renforcer la confiance dans les marchés solaires, en particulier dans les régions en développement.

La feuille de route examine les défis spécifiques auxquels sont confrontés les pays en développement, notamment les pays les moins avancés (PMA) et les petits États insulaires en développement (PEID), dans le secteur de l'énergie solaire. Il souligne le besoin urgent de systèmes de qualification et de certification fiables et spécialisés afin de renforcer la confiance des consommateurs et de garantir la qualité des installations solaires. Le document insiste fortement sur l'importance de l'harmonisation et de la collaboration régionales. Il suggère que l'alignement des normes de qualification et de certification dans la région de la CEDEAO peut améliorer l'apprentissage transfrontalier et fournir des services solaires de qualité.

Les recommandations stratégiques présentées sont complètes et se concentrent sur l'amélioration des cadres de formation pour le solaire photovoltaïque et le solaire thermique. Ces recommandations répondent à différents besoins, de la promotion de la fabrication locale et du développement des compétences au ciblage des installations dans les secteurs critiques.

En outre, le document souligne le rôle essentiel des organismes régionaux tels que l'ECREEE dans la conduite de ces initiatives. En adoptant ces stratégies, l'ECREEE peut renforcer la qualification et l'accréditation solaires en Afrique de l'Ouest. La conclusion du document réitère la nécessité d'une amélioration et d'une adaptation continues des cadres de qualification et de certification pour s'aligner sur les avancées technologiques et les changements environnementaux. Les conclusions tirées mettent en évidence les étapes à suivre pour établir un cadre régional solide pour les qualifications et les certifications dans le domaine de la technologie solaire, en soulignant la nécessité d'une amélioration et d'une adaptation continues aux changements technologiques et environnementaux.

La mise en œuvre de ces recommandations devrait faire progresser l'inclusivité et les prouesses technologiques de l'industrie solaire dans la région de la CEDEAO, contribuant ainsi à un avenir énergétique plus durable et plus équitable. Le document positionne cette initiative comme un catalyseur pour la croissance durable, l'adaptation technologique et la résilience dans les qualifications et certifications solaires PV et SHC, en alignement avec des pratiques inclusives et respectueuses de l'environnement.

L'appel à des recommandations stratégiques englobant un large éventail de domaines est au cœur de la feuille de route. Il s'agit notamment de l'élaboration de qualifications axées sur l'industrie, d'une approche de la formation fondée sur les compétences, de l'intégration des compétences non techniques et de l'accent mis sur l'examen et l'amélioration continus. La feuille de route aborde également la nécessité de cadres inclusifs tenant compte de l'égalité des sexes, de la transformation numérique et de l'adaptation au changement climatique. La feuille de route présente une approche en plusieurs phases visant à établir un secteur de l'énergie solaire résilient et durable au sein de la Communauté des Etats de l'Afrique de l'Ouest. Elle décrit une progression détaillée et systématique à travers des étapes conçues pour renforcer les capacités, mettre en œuvre des normes, évaluer l'efficacité et assurer l'adaptation continue de l'industrie solaire aux nouvelles technologies et méthodologies.

En termes de mise en œuvre, le document préconise des stratégies de communication et des campagnes de sensibilisation efficaces pour souligner l'importance et les avantages de la certification solaire. Il souligne la nécessité d'une approche globale qui aligne les cadres de qualité sur les politiques nationales et régionales, en mettant l'accent sur des évaluations régulières, des mises à jour et la flexibilité nécessaire pour s'adapter aux nouveaux développements.

Dans l'ensemble, la feuille de route fournit un guide complet pour rendre l'industrie solaire dans les régions EAC-CEDEAO plus inclusive, technologiquement avancée et résiliente. Elle envisage de contribuer à un avenir énergétique durable et équitable en intégrant ces domaines stratégiques dans la conception des cadres de qualification et de certification de l'énergie solaire.

En résumé, le document présente un ensemble complet de recommandations et une feuille de route stratégique pour faire progresser les qualifications et les certifications solaires PV et CRS dans la région de la CEDEAO, en positionnant l'industrie solaire pour une croissance durable, une adaptation technologique et une résilience en alignement avec des pratiques inclusives et respectueuses de l'environnement. Cette feuille de route s'aligne sur le Système Régionale de Certification des Compétences en Energie Durable (Energies Renouvelables et Efficacité Energétique) de la CEDEAO mis en œuvre par ECREEE et ses Partenaires.

## Abbreviations

ACQF - African Continental Qualifications Framework  
BTVET - Business, Technical, Vocational Education, and Training  
CBA - Competence-Based Assessment  
CFEE - Certificat de fin d'études élémentaires  
DIT - Directorate of Industrial Training  
EAC - East African Community  
EACAT - Credit Accumulation and Transfer system  
ECOWAS - Economic Community of West African States  
ECREEE – ECOWAS Centre for Renewable Energy and Energy Efficiency  
EPRA - Energy and Petroleum Regulatory Authority  
EQAP - Educational Quality and Assessment Program  
ERERA - ECOWAS Regional Electricity Regulatory Authority  
GN-SEC - Global Network of Regional Sustainable Energy Centres  
GNQF - Gambia National Qualifications Framework  
GSES - Global Sustainable Energy Solutions  
IRENA - International Renewable Energy Agency  
ISA - International Solar Alliance  
IUCEA - Inter-University Council for East Africa  
LMD - Licence-Master-Doctorat  
PV - Photovoltaics  
QF - Qualification Frameworks  
RQF - Regional Qualification Frameworks  
SEIAPI - Sustainable Energy Industry Association of the Pacific Islands  
SHC - Solar Heating and Cooling  
SQF - Samoa Qualification Framework  
SWHs - solar water heaters  
UHEQF - Uganda Higher Education Qualifications Framework  
UNIDO - United Nations Industrial Development Organisation  
WAPP - West African Power Pool  
WAEC - West African Examinations Council  
WAEMU - West African Economic and Monetary Union  
WDA - Workforce Development Authority  
TVET - Technical and Vocational Education and Training  
ZACCC - Coastal Zone Management and Adaptation to Climate Change Project

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## 1. Introduction

High quality capacities and processes in the solar field are fundamental prerequisites for the long-term sustainability of solar markets and investments. They also underpin the trust of consumers, suppliers, and financiers. Such improvements directly affect the quality of infrastructure, and thus contribute to an effective and inclusive energy transition. A well-structured qualification framework has the potential to create local solar jobs, generate income, and empower domestic companies to participate in global or regional value chains of solar manufacturing and servicing<sup>1</sup>.

However, currently the qualification frameworks (QF) for photovoltaics (PV) and solar heating and cooling (SHC) are often underdeveloped, and institutions offering quality curricula and training tailored to the diverse needs of experts along the solar energy value chain are lacking. It is not uncommon for experts to travel to other countries or regional universities to receive academic training on renewable energy solutions. This fragmentation in the field of solar energy qualification leads to duplication of efforts or, worse, critical gaps in expertise.

