SOCIAL MERCHANT BANK APPROACH® (SMBA):

OPPORTUNITIES FOR DISSEMINATION TO CAMBODIA

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EXECUTIVE SUMMARY

The Small-Scale Sustainable Infrastructure Development Fund, Inc. (S^3IDF) promotes inclusive market and financial systems to address barriers and gaps that prevent poor and underserved populations from fully participating in the mainstream economy. Through its Social Merchant Bank Approach® (SMBA), S^3IDF works with public and private players to develop and implement pro-poor business models, investments and development strategies that leverage resources, integrate incentives, and mitigate risk. S^3IDF applies its SMBA in both investment projects and programs.

STUDY OBJECTIVE

This assessment or "Blueprint" was prepared under "Social Merchant Bank Approach: Opportunities for Dissemination to Cambodia," a project made possible through the Nexus Carbon for Development (Nexus) Grants for Innovation (G4I) program with co-funding from S^3IDF. This Blueprint outlines the steps that would be required to successfully transfer and apply S^3IDF's SMBA in Cambodia by pursuing pre-investment feasibility studies and developing a portfolio of pro-poor, small-scale, energy and other infrastructure investments, with a particular focus on renewable energy technologies and applications.

STUDY APPROACH

The Blueprint study involved three phases, including an assessment of the challenges and opportunities of applying the SMBA in Cambodia, determination of the interest in and support for an application of the SMBA among Cambodia's financial and development community, and an evaluation of the overall potential of the SMBA in Cambodia. Specifically, S^3IDF investigated the presence of amenable legal and regulatory conditions, market relevance of selected technologies (especially those with carbon finance potential) and their key providers and distributers, financial institutions and their financing terms and conditions, and the current status of development programs and government policies.

To explore these areas, S^3IDF pursued a combination of extensive desk research, in-country interviews and meetings, and gave a workshop on the SMBA for a range of public and private players. Through these channels, S^3IDF sought to answer the following questions:

- What are the opportunities and challenges that would affect an application of the SMBA?
- Which public and private entities could be effective partners in an application of the SMBA?
- Which technologies and existing programs and initiatives offer the greatest potential for impact?
- What are the funding and financing considerations that would affect investment structuring?
- What are the necessary steps for moving an application of the SMBA from feasibility assessment to implementation to potential scale-up?

OVERALL RESULTS

The results of this study confirm that an application of the SMBA in Cambodia could help to increase the market penetration of selected small-scale renewable energy investments with linked productive-use applications to benefit poor and underserved communities. However, the study also determined that specific characteristics of the Cambodian energy, financial, and development sectors do not make for an "enabling ecosystem," necessitating careful attention to how a SMBA application is pursued and developed. It critical that S^3IDF target opportunities for a SMBA application through specific players whose roles and activities are already supportive of or conducive to leveraged co-financing and related deal structuring and that have financial and human resources available (in hand or accessible through existing donor or other relationships). In these instances, S^3IDF could provide the necessary assistance to support the creation and development of projects and investments using SMBA principles. Options include developing new portfolio investments with selected project partners and building on opportunities through existing development programs.

All of the classes of investment types discussed herein focus on small-scale energy end-users – households, smallholder farms, micro-, small-, and medium-scale enterprises (MSMEs), and selected village schemes. The priority classes of technology and equipment investment types considered for this Blueprint are:

1. Biomass Gasification – Rice husk gasifiers with diesel substitution for mini-grids in rural and remote areas to promote energy access and to provide opportunities for livelihood improvement
2. Solar Photovoltaic Applications – Small-scale solar PV water pumping for irrigation and diesel-PV hybrid mini-grids for productive energy use
3. Biodigestion – Biodigesters for use in pig farming on smallholder farms
4. Small-Scale Hydropower – Pico- and micro-hydro schemes to improve income-generating opportunities in underserved communities

Based on findings from this study and experience in other Asian countries, these investments will typically range from a few hundred US dollars (e.g. for the smallest biodigester) to a few thousand dollars (e.g. for solar PV water pumps for irrigation) to tens of thousands of dollars or more (e.g. for rice husk gasification systems). In all cases, overcoming financing barriers (a critical part of the SMBA) is necessary to ensure pro-poor impacts are achieved through portfolio and program work.

SELECTED FINDINGS

The following summarizes key conclusions and considerations that will frame how an application of the SMBA could proceed and achieve significant pro-poor market penetration of the four classes of investments:

- The Government of Cambodia has set ambitious goals for extending energy access throughout the country and has prioritized the expansion of small-scale renewable energy systems in areas of the country that will prove difficult to reach through national electric grid extension efforts. Focusing on investment classes that will meet the needs of the poor in these difficult-to-serve areas provide the greatest potential for impact through an application of the SMBA.
- For each investment class, there are local players who can provide the "know-how" and technology and who could be partners in a SMBA application. However, to achieve significant market penetration of these investment classes, there would need to be investments along the supply chain as well as with end-users.
- Several early-stage donor-driven programmatic initiatives have the potential for both short-term impact and longer-term systemic changes in the use of development capital in Cambodia. Integration of SMBA principles into program design and implementation could support the existing priorities of lead donors, develop the appropriate institutional relationships (including key partnerships), and set important precedents for future development efforts in Cambodia.

- Given the nature and geographic location of many pro-poor enterprises and investments, it is often not possible to capitalize the soft investment costs into the overall investment costs, necessitating a blended capital structure (grant, concessional, and ideally carbon funds) in a SMBA application. Development and philanthropic capital would need to be used to cover pre-investment costs that cannot be recuperated, buy-down transaction and pre-investment costs, and mitigate risks to mobilize local private sector financing.
- In Cambodia, as is the case elsewhere, there is not enough development and philanthropic capital to support financially viable pro-poor small-scale investments, necessitating the mobilization of local private capital. However, multiple shortcomings of the financial sector, in particular its credit (as well as equity) delivery policies and players mean that resources raised in the formal (or informal) credit market lack sufficient and/or appropriate local intermediation channels and institutions. As a consequence, viable small-scale investments are often not able to secure financing due to low financial inclusion, a reality that is reflective of a lack of physical access to formal institutions offering credit, savings and other services (e.g. various insurance types) and unduly restrictive terms and conditions of the formal financial institutions.

TOWARD A SMBA APPLICATION

Assuming an enabling ecosystem exists, the SMBA can be applied across geographies, technologies, market conditions, business models, and in project and program applications on the community, regional and national levels. The potential for a scale-up of the initial investments in portfolio or program applications in Cambodia will in large part depend on the framework and intention of the feasibility studies as well as the outcomes.

Institutional arrangements for a scale-up of a SMBA application would, regardless of the portfolio or program structure, include a facility providing financial and pre-investment support as well as "know-how" and capacity building support from two separate but inter-related "windows." A revolving fund or similar mechanism would provide "gap filling" finance to mobilize local financing for financially viable but non-bankable investments, thus overcoming the critical financing and related market barriers and inefficiencies that are restricting market penetration of selected small-scale renewable energy and productive-use equipment in Cambodia.

Indicative figures suggest the cost of a scale-up initiative would vary dramatically, from a few million dollars to many tens of millions of dollars depending on the investment types, sizes, and locations.

ACRONYMS

3i	Investing in Infrastructure Program
AMRET	Amret Microfinance Institution
ADB	Asian Development Bank
AFD	Agence Française de Développement
AVSF	Agronome et Vètèrinaires Sans Frontièrs
BCS	Battery-Charging Systems
CAPEX	Capital Expenditures
CBO	Community-Based Organization
CDC	Council for the Development of Cambodia
CDM	Clean Development Mechanism
CEDAC	Centre d'Etude et de Développement Agricole Cambodgien
CMA	Cambodia Microfinance Association
CRDB	Cambodia Rehabilitation and Development Board
CRDT	Cambodian Rural Development Team
EDC	Electricité du Cambodge
ESMAP	Energy Sector Management Assistance Program
FI	Financial institution
FTB	Foreign Trade Bank
G4I	Grants for Innovation
GDP	Gross Domestic Product
GEF	Global Environment Fund
GHG	Greenhouse Gas
IED	Innovation Energie Développement
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IWMP	Improved Water Mill Programme
JICA	Japan International Cooperation Agency
LBFI	Law of Banking and Financial Institutions
m^3	cubic meter
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEF	Ministry of Economics and Finance
MFI	Microfinance institution
MoU	Memorandum of Understanding
MPDF	Mekong Project Development Facility

MSME	Micro Small Medium Enterprise
NBC	National Bank of Cambodia
NBP	National Biodigester Programme
Nexus	Nexus Carbon for Development, Ltd.
NGO	Non-governmental organization
ODA	Official Development Assistance
PADEE	Projects for Agricultural Development and Economic Empowerment
PV	Photovoltaic
PRASAC	PRASAC Microfinance Institutions
REAP	Renewable Electricity Action Plan
REE	Rural Electrification Enterprises
REEEP	Renewable Energy and Energy Efficiency Partnership
REF	Rural Electrification Fund
RHG	Rice Husk Gasifiers
S^3IDF	The Small-Scale Sustainable Infrastructure Development Fund, Inc.
SHS	Solar home systems
SMBA	Social Merchant Bank Approach®
SNV	Netherlands Development Organisation
SPDRE	Strategy and Plan for Development of Rural Electrification in the Kingdom of Cambodia
SREP	Scaling Up Renewable Energy in Low Income Countries Program
USAID	United States Agency for International Development
VAT	Value Added Tax

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INTRODUCTION

This Blueprint explores various opportunities and challenges of transferring and applying S^{3}IDF's Social Merchant Bank Approach® (SMBA) in Cambodia. S^{3}IDF received grant support from Nexus Carbon for Development's Grants for Innovation (G4I) program and also contributed a through a direct project cost-share.

S^{3}IDF AND ITS SOCIAL MERCHANT BANK APPROACH® (SMBA)

Founded in 2001 by international development consultants with over four decades of experience in the physical infrastructure and development finance sectors, S^{3}IDF promotes inclusive market and financial systems that address barriers and gaps that prevent poor and underserved populations from fully participating in the mainstream economy. Through its Social Merchant Bank Approach® (SMBA), S^{3}IDF works with public and private players to develop and implement pro-poor business models and development strategies that leverage resources, integrate incentives, and mitigate risk.

S^{3}IDF believes that micro-, small-, and medium-scale enterprises (MSMEs) are uniquely positioned[1] to provide basic infrastructure services to remote or otherwise difficult-to-serve communities at a cost and a standard that meets the needs of local populations. These MSMEs generate income and increase asset ownership while also providing communities with basic services and employment opportunities. Gaining access to modern energy, telecommunications, and water and sanitation, improves quality of life and also helps to bolster the development of local economies.

SMBA, A MARKET BASED APPROACH

To facilitate the development of MSMEs, S^{3}IDF brings technical, financial, and business innovations common in large infrastructure projects to the development of small-scale infrastructure investments that are designed to specifically benefit poor and underserved populations. By taking a systems-level approach and facilitating business transactions and relationships with local market players and working to create or improve government and donor-driven programs, the SMBA addresses problems facing poor and underserved people by simultaneously overcoming their lack of access to financing, technology, and "know-how."

S^{3}IDF provides or arranges technology access as well as business development support to assist entrepreneurs in establishing viable enterprises. S^{3}IDF works with entrepreneurs to develop and/or integrate technology options, usually adapting off-the-shelf technology. When access to technology is limited by physical availability, S^{3}IDF will strengthen or extend technology supply chains by assisting technology suppliers and, when necessary, help these suppliers to secure financing to boost inventory or for working capital to expand operations. S^{3}IDF also provides entrepreneurs with commercial knowledge and technical training to develop viable business strategies and plans.

[1] due to physical proximity, community trust, and related factors

Through the SMBA, S^{3}IDF also leverages philanthropic and development capital to mobilize co-financing from local financial institutions for otherwise non-bankable infrastructure investments. Financing small-scale infrastructure projects is within the capability of local FIs (e.g. commercial banks, MFIs, leasing companies, etc.) but given both perceived and actual investment and lending risk and typically higher costs associated with assessing new clients and business models, local FIs often require risk mitigation and/or buy-downs of their transaction costs. To overcome these barriers to facilitate local financing, S^{3}IDF utilizes a menu of "gap-filling" co-financing options: debt (primary and secondary), equity, and partial loan guarantees or other credit conditioning instruments, such as technology buy-back agreements. S^{3}IDF provides this gap-filling financing support from a revolving fund, which it operates often in conjunction with a local partner (such as a bank or other for-profit entity).

FIGURE 1.
Perspectives Reflected in Dialogues in Cambodia:
Who Benefits and How from SMBA Applications

The SMBA can be applied across various geographies, sectors and with particular foci (e.g. women owned enterprises)

- In some applications, economies of scale can be captured, but this is not critical to its application.
- With the use of multiple fund/facility windows, priorities of particular donor/investors can be respected and integrated into a SMBA implementation.

