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Cambodia's New Growth Strategy
An Assessment of Medium and Long-term Growth for Resilient, Inclusive, and Sustainable Development

Background Paper 7

# Delivering the skills required for Cambodia's clean energy transition

Dean Rizzetti
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Phnom Penh, February 2025

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ឯកសារសារតារទី៧

# ការផ្តល់ជំនាញចាំបាច់សម្រាប់ អន្តរកាលថាមពលស្អាតរបស់កម្ពុជា

ឌីន រីហ្សេទិ

## សេចក្តីសង្ខេប


អន្តរកាលថាមពលស្អាតបង្ហាញពីឱកាសដ៏សំខាន់មួយ ដើម្បីបង្កើតកម្លាំងពលកម្មថ្មីប្រកបដោយថាមវន្ត សម្រាប់ប្រទេសកម្ពុជា ដែលរាប់ចាប់ពីអ្នករៀបចំផែនការទីក្រុងដែលមានឯកទេសខ្ពស់រហូតដល់វិស្វករបច្ចេកទេស។ ទោះជាយ៉ាងណាក៏ដោយ បច្ចុប្បន្ន កម្ពុជាត្រូវដោះស្រាយភាពខ្វះខាតជំនាញសំខាន់ៗ ប្រសិនបើកម្ពុជាចង់ទទួលបានអត្ថប្រយោជន៍ជាអតិបរមាពីការផ្លាស់ប្តូរទៅថាមពលបៃតង។

ប្រទេសកម្ពុជាបានប្តេជ្ញាចិត្តដ៏មុតមាំ ក្នុងការជំរុញការពង្រីកថាមពលកកើតឡើងវិញ ធ្វើឱ្យប្រសើរឡើងនូវប្រសិទ្ធភាពថាមពល និងបង្កើនការប្រើប្រាស់រថយន្តអគ្គិសនី។ ជាលទ្ធផល ការស្រាវជ្រាវបានបង្ហាញថា កម្ពុជាមានតម្រូវការថាមពលស្អាតខ្ពស់រួចទៅហើយ។ អាជីវកម្មកំពុងជួបការលំបាកក្នុងការស្វែងរកបុគ្គលិកកម្ពុជាដែលមានបទពិសោធន៍ និងមានជំនាញបច្ចេកទេស ជាហេតុទាំឱ្យក្រុមហ៊ុនត្រូវធ្វើការវិនិយោគសំខាន់ៗ លើការបណ្តុះបណ្តាលនិស្សិតដែលបានបញ្ចប់ការសិក្សាពីស្ថាប័នអប់រំ។ តម្រូវការនេះនឹងបន្តកើនឡើងជាលំដាប់។

ដើម្បីដោះស្រាយបញ្ហានេះ ចាំបាច់ត្រូវមានការកែលម្អការសម្របសម្រួលនៃការអប់រំបច្ចេកទេស ការអភិវឌ្ឍជំនាញ និងការធ្វើផែនការ។ កម្ពុជាអាចដោះស្រាយបញ្ហានេះបាន តាមរយៈការបង្កើតផែនទីបង្ហាញផ្លូវជំនាញថាមពលស្អាត ការបង្កើតវេទិកាជំនាញឯកទេស ការរៀបចំកម្មវិធីសិក្សា ការផ្សព្វផ្សាយឱកាសដល់យុវជន សហការជាមួយក្រុមហ៊ុនថាមពលស្អាតអន្តរជាតិ និងការកសាងសមត្ថភាពរដ្ឋាភិបាលក្នុងការរៀបចំផែនការជំនាញថាមពលស្អាត។

ប្រសិនបើគ្មានវិធីសាស្ត្របុរេសកម្មសម្រាប់ការអភិវឌ្ឍជំនាញនោះទេ កម្ពុជាអាចជួបហានិភ័យក្នុងការបោះបង់ចោលអត្ថប្រយោជន៍ដែលអន្តរកាលថាមពលស្អាតនឹងផ្តល់ឱ្យ។ នៅពេលដែលការផ្លាស់ប្តូរកើតឡើងក្នុងរយៈពេលជាច្រើនទសវត្សរ៍ជាបន្តបន្ទាប់ ការវិនិយោគនាពេលបច្ចុប្បន្នក្នុងការបណ្តុះបណ្តាលធនធានមនុស្ស នឹងផ្តល់ផលចំណេញនៅពេលខាងមុខ។

## Background Paper 7

# Delivering the skills required for Cambodia's clean energy transition

Dean Rizzetti

## Abstracts

The clean energy transition presents a significant opportunity to create a dynamic new workforce for Cambodia, spanning roles from highly specialised urban planners to technical engineers. However, there is currently a significant skills gap that must be addressed if Cambodia is to maximise the benefits from the shift to green energy.