Recognising these challenges, there is a strong case for addressing the issue of solar energy qualification regionally in a harmonised manner. These frameworks contribute to the comparability, quality, and transparency of qualifications, making it easier to recognise diplomas and certificates across borders.

The harmonisation of certification schemes of both solar products and services is crucial because it directly impacts the development of regional solar skills. It ensures that high-quality training is delivered to professionals capable of preparing, implementing, operating, and maintaining solar energy systems. International organisations such as the International Electrotechnical Commission (IEC), International Energy Agency (IEA) and the International Organisation for Standardisation (ISO) have worked extensively to develop internationally acceptable certification standards for solar products.

To tackle these multifaceted challenges, UNIDO and the ISA have embarked on the "Structuring of an International Network of Solar Technology and Application Resource Centres" project, funded by the Government of France. The overarching objective of this project is to create a robust network of institutional capacities within ISA Member States.

To maximise its impact and create economies of scale, STAR C has adopted a regional approach. This approach aims to harmonise solar qualification frameworks across borders, fostering collaboration and synergy among neighbouring nations.

Previous interventions by UNIDO in the realm of quality infrastructure and qualification programmes within these regions have already demonstrated the advantages of regional approaches. UNIDO has actively supported several economic communities, including the Economic Community of West African States (ECOWAS), the East African Community (EAC), and the Pacific Community (SPC), in the establishment of qualification frameworks (QF) and certification policies. These efforts have also involved the development of solar skills within the regional energy Centres under the Global Network of Regional Sustainable Energy Centres (GN-SEC) programme. The STAR C project is an integral part of UNIDO's south-south and triangular activities within the GN-SEC platform. Importantly, the project will build upon the institutional infrastructure and lessons learned from previous interventions.

Recognising the significance of solar energy, UNIDO has embarked on a comprehensive initiative to advance solar energy skills, certification, and QF. This initiative fosters a harmonised approach to solar energy development across three distinct regions: ECOWAS, EAC, and Pacific region.

### 1.1 Scope of the activity

The scope of this document in enhancing solar qualification and certification actions encompasses a multifaceted approach aimed at improving the overall quality and reliability of solar energy systems. This

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<sup>1</sup> International Network of Solar Technology and Application Resource Centres (STAR C) | Global Network of Regional Sustainable Energy Centres (GN-SEC). <https://www.gn-sec.net/pt-pt/node/12432>

includes the development of concrete recommendations to refine and standardise solar qualifications and certifications. Such recommendations will focus on upgrading capacities and processes, ensuring that regional best practices are adopted and implemented nationally. A key aspect of this approach is the creation of a clear roadmap for the regional solar qualification and certification processes. This roadmap will detail governance structures, enforcement mechanisms, and strategies for effective information dissemination at the national level. Additionally, the scope of this activity will be broadened to include cross-cutting areas such as gender sensitivity, integration of digital technologies, and incorporating climate change adaptation measures. Considering these factors, the quality frameworks designed will enhance the solar energy sector's efficiency and reliability and ensure it is inclusive, future-proof, and environmentally sustainable.

The Baseline Assessment conducted as part of this initiative is a critical foundation for developing targeted solar qualification and certification frameworks. This assessment comprehensively analysed existing legislation, standards, and regional capacities and needs. It paid particular attention to the unique aspects of each region, including the maturity levels of solar markets and distinct climate conditions. Based on these findings, the initiative developed tailored frameworks and curricula for solar PV and SHC training, which are intended to enhance regional adoption and implementation at the national level, ensuring that high-quality training is delivered to professionals involved in preparing, implementing, operating, and maintaining solar energy systems.

The assessment document provided several key insights into the current state and future solar qualification and certification prospects in the ECOWAS region. These insights included:

1. **Quality Standards' Importance:** The document underscored the crucial role of product and service quality standards in the solar field.
2. **Challenges in Developing Countries:** Developing regions face significant challenges in assuring product quality and services across the solar value chain. These include gaps in qualification and know-how, and a need for more experience in quality installations, which are vital for effective solar energy deployment.
3. **Need for Specialised Qualification and Certification Schemes:** The document emphasised the necessity for reliable and specialised qualification and certification schemes that address the needs of various stakeholders in the solar value chain, including consumers.
4. **Fragmentation and Lack of Training Institutions:** There is a noticeable lack of institutions offering quality curricula and training tailored to the diverse needs of experts in the solar energy sector.
5. **Regional Harmonisation and Collaboration:** The document highlighted the success of regional approaches, as seen in some African economic communities, in harmonizing qualification and certification standards.
6. **Comprehensive Approach to Solar Skills and Certification:** The document underscored the comprehensive approach needed for advancing solar energy skills, certification, and qualification frameworks.

These insights from the document painted a picture of the current challenges and potential strategies for improving solar energy qualification and certification, particularly in regions currently underserved and facing unique difficulties.

## 2. Strategic Recommendations for Enhancing Solar Qualification and Certification

Enhancing solar qualification and certification in West Africa necessitates a multi-faceted strategic approach, focusing on improving both solar PV and solar thermal training frameworks. Given the challenges in the solar thermal water heater market, such as the need for standardised information and the decline of local manufacturing, it is crucial to establish precise specifications for solar thermal water heaters and form partnerships with local manufacturers to bolster production capabilities. Additionally, developing a standardised set of performance metrics for suppliers is essential to aid consumer decision-making and ensure product quality.

Furthermore, there is a need for comprehensive discussions on solar thermal processes, particularly in industrial settings, which should include aspects like waste heat recovery. This approach aims to establish a



quality infrastructure framework to facilitate trade, protect consumers and the environment, and promote sustainable economic development.

Key strategies include enforcing technical regulations, establishing functional Conformity Assessment Infrastructure with inspection bodies, testing laboratories, and certification bodies, and ensuring the harmonisation of standards of interest to the region. Additionally, establishing a regional accreditation system and developing appropriate legal frameworks for National Institutes is vital.

Supporting thematic areas such as promoting quality culture, providing education and training on quality, encouraging public-private partnerships in financing National Quality Infrastructure (NQI), establishing quality award schemes, and improving participation in regional and international quality organisations are also crucial. These strategies will address current market challenges and empower the community through knowledge and skills development, thereby enhancing solar qualification and certification in West Africa.

Establishing a regional certification scheme for various solar professionals, including off-grid solar photovoltaic (PV) technicians, designers, installers, and inspectors, is a significant step towards promoting the quality and safety of PV installations. This voluntary and unified certification system, recognised across all ECOWAS Member States, addresses the critical need for standardised, high-quality renewable energy (RE) and Energy Efficiency (EE) installations. The certification process includes different assessments for technicians, designers, installers, and inspectors, ensuring that each professional category meets specific competencies relevant to their role. Written and practical examinations based on the job task analysis are essential to the certification process, focusing on the practical application of skills necessary for safe and quality installation and maintenance of solar PV systems. For inspectors, functional inspection tests are tailored to assess their ability to ensure the safety and compliance of the solar PV systems.

