Chapter 7

Sustainable Energy through SCP in Cambodia

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7.1 Introduction

This chapter addresses the economy, sustainability challenges and sustainable consumption and production (SCP) practices in Cambodia. It focuses in particular on renewable energy, energy efficiency, and providing energy access, which are also priority areas of the country's Green Growth policy for 2013–2030.

Cambodia is located in Southeast Asia bordering Vietnam in the East, Lao PDR in the North, and Thailand in the West, and has a total land area of 181,035 km^2. The country's population grew from around 9 million in the 1960s to 15.14 million in 2013. The capital, Phnom Penh, has 2.2 million inhabitants with reasonable access to modern services like healthcare, education, and energy. However, approximately 80% of Cambodians live in rural areas with limited access to clean and affordable energy and water.

Cambodia is one of the poorest countries in Southeast Asia and is classified as a Least Developed Country (LDC) by the United Nations and as a low-income country by the World Bank. With a Human Development Index (HDI) of 0.584, Cambodia ranks 136th out of 187 countries. The HDI differs greatly depending on the area: Generally, the urban populations are better off than the rural populations, with Phnom Penh having

the highest HDI of the country at 0.936, and the worst indicator for Mondulkiri, which has a HDI of only 0.220. However, Cambodia has experienced rapid economic growth since 1999, with annual growth rates of between 6 and 10%. Between 1999 and 2011, GDP per capita has more than tripled and it is expected to continue to increase [Small-Scale Sustainable Infrastructure Development Fund, 2015]. This leads to the expectation Cambodia will soon move towards becoming a low–middle income country.

Cambodia has a tropical climate and is subject to both Southeast and Northwest monsoons. The Southeast monsoon, which coincides with the rainy season, extends from May to October. The Northwest monsoon brings a cool but drier period from November to April. The average annual rainfall is about 1,500 mm, with the heaviest rainfalls of up to 4,000 mm per year occurring along the southwest coastal line. The Tonle Sap River drains the Tonle Sap Lake from the northwest before it continues further to the south east to its lower delta in Vietnam. The Tonle Sap Lake is the largest freshwater body in Cambodia, serves as a buffer in the Mekong River system for flood mitigation, and is the source of beneficial dry season flows. The monsoon amplifies the inflow of water volume from the upper Mekong region. As result, hydropower plants face a significant decrease in their generation capacity during the dry season, illustrating one of the challenges Cambodia faces in providing stable electricity supply.

7.2 Economy, Employment, and SMEs

Export of goods and services contributed 66% of Cambodia's GDP in 2013, with the main export destinations being the European Union (EU), China and the United States of America (USA). Around 70% of total export comes from textile goods; other exports include vehicles, footwear, natural rubber, and fish, while the service sector accounts for 40.8% of GDP [UNDP, 2015], with tourism as one of the most important service sectors. In 2013, over 4 million tourists visited Cambodia, providing an accumulation of foreign currency earnings and employment for the Cambodian workforce. The sector faces two main challenges, being revenue leakage and human resources issues. According to the Ministry of Tourism (MoT), 25% of revenue was leaked out of the country due to the

country's dependency on foreign goods to supply the needs of hotels and restaurants. Secondly, there is a lack of human resources and professionalism in the sector. Cambodia's sustainable tourism, which should help to minimise the impact of tourism on the local environment and culture, is not yet well established and investment is needed to build and maintain the hard and soft infrastructure to support the development of this sector. Soft infrastructure refers to human resources, and hard infrastructure refers to transportation, telecommunications, and electricity, including renewable energy technologies. Cambodia's Tourism Strategic Development Plan is mostly oriented towards improving tourism infrastructure (road, airport, water supply, and electricity), simplifying visa services and travel facilities, and diversifying its tourist products and locations to Siem Reap, Phnom Penh, the coastal zone, and the Northeast region. However, the focus is not so much on developing sustainable tourism but rather to take full account of current and future economic, social, and environmental impact, while helping to generate future employment for local people.