Cambodia has made ambitious commitments to drive renewable energy expansion, improve energy efficiency, and increase electric vehicle adoption. As a result, research has shown that there is already a high demand for clean energy roles in Cambodia. Businesses are struggling to find experienced local staff with technical expertise, forcing companies to make significant investments in training in addition to onboarding graduates from educational institutions. This demand will only increase.

To address this, there needs to be significant improvements in the coordination of technical education, skill development and planning. Cambodia can address this by developing a Clean Energy Skills Roadmap, creating a specialised Skills Forum, tailoring curricula, promoting opportunities to youth, collaborating with international clean energy companies, and building government capacity to plan for clean energy skills.

Without a proactive approach to skills development, there is a risk that Cambodia will forego the benefits that the clean energy transition will bring. As the shift unfolds over subsequent decades, investments made now in upskilling human resources will pay dividends for years to come.

# Delivering the skills required for Cambodia's clean energy transition

The clean energy transition offers a once-in-a-generation opportunity to create a dynamic new workforce for Cambodia. Roles required in the clean energy transition range from highly technical professions such as grid engineering and urban planning, to skilled workers erecting solar farms, installing energy efficiency technologies or maintaining electric motorbikes. These roles require a high level of technical fluency, with the ability to operate systems and machinery and solve complex problems.

Addressing the skill demand for clean energy requires foresight, strategic planning, and ambition. Many of the jobs in the clean energy economy are not yet at the scale they will ultimately be at when the transition accelerates. This means that the government and the private sector need to work together to estimate future demand, enact ambitious policies to ensure the development of new clean industries and establish robust coordination mechanisms between the private sector, universities, Technical Vocational Education and Training (TVET) institutions and government.

Addressing the current skills gap will require a major improvement in the quality of technical education and the way in which education is planned and executed in Cambodia. Skill providers will require a clear assessment of demand, and students must be assured that their newly acquired skillsets will lead to stable employment. For this to take place, the government must provide definite plans to unlock the opportunities for clean energy skills.

## Trends in clean energy skills

The Liechtenstein Development Service (LED) has undertaken important scoping work that has identified a number of trends in the clean energy industry:

- **There is already a high demand for many clean energy roles, such as electrical engineers specialising in high-voltage systems**. These roles are likely to increase significantly in the coming years, as renewable energy, energy efficiency and electric vehicle markets are all required to grow significantly in response to the government's climate and energy goals.
- **Businesses find it relatively easy to recruit local early-career technical specialists, but find it much more challenging to source experienced local staff with several years of technical expertise and business development skills.** There is also a challenge in finding candidates for highly specialised roles - while it is relatively straightforward for companies to fill positions such

as solar system designers it is far more challenging to fill more technical roles such as automation engineers. Consequently, Cambodians are missing out on higher-paying jobs and companies are limited in the complexity of systems they can installed. This is exacerbated by the lack of opportunities for students to access work-realistic training while studying and a shortage of experienced professionals in the energy sector who can serve as mentors and role models. There is also a lack of training in key proprietary software, such as AutoCAD, which can lead to the need for additional in-company training and learning on the job.

- **Businesses are making significant investments in training their staff, due to a perception that universities and training programmes have not provided sufficient preparation.** Cambodian employers stated that a new graduate typically requires between 5 to 7 months of training to become fully operational. However, job retention rates are low, which makes training investments risky for clean energy businesses. It was also found that the lack of adequate training within the industry has resulted in a dependence on international companies to provide necessary services.

## What are the key occupations to facilitate the transition to clean energy?

To understand the types of skills that will be required in the clean energy transition, LED has undertaken detailed interviews with businesses currently working within clean energy field. Through these interviews, key sectors have been identified that will need to be addressed as a priority for the transition to clean energy, and the fundamental roles to fill within these sectors.

This analysis identified solar energy deployment, energy efficiency and electric vehicle (EV) deployment as the core sectors to be addressed in the clean energy transition. Of course, there are many subsequent skills opportunities created by the clean energy transition, such as hydrogen production, wind energy, and facilitating regional power trades. However, these are more complex, with technologies that are not currently operational in Cambodia whereas solar, energy efficiency and EV deployment all have existing policy frameworks and a current demand for workers now and into the future.