To further enhance this certification framework, it is recommended to:

- a. **Develop and implement continuous education and training programs** aligned with the job task analysis, ensuring that solar professionals remain updated with the latest technologies and standards. As a specialised agency, ECREEE can lead the development of regional solar certification standards, facilitate the exchange of best practices, and support member states in implementing these standards.
- b. **Promote collaboration between training institutions and industry stakeholders** to ensure that the training curricula are in line with current industry needs and technological advancements.
- c. **Encourage the development of online and remote training modules** to increase accessibility for professionals across the region.
- d. **Implement a mentorship and apprenticeship program** to facilitate practical, on-site learning experiences for trainees, particularly in rural or under-served areas. The West African Power Pool (WAPP) can integrate certification requirements into its operations and maintenance standards for cross-border grid projects. By ensuring that personnel are certified, WAPP can uphold high quality and safety standards in regional power projects. Meanwhile, ECREEE (ECOWAS Centre for Renewable Energy and Energy Efficiency) is focusing on the development of clean mini-grids and Solar Home Systems (SHS). This work is crucial because it promotes sustainable and renewable energy solutions, reduces dependence on fossil fuels, and provides reliable electricity access to remote and underserved communities. By addressing energy poverty, these initiatives support economic development, improve quality of life, and contribute to environmental conservation in the region.
- e. **Strengthen the network of examination and training institutions** across the ECOWAS region to ensure widespread availability and accessibility of certification opportunities.
- f. **Explore the potential for incorporating specialised certifications for emerging technologies** within the solar energy sector, such as battery storage systems and smart grid integration. As a regulatory body, the ECOWAS Regional Electricity Regulatory Authority (ERERA) can ensure that regulations across the region require solar installations to be performed by certified professionals, thus raising the standards and consistency of solar projects.

- g. **Regularly review and update the job task analysis** to reflect evolving industry standards and technological advancements, ensuring the certification remains relevant and rigorous.

By adopting these strategic recommendations, the ECOWAS region can significantly improve the qualification and certification of solar professionals, thereby enhancing the quality, safety, and efficiency of solar installations. This will contribute to the overall goal of sustainable economic development and environmental protection in West Africa.

## 2.1 The Role of the Regional Body in Enhancing Solar Qualification and Certification

In the ECOWAS region, the enhancement of solar energy capacity and the refinement of certification processes at the national level are uniquely facilitated by influential regional bodies. ECOWAS leverages these organisations' influential and integrative capacity to streamline and elevate solar energy qualifications and certifications across member states. This localised approach ensures that the adoption of capacities and processes in solar energy aligns with the specific needs and dynamics of the region. Regional bodies, such as ECREEE, are central to this endeavour, wielding the power to enact change and enforce standards that resonate with both national priorities and regional cohesion. By embracing and implementing the strategic recommendations outlined in this document, ECREEE can take a leadership role in crafting a robust, neutral, and professional initiative. By adopting the following recommendations, ECREEE can lead a neutral and authoritative initiative to reinforce solar qualification and accreditation in West Africa. Particularly, incorporating the recommendations below, a revised strategic approach for strengthening solar qualification and certification in West Africa can be outlined. These recommendations are crucial for the long-term effectiveness and impact of the certification system.

- a. **Promotion and Employability Strategy:** Develop and implement strategies to promote certified solar professionals and enhance their employability. This includes creating awareness about the benefits of hiring accredited professionals and connecting them with potential employers.
- b. **Harmonisation of Examination Processes:** Standardise the examination process across all ECOWAS member states to ensure consistency and reliability in the certification of solar professionals.
- c. **Identify or establish a regional certifying body,** possibly under the umbrella of ECREEE, that would be responsible for the oversight of the certification process. This body should have the authority and capability to conduct examinations, issue certificates, and maintain a registry of certified technicians.
- d. **Action Plan and Resource Mobilisation:** Formulate a comprehensive action plan and mobilise necessary resources to achieve the objectives of the certification program. This includes identifying potential funding sources and partnerships.
- e. **Monitoring, Evaluation, and Reporting:** Establish a robust monitoring and evaluation system in member states and within ECREEE to track progress and impact of the certification system.
- f. **Support for Member States Implementation:** Assist member states in the implementation of the Certification System, providing technical and logistical support where needed.
- g. **Financial Model Development:** Prepare a realistic financial model for the certification system, outlining the costs for students and institutions. This model should be an integral part of the business plan.
- h. **Capacity Building of ECREEE Certification Body:** Strengthen the capacity of the ECREEE Certification Body to ensure it can effectively manage and oversee the certification process.
- i. **Certification System Expansion:** Extend the certification system to other renewable energy sources beyond solar photovoltaics and include energy efficiency components. This broadens the scope and relevance of the certification.
- j. **Gender Component Reinforcement:** Enhance the gender component of the certification system, ensuring equitable access and participation of women in the solar energy sector.
- k. **Online Platform and E-learning:** Develop and implement an online platform for examinations and e-learning, enhancing accessibility and convenience for regional candidates.
- l. **Sustainable Energy Certification Extension:** Expand the certification system to include higher levels of expertise, such as Level 3 certifications related to solar power plants connected to the grid in

addition to existing systems (Level 1 for off-grid solar installers and Level 2 for clean mini grid installers, designers and inspectors).

- m. **Tripartite Consultative Framework Establishment:** Set up a consultative framework comprising representatives from national agencies, associations of sustainable energy professionals, and the ECREE network of academic and scientific partners. This framework aims to support in achieving its medium and long-term goals and becoming a regional and international reference centre for competency certification in sustainable energies.

By adopting these recommendations, the ECOWAS region can significantly enhance the qualification and certification of solar professionals, contributing to the growth and sustainability of the solar energy sector in West Africa. By adopting these recommendations, the ECOWAS region can significantly enhance the qualification and certification of solar professionals, contributing to the growth and sustainability of the solar energy sector in West Africa. A critical component of this effort is the Regional Technical Committee, which plays a fundamental role in overseeing and guiding the certification standards and practices. The establishment of this committee has been a significant step forward, providing expert oversight and facilitating uniformity in certification criteria across member states. The committee has already convened three annual meetings, during which members have collaborated to review progress, address challenges, and strategise on further enhancements to the certification scheme. These meetings are essential for maintaining the relevance and responsiveness of the certification process to the evolving skill demands within the region, ensuring that the workforce remains competitive and well-prepared to meet market needs.