The agricultural sector accounts for 33.5% of GDP and is mostly based on crops, livestock, poultry, fisheries, forestry, and logging. Export goods are pigs, fish, livestock fish, and beef. Another 25.6% of GDP comes from the industrial sector, within which textiles are the largest industry with 19% of GDP. Regarding employment, the unemployment rate was estimated at 1.7% in 2013. Nearly half of the total labour force was employed in the agriculture sector, see Table 7.1 [NIS/MOP, 2014]. Table 7.1 also shows that in 2013, the service sector required 67.9% of the workforce in urban areas and 31.5% nationwide. Among the employed labour force, the proportion employed in the agricultural sector has fallen

Table 7.1: Employment by sector (%)

Sector	Cambodia	Urban*	Rural
Agriculture	48.7	13.4	60.4
Industry	19.9	18.8	19.2
Services	31.5	67.9	20.4
Total	100.0	100.0	100.0

*Excluding Phnom Penh.

Source: NIS/MOP [2014].

from nearly 60% in 2009 to 48.7% in 2013. One out of five people in the employed labour force works in the industrial sector (see Table 7.1).

Spread over all economic sectors, Cambodia has 505,134 enterprises, most within the wholesale sector (57.9% of enterprises), followed by the manufacturing sector with 14.1% of enterprises [NIS/MOP, 2011]. The small- and medium-sized enterprise (SME) sector, defined as enterprises with 11–100 employees, measured 10,809 in 2011 [NIS/MOP, 2011]. Most (80.7%) of these SMEs have between 11 and 30 employees. Within the SME sector, the education sector is largest (31.5%), followed by the accommodation and food service sector (18.9%), then the manufacturing sector (13.1%). Zooming in on the structure of Cambodia's enterprises, 89% are small businesses with fewer than five employees. This is also expressed in the location of the establishments: 64.7% are home businesses and 8.3% street businesses. Of the 28% in rented business premises, the area required for the enterprise is less than 10 m^2 in 52.5% of the cases [NIS/MOP, 2011]. In terms of SCP, these enterprises lack the necessary funds and skills to promote medium and high cost sustainability activities or cleaner production. The concept of SCP is still new for most Cambodian SMEs and in the absence of a national policy framework and promotion of sustainability, their acceptance of this approach will take time.

7.3 Cambodia's Energy Situation

Cambodia's power sector is small by regional and international standards, but demand has been growing rapidly over the last decade. The annual energy growth rate from 2002 to 2011 was 16.3 and 17% for the country's capital Phnom Penh; it is anticipated to show an annual growth of 9.4% until 2020. However, demand has outpaced supply, and electricity shortages and power outages negatively impact the country's economic development [Open Development Cambodia, 2014], illustrating the link between access to energy and development on a macro level.

Wood fuel plays a large role in the energy mix of Cambodia. Of total energy consumption in 2012, only 6% was electricity, 24% oil products, and 70% biomass energy, e.g., agricultural by-products (rice husk, corn cob), and wood fuels like firewood, charcoal, saw dust, wood pellets [IEA, 2015]. Within the wood fuel consumption, 85% can be attributed to

domestic cooking, and 15% to industry and SMEs. While the dependence on firewood reduced from 90.4% in 1998 to 79.5% in 2010 [Kingdom of Cambodia, 2012], wood fuel consumption still asserts pressure on the forests: annually 3,400,000 tonnes of wood fuel originate from Cambodia's forests, and deforestation continues to be a serious problem. Cambodia's forested land area, as a percentage of total land area, declined rapidly due to industrialisation, energy need and a lack of forest conservation. Total forest cover declined from 59 to 57% between 2006 and 2010, equivalent to 366,993 ha of the total land area. Only 18% of Cambodia's forests are considered protected and even protected areas are vulnerable to illegal logging. Despite measures taken, the rate of deforestation and restocking of trees is not enough for Cambodia to meet its MDG target of 60% forest cover by 2015. The percentage of forested land area even declined to 55% in 2013 [WB, 2015b].

Likewise, charcoal production and use contributes to deforestation and causes black carbon emissions. Charcoal for cooking is generally produced and sold by informal SMEs, and these entrepreneurs do not necessarily know or care about producing it sustainably. Since these enterprises operate in the informal sector, their prices are lower than prices of formal and/or sustainable businesses. For Cambodia's transition towards more sustainable energy practices, it is necessary for sustainable businesses to become more competitive by reducing the price differential between the formal and informal sectors. This can only happen when some regulatory measures are put into place, for instance with measures like VAT exemption for formal/sustainable businesses. Strategies like these are currently missing in policies and regulations, but would certainly encourage the development of sustainable energy sources and the formalisation of SMEs in the renewable energy sector.