The SMBA is a "win-win" for all parties involved with the small-scale enterprise-centric investments. Donors and investors (including any government entities) can be more confident in the efficiency and effectiveness of their funding and the impacts achieved.

- The SMBA incorporates intermediation, with tight procedures that have explicit criteria.
- Pre-investment procedures are detailed and rigorous.
- Donor/investor funds are leveraged to facilitate local bank and other financial institution (FI) co-financing through de-risking mechanisms (e.g. partial risk guarantees on loans) for the working poor.

Entities providing "know-how," technology and/or business support services for investments:

- Will be paid fair prices for their services and have the possibility of being preferred suppliers.
- The SMBA includes the possibility of investing in such entities.
- The SMBA implementation will grow their market.

Beneficiaries – customers, employees, and owners of the investments.

- If employees and/or owners, incomes will increase.
- If customers, the fees/tariffs for services will be non-exploitive and reflect their "ability-to-pay" post-investment implementation.
- If owners (ultimately in build-operate-transfer [BOT] and other schemes), asset ownership will grow significantly when the FI debt has been paid.

Local banks or other FIs providing co-financing for the SMBA fostered investments.

- Their risk will be mitigated, but they should have at least some exposure through their "business-as-usual" practices
- They will be able to charge their standard terms paid for such investments taking note of the risk mitigation
- They will make profits if they are efficiently operated
- Their market will grow both in numbers and in new classes of clients (many, if not all, of the poor/underserved beneficiaries will become customers for other forms of financial services)

Bottom line: SMBA implementation is not rocket science; it is just hard work to achieve greater inclusion of poor and underserved populations in a "win-win" manner.

S³IDF'S PROJECT AND INVESTMENT CRITERIA

In seeking enterprises to include in its portfolio, S³IDF looks for MSMEs or entrepreneurs requiring start-up, seed, or growth capital that meet the following criteria:

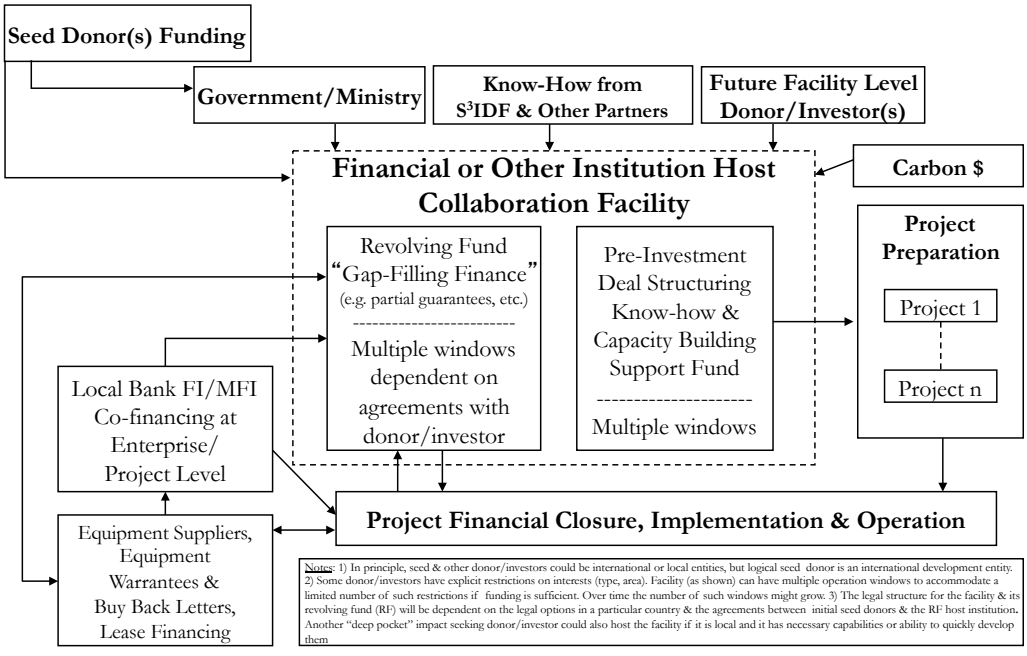
- Pro-Poor: The enterprises S³IDF supports must explicitly benefit the poor as clients, customers, enterprise employees, and/or asset owners.
- Financially Viable: The enterprises incubated and/or strengthened by S³IDF must operate in a financially sustainable manner, covering operating and capital costs, from implementation onwards. Additionally, enterprises must need financial assistance to start or improve their operations.
- Highly Replicable: Enterprises must have the potential to be easily adapted and replicated, requiring only limited modifications to adjust for location and local market conditions.
- Environmentally Responsible: Technologies must use resources sustainably and/or significantly lower pollution and environmental hazards associated with traditional methods as well as produce local public health and environmental benefits, including carbon offsets whenever possible.
- Entrepreneur-Driven: Enterprises must have entrepreneurs who are willing to invest in their own enterprise, either through cash and/or sweat equity.

Projects and investments are also defined by i) the use of various financial structures, business models, and organizational approaches to ensure financial sustainability and by ii) the integration of financial markets and other development synergies (especially through leverage of development and philanthropic capital).

SMBA INSTITUTIONAL ARRANGEMENTS

Institutional organizational arrangements under the SMBA are determined by the presence and experience of the local players and potential investment classes. The following figure shows one suggested arrangement:

FIGURE 2:
Example Multi-Party Collaboration Facility to Apply S³IDF's SMBA



In this example, the institutional arrangement has a facility in an existing financial institution that provides financing as well as pre-investment "know-how" and capacity building support from two separate but interrelated "windows." The financing support (via a revolving fund) in the financial institution (FI) provides the "gap-filling" finance (secondary debt, equity, partial guarantees, etc.) that is needed to mobilize the local finance required to overcome the critical financing challenges the poor face. The grant funds cover the transaction costs involved in identifying and developing financially sustainable schemes, underwriting much of the pro-poor objective.

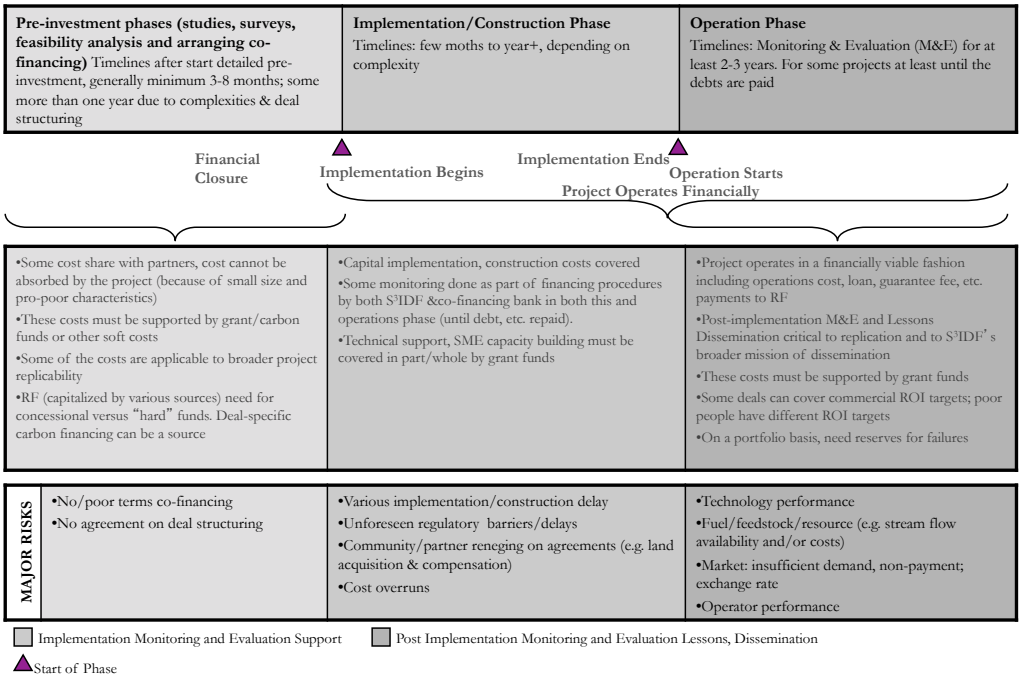
S^{3}IDF generates its deal flow by collaborating with local partner organizations, activists, NGOs, academic groups, equipment suppliers, local banks, microfinance institutions (MFIs), and other relevant FIs.

INVESTMENT CYCLE AND THE ROLE OF GRANT, CARBON, AND CONCESSIONAL FUNDS

S^{3}IDF aims to cover all hard investment costs, which include costs of equipment, construction, and the capital financing costs (e.g. debt and equity charges) and raises grant funding to cover soft investment and other costs, such as enterprise-specific pre-investment work. Given the nature and location of many of pro-poor enterprises, it is often not possible to capitalize the soft investment costs into the overall investment costs, effectively preventing "soft" costs from becoming part of the "hard" costs in the financial structure of the project. S^{3}IDF innovates with fees and deal structuring to capture some surplus while keeping deals financially viable and pro-poor.

The following figure illustrates a typical project investment deal cycle and provides more detail on the use of grant, carbon, and concessional funding during specific phases of the deal cycle.

FIGURE 3:
SMBA Investment Project Deal Cycle &
Need for Grant, Carbon, Concessional Funds



DISSEMINATION, TRANSFER AND APPLICATION OF S^{3}IDF'S SMBA

S^{3}IDF's SMBA can be applied across geographies, cultural environments, and technology types and has the potential to remake market systems globally. As such, S^{3}IDF works to transfer and apply the SMBA in new regions and countries to affect broader and greater impact in underserved communities. Through these transfer and application initiatives, S^{3}IDF also works to build the capacity of other development entities to effectively apply the SMBA.

To date, S^{3}IDF has explored opportunities for transferring the SMBA beyond India (where it has centered its operations), to East Africa, Pakistan, Bangladesh, Nepal, and Sri Lanka. Opportunities in Sri Lanka and Nepal have been pursued through detailed studies and, in the case of Nepal, through an examination of revolving fund structures and a pilot test of the SMBA in a project to expand Nepal's Improved Water Mill Programme (IWMP). A similar early stage transfer initiative is also currently underway in Myanmar.

In addition to the financial resources (development and/or philanthropic) needed to build a pipeline and portfolio of small-scale investments using S^{3}IDF's SMBA, the application requires the following minimum requirements:

- Legal and regulatory environment that permits financing, investment, and business mechanisms and structures that are conducive to small-scale, pro-poor enterprise development
- Human/organizational resources to build a pipeline and portfolio of small-scale investments
- Banks and other financial institutions with term-lending experience with MSMEs
- Suppliers of technology and "know-how"

Other supportive conditions that can greatly improve a SMBA application include:

- Government policies and programs as well as development agency support of renewable energy technologies, especially those focused on expanding access to poor and underserved populations
- Other on-the-ground partners, such as Non-governmental Organizations (NGOs)/Community Based Organizations (CBOs), that support MSMEs

STUDY APPROACH

The Blueprint study involved three phases, including an assessment of the challenges and opportunities of applying the SMBA in Cambodia, determination of the interest in and support for an application of the SMBA among Cambodia's financial and development community, and an evaluation of the overall potential of the SMBA in Cambodia. Specifically, S^{3}IDF investigated the presence of amenable legal and regulatory conditions, market relevance of selected technologies (especially those with carbon finance potential) and their key providers and distributers, financial institutions and their financing terms and conditions, and current status development programs and government policies.

To explore these areas, S^{3}IDF pursued a combination of desk research, in-country interviews and meetings, and a presented a workshop on the SMBA for a range of public and private players. There were almost 50 attendees at the workshop representing financial institutions, international agencies, providers of technology and others relevant organizations (NGOs/CBOs). Through these channels, S^{3}IDF sought to answer the following questions:

- What are the opportunities and challenges that would affect an application of the SMBA?
- Which public and private entities could be effective partners in an application of the SMBA?
- Which technologies and existing programs and initiatives offer the greatest potential for impact?
- What are the funding and financing considerations that would affect investment structuring?

- What are the necessary steps for moving an application of the SMBA from feasibility assessment to implementation to potential scale up?

STUDY ORGANIZATION

Section 2, Considerations Affecting a SMBA Application in Cambodia, summarizes S^3IDF's assessment of Cambodia's energy, financial, and development sectors, with a focus on positive developments and shortfalls that help to answer the question of whether minimum requirements and supporting conditions for a SMBA application are present in Cambodia.

Section 3, Applying the SMBA in Cambodia, presents findings that shape how the SMBA could be applied in Cambodia. This Section includes a discussion of financing considerations and existing programs that could become part of a SMBA application. Section 3 also presents a series of perspectives on selected small-scale technologies and associated investments along with market potential and related topics, including potential "know-how" and technology partners.

Section 4, From Feasibility to Implementation, examines the process required to pursue a SMBA application in Cambodia. This section outlines requirements and issues to consider during each stage.