In addition to the Regional Technical Committee, the establishment of national focal institutions dedicated to the certification of sustainable energy skills is essential. These institutions can provide localised expertise, ensuring that certification programs are tailored to the specific needs and conditions of each country. They can also facilitate continuous professional development and upskilling, making sure that the workforce remains abreast of the latest advancements in sustainable energy technologies

The national focal institutions can play a crucial role in this ongoing dialogue, providing feedback and insights from their respective countries to inform regional strategies and policies. By doing so, they ensure that regional initiatives are grounded in the realities and specific challenges faced by individual member states. This localised input is invaluable for several reasons:

1. **Tailored Solutions:** National focal institutions can identify and communicate country-specific barriers and opportunities, allowing for the development of targeted solutions that are more effective and sustainable.
2. **Increased Relevance:** Feedback from national institutions helps ensure that regional certification standards and training programs remain relevant to the current needs of the workforce and industry in each member state.
3. **Enhanced Collaboration:** These institutions foster a collaborative environment where best practices and successful strategies can be shared across the region, leading to a more cohesive and robust regional energy sector.
4. **Responsive Adaptation:** National focal institutions can quickly identify emerging trends and technological advancements, ensuring that certification programs and skill development initiatives are updated promptly to reflect these changes.
5. **Policy Influence:** By providing ground-level insights, these institutions can influence regional policy-making, ensuring that policies are supportive of both regional and national objectives, thereby enhancing the overall effectiveness of sustainable energy initiatives.
6. **Local Capacity Building:** They play a pivotal role in building local capacity, ensuring that there is a strong and well-trained workforce within each member state that is capable of meeting the demands of the evolving energy sector.

In summary, the national focal institutions are not only essential for implementing and maintaining high standards of certification but also for ensuring that these standards are practical, relevant, and beneficial at both the national and regional levels. Their involvement helps bridge the gap between regional strategies and local implementation, fostering a more integrated and effective approach to sustainable energy development in West Africa.

## Enhanced Solar Thermal Technology Certification Process

Drawing from the thorough needs assessment detailed in Solar Thermal Technology development in the ECOWAS region, a set of strategic recommendations emerges to bolster solar qualification and certification. These recommendations capitalise on the potential of solar thermal technologies to address sustainable energy access challenges in West Africa, providing viable alternatives to reliance on wood and fossil fuels. Notably, the regional adoption of solar water heating systems shows significant variance, which can be attributed to diverse factors such as local policy frameworks, the capacity for local manufacturing, and the varying costs of electricity and other fuels. This nuanced understanding underpins the strategies proposed to effectively enhance the solar sector's qualifications and certifications. Developing regional standards and certification processes for solar thermal and PV technologies is imperative to ensure quality and safety. This will help standardise installations and build trust among consumers and investors. Key recommendations include:

- a. **Promoting Local Manufacturing and Skill Development:** Given the regional variation in solar thermal and PV technology adoption, it's essential to foster local manufacturing skills, especially in countries with developed capabilities like Burkina Faso, Mali, and Niger
- b. **Training programs on solar thermal technologies** should be expanded, emphasising practical skills and local manufacturing techniques.
- c. **Targeted Solar Thermal Installations in Key Sectors:** Strategic initiatives ought to concentrate on sectors where solar thermal technology can have the most impact. For instance, in countries like Burkina Faso and The Gambia, solar water heaters (SWHs) have found substantial application in community residences, healthcare facilities, and hospitality establishments. This targeted strategy, proven effective in these contexts, offers a blueprint that could be adapted and implemented across other West African nations. Such a sector-specific approach enhances the practical utility of solar thermal technologies and sets a benchmark for developing and standardising future certification processes in the region.
- d. **Research and Development Initiatives:** Encouraging research and development in solar thermal technologies, as demonstrated by historical efforts in Niger, is crucial. This could involve partnerships with regional and international institutions to develop innovative solutions suited to the West African context.
- e. **Incentive Policies and Market Promotion Initiatives:** As seen in Burkina Faso and Togo, implementing incentive and harmonised policies could significantly boost the Solar Thermal certification process.
- f. **Incorporation of Cutting-Edge Technologies in Training:** A pivotal strategy is the integration of nascent technologies such as solar sorption refrigeration and concentrating solar technologies into regional training programs. Despite their limited use, these technologies hold considerable promise for the region. By bringing these innovative solutions into educational curriculums, the region can stay at the forefront of solar technology advancements.
- g. **Public Awareness and Education:** Building public awareness about the benefits of solar thermal and PV technologies harmonisation and educating potential users on the economic and environmental advantages can drive broader adoption.
- h. **Strengthening Regional Cooperation and Knowledge Sharing:** Strengthening collaboration between West African countries can facilitate knowledge sharing and replicating successful models across the region.

Implementing these strategies requires a collaborative effort involving governments, industry stakeholders, educational institutions, and international partners. Such a multifaceted approach can significantly enhance solar qualification and certification, contributing to sustainable energy development in West Africa.

## 2.2 Effective Communication Strategies for Solar Certification Awareness

In the ECOWAS region, where regional bodies hold significant sway, the successful dissemination of solar qualification and certification information is essential. These regional bodies, such as ECREEE, with their robust governance structures and authoritative reach, are well-positioned to lead extensive awareness campaigns. Through these campaigns, they must address the linguistic and cultural nuances of West Africa to ensure the message is effectively communicated across language barriers and national boundaries.

The introduction of such campaigns should emphasise the pivotal role of ECOWAS's strong regional bodies in facilitating a cohesive and uniform understanding of solar certification benefits. It should articulate how these campaigns will bridge the language diversity by tailoring communications to the region's French, English, Portuguese, and indigenous language-speaking populations. By doing so, the initiative can leverage the authority and structure of these bodies to maximise outreach and foster a universally high standard of solar installations, consumer trust, and safety. This strategy not only underscores the commitment to sustainable solar practices but also aligns with ECOWAS's broader objectives of regional integration and economic development. By centralizing communication efforts at the regional level, duplication of resources and efforts can be minimised. This results in a more efficient use of resources and a streamlined communication process.

Effective dissemination of solar qualification and certification information is critical to ensure broad awareness and understanding among stakeholders. This can be achieved through well-planned awareness campaigns and diverse communication channels.

The focus should be on the implementation of awareness campaigns that clearly communicate the importance and benefits of solar certification to a **broad range of stakeholders**, including potential solar professionals, industry players, policymakers, and the general public, where the advantages of accreditation will be emphasised, such as improved quality of solar installations, increased consumer trust, enhanced safety, and the long-term sustainability of solar investments. To maximise the effectiveness and impact of the campaign, it's essential to harness **various communication channels**. This approach should leverage digital platforms, such as social media, websites, and online forums, to reach a broad audience efficiently. Complement these online efforts with face-to-face activities like workshops and seminars. These in-person events offer detailed information and practical experiences on solar certification, effectively catering to specific audience needs. Technical training sessions can be organised for installers, while informational briefings for policymakers and investors will broaden the campaign's reach and deepen its influence. For this purpose, **collaboration with universities, colleges, and vocational training centres** to integrate information about solar certification into their curricula is vital. They should be the core of this activity, leading consistent and Continuous Communication, providing regular updates about the latest developments in solar certification standards and processes, and establishing feedback mechanisms where stakeholders can express their concerns, ask questions, and provide suggestions regarding solar certification. This two-way communication fosters a sense of community and involvement. Nevertheless, all the dissemination process must be reinforced with collaborative efforts for broader reach, creating **partnerships with industry and government bodies**. Their endorsement can lend credibility and attract wider attention.