Hydropower dams, currently providing 3% of Cambodia's electricity supply, could provide more power; however, a huge issue is the mitigation of social and environmental impacts on the Mekong River and its tributaries (e.g., fisheries, resettlement, land issues, changes in flood patterns, less sediment, greenhouse gas/GHG emissions, etc.). In the commissioning of hydropower dams, there generally is a lack of transparency, environmental and social impact assessments, and community consultations, all of which make large-scale hydropower dams highly controversial [Energypedia, n.d.].

Additionally, these hydropower projects are usually implemented with foreign investment, and therefore revenues, for instance from the export of electricity, go to foreign investors and not to national coffers.

The efficient use of agricultural biomass residues offers solutions to address the issues of affordability and access. In 2013, the Cambodian Ministry of Industry, Mines and Energy launched a project with the support of UNIDO, to promote the development agricultural-residue biomass utilization. One specific example is rice husks of which Cambodia has significant amounts available for utilisation. It is estimated that if all risk husk resources from mills were used in gasifiers to generate electricity, up to 30% of Cambodia's current electricity demand could be met [Larasaty, 2015]. Rice processing plants can achieve significant savings with gasifiers, similarly large rice mills. Rice Husk Gasification (RHG) technology in the rice-milling sector has been in use in Cambodia since 2006 with over 100 examples currently in operation, but with gasifiers not always of the highest quality or safety. These low quality RHG systems have negative environmental impacts associated with them. The SWITCH-Asia project "Waste-to-Energy in the Rice Milling Sector" addressed these issues (see Box 7.1).

Box 7.1 Case study of the SWITCH-Asia project "Waste-to-Energy in the Rice Milling Sector"

The Cambodian rice milling industry faces challenges to compete with neighbouring countries due to the high cost of processing and logistics — within which energy prices play a significant role. The rice milling sector in Cambodia potentially has 1.6 million metric tonnes of rice husk available that could be converted into energy. However, currently only about 10% of the rice husk is utilised as fuel biomass for waste-to-energy (WtE) technologies. Of the over 100 Cambodian RHG systems in use today, there are significant concerns over the negative environmental impacts from low-quality RHG systems.

The main goal of the "WtE in rice milling sector" project, implemented from January 2012 to December 2015, was to promote sustainable production (SP) of milled rice through the replication of existing RHG technologies. The project

(*Continued*)

Box 7.1 (*Continued*)

promoted a standardised RHG technology and its application by 150 rice mills (30 rice mills with existing WtE installations and 120 new installations).

Three project components were implemented:

1. Technological improvements and the establishment of essential business services that support increased application of standardised WtE technologies over nine target provinces.
2. Development and implementation of a national standard for WtE technology and a licensing procedure that will encourage millers to switch to WtE.
3. Essential investment in business planning and the promotion of WtE, so that rice millers and WtE manufacturers have better access to investment credit. As banks and financial institutions (FIs) see the benefits, they will be better able to provide tailored financial packages to the sector.

Under Component 1, the project carried out Internal Management System to test some tools and templates on rice milling production at a number of selected mills (in terms of book and record keeping, operation and management of the mill, sales inventory, administration tasks, etc.). Training was also provided during testing and the project reached out to other relevant organisations (rice export and import organisations) in Cambodia to disseminate the templates and tools in order to capture a broader audience and introduce the applications.

Based on the project's experiences, basic safety procedures, operation and maintenance procedures and handling have proved to be a real challenge for most of the mills to abide by, which requires a gradual process and steady approach in order to change the present behaviour. The rice milling sector will need further supported in order for them to seamlessly adopt the proposals and create the necessary change.

During 2015, the project's focus was on blackwater assessments, disposal and management, and wastewater treatment plant improvements for three rice mills. A number of new activities related to turning waste into another source of biomass energy (e.g., pellets of rich husk char and other organic solid waste) and formulating a mixture of rice husk char with organic and slurry waste to create an organic fertiliser for agriculture crops.