Annexes to this Blueprint provide supplemental information, ranging from interview questions to meeting lists to SMBA Workshop presentation slides.

CONSIDERATIONS AFFECTING A SMBA APPLICATION IN CAMBODIA

An application of the SMBA requires certain minimum requirements to be present and is greatly benefited when additional supportive conditions exist. These requirements and conditions are provided in the previous section. S[3]IDF conducted an analysis of these requirements and factors by analyzing the energy, financial, and development sectors in Cambodia.

ENERGY SECTOR IN CAMBODIA

Energy Sector Overview

Cambodia has developed steadily in recent decades since relative peace and stability returned to the country. Figures show that between 1999 and 2013, Cambodia's GDP per capita more than tripled[2]. However, the demand for electricity and modern fuels has outpaced supply. Recent assessments indicate that demand for electricity will, on average, increase by 17.9 percent per year until 2020[3]. The Government of Cambodia (Government) has acknowledged that electricity shortages and power outages already negatively affect the country's economic development by limiting economic productivity and curtailing foreign investment.[4] At present, significant challenges with energy supply, distribution, and sourcing exist throughout Cambodia.

At present, the country is dependent on foreign sources of power, especially imported heavy fuel oil, diesel, and electricity from neighboring countries, including Laos PDR, Vietnam, and Thailand[5]. Underdeveloped electricity distribution systems throughout Cambodia also impact reliability and access. While urban areas of Cambodia, such as the capital, Phnom Penh, have universal electricity coverage and account for upwards of 90 percent of Cambodia's total electricity consumption, rural and remote areas of the country remain largely un-electrified, a reality that affects approximately 80 percent of Cambodia's population[6]. Taken together, only 22.5 percent of Cambodian households have access to electricity[7], leaving rural and remote populations to depend heavily on car batteries and diesel generators, negatively affecting both household finances and the environment. Even those with grid connections (in both urban and rural areas) face challenges, including high prices, which stem from inefficient and fragmented distribution systems and the high import costs[8].

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[2] "GDP per capita (current US$)," The World Bank, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD.

[3] Council for the Development of Cambodia, *Cambodia Investment Guidebook*, 2013, IV-2, http://www.cambodiainvestment.gov.kh/#fragment-3-tab.

[4] "The Cambodian Energy Sector," Open Development Cambodia, 2014, http://www.opendevelopmentcambodia.net/briefing/the-cambodian-energy-sector/.

[5] "The Cambodian Energy Sector," Open Development Cambodia.

[6] Mark Grimsditch. *3S Rivers Under Threat: Understanding new threats and challenges from hydropower development to biodiversity and community rights in the 3S River Basin,* 3S Rivers Protection Network and International Rivers, 2012.

[7] Council for the Development of Cambodia, *Cambodia Investment Guidebook*, IV-2.

[8] Asian Development Bank, *Climate Investment Funds: Terms of Reference, Scaling-up Renewable Energy Program (SREP). Scoping Mission*, 2015, https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/TOR-SREP%20CAM%20Joint%20Scoping%20Mission_FINAL.pdf.

Cambodia is working to increase its own power generation capacity and to address issues with transmission and distribution.[9] The Government plans to prioritize national grid electrification through a scale-up of large-scale hydropower and coal-fired power plants, but it also appreciates the role micro- and/or mini-grids as well as off-grid solutions can play in servicing some of the most difficult-to-reach remote or rural locations. In many of these situations, the Government is looking toward renewable energy solutions.

Opportunities and Challenges of Deploying Renewable Energy Solutions

Cambodia has endeavored to develop clear processes and procedures for the development of its energy sector and remains very committed to improving energy access, reliability, and affordability. However, despite important achievements and progress, Cambodia still faces a number of challenges in meeting its energy goals, especially in the area of rural energy access through renewable energy.

Renewable energy potential is high in Cambodia. In addition to large-scale hydropower, the Government is prioritizing the development of solar battery-charging systems (BCS) and solar home systems (SHS), biomass mini-grids, and micro-hydro schemes[10]. Positive development include:

Strong Governmental Commitment to Expanding Energy Access through Renewable Energy. The Government has set ambitious goals for developing the energy sector and has codified plans and policies in a number of governance directives[11] and regulations. Building on the Renewable Electricity Action Plan (REAP) 2002-2012, which was Cambodia's first plan to mention renewable energy generation as part of the country's strategy, the Government deepened its focus on renewable energy through the Rural Electrification by Renewable Energy Policy in 2006 and reaffirmed major goals in the 2011 Strategy and Plan for Development of Rural Electrification in the Kingdom of Cambodia (SPDRE). Cambodia aims for all villages to have access to electricity by 2020 and for 70 percent of households to have access to grid quality electricity by 2030. To greatly expand the reach of the grid, SPDRE emphasizes the use of:

- Soft loans and grants to Electricité du Cambodge (EDC) for medium voltage/low voltage grid expansion
- Subsidies through the Rural Electrification Fund (REF) for interest-free grid-connection financing for consumers, or when grid connection is not possible, to help facilitate access to solar home systems
- Grants to Rural Electrification Enterprises (REEs) and related bank guarantees[12]

The decision to encourage the use of these mechanisms and schemes is a very significant development. However, challenges remain, complicating greater utilization of these and related mechanisms for energy access. For rural and remote areas of the country that pose especially significant challenges to expanding energy access, the Government has identified a need for decentralized energy solutions and has placed an emphasis on renewable solutions but pursuing these off-grid or micro-/mini-grid solutions pose additional complications. Challenges include:

Renewable Energy Deployment in Cambodia is Largely in the Demonstration Phase. Despite the Government's commitment, renewable energy solutions are largely in pilot or demonstration stages[13]. Estimates place renewable energy sources contributing to just 3 percent of Cambodia's energy supply, limiting the ability of the country to integrate lessons learned and to replicate or scale up proven solutions.

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[9] Foreign investment has poured into transmission and generation projects, with strong Chinese investment in hydropower projects in particular. Malaysian and Thai companies are developing coal-fired generation plants. Cambodia also receives significant support from development finance institutions, such as the ADB and the World Bank, and bi- and multi-lateral donors.

[10] Ministry of Mines and Energy, *Cambodia's Rural Electrification Minigrid Systems, Standard and Regulation,* Presentation prepared for the Regional Workshop on GMS Country Experiences in Achieving Performance Target, 9-10 August 2012.

[11] Energy sector policies and goals are integrated throughout many of Cambodia's planning documents, including but not limited to: The Energy Sector Development Plan, 2005–2024, The National Policy, Strategy and Action Plan on Energy Efficiency in Cambodia (The Ministry of Mines and Energy), Rural Electrification Master Plan, The Rectangular Strategy Phase III, The National Strategic Development Plan 2014–2018

[12] Ministry of Mines and Energy, Kingdom of Cambodia, *Expression of Interest to Participate in SREP – Kingdom of Cambodia*, 2014, https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Cambodia_EOI.pdf.

[13] Asian Development Bank, *Aide-Memoire: Scaling up Renewable Energy Programs in Low Income Countries, Cambodia SREP Scoping Mission,* 2015, https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/CAM%20SREP%20Scoping%20Mission%20Aide%20Memoire%20Final%20Feb%202015.pdf

Limited Analysis on Market Characteristics and Renewable Energy Potential. While some general assessments of renewable energy resources have been conducted, more detailed pre-feasibility studies of the market and appropriate projects are limited. This lack of information impedes decision-making and planning and reduces the likelihood that many private sector players will make investments in renewable energy businesses or, in the case of technology suppliers and private energy producers, will be less likely to adopt or expand the use of renewable energy.[14]

Insufficient Consumer and MSME Financing for Renewable Energy. Although REF is promoting both connection financing to consumers in grid extension projects and is working to support REEs so that they can have the capital necessary to expand grids, this program is not adequately addressing the scale of the demand or the range of renewable energy-related investments required to significantly expand access to underserved areas. Key barriers are a lack of investment capital and appropriate financing. Commercial financing tends to not be available meaning the only option for REEs is to take high cost loans from local banks to extend their grids. Unfortunately, even bank loans can prove to be inaccessible since there are high collateral requirements. Ultimately, many REEs cannot make the necessary investments to expand energy coverage, even when consumers can afford connection fees and regular bill payments[15]. MSMEs are also negatively affected by other costs, such as high import taxes on machinery and equipment. MFIs in some instances have been twinning or pairing uncollateralized microloans for SHSs but gaps still exist. Additional financing challenges for consumers and MSMEs are detailed in the following section.

Lack of Consumer and MSME Awareness about Renewable Energy. In addition to financing barriers, both consumer and MSMEs often are not sufficiently aware of renewable energy options or, given distribution issues, cannot access renewable energy. There are also related challenges of appropriately pairing effective and appropriate technologies to meet the needs of both consumers and MSMEs[16]. This is particularly problematic since MSMEs are uniquely positioned given physical proximity and community connections to address local energy needs and bolster local economic development through the productive use of energy.

Inadequate Capacity of MSMEs to Operate Renewable Energy Businesses. While MSMEs are often well positioned to provide and/or benefit from renewable energy, they often face institutional capacity challenges in areas such as operations and management, business planning and/or renewable energy technology integration. The SME Development Strategic Framework for 2010–2015 identifies priority areas, including the promotion of enabling business conditions, need for expanded capacity and increased technology transfer, investment opportunities and improved access to financing and market linkages[17]. Acting on and developing these priority areas requires additional resources and planning.

FINANCIAL SECTOR IN CAMBODIA

Financial Sector Overview

The National Bank of Cambodia (NBC) registers, licenses and regulates the country's financial institutions and banks of which there are three types – commercial banks, specialized banks, and MFIs. In September 2013, the NBC had recognized 35 commercial banks, 8 specialized banks, and 36 MFIs[18].

Commercial banks in Cambodia serve both individuals and businesses and offer a range of financial products. Under the Law of Banking and Financial Institutions of 1999 (LBFI), commercial banks must have at least USD $37.5 million in capital and an investment grade rating[19]. Specialized banks differ from commercial banks in that they focus on deposit collection from the general public, provide credit in the form of leasing, guarantees or other similar forms,

[14] Ministry of Mines and Energy, Kingdom of Cambodia, *Expression of Interest to Participate in SREP – Kingdom of Cambodia*, 3-4.
[15] Ibid, 3-4.
[16] Ibid, 3-4.
[17] ADB, *Asia SME Finance Monitor 2013*, 2014, 43, http://adb.org/sites/default/files/pub/2014/asia-sme-finance-monitor-2013.pdf.
[18] B2B Cambodia, "The Money Matters," Cambodia Pocket Guide, 2013, 18-21, http://www.cambodiapocketguide.com/pdfs/b2b01/index.html#
[19] Ibid, 18-21.

or offer payment and payment processing services using the Cambodian Riel[20]. Specialized banks also must meet minimum capital requirements set by the NBC and obtain necessary ratings by independent agencies.

MFIs provide financial products (primarily though not exclusively in the form of microloans) to poor and underserved populations. The LBFI mandates that MFIs that cross certain lending and deposit thresholds must be registered and/or licensed[21]. Licensed MFIs must meet further requirements described in the Licensing of Microfinance Deposit-Taking Institutions in order to take public deposits[22]. By September 2013, seven MFIs[23] were authorized to use deposits from the public or deposit-taking MFIs[24].

The Government is currently pursuing objectives outlined in the Financial Sector Development Strategy 2011–2020, which aims to achieve "diversification and modernization of the economy to support sustainable economic growth, improve people's living standards, and reduce poverty"[25]. The current Strategy builds on past achievements and identified areas for improvement.

Opportunities and Challenges of the Financial Sector

Aspects of the financial sector relevant to MSME investments illustrate both shortcomings and challenges as well as some positive developments. Notable achievements in recent years that affect the potential application of the SMBA center on efforts to improve the "financial sector infrastructure necessary to support financial market activities and improve outreach to the rural poor"[26]. Examples include:

Growth of the Microfinance Sector and Micro-Lending for both MSMEs and Consumers. Microfinance began in the 1990s and by the end of 2011 had developed into a formalized and integral part of Cambodia's financial sector. Although the sector was affected by the global financial crisis beginning in 2008, microfinance in Cambodia experienced a 50% year-on-year increase in total assets between 2010 and 2011[27]. This amounted to USD $749 million with $641 million in microloans outstanding at the end of 2011[28]. This growth is most impactful for consumers since credit issued to MSMEs is less than 20% of total loan provision in the country with a third quarter 2013 figure coming in at just 7.8%[29]. Microloans seem to be working best for consumers interested in less expensive products, in some instances, up to several hundred dollars (in the case of SHS)[30].