By implementing these dissemination strategies, stakeholders across various sectors can be educated and informed about the significance of solar certification, thus fostering a more robust and qualified solar industry. This approach enhances the understanding and adoption of solar certification and supports the overall growth and sustainability of the solar energy sector.

## 2.3 Cross-Cutting Areas in the Design of Quality Frameworks

### a. Gender Inclusivity:

In exploring the solar energy training and certification field, it is imperative to focus on the crucial element of Gender Inclusivity. This aspect transcends mere notions of fairness and social justice; it's about embracing and promoting diversity within the solar industry. Strategies that ensure equal opportunities and fair representation for all genders must be implemented to achieve this.

Several initiatives promoting gender inclusivity have been implemented across ECOWAS member countries. ECOWAS member countries have developed national gender policies and action plans aimed at promoting gender equality and women's empowerment. These policies often include measures to address gender-based discrimination, increase women's participation in decision-making processes, and improve access to education, healthcare, and economic opportunities for women and girls. Various initiatives aimed at promoting women's economic empowerment have been implemented across ECOWAS member countries. These include entrepreneurship training, access to credit and financial services, support for women-owned businesses, and initiatives to promote women's participation in traditionally male-dominated sectors such as energy and technology. For example, Ghana has undertaken initiatives to promote gender equality and women's participation in the energy sector. The country has programs aimed at increasing women's access to clean cooking solutions and renewable energy technologies. Ghana has also implemented projects to train women in solar energy installation and maintenance, empowering them to participate in the growing renewable energy industry. Nigeria has also implemented projects to promote women's entrepreneurship in the energy sector, such as providing support for women-owned businesses in renewable energy. Senegal has initiatives aimed at promoting gender equality and women's empowerment in the energy sector. The country has programs to increase women's access to clean cooking solutions and improve their participation in the renewable energy workforce. Senegal has also implemented projects to provide solar-powered electricity to rural communities, benefiting women who often bear the burden of household energy tasks.

These examples highlight efforts by ECOWAS member countries to address gender disparities in the energy sector and promote women's empowerment through various initiatives. While progress has been made in promoting gender inclusivity across ECOWAS member countries, challenges remain in addressing deep-rooted gender inequalities and ensuring the effective implementation of gender policies and programs. Continuous efforts and collaboration among governments, civil society organisations, development partners, and regional institutions like ECOWAS are essential to advance gender equality and women's empowerment in the region.

In order to foster an inclusive environment, from developing gender-sensitive training materials to creating specialised programs and policies, each of these strategies is designed to break down barriers and create a more equitable landscape in the solar energy industry.

- **Equal Opportunities and Representation:** Develop strategies to ensure equal opportunities and representation for all genders in solar energy training and certification programs. This might involve offering scholarships or incentives to encourage participation from underrepresented groups.
- **Gender-Sensitive Training Materials:** Ensure that training materials and methodologies are gender-sensitive and do not perpetuate stereotypes. Incorporating case studies and examples that highlight the contributions of diverse individuals in the solar sector can be effective.
- **Development of Inclusive Policies:** Create and enforce policies that promote gender inclusivity within solar energy training and certification programs. This could include setting targets for female participation and ensuring gender balance in decision-making roles.
- **Specialised Training Programs:** Offer technical training programs or incentives aimed at increasing the participation of women and other underrepresented groups in the solar sector.
- **Vocational Workshops from Early Ages:** Introduce vocational workshops focused on solar technologies at early educational stages. These workshops should be designed to spark interest and provide foundational knowledge in renewable energy. By targeting young learners, these workshops can play a pivotal role in shaping future generations' perceptions and capabilities in the solar energy

field, ensuring a diverse and well-prepared workforce. This early engagement can also help normalise the presence of all genders in technical roles, laying the groundwork for a more inclusive industry.

#### **b. Digitalisation:**

Following the emphasis on gender inclusivity, the next pivotal aspect in the development of solar energy training and certification is Digitalisation. This facet is crucial in adapting to the rapidly changing technological landscape of the solar energy sector. Embracing digital tools and platforms not only modernises the delivery of training and certification processes but also ensures efficiency and wider accessibility.

ECREEE plays a crucial role in promoting renewable energy and energy efficiency across the ECOWAS region. While ECREEE's primary focus is on renewable energy and energy efficiency, it also recognises the importance of digitalisation in advancing these objectives. ECREEE can spearhead efforts to collect and analyse data on renewable energy resources, energy consumption patterns, and energy efficiency measures across ECOWAS member countries. By leveraging digital technologies for data collection, management, and analysis, ECREEE can provide valuable insights to policymakers, energy stakeholders, and investors to inform decision-making and resource allocation. ECREEE can also serve as a platform for knowledge sharing and networking among stakeholders in the renewable energy and energy efficiency sectors. Through digital platforms such as online forums, webinars, and virtual conferences, ECREEE can facilitate peer-to-peer learning, collaboration, and exchange of best practices among practitioners, researchers, policymakers, and other stakeholders in the region.

Several ECOWAS member countries have been advancing national initiatives on digitalisation in the energy sector. These initiatives aim to leverage digital technologies to improve energy access, efficiency, and sustainability. Cabo Verde has been exploring the development of smart grids to modernise its electricity infrastructure. Smart grids utilise digital technologies to monitor and control electricity flows, optimise grid operations, and integrate renewable energy sources more effectively. It has been investing also in advanced metering infrastructure (AMI) to modernise its metering systems and enable two-way communication between utilities and customers. AMI allows for remote meter reading, real-time monitoring of energy consumption, and the implementation of time-of-use pricing schemes. Nigeria has launched programs to deploy smart meters and smart grid technologies to improve electricity distribution efficiency and reduce losses. Ghana has also launched digital platforms for energy service delivery, including mobile payment systems and online customer portals for energy management. Côte d'Ivoire has also implemented digital platforms for energy management and payment, including mobile applications and online customer portals. Incorporating digital literacy as a fundamental component of training programs, investing in robust digital infrastructure, and utilising advanced data management techniques are essential steps.

These measures will guarantee that participants are well-equipped with the necessary digital skills, making the certification process more adaptable, accessible, and in tune with the demands of the modern energy industry.