(*Continued*)

Box 7.1 (*Continued*)

The development and implementation of a national standard for WtE technology and a licensing procedure under component two was still underway when the project was concluded at the end of 2015. The project has established cooperation with the Institute of Standards of Cambodia (ISC) under the Ministry of Industry and Handicrafts (MIH), who will establish an implementation body at the provincial level for the standard. They have committed to appoint one officer in each province. It can be expected that this effort will garner attention from the industry, despite being a voluntary initiative. As the development of the standard is being organised in a transparent manner, the process of adopting the standard is expected to be seamless.

The project has published a final document on the Baseline Standard on Health, Safety and Environment at workplace, where ISC and MIH will extend the baseline standard into a more detailed technical standard for manufacturing and production of RHG. The Health, Safety, and Environment baseline will be applied to rice mills and manufacturers while the standard for the RHG system is to be adopted by the manufacturers, both local and imported technology providers. The development of the business support services that the project provided under Component 3 have shown some positive signs that the technology suppliers, rice milling equipment suppliers, and commercial banks will work together to provide rice millers the equipment they require at competitive loan terms. Both the local Cambodian banks Canadia and Acleda have participated in most of the project's awareness raising events with attendance from the rice millers and other key sector players. Both banks have their own existing loan and credit structures for the rice sector, with an interest rate between 10% and 12%, and typically the mill's land title and other physical assets are required as collateral. The only downside of the existing loan structure was that millers take out loans for facility improvements and stocking paddies and very few would use the loans for RHG installations or upgrades to create the necessary energy switch at their facility.

More project information is available on: http://www.switch-asia.eu/projects/w2e-in-rice-milling-sector/.

7.3.1 *Electricity access and poverty*

From 1990 to 2010, worldwide access to electricity in urban areas increased by around 1.1 billion people, while the total global population increased by 1.27 billion; at the same time both total population and

people with access to electricity in rural areas increased by around 0.3 billion people. As we see, rural electrification has increased in line with population growth, but the number of people without access to electricity has not changed [IRENA, 2015]. Cambodia is no exception to this and compared to its neighbours has the lowest electrification rate in the region: while almost all households in urban areas are connected to the national grid, only 14% of rural households are connected. In 2012, 31% of Cambodia's population had access to electricity [World Bank, 2015]. Even though GDP per capita increased between 2000 and 2009, the growth in electricity access did not keep track with this development (see Figure 7.1).

From the perspective of SCP, the challenge for Cambodia is how to provide access to affordable and sustainable energy sources, thereby enable leapfrogging of unsustainable energy generation infrastructures and unsustainable energy consumption patterns of industry and households. Until 2007, Cambodian energy supply was almost entirely generated from oil-fired power stations. Domestic generation was replaced by imports from Thailand and Vietnam with the commissioning of inter-connectors in 2007 and 2009 respectively [Cambodia Chamber of Commerce, 2015]. Supply and demand continue to have mismatches at different times of the year and day. Because of expensive imported diesel and fragmented power supply systems, electricity prices in Cambodia are amongst the highest worldwide.

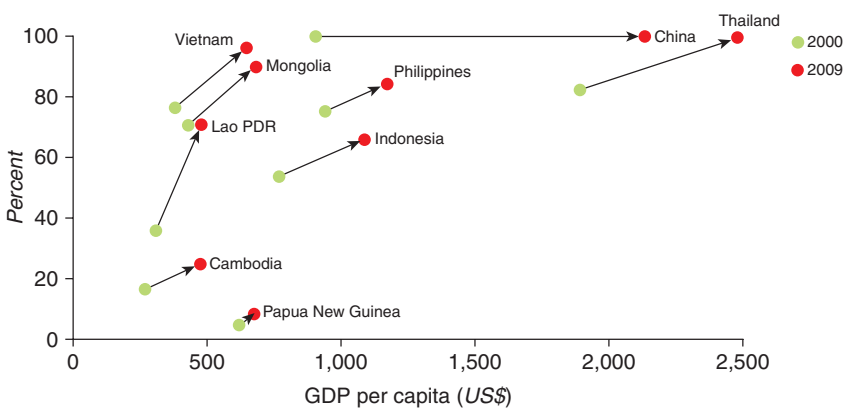

Figure 7.1: Growth in electricity access versus GDP in Asia (per capita, 2000–2009)

Source: [World Bank, 2011].