Creation a National Credit Bureau. In 2011, a national credit bureau was created to help expand access to credit and financing by offering lenders the ability to conduct reliable credit checks on loan applicants. Jointly owned by Association of Banks in Cambodia, the Cambodia Microfinance Association (CMA), and Veda Advantage (a private service provider of credit system technology), the credit bureau receives thousands of requests each day. The national credit bureau is making it easier for qualified applicants to obtain credit, allowing for tailored interest rate decisions to be used based on actual risk profiles and credit histories, speeding up loan processing and approval times and cutting costs by limiting the impact of fraudulent loan applications[31]. These improvements have translated into a drop in interest rates and have been associated with a dramatic fall in non-performing loan rates[32].

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[20] Ibid, 18-21.

[21] MFIs with loan portfolios of USD $25,000 or more and/or 100 or more deposits must be registered and those with loan portfolios of $250,000 or more and/or 1,000 or more deposits must be licensed.

[22] ADB, *Asia SME Finance Monitor 2013*, 42.

[23] PRASAC, AMRET, SATHAPANA, Hattakaksekar, Angkor Microherhvatho Kampuchea, KREDIT, and Vision Fund Cambodia.

[24] B2B Cambodia, "The Money Matters," 18-21.

[25] ADB, *Financial Sector Development Strategy 2011–2020, 2012,* 1, http://adb.org/sites/default/files/pub/2012/financial-sector-development-strategy-2011-2020.pdf.

[26] ADB, *Financial Sector Development Strategy 2011–2020,* ix.

[27] B2B Cambodia, "The Money Matters," 18-21.

[28] Ibid, 18-21.

[29] ADB, *ADB–OECD study on enhancing financial accessibility for SMEs: Lessons from recent crises*, 2013, 5, http://www.oecd.org/cfe/smes/adb-oecd-study-enhancing-financial-accessibility-smes.pdf.

[30] There are a number of business partnerships that have been created between technology providers and MFIs in which products and financing are packaged together to increase consumer interest and product affordability. Examples include Kamworks working with VisionFund, Hattha Kasekar Limited, and Maxima Mkroheranhvatho and Hydrologic working with AMRET.

[31] ADB, *Asia SME Finance Monitor 2013*, 42.

[32] B2B Cambodia, "The Money Matters," 18-21.

Alternative Financing and Money Transfer Options. Money transfer, crowdfunding, and leasing have expanded the range of financial products and services available in the Cambodian marketplace. Wings payment and money transfer business helps to reduce transaction costs, Kiva and other crowdfunding options are open up new sources of funding for social enterprises and MFIs, and GL Finance (Cambodia's first leasing company) offers lease financing for motorcycles, which will likely have very positive impact on rural transport and some construction services as it expands.

Despite the significant improvements achieved in the financial sector in Cambodia, challenges still remain, including in a number of areas that directly impact the ability of MSMEs to access financing and other critical inputs required for business operation and growth[33]. The SME Development Strategic Framework for 2010–2015 noted improved access to financing as a high priority for the SME Sub-Committee and current efforts are focused on formalizing informal enterprises, reducing barriers to obtaining business financing, and developing specific economic sectors to further bolster and diversify the Cambodian economy[34]. A 2011 assessment, Small and Medium Enterprises (SMEs) Access to Finance in Selected East Asian Economies, describes the situation as one in which:

> *The banking sector is profit-oriented, and banks focus on big business transactions to maximize their profit. The MFIs that tailor-make credit for micro-sized firms usually set small loan sizes, charge high interest rates and allow only short maturity. Moreover, all credit from the formal sector must come with collateral. There is good evidence that banks perceive a high risk of non-repayment of loans to MSMEs and are setting terms and conditions of lending that seem suitable for them.*[35]

These barriers to further expansion of appropriate MSME financing are discussed further below:

Immovable Collateral Requirements. A study conducted in 2003 for the Mekong Project Development Facility (MPDF), found all of the surveyed banks required collateral, with most requiring immovable property such as land or buildings as opposed to movable property such as equipment due to legislation that provides for the registration of a security interest for immovable property[36]. These issues are reinforced in more recent studies, including a 2010 IFC study in which 81% of entrepreneurs surveyed indicated an interest in financing to upgrade or expand their business operations if banks were willing to accept movable assets as collateral[37]. Of the enterprises surveyed, 25.56% also stated that current financing was insufficient to meet future business development needs[38]. The conclusion that can be drawn from these and related studies and assessments is succinctly summarized by Mekong Strategic Partners: "lending policies [] are too conservative and/or inappropriate for the Cambodian market."[39]

Limited Options Available for Financing Products. In many financial institutions, deposits and loans continue to be the sole or the primary financial products offered to MSMEs and even then, with restrictions. Proposed solutions include updating and issuing regulations that would incentivize banks and MFIs to develop new products and services, including more tailored financing for MSMEs (e.g. based on cash flows) and increased integration of mobile payment options[40] but these have yet to be widely promoted or adopted. While local and international equity continues to support aspects of Cambodian growth, equity sources aimed at smaller private enterprises in areas of focus in this study appear few.

There are also very few non-bank financing options available for MSMEs. Angel investors and venture capitalists have very limited presence in Cambodia (though this is slowly changing), further restricting the opportunities for entrepreneurs and their enterprises[41]. A few private impact investors exist with largely donor and/or philanthropic

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[33] ADB, *Asia SME Finance Monitor 2013*, 42.

[34] Ibid, 42.

[35] L. Ung and S. Hay, "'SMEs Access to Finance in Cambodia", 98, in *Small and Medium Enterprises (SMEs) Access to Finance in Selected East Asian Economies*, ed. C. Harvie, S. Oum, and D. Narjoko, ERIA Research Project Report 2010-14, Jakarta: ERIA, 83-116.

[36] Stephen M Harner, *Financing SMEs in Cambodia : why do banks find it so difficult*, 14, Private sector discussions; no. 14, Washington, DC: World Bank, 2013, http://documents.worldbank.org/curated/en/2003/04/7276903/financing-smes-cambodia-banks-find-so-difficult.

[37] L. Ung and S. Hay, "'SMEs Access to Finance in Cambodia", 98.

[38] Ibid, 98.

[39] Mekong Strategic Partners, *Cambodian Banks – High Growth Opportunity vs Low ROE Conundrum*, November 2014, 4, http://www.mekongstrategic.com/cambodian-banks--high-growth-opportunity-vs-low-roe-conundrum.html.

[40] ADB, *Financial Sector Development Strategy 2011–2020,* 18-19.

[41] B2B Cambodia, "The Money Matters," 18-21.

capital backing but the main sources of equity capital for small enterprises appear to be the informal "friends and family" sources common in many developing countries.

Although additional financial products are beginning to be offered by banks and MFIs and more investors are becoming interested in exploring opportunities for impact investment, gaps are largely still filled by money changers and pawn businesses, especially for consumers and MSMEs at the lower end of the market where collateral and other requirements severely limit access to mainstream financing[42]. The Government issued legislation, Licensing of a Pawn Business and Buying and Selling of Pawned Pledges and Transfer of Title, in 2010, which has since registered 73 pawn businesses, legalizing their services and enabling stricter regulation[43]. The Ministry of Economy and Finance is working on additional regulations that would decrease the monthly interest rates offered by pawnshops from 10%–15% per month (i.e. 120% – 180% per year) to 24% per year[44].

Mismatch between Loan Tenure, Size and MSME Requirements. Although financial institutions are now offering some relatively longer-term loans, most loans in Cambodia (with the exception of some real estate loans) mature within 12 months. As described in *Financing SMEs in Cambodia: Why do Banks Find it so Difficult?* the most frequently cited reasons for short loan terms include the:

1) *Perception that the current legal system is unable to protect their interests;*
2) *Relatively high funding costs – high bank rates on deposits;*
3) *Shortage of access to long-term capital;*
4) *Inability to conduct accurate due diligence and the current unavailability of information (such as corporate records and audited financial information) on loan applicants;*
5) *Need to meet the NBC's high liquidity ratio – deposits cannot be deployed as loans; and*
6) *Inability to assess, manage and price risks associated with term loans due to lack of experience and skills*[45]

Some 12-month loans can be eligible for extension to 24 through 60 months through revolving credit structures in which existing loans are renewed on the date of maturity. Revolving credit structures are helping to address the lack of bridging and medium-/long-term loan products, such as through leasing or developed secondary markets, but are not a solution to address the need for longer-term loans. Consequently, some medium and long-term MSME financing needs being financed through short-term products or are simply going unmet[46].

In addition, growing MSMEs have limited options for larger loans due to bank limits on individual loans and a reluctance by many banks to lend directly to smaller enterprises. Credit for investments with capital needs that fall above microfinance limits but below many commercial minimums (or preferences), such as cold storage and small irrigation works, is relatively absent except for donor or other special facilities, or those with very strong banking relationships. At present, syndication of financing across financial institutions has not been widely adopted due to many factors, including a lack of understanding and/or interest in putting together these deal structures among banks[47].

Lack of Affordable Financing. Although interest rates are coming down, the Asian Development Bank's (ADB's) Asia SME Finance Monitor 2013 reports that MFIs still charge 24% per annum, compared with commercial banks that offer rates ranging from 7%–8% to 10%–12% per year[48]. Interest rates tend to be highest in rural areas due to the higher costs incurred in administering loans in remote locations (security concerns, travel time requirements, poor physical road infrastructure) and barriers that limit economic activity (few income-generating options, minimal existing knowledge of how to start or operate a business).

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[42] ADB, *Financial Sector Development Strategy 2011–2020,* 8.
[43] Ibid, 16.
[44] ADB, *Asia SME Finance Monitor 2013*, 42.
[45] Stephen M Harner, *Financing SMEs in Cambodia : why do banks find it so difficult*, 5.
[46] ADB, *Financial Sector Development Strategy 2011–2020,* 9.
[47] Ibid, 9.
[48] ADB, *Asia SME Finance Monitor 2013*, 40.

Under The Financial Sector Development Strategy 2011–2020, the Government of Cambodia is exploring options to help improve cost efficiency and ultimately reduce the cost of borrowing. Possibilities that have been identified for further consideration include:

> *…(i) providing an united guarantee facility to banks to lend to qualified, creditworthy MFIs and borrowers in preferred industries; (ii) giving permission to banks to use an appropriate level of MFI securities as reserve requirements in order to encourage banks to lend to MFIs in riel; (iii) continuing to provide wholesale funds in collaboration with other fund providers, including banks, for on-lending to MFIs; (iv) considering a comprehensive approach such as setting up a development finance institution that can play the role of mobilizing and providing wholesale funds to MFIs; and (v) implementing the Microfinance Risk Participation Program that ADB approved. This credit facility has $250 million and financial institutions that participate in the credit facility can be guaranteed up to 50% repayment if an MFI defaults"*[49]

Insufficient Development and Operations Support for MSMEs. The Financial Sector Development Strategy 2011–2020 identifies the need for additional capacity development support for MSMEs to help ensure that enterprise owners and operators are positioned and capable of managing loans and growing their businesses. Improved training programs (including efforts to train business support trainers) and comprehensive materials and curricula have been identified as important complementary efforts that could help to further expand financing[50].

Limited Consumer Financing. With the exception of some recent collaborations that package microcredit with consumer products, the poor face substantial first cost barriers since they are unable to make cash purchases and depend on some source of credit. Critically, first cost barriers in Cambodia appear to be as little as USD $15-20 or lower for some households. Overcoming these barriers must also take into account consumers' ability to pay based on income flows (which can vary from day to day and season to season) and how well the terms of the credit match (assuming credit is available).

Barriers to Expanded Use of Leasing. Leasing structures are gaining in popularity in Cambodia but inconsistencies and contradictions between The Law on Secured Transactions (2007), The Law on Financial Leasing (2009) and an associated laws under the Civil Code (2011) mean that confusion exists over the types of leases that are restricted to banks or NBC licensed entities. Leasing is already playing an important role in MSME development and growth (e.g. leased biofuel generation facilities and vehicle leasing) but further use of leasing will likely be limited until confusion over repossession, maintenance, value-added tax (VAT) and withholding tax, and other issues can be resolved[51].

Risk Aversion, "Business-as-Usual," and Lack of On-Lending and Wholesale Financing. FIs, including banks and MFIs, tend to be very risk averse and prefer existing "business-as-usual" practices over exploring new business opportunities for their institutions. Most of the FIs S^3IDF interacted with were hesitant to put their own capital into investment deals, at least initially, even if risk mitigation schemes such as loan guarantees, could be integrated. While the top performing banks and MFIs have less need or incentive to pursue innovation, according to a study by Mekong Strategic Partners, "Of the 43 banks in Cambodia in 2013, just five earned an acceptable return on capital (above 15% ROE) with the remainder effectively destroying value for their shareholders. The overall sector ROE was just 11.6%, well below the 22% achieved by the MFI sector. Outside of the big four banks, average ROE was a very disappointing 6%."[52] This scenario suggests that there should be an interest from lesser performing banks to explore ways to expand their market share and profits, especially in light of the clear opportunities, such as 2010 IFC findings that determined 25.56% of the enterprises surveyed felt current financing was insufficient to meet future business development needs[53].