- **Incorporation of Digital Tools:** Utilise digital tools and platforms in the delivery of training and certification processes. This could include online courses, virtual simulations for practical training, and digital platforms for certification exams.
- **Data Management and Analysis:** Employ digital solutions for data management and analysis, enabling more efficient tracking of training outcomes, certification renewals, and ongoing professional development.
- **Digital Literacy and Training:** Incorporate digital literacy as a core component of solar energy training programs. This ensures that all participants are skilled in using digital tools essential in the modern energy sector.
- **Investment in Digital Infrastructure:** Invest in digital infrastructure to facilitate online learning, virtual simulations, and automated certification processes, making training and certification more accessible and efficient.
- **Consider integrating Internet of Things (IoT), artificial intelligence (AI) and Industry 4.0:** The integration of such technologies and concepts into the energy sector holds significant potential for the future development of the region. These technologies could revolutionise energy systems

management, predictive maintenance, and energy efficiency, driving further innovations and sustainability in the renewable energy sector.

### c. Climate Change Adaptation:

Building on the foundations of gender inclusivity and digitalisation, another vital dimension in solar energy training and certification is Climate Change Adaptation.

ECOWAS has developed a Climate Change Policy Framework to guide climate action across member states. The framework outlines principles, objectives, and priority areas for addressing climate change impacts in the region, including adaptation measures such as enhancing resilience to climate-related hazards, promoting sustainable land and water management, and mainstreaming climate considerations into development planning. ECOWAS member states have also developed and implemented national adaptation plans to address climate change impacts at the country level. These plans identify priority sectors and measures for adaptation, such as agriculture, water resources management, coastal zone protection, and disaster risk reduction. ECOWAS provides technical support and capacity-building assistance to member states in the development and implementation of these plans. For example, Cabo Verde has implemented projects such as the Coastal Zone Management and Adaptation to Climate Change Project (ZACCC) to address coastal erosion and climate-related risks and it has also invested in renewable energy projects to reduce reliance on fossil fuels and enhance energy security in the face of climate change impacts. Sierra Leone has also implemented projects such as the Rural Renewable Energy Project to improve access to clean energy in rural areas and build resilience to climate change impacts.

Climate Change Adaptation involves embedding resilience and adaptive strategies into the training curriculum, focusing on how solar installations can be designed and maintained to endure climate-related challenges. The curriculum should not only teach technical skills but also emphasise sustainable practices and the role of solar energy as a climate-friendly solution. Additionally, it's vital to foster research and development in solar technologies that are resilient to the impacts of climate change. This approach ensures that the training is current and forward-looking, preparing participants to respond to the evolving environmental challenges effectively.

- **Resilience and Adaptation in Curriculum:** Integrate climate change resilience and adaptation strategies into the training curriculum. Teach how solar installations can be designed and maintained to withstand climate-related challenges, such as extreme weather events.
- **Promoting Sustainable Practices:** Emphasise the role of solar energy as a climate-friendly solution and encourage sustainable practices throughout the training and certification processes.
- **Curriculum Integration:** Integrate climate change adaptation and resilience-building strategies into the training curriculum, teaching how to design and maintain solar installations in the face of climatic changes.
- **Research and Development Support:** Encourage and support research and development in solar technologies that are resilient to climate change impacts.

All these dimensions seamlessly converge into a holistic approach, wherein the integration of cross-cutting areas aims to achieve a unified objective. By aligning quality frameworks with national and regional policies on gender equality, digital transformation, and climate change adaptation, we ensure a cohesive and policy-supported framework. It's crucial to regularly assess and update these frameworks, maintaining their relevance and efficacy in addressing these diverse yet interconnected areas. This involves conducting periodic reviews and actively seeking feedback from participants and stakeholders. Ultimately, it's essential to maintain the flexibility of these frameworks, enabling them to adapt and evolve with new developments and insights in these critical aspects.

By integrating these cross-cutting areas into the design of solar energy qualification and certification frameworks, the solar industry can become more inclusive, technologically advanced, and resilient, ultimately contributing to a more sustainable and equitable energy future. The solar energy sector can ensure that its qualification and certification frameworks are technically robust, socially inclusive, and environmentally resilient.



### 3. Enhanced Roadmap for Solar Energy Development in ECOWAS

To create a roadmap that incorporates stakeholder analysis as a fundamental first step, we begin by identifying and understanding the key participants involved in the project. This stakeholder analysis is crucial in recognizing the varying levels of impact and influence different groups have on the project, as well as what is important to them. It serves as a guide to tailor engagement strategies that align with the interests and contributions of each stakeholder group.

A post-stakeholder analysis for a project like ECOWAS's solar energy initiative would look like this:

- a. **Identification of Stakeholders:** Recognise all relevant parties, their needs, and concerns regarding the solar energy project.
- b. **Assessment of Impact and Influence:** Evaluate how much the project affects each stakeholder and the extent of their influence over the project.
- c. **Alignment of Interests:** Establish common goals with stakeholders, ensuring the project's objectives resonate with what is important to them.
- d. **Contribution and Collaboration Strategies:** Determine how stakeholders can contribute to the project and develop strategies for effective collaboration.
- e. **Anticipating Challenges:** Identify potential obstacles stakeholders might pose and plan for ways to mitigate these risks.
- f. **Engagement and Communication:** Create a plan for ongoing stakeholder engagement, utilizing methods such as collaborative policy development, workshops, and regional dialogues.
- g. **Implementation Planning:** Develop a detailed action plan that incorporates the roles of different stakeholders, reflecting the analysis findings in the execution strategy.
- h. **Monitoring and Adjusting:** Continuously monitor the project's progress and stakeholder feedback, ready to adjust the roadmap as necessary.

By following these steps and repeating them on a regular basis, the roadmap becomes a living document that evolves as stakeholder dynamics change throughout the project lifecycle, ensuring that the initiative remains responsive to the needs of all parties involved and is poised for success.

**Table 1.1 Stakeholder analysis**

| ECOWAS Stakeholder Analysis Matrix                      |   |   |   |  |   |   |
|---|---|---|---|--|---|---|
| Stakeholder Name  | Impact<br><i>How much does the project impact them? (Low, Medium, High)</i> | Influence<br><i>How much influence do they have over the project? (Low, Medium, High)</i> | What is important to the stakeholder?                                 | How could the stakeholder contribute the project?                | How could the stakeholder block the project?                        | Strategy for engaging the stakeholder                               |
| Energy specialised regional bodies                      | High  | High  | Harmonizing solar energy qualifications and certifications in ECOWAS. | Leading regional efforts in standardizing solar energy training. | Diverse energy policies and market conditions across member states. | Collaborative policy development and regional workshops.            |
| Government Bodies and Regulatory Authorities            | Medium  | Medium  | Alignment with regional renewable energy policies.                    | Adopting and enforcing regional standards and certifications.    | Inconsistent implementation and regulatory variations.              | Regional policy dialogues and harmonization initiatives.            |
| Educational institutions and Training service providers | High  | Medium  | Enhancing solar technician training and certification.                | Providing accredited training and developing regional curricula. | Limited regional integration and resource constraints.              | Collaboration with industry and international partners.             |
| Industry and Employers                                  | Medium  | Low   | Skilled workforce for solar energy projects.                          | Investment in training and adopting certified professionals.     | Varied quality and recognition of qualifications.                   | Private-public partnerships and sectoral skills development.        |
| Academia  | Low   | Medium  | Developing localized and relevant solar energy research.              | R&D in solar technologies and training experts.                  | Funding limitations and academic-industry disconnect.               | Establishing regional research networks and curriculum development. |
| NGO and international bodies                            | Low   | High  | Promoting sustainable energy and capacity building.                   | Implementing training programs and advocacy.                     | Complex regulatory environment and limited reach in remote areas.   | Community-based initiatives and regional partnerships.              |