The Cambodian population suffers from having high electricity tariffs and energy costs. Paradoxically, prices per kWh are the highest in the areas where the poorest people live: in Phnom Penh, households pay USD 0.18 per kWh and businesses USD 0.19 per kWh. In grid-connected towns and urban areas, prices can be as high as USD 0.25–USD 0.40 per kWh.

Even though the Millennium Development Goals (MDGs) did not explicitly address the need for access to energy, particularly modern energy, the need to improve overall welfare were well recognised by the development community [World Bank, 2011]. The UN Sustainable Development Goals (SDGs), in particular SDG7, specifically addresses the need of access to "affordable, reliable, sustainable, and modern energy for all." The targets of SGD7 entail not just increased access to energy, but also to increase the share of renewable energy solutions in the energy mix and the improvement of energy efficiency. Here are clear overlaps and synergies with SDG12 on SCP. Realising the targets of the SGD framework requires new strategies to ensure affordable, sustainable energy especially for the poor through SCP, which encompasses issues such as energy efficiency and renewable energy.

7.3.2 *Sustainable energy policies*

Policy frameworks play an important role to enable the development of an effective sustainable energy supply and demand system. Cambodia has abundant renewable energy resources, such as hydropower, biomass, and solar, however, the development of renewable energy sources is slow and their contribution to the total energy supply mix is still small. This is partly due to the lack of experience and funds, coupled with inadequate data, but more importantly, the country's legal, regulatory, and policy framework regarding renewable energy is nascent and has not yet facilitated the uptake of renewable energy sources. The policies and laws which have been implemented so far to address the supply side and rural electrification are listed below (see Table 7.2).

Furthermore, the energy demand side has so far not been addressed sufficiently. Until 2013, Cambodia did not have a policy for energy efficiency to reduce energy consumption while increasing energy availability, when the EU Energy Initiative Partnership Dialogue Facility (EUEI PDF) assisted the Ministry of Industry, Mining and Energy (MIME) to develop

Table 7.2: Cambodia's key laws and policies related to sustainable energy development from 1998 to 2008

Year	Laws, Policies, and Action Plans Related to Cambodia's Sustainable Energy Development
1998	National power development plan
1999	Cambodia power sector strategy
2001	Approval of electricity law
2002	Renewable Electricity Action Plan 2002–2012
2005	Sub-decree on electricity tariffs
2006	Rural Electrification by Renewable Energy Policy
2008	Master Plan Study on Rural Electrification by Renewable Energy

Source: [Kingdom of Cambodia, 2012].

such a strategy. This resulted in the draft National Policy, Strategy, and Action Plan on Energy Efficiency in Cambodia (CNEE) that contains an action plan for promoting energy efficiency in industry, including raising awareness of good energy management, funding energy audits for SMEs and providing loans for improvements in energy efficiency [Cambodia Chamber of Commerce, 2015].

Development and energy efficiency, especially industrial energy efficiency, are clearly linked. Remarkably, even though energy prices are high in Cambodia, energy management practices are not widespread and even in the industry and service sector, energy audits are sparse. Even if actors are aware of the disproportionate consumption of high cost energy and the potential of energy efficient products and services, they have so far failed to achieve significant energy efficiency. Reasons for this lack of progress could be linked to insufficient technical capacity, lack of human and financial resources, lack of qualified local suppliers, or financing constraints.

7.4 Towards SCP in the Energy Sector

Since 2004, Cambodia's long-term socio-economic energy development vision has been detailed in the 'Rectangular Strategies for Growth, Employment, Equity and Efficiency.' The National Strategic Development Plans (NSDP) set out the implementation of the Rectangular Strategies

and align sectoral planning as well as guide external development partners to align their efforts to enable better aid effectiveness. In the first NSDP (2004–2008), environmental issues or energy efficiency were not yet mentioned specifically. However, the 2009–2013 NSDP started to include a focus on the environmental and social effects of energy consumption. The current 2014–2018 NSDP takes this further by referring to strategies and policies for green development and climate change — topics that are overlapping with the SCP agenda.

