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Case study

Skills Development Programme in Cambodia - building green technical and vocational education and training systems

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Case **study**
Skills Development Programme in Cambodia - building green technical and vocational education and training systems

Cambodia's Skills Development Programme (SDP) demonstrates how a market systems approach to TVET reform creates pathways to green jobs while transforming institutional practices. Across multiple phases, SDP has shifted the institutional conditions for more market-responsive TVET, which in turn has enabled some system-wide experimentation with 'green campus' initiatives. One concrete example is the development of solar Photovoltaic training based on local demand analysis, which is led by TVET institutions themselves.

Dual objectives

Green skills development must respond to both economic opportunities and environmental imperatives. SDP is focused on establishing green campuses across the national TVET network while creating green job pathways.

Economic Objectives

- Improve access to quality TVET for disadvantaged youth, particularly in rural areas
- Align skills development with labour market demand in emerging green sectors
- Strengthen institutional capacity to deliver market-relevant training
- Support formalization and growth of green economy sectors

Environmental Objectives

- Mitigation: Build workforce capacity for renewable energy transition, particularly solar
- Adaptation: Develop skills for climate-resilient agriculture and sustainable practices
- Environmental protection: Transform TVET institutions into models of resource efficiency

Context and market opportunity

Climate and environmental risks
Cambodia faces intensifying climate impacts that threaten its development trajectory. The country has experienced temperature increases of 0.8°C since 1960[1], with more erratic rainfall contributing to both severe droughts (affecting 2.5 million people in 2015-2016) and flooding that regularly impacts tens of thousands of households[2]. Without strong adaptation measures, climate change could reduce Cambodia's GDP by up to 9% by 2050[3], while energy insecurity, with limited grid coverage in rural areas, constrains economic growth. These converging pressures demand a skilled workforce capable of implementing climate solutions.

Market dynamics
Cambodia's TVET system is undergoing a significant transformation. While historically facing challenges of low enrollment and weak industry linkages, the sector is turning itself around.

Families are starting to consider TVET as a viable pathway for their children, and institutions are strengthening connections with employers. SDP and other programmes have supported TVET providers to pay closer attention to labour market needs, moving away from purely supply-driven approaches. This evolving landscape creates opportunities for integrating new competencies, including green skills, into strengthened training systems.

Market opportunity
In remote provinces, household demand for off-grid solar solutions is driving market growth. Individual families seek mini solar units for lighting, phone charging, water pumping, and other applications. This household-level demand opens a market for local electrical companies that who provide installation and maintenance services across a range of electrical work, including solar.
These electrical companies, in turn, need skilled workers who can handle diverse tasks such as conventional wiring, appliance repair, and increasingly, solar installations. The labour market demand is high for versatile electricians with broad competencies, including solar knowledge, rather than narrow specialists.

[1] World Bank Climate Knowledge Portal
[2] World Bank (2023)
[3] World Bank (2023)

Partners and Behaviour Changes

Key Partners

- **Government:** Ministry of Labour and Vocational Training, Department of TVET, provincial authorities
- **TVET institutions:** Regional Polytechnic Institute Techo Sen Eisan in Kratie, Provincial Training Centre in Ratanakiri, plus additional schools implementing Green Campus
- **Private sector:** 35 electrical companies that handle solar installations as part of their broader portfolio, providing internships and exposing students to technologies like solar water pumps, motor control systems, and off-grid diagnostics
- **Development partners:** WWF Cambodia and Live & Learn Cambodia for curriculum development and outreach; Don Bosco Phnom Penh for Training of Trainers
- **Future partners:** SchneiTech Group for apprenticeship pilot in Pursat province

Targeted Behaviour Changes & Incentives

- The programme aims to shift deeply entrenched behaviors across the system. TVET institutions needed to move from rigid, supply-driven curricula to flexible programmes that respond to actual market complexity.
- Electrical companies had actively engaged in training through internships and curriculum input. The participation of 35 companies in providing practical training opportunities represents significant progress. Some are larger firms with dedicated solar divisions, while others are small businesses where solar is just one service among many.
- Government officials had to understand that green skills don't always mean new green jobs—sometimes it means adding green competencies to existing occupations. The Ministry of labour and vocational training's support for integrating solar into electrical training rather than creating separate programmes shows this nuanced understanding is taking hold.