Developing a comprehensive roadmap for ECOWAS to further enhance solar qualification and certification requires a strategic and phased approach. The roadmap will address the current landscape where ECOWAS has made strides in sustainable energy skills certification, particularly with the ECREEE-led Regional Certification Scheme. As we pivot towards the advanced stages of regional training and certification, the roadmap will encapsulate phases dedicated to expanding the existing frameworks for solar PV, especially in the context of mini-grids and solar thermal training. Additionally, a significant emphasis will be placed on overcoming the challenges of raising awareness about certification schemes.

Creating a roadmap for the ECOWAS involves a tailored strategy to enhance the existing solar qualification and certification framework. This roadmap recognises ECOWAS's progress in establishing the Regional Certification Scheme for Sustainable Energy Skills, spearheaded by the ECREEE. With a focus on evolving the

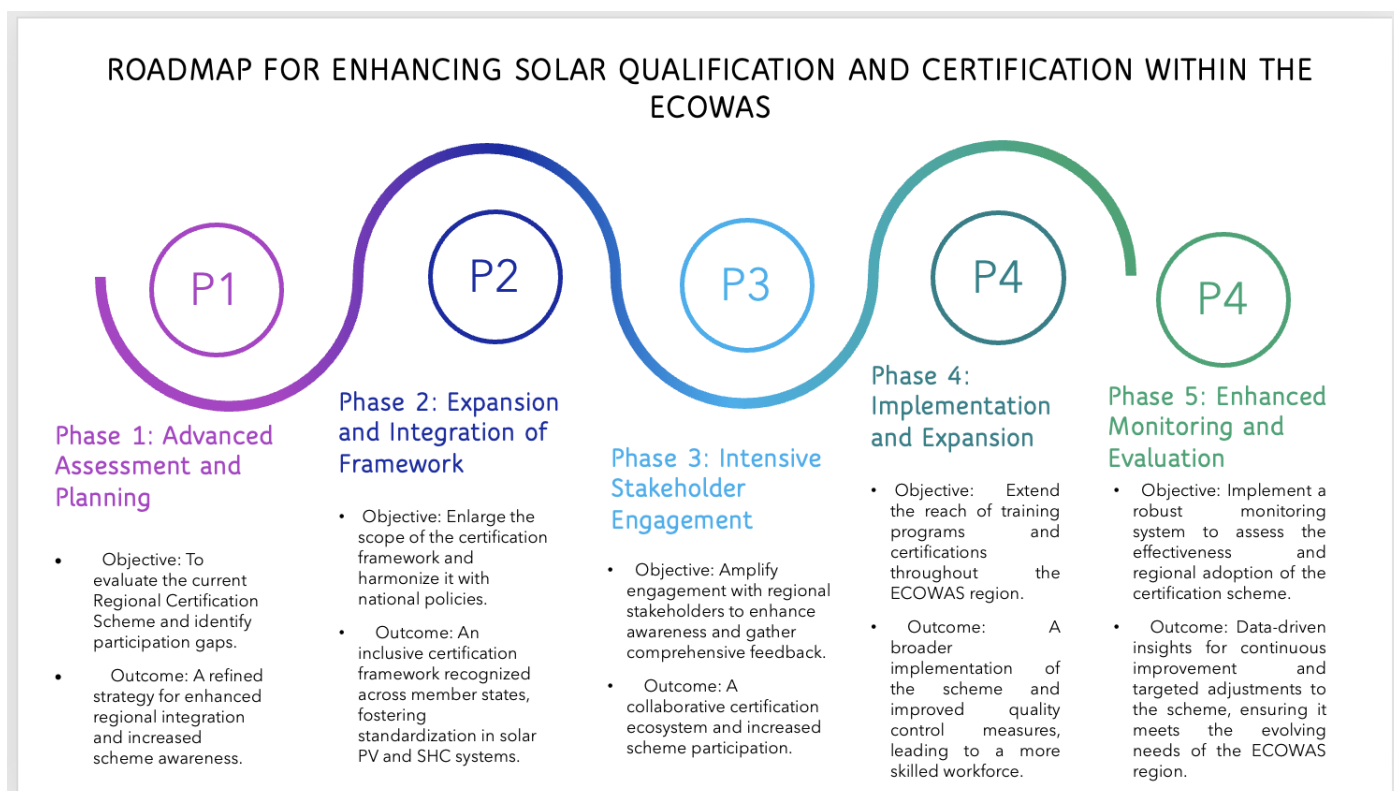
training for solar PV, particularly for mini-grids, and bolstering solar thermal training, the roadmap will unfold in strategic phases. These phases will be:

1. **Advanced Assessment and Planning**
2. **Expansion and Integration of Framework**
3. **Intensive Stakeholder Engagement**
4. **Implementation and Expansion**
5. **Enhanced Monitoring and Evaluation**

Creating a comprehensive roadmap for ECOWAS to further advance solar qualification and certification involves recognizing the region's achievements and current initiatives. With ECREEE's Regional Certification Scheme as a foundation, the roadmap is tailored to expand and refine solar PV training, especially for mini-grids, while also developing solar thermal training which is comparatively less advanced. A key priority will be to address the challenge of raising awareness about these certification schemes. For each phase in the ECOWAS roadmap, the structure would be outlined as follows:

- a. **Players & Responsibilities:** Assign specific organisations to each task, such as ECREEE overseeing the expansion of certification scope or member states' ministries integrating the frameworks into national policies.
- b. **Activities:** Detail the activities required, such as conducting assessments of current certification reach or developing and delivering targeted awareness campaigns.
- c. **Timeframe:** Set clear start and end dates for each phase to ensure timely progress, like initiating the assessment phase immediately and aiming for completion by Q2 2024.
- d. **Strategic Recommendations Integration:** Link each action to strategic recommendations, ensuring that activities like stakeholder workshops.

This forward-looking roadmap aims to sustain the momentum in building a competent sustainable energy workforce within ECOWAS.



### Phase 1: Advanced Assessment and Planning

- **Timeframe:** Immediate to Q2 2024
- **Key Players:** ECREEE, industry experts, data analysts.
- **Responsibilities:**
  - Conduct an advanced assessment focusing on the effectiveness and reach of the existing Regional Certification Scheme.
  - Identify gaps in country participation and scheme adoption.
  - Develop strategies for broader regional integration and awareness.