Even the Cambodian microfinance sector, which is "…one of the best performing MFI sectors globally, delivering high returns (22% ROE) and high growth (48% loan growth) in 2013…"[54] could benefit from more innovation. This

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[49] ADB, *Asia SME Finance Monitor 2013*, 19.
[50] ADB, *Financial Sector Development Strategy 2011–2020,* 17-18.
[51] Ibid, 22-23.
[52] Mekong Strategic Partners, *Cambodian Banks – High Growth Opportunity vs Low ROE Conundrum,* 2.
[53] L. Ung and S. Hay, "SMEs Access to Finance in Cambodia", 98.
[54] Mekong Strategic Partners, *The Goldilocks Conundrum - Are MFI Returns in Cambodia Too High, Too Low or About Right?*, January 2015, 2, http://www.mekongstrategic.com/news---insights.html.

is due to similar overcrowding in the MFI sector with "revenue growth…captured almost entirely by the top eight MFIs, which together have 90% of the market."[55] The other MFIs can only increase revenue and market share by offering alternative financial products to meet demands.

Furthermore, there is essentially no local resource mobilization from the deposit-taking banking sector that is being channeled via on-lending/wholesale financing to MFIs or other FIs whose operations and geographic "footprints" place them in a better position to support viable small investments.

DEVELOPMENT SECTOR IN CAMBODIA

Development Sector Overview

International donor support, including Official Development Assistance (ODA) and philanthropic and other sources, plays a significant role in the development budget of Cambodia. ADB has determined that in recent years donor funds have been the equivalent of about 58% of the Government's budget with ODA increasing from $427 million in 2000 to $1,027 million in 2010[56].

These donor entities exercise much influence in shaping the policies and practices of how such assistance is targeted and prioritized and how the donor support is channeled to target beneficiaries and the intermediary entities involved, as well as the strictures or conditions on this intermediation. At present, The Ministry of Planning and Ministry of Economics and Finance (MEF), the Council for the Development of Cambodia (CDC) and Cambodia Rehabilitation and Development Board (CRDB) are working to develop a new policy to cover more partnership arrangements and collaborative opportunities[57] and it is too early to determine the extent to which this effect will impact prevailing practices and procedures.

Opportunities and Challenges of the Development Sector

International donor support has enabled the Government to make important progress in energy, finance, and related sectors in recent decades. However, international donor support needs to address shortfalls to more efficiently and effectively impact small-scale investments that are the focus of this Blueprint. Some of the most significant shortfalls include:

Inadequate Intermediation. Many of the financial sector shortcomings noted above are directly or indirectly due to the way international donors handle both the design and implementation of their programs and projects. While it is understood that with regard to ODA these matters are worked out through agreements with the Government, the donors could and should take a more activist approach in pushing for change and improvement. At present, there is little intermediation of donor directed funds for the investment types recommended in this Blueprint where this support flows through to the investments through intermediation by a local bank. An exception is a new initiative by Agence Française de Développement (AFD) in collaboration with Foreign Trade Bank (FTB) in support of the REE electricity and water licensees, which is being implemented by a "classic" donor-bank-beneficiary intermediation mechanism (see below). Most critically, international donors should work to ensure that their support does not accrue largely with the government ministries and other entities it works with instead of with poor and underserved populations.

"Silo" Effect: Missed Opportunities for Integration and Coordination. In some, perhaps even many, donor situations, the "silo" organizational structure[58] makes it difficult – but not impossible – to address development challenges that are inter-sectoral in nature. This issue might best be addressed with some hybrid initiatives in which

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[55] Mekong Strategic Partners, *The Goldilocks Conundrum - Are MFI Returns in Cambodia Too High, Too Low or About Right?*, 9.
[56] Ministry of Mines and Energy, Kingdom of Cambodia, *Expression of Interest to Participate in SREP – Kingdom of Cambodia*, 9.
[57] Ibid, 9.
[58] "Silo" organizational structures are generally dictated by the larger donor institutions' headquarters. It is beyond the scope of this study to assess whether the effects of the "silos" could be addressed at the Cambodia country level.

both the public (sovereign lending) and private sector (non-sovereign) donor groups and operations staff are involved. Such arrangements can happen when the development challenge is one that requires small-scale infrastructure investments (e.g. energy supply, post-harvest storage) to enable agriculture-cum-rural development initiatives, requiring both technical inputs and others' productivity enhancing investments (minor irrigation works). These investments should be facilitated with innovative finance mechanisms that tap into (at least in part) local capital. Such possible cases are easily found in Cambodia.

Lack of Blended Capital Arrangements and Financial Leveraging. While some donors are in a position to offer grant-based support (for some mixture of technical assistance and/or pre-investments needs), others are only able to offer debt (or a mixture). Given the stage of its overall development, particularly the development challenges facing the lower income strata of the Cambodian population, there is strong argument for a complementary use of grant and debt assistance in multiple specific challenge areas (defined by geographies or multiple/inter-sector). This is likely to require close collaboration – even co-financing – if one donor is in a better position to provide scarce grant resources.

Bureaucratic Barriers to Innovation. The bureaucratic nature of international donor institutions often erects barriers to innovative solutions to development challenges. However, one mechanism that could help would be more proactive coordination amongst the donor community. This should go beyond just keeping each other informed about respective activities. The coordination would be particularly important at the early definitional and design stage of new project/program initiatives and should have the explicit objective of finding possible synergies and complementarities if not by formal co-financing (likely requiring "headquarters" approval), then by less formal but very meaningful joint implementation agreements that can be put in place locally. Beyond the major bi-lateral and multi-lateral donors, attempts should be made to bring major philanthropies into these types coordination because often these entities have great flexibility at the country level. The possibility of true synergies is likely to be worth the "hassles" with regard to bureaucratic strictures and would have the co-benefit of being very mutually informative.

APPLYING THE SMBA IN CAMBODIA

MINIMUM REQUIREMENTS AND SUPPORTING CONDITIONS IN CAMBODIA

Early in this Blueprint study S^{3}IDF determined that core minimum conditions were met in Cambodia with the identification of various implementation organization structures, possible lead players and at least a few technologies with potential for widespread use. A number of supporting conditions were also determined to be present, at least to a limited degree. However, further in-depth evaluation during the fieldwork investigation determined that multiple challenges exist that cannot not be overcome without considerable additional effort, complicating the prospects of an application of the SMBA.

For this reason it is critical that S^{3}IDF targets opportunities for a SMBA application through specific players whose roles and activities are already supportive of or conducive to leveraged co-financing and related deal structuring and that have financial and human resources available (in hand or accessible through existing donor relationships). In working with such players, S^{3}IDF could provide the necessary assistance to support the creation and development of projects and investments using SMBA principles. This might include assistance in developing further donor relationships and/or aiding in the creation of new relationships. Different options for structuring a SMBA application are described below.

OPTIONS FOR STRUCTURING A SMBA APPLICATION

The SMBA is, fundamentally, an approach that benefits poor and underserved populations by developing and implementing inclusive business models, investments, and development strategies that leverage resources, integrate incentives, and mitigate risk. In applications of the SMBA, the focus is on addressing barriers and gaps that prevent these populations from fully participating in the mainstream economy and, in so doing, achieving improved development outcomes and a more inclusive and equitable economy. This is achieved through the provision of bundled support of integrated and ongoing technical and business development along with financial innovation and support to enterprise investments. Importantly, options exist for how SMBA investments and programmatic initiatives are developed and implemented. In Cambodia a SMBA application could center on developing new investments and initiatives with selected project partners and/or could build off and improve existing programs, preferably both.

Developing New Investments with Selected Project Partners

S^{3}IDF, in close collaboration with selected project partners, could focus on developing a portfolio of investments that would integrate aspects of partners' (e.g. technology providers, practitioners, etc.) existing operations with key elements of the SMBA. Investments would prioritize the economic and social development of poor and underserved households and communities. This could be accomplished through increasing income generation via employment opportunities and/or productivity increases, creating asset ownership opportunities, or providing products and services for customers (e.g. post-harvest crop cold storage).

Of particular importance are SMBA applications that create asset ownership opportunities for the poor in addition to increasing their productivity and quality of life. These investments (that raise the poor's asset ownership position) have much greater impact in terms of economic development. However, these types of investment generally require considerably more effort for business development and deal structuring. This increases pre-investment costs, especially for small-scale projects, which are generally not recoverable as part of investment financing and must be underwritten in whole or part with grant funds.

A number of potential project partners were identified in the course of this study, with many detailed below. For explanatory purposes, an illustration of this type of SMBA application could be through GL Finance, Cambodia's first leasing company. GL Finance is expanding its financing to agricultural equipment leasing. Opportunities could exist to work directly with GL Finance to develop independent small-scale enterprises and/or add-on activities to selected existing enterprises or NGOs that would lease equipment through GL Finance and in turn rent out equipment to local farmers and farming co-operatives on a "as-needed" basis. This type of business model would eliminate many first cost barriers facing poorer Cambodians farmers, enabling them to access equipment on an affordable basis thereby increasing productivity. To limit transaction costs, the initial focus should be on equipment (mobile or stationary) widely used (or potentially used) in rural Cambodia and with only one or a few suppliers of this equipment. These suppliers should be vetted based on multiple criteria – e.g. reputation, willingness to extend warranties through such arrangements, etc.

Building on Existing Development Programs

Although a number of development sector shortfalls – ranging from inadequate intermediation to "silo" effects – have imposed barriers on more effective and efficient use of capital and program structures, there are nevertheless several early stage programmatic efforts by the Asian Development Bank (ADB), Australian Embassy, and Agence Française de Développement (AFD) that offer significant potential for both short-term impact and longer-term systemic changes in the use of development capital in Cambodia. Integration of SMBA principles into program design and implementation could support the existing priorities of lead donors, develop the appropriate institutional relationships (including key partnerships), and set important precedents for future development efforts in Cambodia.

One such early stage program in Cambodia is Scaling Up Renewable Energy in Low Income Countries Program (SREP)[59]. SREP was "established to scale up the deployment of renewable energy (RE) solutions in the world's poorest countries … [with] SREP financing aim[ing] to pilot and demonstrate the economic, social, and environmental viability of low emissions development pathways building on national policies and existing energy initiatives."[60] Since the January 2015 scoping mission, the decision has been made to create an Investment Plan that is scheduled for November 2015. Notably, SREP is encouraging innovative approaches and public-private partnerships that have the potential for widespread application and scale[61].

Given the current challenges with financing for consumers, MSMEs (including REEs), significant potential exists to structure a larger programmatic initiative through SREP that would extend more tailored and appropriate financing to these groups. However, the lack of technical assistance funding under SREP is a serious constraint because such assistance could cover pre-investment costs. Most renewable energy projects require pre-investment costs that generally cannot be fully recovered as part of the total investment financing and must be underwritten by some source of soft funding. Absent some "twinning" or collaboration with another donor for such pre-investment, the net result is likely to be a focus on renewable energy investments that have fewer pro-poor impacts. This would include investments that are larger and more financially attractive post-financial closure in which some or a large part of the pre-investment costs can be absorbed if the financial costs and terms are better relative to those offered by the Cambodian financial sector.

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[59] SREP is part of the Climate Investment Funds (CIF) and in Cambodia, SREP is overseen by ADB.

[60] ADB, *Aide-Memoire: Scaling up Renewable Energy Programs in Low Income Countries, Cambodia SREP Scoping Mission,* 1.

[61] Emphasized during the meeting, Scaling-up Renewable Energy Programs in Low Income Countries (SREP) Cambodia SREP Scoping Mission 21 – 22 January 2015 in Phnom Penh, Cambodia.

However, the members of the SREP team understand that certain challenges, such as a lack of technical assistance funding under SREP must be directly addressed in order to ensure that proposed solutions are adequately structured to benefit low income population segments. This team can draw on the ADB experience in arranging appropriate collaboration between particular bilateral donors. Such opportunities exist to, for example, explore synergies with the Australian Embassy's Investing in Infrastructure (3i) program, which is similarly focused on "unlock[ing] opportunities for economic growth and trade by increasing investment in private sector-led small-scale infrastructure" with the explicit objective to "increase[] access to utilities and other infrastructure services for households and businesses" and to achieve "new and improved opportunities for trade-related businesses and industries."[62] 3i has a clear and stated interest in co-investment and in processes that will overcome market inefficiencies and barriers. Critically, 3i has grant funds available that can be used to help ensure that underserved populations and explicitly pro-poor investments remain the focus of the program outcomes. Renewable energy investments that become part of the 3i programs, could be a strong complement to SREP but SREP will still need partners for others program areas to cover pre-investment cost.