**Solar energy:** This sector's positions include solar system designers who have qualifications in electrical and mechanical engineering with experience designing, installing and connecting solar systems, solar PV installers with practical experience and automation engineers. They would be responsible for developing, testing and implementing software tools or programmes to automate technical operations. Maintenance staff would also be required on an ongoing basis to operate new solar installations.

**Energy efficiency sector:** The roles within this sector include energy auditors (who evaluate energy usage and suggest

ways to improve efficiency), monitoring & verification (M&V) specialists (who verify and document energy savings) and mechanical engineering and plumbing (MEP) engineers (who design and oversee the installation of new equipment).

**Electric vehicles:** This sector requires electrical engineers, manufacturing workers and maintenance mechanics. Cambodia's EV sector is relatively new, and many companies operating in this industry are branches of international corporations.

## Cambodia needs an action plan to maximise the skills opportunities created by clean energy

The opportunities created by clean energy are significant, but realising this opportunity requires extensive coordination, planning and collaboration. Universities and training facilities need to have total confidence that their graduates will be required in the employment market, and this means the government must set firm targets and policy deployment processes to ensure the demand for these skills. Policy coordination is also vital - training facilities need to understand energy policy, and energy policymakers must understand the timeline, processes and constraints of training facilities. Pursuing this will require an evidence-based, coordinated approach, which is outlined below:

### *Understanding the clean energy skills opportunity*

The scale of the clean energy transition in Cambodia and worldwide is immense. The International Energy Agency's Net Zero Roadmap says that limiting global warming to 1.5 degrees Celsius will require an investment in clean energy of $4.5 trillion per year by 2030.

The first step in taking advantage of the clean energy skills opportunity is mapping Cambodia's current training pathways and estimating the workforce that will be required in each of the key clean energy sectors, such as renewable energy deployment, electric vehicles and energy efficiency. EnergyLab has worked with LED to begin to analyse key sectors and identify priority occupations in Appendix 1. However, more analysis is required to rank these opportunities fully.

### *Develop and endorse a clean energy skills roadmap for Cambodia*

Cambodia needs a central roadmap to guide clean energy skills development. This roadmap should clearly articulate the current skills gaps and identify priority areas that should be the focus of investment to maximise the benefits of the clean energy transition for Cambodians. The roadmap should outline a phased approach to enhance skills training, standardisation, and efficiency. It will also propose targets and timelines for development to ensure that Cambodia has the skills it needs in place to meet energy and climate goals in a timely way. The roadmap should also be designed to inform development partners' investments in skills development. The roadmap should be based on a detailed

analyses of the current skills gaps in clean energy and the suitability of currently available courses. This would include an analysis of how companies currently deliver internal training efforts and whether this could be better incorporated into formal training programmes.

The roadmap should also provide clarity on the institutional interactions required for the clean energy transition by articulating the roles and responsibilities of public institutions and private actors. This will help harmonise the delivery between government ministries and across public and private providers. This will lead to consistent, standardised engagement between content-driven line ministries (e.g. Ministry of Mines and Energy, and the Ministry of Public Works and Transport) and skills focused ministries such as the Ministry of Labour and Vocational Training (TVET institutions) and the Ministry of Education, Youth and Sport (technical high schools, universities).

### *Create a specialised clean energy skills forum*

Developing the Clean Energy Skills roadmap will require a series of structured dialogues between industry, government, and educational institutions on clean energy skills requirements and opportunities. These forums can be designed to operate on an ongoing basis, providing a platform to review emerging policies and to ensure that Royal Government of Cambodia is being provided with timely articulation of industry needs.

This forum should grow as the clean energy sector expands - with new industry players actively encouraged to join. This will help RGC agencies plan their skill priorities and, most importantly, will ensure that emerging professions such as 'EV mechanics' evolve in line with industry needs.

### *Tailor the curriculum to deliver clean energy skills*

Following the clean energy skills roadmap, Cambodia needs to undertake a coordinated process of delivering comprehensive clean energy curriculum development. This should draw on international experience, and be reviewed and endorsed through the new Clean Energy Skills Forum.

### *Promote clean energy opportunities to Cambodia's youth*

Once training pathways are well established, it will be necessary to increase awareness amongst Cambodian students about the opportunities to focus on clean energy as a career path. Concern about climate change is widespread, but relatively few understand how they can focus on clean energy through their studies and, in doing so, become part of the solution.

### *Collaborate with international operators to improve skills transfer*

Countries from across the region have successfully managed the growth of skills development in the clean energy sector, and Cambodia needs to actively learn from these examples. Cambodia can also use its Clean Energy Skills Roadmap and Clean Energy Forum to specifically target high-value companies to expand their training

aspirations - making the Kingdom both a destination for investment and a leader in clean energy skills.