Market actor incentives

Schools saw green campus initiatives as opportunities to reduce operating costs through energy and water savings while attracting students through improved facilities. The government recognized green TVET as essential for meeting climate commitments and attracting continued donor support. Private companies engaged to address skills shortages constraining business growth, particularly in renewable energy. Students pursued training that offered pathways to emerging job opportunities with higher wages than traditional sectors.

Project interventions

SDP works through existing institutions, facilitating change at macro (policy), meso (institutional) and micro (school) levels. Now in its third phase, the project has laid groundwork to shift the broader TVET system toward market responsiveness, with growing interest in green dimensions emerging more recently.

1. Policy and institutional strengthening (core foundation)

SDP's primary focus lies in strengthening the TVET system's fundamental capacity to identify and respond to market needs—with green skills emerging as one priority among many. The programme worked with the Ministry of Labour and Vocational Training to develop planning and coordination mechanisms that enable evidence-based decision-making. Through support to the Vocational Education Development Institute (VEDI) and Department of TVET, SDP helped establish processes for curriculum development and industry engagement. Importantly, labour market assessment is now conducted by individual TVET providers as part of their core work, not as a project activity.
The integration of environmental considerations into the Five-Year TVET Development Plan emerged organically from these strengthened planning processes, rather than being imposed as a separate agenda.

2. Green campus transformation

Building on improved institutional capacity, SDP supported schools to develop context-specific greening initiatives. The programme evolved from awareness campaigns in Phase 1 to comprehensive Green Campus Guidelines by Phase 3. Schools implemented practical changes—waste segregation, tree planting, workshop organization using 5S principles—that demonstrated environmental benefits while improving learning environments. In some cases, these initiatives are linked to income generation through composting and recycling, creating financial incentives for continuation. The Green Campus work served multiple purposes: improving school management, reducing operational costs, and creating visible models of environmental responsibility[4].

3. **Market-driven skills development** (example: solar as a component of electrical training)

The solar PV integration in Kratie and Ratanakiri exemplifies how strengthened institutional processes enable schools to respond to nuanced market realities. In these remote provinces, electrical companies need electricians with comprehensive skills who can handle various electrical tasks, including solar installations when required.
Employer feedback indicates a preference for multi-skilled technicians who can perform technical tasks (electrical box control, refrigerator and AC repair, welding for rooftop installations) and interact effectively with customers through strong communication and problem-solving skills.
The market assessment also revealed that companies sought competent electricians who could handle practical applications such as solar water pumps, mini-grid connections, or off-grid installations. This exemplifies 'greening' an existing job, rather than creating a new or separate 'green job' (i.e, a solar technician).
TVET institutions (RPITSE in Kratie and PTC-RTK in Ratanakiri) added solar content to their two-year electrical programmes, strategically introducing it in the second year after students had mastered electrical fundamentals. This ensures graduates emerge as versatile electricians capable of handling the full range of work available in their local markets.

[4] Dibra, S., Hofstetter., S. (2025). "The role of green skills and green campus in students' behaviour toward green careers", VET Congress 2025: Opportunities and Challenges of Contemporary Career Transitions, University of Lausanne- Synathlon Building, Lausanne, 03–05 September 2025

Results to date

Behaviour Change Indications

1. The government has embedded green TVET as one of four pillars in the new national TVET Development Plan, signaling sustained commitment beyond project funding.
2. The MLVT is initiating a Green Campus Award to encourage and support TVET institutes in adopting green initiatives.
3. Some schools have independently expanded green initiatives:
   - Ratanakiri Technical College mobilized support from private sector partners for workplace-based training, including allowances and resource speakers, demonstrating ownership.
   - Some schools also report using environmental improvements in marketing to prospective students, indicating market value recognition.
4. Private sector companies are seeing opportunities to expand from home solar systems to on-grid solar solutions and establishing new branches in districts.

Quantitative Outcomes

Green Campus and broader initiatives:

- 14 TVET schools implementing Green Campus initiatives across 12 provinces
- 11 environmental modules integrated into Certificate 1 level curricula
- 88 trainers (20 women) trained in green 5S methodology across all schools
- All 14 schools have developed their own Green Campus action plans

Solar-enhanced electrical training (pilot phase):

- 2 TVET institutes (RPITSE and PTC-RTK) with upgraded workshops and equipment
  - Trainers supported with knowledge on in solar technologies and Green 5S principles
- 35 electrical companies (with varying degrees of solar work) engaged as partners providing internships
- 95 trainees (14 women) completed electrical training with integrated solar PV modules

Qualitative Outcomes

From the broader Green Campus initiative:

- Evolution from basic greening campaigns (Phase 1) to structured Green Campus Guidelines (Phase 3)
- Schools beginning to link environmental initiatives with income generation (composting, recycling), though income generation has not yet materialized
- Wage opportunities for solar-capable electricians range from 175-250 USD per month based on observations in target provinces, which is slightly higher than a typical electrician (150 USD/month).