AFD has a new initiative with Foreign Trade Bank (FTB) that consists of a long-term concessional loan (USD $15 million), capacity building grant component (USD $4.2 million), and a loan guarantee scheme (USD $5 million) that is intended to finance privately owned water and electricity providers (REEs) to supply rural areas that cannot be easily serviced[63]. This blended capital structure and the emphasis on working to overcome financing barriers (collateral requirements) is an important initiative that, if it proves to be successful, could have positive implications for future program structuring and public-private partnerships in Cambodia. The program design is significant in that it incorporates a complementary use of debt assistance, grants, and risk mitigation to overcome market barriers. The challenge remains, however, to encourage FTB put its own capital into REE loans over time as it becomes more familiar with the market, business models, and risk profile of different types of REEs.

FUNDING AND FINANCING PERSPECTIVES

In SMBA applications, funding and financing play a significant role in determining scale, deal structures, and the degree to which investments have pro-poor impact.

Importance of Development and Philanthropic Capital

Regardless of the option pursued in Cambodia – developing new investments or building off of existing development programs – any SMBA application would require making more effective and efficient use of development and philanthropic capital. Cambodia benefits significantly from donor programs in terms of resources and number of active donors, but more must be done to ensure that policies and mechanisms leverage financing from local capital sources, especially for consumers and MSMEs.

Although the exact terms and targeted uses of development and philanthropic capital would vary depending on the specific application, in all instances, this capital should be used to cover pre-investment costs that cannot be recuperated (see immediately below), buy-down transaction costs, and mitigate risks to mobilize local private sector financing. This type of co-financing is critical since there is not enough development and philanthropic capital to meet the scale and nature of the development challenges in Cambodia. Co-financing is also important since the process of bringing local financial institutions into these types of investments promotes a more inclusive development trajectory.

Overcoming Financial Sector Shortfalls and Limitations

Although energy, financial, and development sector challenges and shortfalls constrain an application of the SMBA in Cambodia in various ways, financial sector limitations, especially those related to inadequate financing for consumers

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[62] Australia Embassy Cambodia, "Position Description: Team Leader for *3i: Investing in Infrastructure* program," 2014, http://www.cambodia.embassy.gov.au/files/penh/job-ads-position-description-for-team-leader-of-3i.pdf.

[63] Khan Sophirom. "AFD To Improve Access to Clean Water and Electricity for 85,000 Households," *Agence Kampuchea Presse*, Phnom Penh: 28 April 2014.

and MSMEs, pose some of the most significant issues. Financial sector challenges and shortfalls are a function of economic policy – insufficient regulatory directives – as well as market driven practices and preferences. While it is outside the purview of a SMBA application in Cambodia to work directly on policy and regulatory issues (though a larger-scale application would ideally influence changes in these areas), it is possible (albeit difficult) to affect necessary changes in the practices of local FIs.

To overcome first cost barriers and financing mismatches, a SMBA application in Cambodia would need to pay particular attention to integrating risk mitigation structures, transaction cost buy-downs, and incentive structures during early stages of FI partnerships to demonstrate that profitable business opportunities exist in the types of new business models and lower income population segments that S^{3}IDF and partners would target through MSME investments. The AFD-FTB program and the paired MFI-technology supplier partnerships for domestic product financing set important precedents that can be used to build broader interest from both bank and MFI players for related financing structures. Of particular importance would be tailoring interest rates, payment schedules (flexible schedules reflecting crops cycles and sales), loan tenure (incorporating balloon payments or other options when longer term loans are required), and collateral (allowing the technology to be considered as collateral or using loan guarantee mechanisms).

Investment Financing and Cost Recovery Limitations

In SMBA applications, it is important to cover all hard investment costs, which include costs of equipment, construction, and the capital financing costs (e.g. debt and equity charges) and to raise grant funding to cover soft investment and other costs, such as enterprise-specific pre-investment work. Given the nature and location of many pro-poor enterprises, it is often not possible to capitalize the soft investment costs into the overall investment costs, effectively preventing "soft" costs from becoming part of the "hard" costs in the financial structure of the project. In many instances, only a small portion of the soft costs can be recovered. In addition, it is rare that any of the other "broader and more programmatic" costs can be recovered. This reality results from the fact that while the poor often have a willingness to pay for goods and services, their ability to pay is severely limited and therefore, structuring the deals to allow recovery of hard costs must be the first priority.

In effect, the SMBA requires that much or all of the soft costs be covered by donor funding and set aside into a revolving fund (see Figure 2). This is the best and most sensible use of such funding. Only in very special circumstances should donor funding or subsidies be used when there is willingness and ability to pay on the part of the poor. However, it should be noted that if government subsidies exist, regardless of whether they are "smart" or not, part of the soft costs should be used to access and utilize these subsidies for the benefit of poor and underserved populations.

FIGURE 4.
Types of Investment Costs in the SMBA

- **Hard investment costs** include the costs of all equipment, construction, etc. needed to implement the specific investment project and put it on an operating basis.
- **Soft investment costs** include project- or enterprise-specific pre-investment costs, including the financial structuring and arrangements (a special challenge) and project- and enterprise-specific capacity building. In larger infrastructure investments, these costs are normally capitalized into the total investment costs, effectively becoming part of the "hard" costs of the project.
- **Conventional financial sustainability** is reached when all hard and soft investment costs are covered. In large, ongoing pro-poor initiatives dealing with the same types of small-scale investments, these soft investment-specific costs should trend downwards, especially when the same set of know-how, technology, bank, and FI partners are involved.
- **Programmatic soft costs** include a range of overall program activities that are often common to many investments. This could include helping to identify and then develop all the necessary player partnerships and collaborations (sometimes with government and regulatory entities), organizing community groups (sometimes this can be investment- specific), and post-investment monitoring and evaluation. A special case of programmatic soft costs is dealing with and accessing carbon financing under a mechanism such as a CDM approach, which can entail thousands of individual small investments.

Carbon Finance

Carbon financing for some technologies can provide a valuable source of funding for pre-investment and project soft costs in small-scale investments and, in the case of large-scale or programmatic initiatives, could also help to cover some of hard investment costs.

S^{3}IDF worked with Nexus to assess whether the Blueprint priority technologies (detailed below) could offer opportunities to integrate carbon financing into a SMBA application. A summary of the assessment is shown below:

Technology Type & Size	Unit Output	t/ CO_2 Saving per Unit per year	Other GHG Savings per Unit	Carbon Equivalent	Number of Projects/ Installations Required to Meet 15,000 t/ CO2 Savings per year	Precedent Projects	Nexus members engaged with project type	Range of $/Unit under Different Mechanisms	
								US$/ VER	US$/CER
Gasification									
Gasification 200 hph	kW	65	N/A	N/A	229	Yes	CEDAC/ SNV	6.4	0.5
Gasification 400 hph	kW	131	N/A	N/A	115	Yes	CEDAC/ SNV	6.4	0.5
Gasification 600 hph	kW	196	N/A	N/A	76	Yes	CEDAC/ SNV	6.4	0.5
Gasification 800 hph	kW	261	N/A	N/A	57	Yes	CEDAC/ SNV	6.4	0.5
Solar									
Centrifugal Solar Pump System (max) - 60% utilization and diesel pump replacement	kW	43	N/A	N/A	351	No	No	6.4	0.5
Centrifugal Solar Pump System (min) - 60% utilization and diesel pump replacement	kW	11	N/A	N/A	1370	No	No	6.4	0.5
Diesel-PV Hybrid Isolated Mini-Grid - .15 MW, 440 customers, 4.4 km coverage	kW	114	N/A	N/A	132	-	No	6.4	0.5
Biodigestion*									
2m3 Mixed feedstock (livestock and agricultural wastes) 50kg/day	m3	0.85	1.36	2.20	6,810	Yes	No	6.5	0.5
4m3 Mixed feedstock (livestock and agricultural wastes) 100kg/day	m3	1.69	2.72	4.41	8,874	Yes	SNV/ HIVOS	6.5	0.5
8m3 Livestock dung 200kg/day	m3	3.38	5.43	8.81	4,437	Yes	SNV/ HIVOS	6.5	0.5

** Assumed substitute (e.g.biogas exchanged for fuelwood)*

Investments are generally assumed to be viable at an average of 15,000 t/CO_2 equivalent per year[64], or in the case of Gold Standard micro-scale projects, up to 10,000 t/CO_2 equivalent per year.[65] Taking into account auditor fees for verification and issuance, Gold Standard fees[66], technical assistance and associated process management costs as well as the current voluntary carbon market prices and the market size for the priority technologies, carbon finance could be a potential funding source for solar PV water pumps for irrigation (even at a few thousand installations) and for $2m^3$ biodigester (at scale of several tens of thousands of units). It will be necessary in subsequent stages of work (described in Section 4), to build on this initial carbon analysis as preferred options for technologies, scale, and applications are refined with potential partners.

TECHNOLOGY AND EQUIPMENT PRIORITIES

Cambodia has set ambitious goals for extending energy access throughout the country and has prioritized the expansion of small-scale renewable energy systems in areas of the country that will prove difficult to reach through national grid extension efforts. The Government is focusing on solar battery-charging systems (BCS) and solar home systems (SHS), biomass mini-grids, and micro-hydro schemes[67].

In light of these development objectives and associated programmatic priorities, S^3IDF evaluated renewable energy technologies, equipment combination options, and related opportunities based on the following criteria:

- Existence of appropriate technology and related "know-how" providers;
- Market potential for pro-poor technology application;
- Technology that has thus far not had a major donor and/or government push for market penetration, including financing support, or has yet to fully reach its potential due to market barriers and other factors
- Technology has "carbon assets" potential;
- "Added value" in terms of both social and environmental impact. In accordance with S^3IDF's SMBA project criteria, all projects must benefit the poor as the owners, operators, and/or customers of the enterprises and must make use of technologies that are cleaner or more efficient than those currently in use.

[64] Personal email communication with staff at Nexus Carbon for Development

[65] According to Version 2.2 of the Gold Standard Requirements, micro activities/projects can be grouped and submitted within "Micro-programmes" in order to meet emission reduction requirements.

[66] The Gold Standard, "The Gold Standard Fee Schedule," 2013, 1, http://www.goldstandard.org/wp-content/uploads/2013/01/v2.2_ANNEX-L.pdf.

[67] Ministry of Mines and Energy, *Cambodia's Rural Electrification Minigrid Systems, Standard and Regulation.*

Market Potential and Potential Partners

Based on these criteria, S^{3}IDF identified as its technology and equipment priorities: biomass gasification, solar photovoltaic applications, biodigestion, and micro-hydropower, in conjunction with productive end-use equipment. A summary of these investment classes is provided below:

Pro-Poor Investment Types that a SMBA Application Might Facilitate			
Technology/ Equipment Investment Type	**Indicative Hard Investment Cost**	**Market Size**	**Possible Implementation Partners** *(includes already active)*
Gasification – Rice Husk Gasifiers	On average, US $2,800/kW for a gasifier equipped with gas cleaning equipment, two sets of filters for continuous operation, water treatment and ash removal[A]. [A] *IED. "Identifying the gaps and building the evidence base on low carbon mini grids: Final Report," 166.*	Several dozen potential projects have been identified, particularly in Banteay Meanchey[E] [E] *IED. SREP: Sustainable Rural Electrification Plans for Cambodia: National level plans, 71.*	Nexus, SME Renewables Ltd., Centre d'Etude et de Développement Agricole Cambodgien (CEDAC)
Solar – Diesel-PV Mini-Grids	Approximately US $8,885 - $9930/kW for diesel-PV system with battery backup.[B] [B] *IED. "Identifying the gaps and building the evidence base on low carbon mini grids: Final Report,"41.* *&* *Léna, Grégoire. Rural Electrification with PV Hybrid Systems Overview and Recommendations for Further Deployment, 14* *Calculations are based on an average 2012 Euro to USD conversion (1.3 Euro = 1 US Dollar)*	Approximately 150 projects[F] [F] *IED. SREP: Sustainable Rural Electrification Plans for Cambodia: National level plans, 90.*	The Renewable Energy and Energy Efficiency Partnership (REEEP), Innovation Energie Développement (IED)
Solar – Solar PV Water Pump for Irrigation	Varies by supplier and manufacturer; a smaller system example: US $930 for PV 80W panels (2), solar pump (7m deep, 18m head, 3m^3/h capacity), accessories, or $2480 total (inclusive of installation, transport, hardware)[C] [C] *ABC Solar pump price list*	Tens of thousands to over hundred thousand or more[G], especially in Siem Reap, Battambang, and Kampong Chhnang in the Tonle Sap region; Kampong Cham province in the Phnom Penh region; and Prey Veng, Svay Rieng, Takeo, and Kandal[H] [G] *Polak, P., Nanes, B. and Sample, J. "Opening Access to Affordable Micro-Plot Irrigation for Small Farmers." IDE documented almost 100,000 treadle pumps sales in a 4 year period* [H] *Sophally, Sok. "Groundwater Resources in Cambodia" 3-4.*	Agronome et Vétérinaires Sans Frontières (AVSF), PicoSol Cambodia, EcoSun, Solar Partners Asia Cambodia
Biodigestion	Varies by size and model with the smallest PADEE 2m^3 biodigester at US $300 (before subsidy)	Estimated 350,000 to under 700,000 smallholder farmers (1 – 6 swine)[I] [I] *Heifer International Cambodia. "Swine Value Chain Study," 7.*	Netherlands Development Organisation (SNV), International Fund for Agricultural Development (IFAD), PRASAC Microfinance Institution, Amret Microfinance Institution, Hattha Kaksekar
Small-Hydropower	Average cost of US $4300/kW for systems around 50kW[D] [D] *IED. SREP: Sustainable Rural Electrification Plans for Cambodia: National level plans, 64.*	33 – 38 projects, ranging from a total (collective) installed capacity 6449kW to 7309kW.[J] Provinces with identified pico-hydropower potential include Stung Treng, Pursat, Koh Kong, Kampong Chhnang and Modul Kiri [J] *IED. SREP: Sustainable Rural Electrification Plans for Cambodia: National level plans, 64.*	Cambodian Rural Development Team (CRDT), EcoSun

Applying the SMBA to achieve pro-poor market penetration of the above-listed investment classes will target the following types of small-scale energy end-users: households, smallholder farms, MSMEs, and selected village schemes. The potential market size of these investment classes is notable, accommodating a range of SMBA application options, including the potential for larger programmatic initiatives.