For the development of these strategies and policies, the Royal Government of Cambodia (RGC) works together with a number of organisations, such as the Global Green Growth Institute (GGGI). In 2012–2013, the GGGI supported the RGC with adopting the National Policy and Strategic Plan on Green Growth 2013–2030, and establishing the governance structures, such as for the coordination of green growth sector strategies and activities. Currently, GGGI works together with Cambodia's National Council for Sustainable Development (SD) and the General Secretariat for Sustainable Development (SD) to develop the Green Urban Development Plan, which aims to help integrate green growth into the planning processes of Cambodia's cities.

In 2012–2013, the National Council on Green Growth was established with 57 members, with core responsibilities to prepare legal norms, policies, strategic plans, activity plans and programmes related to green growth and to integrate green growth principles into all aspects of the national development strategies. The National Green Growth Road Map 2010 has been integrated into the National Policy on Green Growth (2013–2030), aiming at developing the economy with consideration for the environment and sustainability of natural resources. With the national policy targeting a balance between economic development and environmental protection, culture preservation, social stability, and sustainable consumption of natural resources to improve people's living conditions and welfare, the Green Growth plan aims at developing a green economy by the effective use of natural resources, environmental sustainability, and green economy and finance. While pursuing its Green Growth strategies, the RGC has also embraced the MDGs and, more recently, the SDGs, where SCP has become a standalone goal (SDG 12) which links to other SDGs. There are numerous potentials to link SCP

with Cambodia's National Strategic Development Plans and the Green Growth Road Map.

7.4.1 *The SWITCH-Asia programme in Cambodia*

The central question of this book, and this chapter on Cambodia is no exception to this, is how to reduce environmental impacts such as GHG emissions, water pollution and unsustainable use of natural resources while sustaining the growth of the economy and reduce poverty. Regarding Cambodia's energy sector, the essential approach is to balance the use of energy resources alongside the increasing demand for goods and services, which can be partly achieved by increasing energy efficiency; or by increasing the efficient use of biomass as energy resource.

The SWITCH-Asia Programme has so far co-funded seven projects in Cambodia (see Table 7.3), including the "MEET-BIS" project, which focused on increasing energy efficiency by improving SMEs' access to energy efficient and renewable energy technologies through business innovation packages (see Box 7.2).

7.5 Summary and Conclusion

In this chapter, Cambodia's economy, sustainability challenges and energy-related SCP policies and practices were introduced, illustrated by two SWITCH-Asia projects implemented in Cambodia, which demonstrate the development of SCP in the country.

Cambodia is still one of the poorest countries in Southeast Asia, but it has seen a rapid economic growth in the first decade of the 21st century. If current trends continue, Cambodia will soon be classified as a low–middle income country. With the increase of wealth, energy consumption has also risen and the energy growth rate is expected to grow annually by more than 9% until 2020. Unfortunately, the country's energy demand has outpaced supply, resulting in high energy prices, electricity shortages, and power outages which has a negative impact on the country's economic development. The implementation of SCP practices for energy efficiency is likely to contribute solutions which will ensure sustainable and affordable energy for many and sustainable economic growth, especially in the SME sectors.

Table 7.3: Overview of SWITCH-Asia projects in Cambodia

Name of Project	Period	Main Implementing Organisation	Places of Implementation	SCP Practice	Objectives or Impact
Sustainable Freight & Logistics	2016–2019	GIZ, Germany	Cambodia, Laos, Myanmar, Vietnam, Thailand	Sustainable transportation, supply chain	To increase sustainable freight transport and logistics in the Mekong Region mainly through energy efficiency and safety measures in at least 500 SMEs in Cambodia, Lao PDR, Myanmar, Vietnam (CLMV), and Thailand
Efficient Air Conditioners	2013–2016	European Copper Institute (ECI)	Cambodia, Indonesia, Laos, Malaysia, Myanmar, The Philippines, Thailand, Vietnam	Energy efficiency	Increasing the market share of higher efficient air conditioners in ASEAN, through harmonisation of test methods and energy efficiency standards, adoption of common Minimum Energy Performance Standards (MEPS), and changing consumer purchasing attitudes in favour of energy efficient ACs