### Phase 2: Expansion and Integration of Framework

- **Timeframe:** Q3 2024 - Q2 2025
- **Key Players:** Expert Panels (ECREEE, educational institutions, international consultants).
- **Responsibilities:**
  - Expand the qualification and certification framework to include more diverse sustainable energy skills.
  - Work towards integrating the framework with national policies of member countries.
  - Promote regional standards for solar PV and SHC systems.

### Phase 3: Intensive Stakeholder Engagement

- **Timeframe:** Q3 2025
- **Key Players:** ECREEE, all national ministries, private sector, community leaders.
- **Responsibilities:**
  - Conduct intensive workshops across all member states for feedback and awareness.
  - Develop targeted campaigns to promote participation in the certification scheme.
  - Strengthen ties with regional bodies for standard harmonisation.

#### Phase 4: Implementation and Expansion

- **Timeframe:** Q4 2025 onwards
- **Key Players:** Accredited national institutions and training centres in all member states.
- **Responsibilities:**
  - Broaden the implementation of training programs to include more countries within the ECOWAS region.
  - Focus on the certification process for a wider range of sustainable energy professionals.
  - Implement quality control measures across all member states.

#### Phase 5: Enhanced Monitoring and Evaluation

- **Timeframe:** Starting Q1 2026, with biannual reviews
- **Key Players:** ECREEE, national monitoring bodies, international partners.
- **Responsibilities:**
  - Implement an enhanced monitoring system to track the scheme's adoption across the region.
  - Assess the impact of the programs on regional energy goals.
  - Gather feedback for continuous improvement of the scheme.

The enhanced ECOWAS roadmap for solar energy qualification and certification focuses on cross-cutting strategies to promote inclusive growth, ensuring that benefits extend to underrepresented communities and nations within the region. It emphasises the adoption of digitalisation for efficient training and monitoring, while also embedding climate change awareness and environmental sustainability into all aspects of the certification process. The roadmap also encourages regional advocacy and public-private partnerships to foster investment and support. By utilizing a data-driven approach, the policy-making process will be informed, leading to widespread regional participation and an empowered, diverse workforce. ECREEE's role is pivotal in leading these efforts, advocating for sustainable practices, building capacity, and sharing knowledge to reinforce a culture of continuous improvement. This strategy aims to significantly contribute to ECOWAS's sustainable development and environmental protection goals.

To further strengthen this roadmap, we are incorporating additional critical topics. These include the ECOWAS Regional Sustainable Energy Skills Certification System Business Plan and the ECREEE accreditation process as a Regional Skills Certification Body in Sustainable Energy according to regional and/or international standards. The inclusion of the business plan is essential for providing a strategic direction for the development and sustainability of the certification system. It will outline the financial, operational, and administrative frameworks necessary to support this initiative, ensuring its long-term viability and effectiveness.

The ECREEE accreditation process will be crucial in establishing ECREEE as a recognised certification body that adheres to high-quality standards. This will enhance the credibility and trustworthiness of the certification

system among various stakeholders, including industry leaders, government agencies, and educational institutions. By meeting regional and international standards, ECREEE will ensure that the certifications it grants are respected and valued across the ECOWAS region and beyond.

Furthermore, in the long term, we recognise the importance of synergising actions between ECREEE and the Agency in charge of the Quality of ECOWAS, which is currently undergoing a review process. This collaboration will be vital for aligning quality assurance processes with certification standards, ensuring consistency and high quality in training programs and certification procedures across the region. By working together, ECREEE and the Quality Agency can develop unified standards and best practices that will enhance the overall effectiveness and reliability of the certification system. This partnership will also facilitate the mutual recognition of certifications across member states, promoting the mobility and employability of certified professionals within the ECOWAS region. The combined efforts of ECREEE and the Quality Agency will contribute to the continuous improvement of skills development and certification processes, ultimately supporting the region's sustainable energy goals and economic development.

## Conclusion

The document on “ECOWAS Strategic Recommendations and Roadmap for Regional Solar PV and SHC Qualification and Certification Frameworks” highlights the critical importance of solar energy in the ECOWAS region. It elaborates on the need for a comprehensive and robust qualification and certification framework for solar PV and SHC systems. This framework is essential to ensure the quality, reliability, and standardisation of solar technologies across the region, fostering trust and confidence in their use.

To enhance solar qualification and certification, a multi-faceted strategic approach is necessary. This includes focusing on solar PV and thermal training, establishing precise specifications for solar thermal water heaters, and forming partnerships with local manufacturers to strengthen production capabilities. Developing standardised supplier performance metrics is crucial to aid consumer decision-making and ensure product quality. Comprehensive discussions on solar thermal processes in industrial settings, including waste heat recovery, are recommended to establish a quality infrastructure framework.

Supporting thematic areas such as promoting quality culture, providing education and training on quality, encouraging public-private partnerships in financing NQI, establishing quality award schemes, and improving participation in regional and international quality organisations are crucial. These strategies will address current market challenges and empower the community through knowledge and skills development, thereby enhancing solar qualification and certification in West Africa.

Establishing a regional certification scheme for various solar professionals, including off-grid PV technicians, designers, installers, and inspectors, is significant for promoting the quality and safety of PV installations. This voluntary and unified certification system, recognised across all ECOWAS Member States, addresses the critical need for standardised, high-quality RE and EE installations. The certification process includes different assessments for technicians, designers, installers, and inspectors, focusing on the practical application of skills necessary for safe and quality installation and maintenance of solar PV systems.

To further enhance this certification framework, it is recommended to develop and implement continuous education and training programs, promote collaboration between training institutions and industry stakeholders, encourage the development of online and remote training modules, implement a mentorship and apprenticeship program, strengthen the network of examination and training institutions, explore specialised certifications for emerging technologies, and regularly review and update the job task analysis.

The role of regional bodies like ECREEE is pivotal in strategically enhancing solar qualification and certification in the ECOWAS region. They can lead a neutral and authoritative initiative to reinforce solar qualification and accreditation. Key recommendations for ECREEE include developing a promotion and employability strategy, standardizing examination processes, formulating an action plan and mobilizing resources, establishing a robust monitoring and evaluation system, assisting member states in implementing the certification system, preparing a financial model, strengthening the capacity of the ECREEE Certification Body, extending the certification system to other renewable energy sources, reinforcing the gender component, developing an

online platform for examinations and e-learning, expanding the certification system to include higher levels of expertise, and setting up a tripartite consultative framework.

Overall, the document presents a vision of a cohesive, well-regulated solar energy sector within the ECOWAS region, underpinned by a commitment to quality, innovation, and collaboration among member states. This framework aims to strengthen the regional solar energy market and contributes to broader objectives of sustainable economic growth and environmental stewardship.