### *Build the government's capacity to plan for clean energy skills*

Skills development is a relatively marginal component of energy policy. However, if Cambodia is wants to maximise a skills dividend from the transition to clean energy, then skills development needs to become embedded in policy making. This is best done by ensuring that the ministries responsible for delivering policy have the experience incorporated within their teams. These ministries can then collaborate with, and lead, other ministries to ensure that the skills required for the clean energy transition are being delivered. To facilitate this process, government officials must be provided with training in skills development to understand how to embed skills development in their broader programmes.

## Conclusions

Cambodia has an incredible opportunity to create thousands of new jobs. However, without a proactive approach that ensures the development of the required skills, there is a real risk that the clean energy transition will be delivered by an international workforce. The clean energy transition will take decades, so investments made now will pay dividends for years to come. Therefore, a clear pathway, opportunities for collaboration, and capacity development must be supported now to build the foundations for this vital sector.

## Appendix 1: Summary of clean energy employment opportunities

| Sector | Key Occupations | Labour market potential | Importance in the sector | Availability of local labour | Adequacy of existing training programmes | Key observations |
|---|---|---|---|---|---|---|
| Solar sector | Solar system designer | High | High | Low to medium | Low | The government's commitment to renewable energy and ongoing solar projects creates a need for solar system designers. There is a shortage of professional solar designers in the local labour market. |
| | Solar PV installer | High | High | Low to medium | Low | The role of local solar installers is crucial in the solar industry, and there is a need for more professionals in this field. This often results in outsourcing installation tasks to international consultants, which increases project costs. |
| | Automation engineer | Medium to high | Medium to high | Low to medium | Low | Solar projects require automation engineers and local companies still lack expertise in modern automation technologies. While some local companies already provide these services, formal training in automation is inadequate. |
| Energy efficiency sector | Energy auditor | High | High | Low | Low to medium | There is a growing need for energy audit professionals in Cambodia as there is great potential for energy efficiency. The approval of the National Energy Efficiency Policy is driving growth in the energy efficiency market, creating a demand for energy auditors. |
| | MEP Engineers | High | High | Medium | Medium | There is a high demand for MEP engineers due to their essential role in handling mechanical and electrical interventions of Energy Efficiency or Renewable Energy projects. Therefore, there is a need for more experienced and local MEP engineers. Qualified MEP engineers can also offer energy audit and M&V services, highlighting the importance of providing them with training. Although local technical institutes offer MEP engineering courses, feedback suggests that experienced professionals in this field still require further training. |
| | M&V Specialists | High | High | Low | Low | M&V plays a crucial role in every Energy Efficiency project, and its importance will become more apparent as the market expands. Only a few companies can provide good Monitoring and Verification services, and international companies are typically contracted to verify energy savings. There are no dedicated programmes or courses to train individuals in undertaking M&V, nor are there any M&V training centres in Cambodia. |

| Sector | Key Occupations | Labour market potential | Importance in the sector | Availability of local labour | Adequacy of existing training programmes | Key observations |
|---|---|---|---|---|---|---|
| Electric vehicle sector | Electrical engineer | Low to Medium | Medium | Medium | Low to Medium | Although the electric vehicle industry is still in its early stages, there is potential for job opportunities to expand in electrical engineering. As the industry grows, there may be an increased demand for experienced workers. To address the current shortage of workers, Electric Vehicle suppliers are providing training programmes to graduates from local technical schools. As the industry continues to expand, it will be necessary to develop additional training programmes or curricula. |
| | Electronics engineer | Medium | Medium | Medium | Low | Compared to the Energy Efficiency and Renewable Energy sectors, the market for electronic engineers in Cambodia is relatively small as the country relies on imported electronic products. However, the expertise of electronic engineers is just as crucial as electrical engineers in the Electric Vehicle industry, and their contribution is expected to become more valuable in the future. The number of graduates in electronics and automation engineering is lower than that of electrical engineering, so it is recommended to increase training on Electric Vehicles in technical schools to fully realise their market potential in the Electric Vehicle sector. |
| | Electric vehicle mechanic | High | High | High | Medium | Many Cambodians are already employed in maintaining motorcycles. Expanding their skill-set to incorporate electric vehicles will be relatively straight-f orward. As part of this, stewardship of used batteries and safety can be improved. However, many mechanics do not receive formal training, so improving this sector will require a formalisation of mechanic training. |

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