The remainder of this section contextualizes these priorities and provides information on possible technical and know-how partners that could be involved in a SMBA initiative to push into these markets with a focus on poor and underserved populations.

Biomass Gasification

Biomass gasification emerged as an alternative source of energy in Cambodia in the mid-2000s when high energy prices and the readily available supply of rice husks (a byproduct of rice cultivation) converged, opening up an opportunity for SME Renewable Energy Ltd to introduce the technology. Currently, there are an estimated 150 rice husk gasifiers (RHG) in Cambodia, including a mix of imported and domestically produced systems[68]. Biomass gasification can be used to create electricity, in heating applications, and in transport in conjunction with internal combustion engines. In Cambodia gasification has been primarily used in rice milling applications, reducing dependence on imported diesel fuel and lowering business-operating costs through fuel substitution.

With rice production already dominating Cambodia's agricultural sector and the Government's plans to make rice production and commercialization key to its economic development,[69] the opportunities to further advance rice husk gasification use are notable but not without some restrictions. Opportunities are bounded, especially in areas where grid extension and reliability are expected to improve[70] and prices for electricity will correspondingly fall[71]. While other applications of gasification cannot match the high fuel substitution rates of rice milling[72], other value-added uses of RHGs exist and have been installed, including in ice, brick, and garment factories where reliance on diesel generators is high.[73]

Despite opportunities, a number of barriers have been identified, including high investment costs, lack of affordable financing, and falling diesel prices (weakening cost savings advantages of integrating gasification systems)[74]. SME Renewable Energy Ltd, which remains the primary gasification technology and "know-how" provider in Cambodia, has worked to directly address these barriers in the past by designing a financial package for rice mills. This packaged blended flexible down payment structures, an extended loan term of 5 years, and a below market interest rate[75]. More recent efforts, most prominent of which are those through SWITCH-Asia's project, Waste to Energy for the Rice Milling Sector in Cambodia[76], include the promotion of local commercial bank financing. This project, which runs through 2015, works with rice millers to develop viable business plans, promotes the exclusive use of regulated rice husk gasification systems from vetted suppliers willing to guarantee their systems, and encourages local commercial banks to extend loans[77].

Rice Husk Gasifier Powered Mini-Grids and Livelihood Investments

RHGs have, in a limited capacity, been used in REEs to generate and supply power. Opportunities exist to encourage the further development of this application of rice husk gasification in areas where the supply of rice husks is sufficient and the national grid is unlikely to reach in the foreseeable future or where it would be beneficial to create national grid linkages. For these applications, it will be necessary to continue to develop tailored financing packages similar to those currently promoted by the *Waste to Energy for the Rice Milling Sector in Cambodia* and to take advantage of

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[68] Samuel Bryan, Eleonora Gatti and Ivo Besselink, Conceptual Development Study: Rice Husk Gasification Programme, prepared for KfW by Nexus-Carbon for Development, April 2013, 4.

[69] ADB, *Improving Rice Production and Commercialization in Cambodia: Findings from a farm investment climate assessment,* 2014, 1, http://www.adb.org/sites/default/files/publication/77825/improving-rice-production-cambodia_2.pdf

[70] The June 2014 Survey Report: Status of Rice Husk Gasifiers, Rice Husk and Rice Husk Char From Gasifiers in 12 provinces of Cambodia EU SWITCH-Asia funded project: "Waste to Energy (WtE) for the Rice Milling Sector in Cambodia" found that 36 gasifiers out of total of 116 surveyed stopped operation, 28 of which stopped since they switched to electricity provided from the national grid. Source: H. Ngin, Status of rice husk gasifiers; rice husk and rice husk char from gasifiers in 12 provinces of Cambodia, 13.

[71] According to figures offered by SNV in December 2013, "The estimated all-in cost of electricity produced by a rice mill using a locally manufactured gasifier is in the range of $0.06 to $ 0.24 per kWh. If imported gasifiers are used, the price per kWh would be between $0.07 to $ 0.27. For rice mills using more than 50,000 litres of diesel per year, gasifiers are preferable to grid electricity."
SNV, "Green Tech Boost to Cambodian Rice Exports," SNV World, 12 December 2013, http://www.snvworld.org/en/cambodia/news/green-tech-boost-to-cambodian-rice-exports#_ftnref3.

[72] Information that emerged from a 2009 ESMAP conference, Fighting Poverty through Decentralized Renewable Energy, in Phnom Penh, Cambodia, indicated that medium-sized rice mills that process a minimum of two tons of rice per day have the highest diesel substitution rates from 50 to 80%. Source: Energy Sector Management Assistance Program (ESMAP), "Fighting Poverty through Decentralized Renewable Energy," Workshop Proceedings: Energy SME Conference, Phnom Penh, Cambodia, 2009, 7, https://www.esmap.org/sites/esmap.org/files/ESME_ESMAPCambodia.pdf.

[73] ESMAP, "Fighting Poverty through Decentralized Renewable Energy," 7.

[74] Meeting with Tony Knowles of SME Renewable Energy Ltd. on 15 January 2015.

[75] ESMAP, "Fighting Poverty through Decentralized Renewable Energy," 7.

[76] Implementing partners include: Netherlands Development Organisation (SNV), Federation of Cambodian Rice Millers Associations (FCRMA) Association pour la Promotion de la Technique et Metiers (PTM), and the Centre Kram Ngoy (CKN).

[77] SWITCH-Asia. *Greener Biomass Technology Enhances Cambodia's Rice Milling Sector,* SWITCH-Asia Project Impact Sheet, 3, http://www.switch-asia.eu/fileadmin/user_upload/Impact_Sheet_2013_-_Waste_To_Energy_screen_01.pdf

new opportunities for REE licensees, such as the financing package offered under the AFD-FTB partnership.

A 2013 assessment calculated that RHG in Cambodia have a capital expenditure (CAPEX) that ranges from $1300 to $3000/kW[78] and that RHG REEs save an average of $42,000 per year through diesel substitution[79]. However, these figures must also be considered in light of broader RHG REE business models since there is limited experience in Cambodia with RHG for rural electrification (most RHGs to date have been tied to a core or anchor customer)[80]. Business models include RHGs with dual fuel gensets (in clusters and as captive systems) and RHG cogeneration (as captive systems). The potential number and capacity of installations ranges from 12 to 28 for clusters of RHGs with dual fuel gensets (cumulative installed capacity ranging from 2096kW to 4728kW), to 2 to 10 captive RHGs with dual fuel gensets (cumulative installed capacity ranging from 321kW to 2078kW), to about 6 captive RHG cogeneration projects with a cumulative installed capacity up to 4150kW.[81]

The financial viability of these investments will necessitate a focus on local MSMEs that can diversify and increase REE revenue beyond purely domestic electricity consumption. These MSMEs will also be critical in furthering SMBA objectives of ensuring that poor and underserved populations benefit from investments as customers, employees, and/or owners. For example, a small-scale enterprise could be developed to use RHG REE electricity to power a village-level reverse osmosis water purification plant that sells clean drinking water to community members.

Solar Photovoltaic Applications

Cambodia, with an average of 6 hours[82] of sunlight per day (an average of 5kW per day[83]) has had an active solar energy sector since the 1990s. Solar photovoltaic (PV) systems have been used to aid in power generation for lighting, telecommunications, and small appliances in rural areas. There are numerous companies based in and outside of Cambodia (with Cambodian distributors) that sell, install, and maintain solar products and equipment. The main obstacles to greater adoption and expansion of solar technologies and its applications are overcoming accessibility issues (due to financing constraints or physical distance) and limited awareness among consumers about its viability and flexibility in its use (e.g. productive-use applications), particularly in rural and remote areas.

Solar water pumps and solar-PV hybrid mini-grids are currently limited in use and application but exhibit significant potential for impact if deployed as market-based and enterprise-centric solutions.

Small-Scale Solar Pumping for Irrigation

Small-scale groundwater pumping, if conducted in a responsible and sustainable manner, provides opportunities in Cambodia to improve agricultural productivity and incomes, especially for smallholder farmers. While more detailed studies by the Government and partners have been and are currently being carried out, it is known that groundwater is available across the majority of Cambodia, with the dry zone existing almost exclusively in central and northwest areas[84]. Groundwater can provide valuable irrigation to fill water shortfalls throughout the year, including during an early or late wet season and, critically, and it can also make double cropping possible[85]. A double cropping option is particularly important since farmers can plant higher value crops, such as vegetables. A 2013 assessment, "Groundwater for Irrigation in Cambodia," also noted another benefit: "small-scale pump irrigation from

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[78] IED, "Identifying the gaps and building the evidence base on low carbon mini grids: Final Report," Support study for DFID, November 2013, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/278021/IED-green-min-grids-support-study1.pdf

[79] SNV, "Green Tech Boost to Cambodian Rice Exports."

[80] IED, "Identifying the gaps and building the evidence base on low carbon mini grids: Final Report," 29.

[81] IED, *SREP: Sustainable Rural Electrification Plans for Cambodia: National level plans*, March 2011, 69, https://energypedia.info/images/8/8b/Rural_Electrification_Plan_Final_Report_-_Cambodia.pdf

[82] Roger van Mansvelt, "How to scale-up solar diffusion in Cambodia?" The solar roadmap for Cambodia: Strategy formulated by stakeholders, Phnom Penh, June 2011, http://www.kamworks.com/uploads/tx_news/2011-solar-roadmap-cambodia-summary_02.pdf.

[83] Fondation Energies pour le Monde, *Assessment of the renewable energy potential in Oudomxay (Lao PDR), Dak Nong (Vietnam) and Kampong Thom (Cambodia) Evaluation of the solar photovoltaic potential in the 3 provinces*, RESIREA – Work Package 3, n.d., *14*, http://www.energies-renouvelables.org/resirea/resirea07-08/report_on_the_pv_potential.pdf

[84] Sok Sophally, "Groundwater Resources in Cambodia," Presentation for discussion, Institute for Global Environmental Strategies, n.d., http://www.iges.or.jp/en/natural-resource/groundwater/PDF/activity20110602/S1-3_Mr.Sok-Sophally_GW_Cambodia.pdf

[85] Robyn Johnston, Michael Roberts, Thuon Try, and Sanjiv de Silva, *Groundwater for Irrigation in Cambodia*, Issue brief #3, International Water Management Institute (IWMI), June 2013, 4, http://www.iwmi.cgiar.org/Publications/issue_briefs/cambodia/issue_brief_03-groundwater_for_irrigation_in_cambodia.pdf.

groundwater can circumvent the large investments in storage and transmission infrastructure required for surface water irrigation,"[86] providing cost and time savings.

Despite the potential benefits, the adoption of shallow groundwater pumping for irrigation has grown slowly in Cambodia[87], a function of prohibitively expensive fuel costs (most shallow groundwater pumps that have been promoted are diesel-powered), a lack of awareness about solar pumps, mismatches between growing input and production costs and steady or only nominally increasing market selling prices[88], and insufficient equipment financing options. Unlike other solar initiatives, such as solar home systems (SHS) that have been paired with microloans through technology supplier-MFI collaborations and encouraged through Government programs, solar pumps have yet to be offered with tailored financing options or given the same attention and level of promotion.