The solar training represents more than a technical upgrade, it's a shift in mindset for TVET institutions. Key qualitative changes include:

- **Institutional innovation:** RPITSE and PTC-RTK demonstrated capacity to co-create solutions rather than wait for top-down directives
- **Industry-education collaboration:** Solar companies moved from passive critics to active partners, providing internships and technical input on curriculum
- **Practical orientation:** Training grounded in real-world application through hands-on practice with technologies like solar water pumps, motor control systems, and off-grid diagnostics
- **Workshop transformation:** Introduction of Green 5S principles created safer, more sustainable learning environments
- **Local relevance:** Training aligned with youth aspirations to stay in home provinces rather than migrate for work

Key learnings

Green skills don't always mean green jobs

The solar example challenges some assumptions about green transitions. The labour market wasn't asking for specialists. Rather, demand was for multi-functional electricians who can handle solar when required. As the programme discovered, the 35 participating companies are electrical contractors with varying degrees of solar work, not dedicated renewable energy firms. This shapes the approach to green skills and jobs: rather than creating new green occupations, the priority is often "greening" existing trades by adding relevant competencies. This more nuanced understanding prevents the common mistake of training for jobs that don't exist (and aren't likely to in the future, either).

Foundation-first approach enables innovation

SDP's approach to investing in fundamental institutional capacity created the conditions for locally-driven innovation. The solar integration emerged from schools applying improved planning capabilities developed through SDP's core institutional strengthening work. RPITSE and PTC-RTK used labour market assessment tools to understand what employers actually needed.

This sequencing proved critical. Schools needed strengthened management systems and an orientation to employer needs before they could effectively implement green initiatives. The progression from basic awareness (Phase 1) to systematic guidelines (Phase 3) reflected institutional readiness rather than project timelines. When TVET institutions had the foundational skills to assess markets, they could identify nuanced local opportunities that top-down interventions may have missed.

Multiple benefits drive adoption

Successful green initiatives delivered multiple benefits simultaneously. The 5S workshop organization improved safety and efficiency while reducing waste. Campus beautification attracted students while demonstrating environmental commitment. Income generation from composting and recycling supported financial sustainability while teaching circular economy principles. This multi-benefit approach proved more effective than purely environmental messaging in motivating action.

Future outlook

The transformation initiated by SDP shows plausible pathways to sustainability and scale. The solar PV training model is already expanding beyond its pilot phase, with concrete plans for replication and formalization:

Immediate expansion plans:

- Continued piloting at RPITSE and PTC-RTK with foundational modules for Certificate Level 1
- Embed solar knowledge and skills into competency standards (C1 Installer, C2 Technician, C3 Senior Technician) in the Cambodia Qualifications Framework
- New work-based learning pilot in Pursat province through a partnership with SchneiTech Group
- Development of master trainers through Don Bosco Phnom Penh's Training of Trainers programme

Systemic enablers for scale:

- Government embedding green TVET in national strategy, signaling sustained political commitment
- Demonstration effects as success in Kratie and Ratanakiri inspire other provinces facing similar energy challenges - this could be accelerated through inter-provincial coordination and learning.
- Private sector engagement deepening—from initial 35 solar companies to broader industry involvement, which may need to involve industry associations or other actors to bridge localized learning by those firms into new areas.

Several challenges remain. The initiative requires significant coordination across multiple stakeholders. Equipment costs for solar training remain high for resource-constrained institutions. The pace of technology change requires continuous curriculum updates. Rural schools still struggle to engage sufficient numbers of private sector partners. And resource savings from green initiatives have not yet been systematically measured, though this is planned for future monitoring.

The SDP case demonstrates that it's possible to transform TVET systems to serve both economic and environmental objectives. By strengthening institutional capacity first, then facilitating locally-driven responses to market opportunities, the programme created changes with potential to endure and spread. The current focus on deepening implementation across 14 TVET institutes in 12 target provinces, rather than rapid expansion, reflects a commitment to quality and sustainability over quick wins.