AEMAS	2010–2014	ASEAN Centre for Energy	Cambodia, Indonesia, Laos, Malaysia, Myanmar, The Philippines, Thailand, Vietnam	Energy efficiency accreditation	Reducing energy consumption in the manufacturing and industrial sectors in ASEAN and to cut greenhouse gas emissions
MEET-BIS Cambodia	2014–2015	ETC foundation	Cambodia	Energy efficiency	Promoting economic prosperity and poverty reduction in Cambodia with reduced adverse environmental impact of SMEs in selected sectors
Reducing plastic bag waste	2014–2017	Fondazione ACRA — CCS	Cambodia	Waste Management	Promoting sustainable growth and environmental sustainability in the country, by changing consumption patterns and consumer behaviour to order to reduce plastic bag use and waste in major Cambodian cities
SPIN-VCL	2010–2014	Delft University of Technology	Cambodia, Laos, Vietnam	Product design for sustainability	Promoting sustainable product innovation as a proven approach in at least 500 companies in five of the most relevant industrial sectors in Vietnam, Laos, and Cambodia

Box 7.2 Case study of the SWITCH-Asia project "Mainstreaming Energy Efficiency through Business Innovation Support" (MEET-BIS Cambodia)

The MEET-BIS project promoted SP by SMEs in Cambodia by ensuring that they have access to affordable energy efficient and renewable energy technologies through scalable, commercially viable business innovation packages. The project did not target SMEs directly, but aimed to mobilise Cambodian suppliers of state-of-the-art and proven clean technology products, as well as (inter)national FIs that can offer financial services to SMEs to invest in these energy efficient technologies, if required. The project built on the experiences of the MEET-BIS Vietnam project, which was implemented from 2009 to 2013, also part of the SWITCH-Asia Programme. Trying to promote energy efficiency in a country with a low price of electricity (USD 0.06 per kWh) is a well-known challenge. As a first step, a baseline survey was conducted to investigate the experience of SMEs and identify the main obstacles encountered by SMEs regarding energy efficiency issues. The main barriers are summarised in Table 7.4.

Table 7.4: Four barriers to energy efficiency in Cambodian SMEs

Identified Barrier	Proportion of Respondents
Too busy with other business issues	69%
Lack of authoritative information	43%
Cost of implementing new measures	41%
Too much information available to select the best option	8%

Note: Information is based on a MEET-BIS survey with 172 respondents could choose more than one option.

For SMEs, energy efficiency is mostly a marketing challenge, and the MEET-BIS project activities focused on supporting suppliers to enhance their marketing and sales capacity, in order to build their market share among SMEs. To demonstrate this to SMEs, an audit was carried out in a garment factory to assess its energy saving potential, as well as showing the payback periods of the potential investments in new technology. The payback period is

(*Continued*)

Box 7.2 (*Continued*)

short for many simple measures, making energy efficiency an interesting cost saving measure for the majority of SMEs.

The project strategy was to develop partnerships with suppliers of energy efficiency products at the beginning of the project, lead the market research, execute the marketing and sales campaigns, and build capacity of suppliers. To facilitate these marketing and sales campaigns, MEET-BIS developed a Business Support Toolkit — based on a needs assessment of the partner suppliers — linked to the marketing and sales cycle, and specifically targeted to the SME sector. Figure 7.2 shows the different business support tools that have been developed as part of two different types of roles that MEET-BIS has used to build capacity and increase sales to SMEs:

1. MEET-BIS as facilitator: market creator, business connector, capacity developer, international matchmaker.
2. MEET-BIS as innovator & initiator: developing marketing and sales tools for suppliers to approach SMEs profitably.

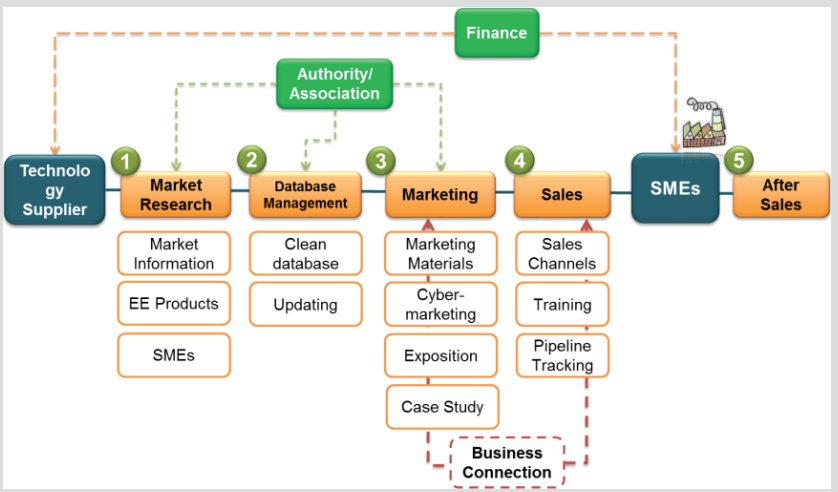

Figure 7.2: MEET-BIS project business support tools for SMEs

The project conducted research into relevant product/market combinations, resulting in insights into the landscape of relevant SME sectors, existing FIs

(*Continued*)

Box 7.2 (*Continued*)

operating in Cambodia and available green credit lines. Secondly, partnerships were developed with six suppliers of energy efficient and renewable energy products such as solar water heaters; variable speed drives/inverters; lighting (T5, LED); heat pumps gas water heaters, boilers, sensors and compressors; motors and pumps; and single split and multi-split air-conditioning.

An initial version of the Business Support Toolkit Manual in English and Khmer was provided to the suppliers. They were also supported with commercial and promotional materials specifically targeted towards their energy efficient and renewable energy products, which leverages their marketing approach to potential customers.

In terms of access to finance, two memoranda of understanding (MoU) were concluded with Acleda Bank and Mega Leasing Ltd. With the two FIs, five pilot financing models were developed: (SME) banks, lease firms, donor energy and climate funds, vendor leasing and ESCO structures, and crowdfunding type structures. Upon the conclusion of the MEET-BIS project in 2015, one pilot on product finance has been implemented with a leasing firm.

At the policy level, an MoU was signed with the Ministry of Mines and Energy, who made a valuable contribution to the project implementation.

Besides capacity building, the project also organised events in order to start the sales process for suppliers. Eight events have been held (workshops, business connection events, and sales training), involving and attracting 201 participants from project stakeholders, plus two seminars engaging 114 SMEs. Awareness has been raised among 765 SMEs through surveys, energy efficient and renewable energy technologies promotion, and providing information via newsletters. A total of 115 SMEs showed interest in energy efficient and water saving products and services by attending the seminars or by approaching the suppliers' sales agents at meetings organised by MEET-BIS project. Seven SMEs decided to invest in the energy efficient technologies.

More project information is available on: http://www.switch-asia.eu/projects/meet-bis-cambodia/.

Addressing the gaps in Cambodia's SME and energy sectors as a way of contributing to the country's SD, the SWITCH-Asia projects have introduced SCP practices in various industry sectors. The "MEET-BIS" project has worked to mainstream energy efficient technologies among SMEs and the "WtE in Rice Milling Sector" project promoted RHG as

alternative, sustainable biomass energy source. Both projects have achieved substantial results by combining technical input, education and awareness-raising, and financing options that could be replicated in other sectors or industries.

7.5.1 *Recommendations for SCP in Cambodia*

The topic of SCP is relatively new in the Kingdom of Cambodia. Even though there are many existing laws, legislation, policies and strategies on energy, development and environmental protection, a solid policy that combines all these topics has not yet been issued. Considering the focus on energy that the Government placed on the implementation of SD, SCP can pave the way towards a more integrated policy addressing both supply and demand side, due to the cross-cutting nature of SCP itself.

The development of a quality control label for different renewable energy sectors would be recommendable to help raise awareness and trust amongst potential users of renewable energy technologies. As in the case of the "WtE in Rice Milling Sector" project, low quality gasifiers spoil the market and the same trend occurs in the solar sector with low quality panels and products flooding the market.

In the absence of a strong coherent network of specific policies, strategies and tools for SCP, projects like "MEET-BIS" and "WtE in Rice Milling Sector" are crucial in pioneering and promoting SCP practices amongst SMEs and providing examples for policymakers. The SWITCH-Asia projects have shown that industrial development, technology innovation and environmental sustainability can develop hand in hand.

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