Looking ahead to potential SMBA applications, supporting new partnerships that would, for example, bring together solar companies (e.g. Picosol Cambodia that offers solar pumping systems and technology "know-how"), agricultural development and livelihood practitioners (e.g Agronomes et Vétérinaires Sans Frontières), and MFIs will prove critical. These partnerships will prove critical since solar pump access will need to be paired with improved crop processing and storage systems in order for the full benefit to be realized. At present, farmers, who experience estimated harvest to storage losses of 20% to 50%[89] and consequently must sell crops as soon as possible, need ways to break the "price taker" cycle that acts as a disincentive for making investments in equipment like solar water pumps. Small-scale processing and storing systems that can be run by local entrepreneurs or cooperatives offer solutions but, as is the case with solar water pumps, require an attention to tailored business models and financing. Until FIs become more comfortable with the technology, the related business models, and the positive impact on farmers' income from improved or high value yields, it is likely that attention will need to be paid to creating loan guarantee schemes and/or supplier buy-back agreements.

Diesel-PV Hybrid Mini-Grids for Productive Energy Use

Estimates place the current number of REEs (both licensed and unlicensed) in Cambodia that are using mini-grids between 600 – 1000[90]. These REE estimates include those that both generate and distribute energy and those that only distribute energy. Even as the Government expands the national grid, reducing the overall need for isolated mini-grids, there are still a number of areas in Cambodia where physical distance, population density, and difficult terrain, make these types of mini-grids necessary. Of the total REEs, there are about 300 licensed diesel-based mini-grids[91] of which about 150[92] have been identified as candidates for diesel-PV conversion pending the outcome of location-specific analyses.

An assessment by Innovation Energie Développement (IED) in November 2013 that analyzed diesel-PV hybrid systems across 16 towns in Cambodia determined that while diesel-only mini-grids would be slightly more financially (but not environmentally) appealing than a diesel-PV hybrid system, the financial analysis could change if the PV components are integrated into existing systems as opposed to installed during initial construction (as would be the case in diesel to diesel-PV hybrid conversions, an area of interest for a SMBA application)[93]. The financial analysis is also likely to be positively impacted if diesel-PV hybrid conversions are designed to include revenue diversification (i.e. meeting both domestic [consumptive] as well income-generating/business [productive] energy needs). This emphasis on providing energy for productive uses also plays a critical role in bolstering local economic development and addressing poverty – key objectives through SMBA applications.

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[86] Robyn Johnston et al, *Groundwater for Irrigation in Cambodia*, 3.

[87] Ibid. 3.

[88] Robyn Johnston, Sanjiv de Silva, and Sonali Senaratna Sellamuttu, *Agriculture, Irrigation and Poverty Reduction in Cambodia: Policy Narratives and Ground Realities Compared*, IWMI, November 2013, 46, http://publications.iwmi.org/pdf/H046294.pdf.

[89] Ibid., 46.

[90] IED, "Identifying the gaps and building the evidence base on low carbon mini grids: Final Report," 272.

[91] Ibid., 19.

[92] IED, *SREP: Sustainable Rural Electrification Plans for Cambodia: National level plans*, 90.

[93] The IED assessment, Identifying the gaps and building the evidence base on low carbon mini grids: Final Report, used a financial model in which the installed capacity (without storage) was only completely used in 10 years indicating that a phased introduction of PV (through a conversion to a hybrid system, for example) that aligned with the growing energy demand could change the assessment.

A priority is to work with donors and practitioners already familiar with mini-grids in Cambodia, such as Renewable Energy and Energy Efficiency Partnership (REEEP), IED and DFID, to explore additional opportunities for a pipeline, and to develop appropriate financing structures to facilitate investment in these types of conversions, allowing for greater use of hybrid mini-grids in rural areas of Cambodia, particularly in the Northern provinces.

Biodigestion

Biogas is a combustible gas that allows for the delivery of modern energy services to small-scale users. Biogas digesters (biodigesters) also yield slurry that is high in nutrients and organic content that can have agricultural value as a fertilizer and soil conditioner. Notably, this slurry reduces the need to purchase expensive fertilizers and sanitizes otherwise unprocessed wastes that could introduce disease if spread directly on agricultural fields. The most common small-scale end-use for biogas in Asia is as a household cooking fuel that requires only limited additional investments (for example, stove and burner). Biogas burns cleanly, reducing indoor air pollution, when compared to firewood and kerosene. Biogas can also be used for numerous other applications, including running internal combustion engines for various mobile or stationary shaft power uses. These applications will add to the necessary investment cost but can increase income generation opportunities and improve productivity, especially in integrated farm systems.

Cambodia's National Biodigester Programme (NBP), a collaboration between the Ministry of Agriculture, Forestry and Fisheries (MAFF) and Netherlands Development Organisation (SNV), has provided over 120,000 people with biodigesters across the country through the installation of over 20,000 systems from 2006-2014.[94] Despite this achievement, additional opportunities exist to expand the use of biodigesters in Cambodia, especially for smallholder farm pig rearing applications.

Pig Rearing on Smallholder Farms

Livestock accounts for an estimated 15.3% of Cambodia's agricultural sector with swine comprising roughly 48% of the all livestock in the country[95]. With only a handful of commercial pig farms in Cambodia (only three in 2009), smallholder farms and semi-commercial farms make up the majority of the sector. In 2011, "only 164,448 out of 2,099,332 pigs came from 364 semi-commercial farms, whereas the rest came from small farmers who raised only one to six heads. This means that approximately one million people are earning incomes based on swine raising activities, which includes both direct and indirect activities involved in pig production"[96]. As a result, smallholder farms make up a significant potential market for small household level biodigesters. These smallholder farms are good candidates for biodigesters since "tethering [] animals in fields or close to the homestead is practiced widely to collect dung for crop cultivation…"[97], a fact that suggests very little behavioral change would be required for an effective expansion of biodigesters among this target group.

The NBP offers five different biodigester sizes: $4m^3$, $6m^3$, $8m^3$, $10m^3$, and $15m^3$. The $4m^3$ and the $6m^3$ systems are the two most popular sizes, making up 53% and 41% of the total installations with the $8m^3$, $10m^3$, and $15m^3$ systems making up at total of just 6% of the installations.[98] Recently, SNV has been working through an International Fund for Agricultural Development (IFAD) program, "Projects for Agricultural Development and Economic Empowerment (PADEE)," to develop a smaller, less expensive $2m^3$ biodigester to address unmet consumer needs. The $2m^3$ system is particularly suited to smallholder farm situations since households can have a minimum of 3 – 5 pigs if they use only manure as the feedstock or just 1 or 2 pigs if they also use agricultural or human waste as feedstock. This smaller system helps to address previous sizing mismatches in which smaller and/or poorer households/farms were unable to produce/obtain enough waste feedstock to keep the $4m^3$ biodigester viable[99].

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[94] National Biodigester Programme, "Achievements," 2015, http://nbp.org.kh/Result.aspx.

[95] Food and Agriculture Organization of the United Nations, *Swine Industry Profile Of Selected South East Asian Countries*, Bangkok: October 2011, 4.

[96] Heifer International Cambodia, "Swine Value Chain Study," 2013, 1, http://www.heifercambodia.org/Swine%20Value%20Chain%20Report.pdf.

[97] Barbara Tornibene and Prof. Trevor Drew, *Characterisation of Swine production systems in the Cambodian Mekong lowland region*, May 2012, 12.

[98] Eric Buysman, *Carbon Monitoring Report 2013,* National Biodigester Programme Cambodia, August 2013, 14, https://mer.markit.com/br-reg/PublicReport.action?getDocumentById=truedocument_id=103000000041350.

[99] Precy Vinea Cabrera, "The National Biodigester Programme Cambodia: Building Capacity for Delivery of Clean Energy to Rural Households," in *Market Solutions to Public Needs*, ed. Juan Miguel M. Lux and Justin G. Modesto, (Gale Asia, 2014), 221.

FIGURE 6:
COMPARISION OF BIODIGESTERS* IN CAMBODIA

Minimum Number of Swine (if only using manure as feedstock)	Biodigester Size (cublic meters, m^3)	Source	Initial Feeding (manure)	Daily during feeding (kg)	Water to mix with dung (litre)	Total Cost (US$)	Subsidy (US$)	Farmer Cost (US$)
3 - 5	2	PADEE	800 (estimated)	10 - 20	10 - 20	$300	$100	$200
5 - 9	4	NBP	1500	20 - 40	20 - 40	$400	$150	$250
9 - 14	6	NBP	2300	40 - 60	40 - 60	$500	$150	$350
14 - 18	8	NBP	3000	60 - 80	60 - 80	$550	$150	$400
18 - 23	10	NBP	3800	80 - 100	80 - 100	$650	$150	$500
23 - 34	15	NBP	6000	100 - 150	100 - 150	$900	$150	$750

** $2m^3$ system figures from Gerles, 2013; $4m^3$-$15m^3$ system figures available from the National Biodigester Programme website*

Cost subsidization and financing have proven to be critical elements of the NBP's success, evidenced by a decline in sales during a 7-month period in 2013 when a funding gap caused a subsidy reduction[100] and with 70% of all consumers financing their biodigester purchases[101]. Presently, three MFIs – PRASAC, AMRET, and Hattha Kaksekar – provide loans for NBP biodigesters and have agreed to offer better terms and lower interest rates than can be obtained in the broader market (24-month loans carry a 1.2% interest rate per month on declining balance)[102]. However, the NBP has indicated that "…a model will have to be sought to come to a permanent credit scheme for biodigester construction investment."[103] Similar long-term subsidization challenges through PADEE also need to be considered. Looking forward, the future of biodigestion in Cambodia is dependent, in part, on developing alternative financing structures that are less dependent on subsidy and more financially sustainable. From a SMBA perspective, the greatest potential lies with developing risk mitigation fund structures that can initially entice MFIs to begin or continue to offer financing on favorable terms, and overtime, to wean them from the risk mitigation support as they become more familiar and experienced with financing biodigesters and make these loan products an integral part of their core financial products and offerings.

Small-Scale Hydropower

As a central part of the Greater Mekong Subregion, Cambodia has significant hydropower potential with an estimated total capacity of 10,000 MW of which 50% is concentrated in the Mekong River, 40% in the tributaries, and 10% along the southwestern coast outside of the Mekong River Basin.[104] The 2013 World Small Hydropower Development Report states that the estimated potential of smaller hydropower schemes has been assessed around 300 MW installed with a current installed capacity of mini and pico-hydropower of about 1.87 MW (including a number of 1kW – 30kW systems in the Northern provinces).[105] However, a 2009 assessment by Innovation Energie Développement (IED) determined that by filtering a comprehensive 2006 Japan International Cooperation Agency (JICA) project list by those with rural electrification potential, those without competing demands, and those with sufficient demand, the results would narrow to 33 – 38 projects, ranging from a total (collective) installed capacity 6449kW to 7309kW.[106] While this number of projects and the installed capacity estimates are lower than those made by the World Small Hydropower Development Report, these project sites are likely to provide the greatest impact potential.

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[100] Eric Buysman, *Carbon Monitoring Report 2013,* 13.
[101] National Biodigester Programme, "Special Credit," http://nbp.org.kh/Credit.aspx.
[102] Ibid.
[103] Ibid.
[104] Ministry of Industry, Mines, and Energy, *Hydropower,* Presentation prepared in association with Cambodia National Mekong Committee for National Sector Review 2003: Hydropower, June 2003, 5.
[105] H. Liu, D Masera, and L. Esser, eds., *World Small Hydropower Development Report 2013*, United Nations Industrial Development Organization; International Center on Small Hydro Power, 2013, 1.
[106] IED, *SREP: Sustainable Rural Electrification Plans for Cambodia: National level plans*, 64.

In addition to its emphasis on large-scale hydropower development, the Government recognizes the potential of micro-hydropower to promote energy access in rural and remote locations in Cambodia. The Government sees its role as helping to encourage private sector participation and reducing or providing exceptions on import taxes for associated small-scale hydropower equipment.[107] Even with this support, there are several barriers to development, including a lack of appropriate financing and high upfront system installation costs, particularly for micro-hydro installations with distribution networks that connect the remote areas of Cambodia to equally remote communities.[108] Financing barriers can be addressed through a SMBA application, in part, by integrating productive-use (income-generating) business models into the overall project design. Depending on the size of the installation, productive-use opportunities could range from powering small grain-grinding equipment to larger cold storage facilities to reduce post-harvest losses.

Although local expertise is limited for small-scale hydropower development, a handful of experienced entities exist, including Cambodian Rural Development Team (CRDT) and EcoSun, which both have the capacity to manage the technical aspects and social benefits of pico- and micro-hydro[109] installations. JICA has also been involved in a past micro-grid initiatives from 2008 – 2011 that focused on providing EDC with a more affordable energy source to power homes, restaurants and other small businesses, as well as a factory[110].

[107] H. Liu, DMasera, and L. Esser, eds., *World Small Hydropower Development Report 2013*, United Nations Industrial Development Organization; International Center on Small Hydro Power, 2013, 1.

[108] Ibid, 2.

[109] EcoSun provide micro-hydro systems up to 100kW and CRDT has completed micro-hydro projects of 20kW.

[110] H. Liu et al, *World Small Hydropower Development Report 2013*, 1.

FROM FEASIBILITY TO IMPLEMENTATION

INDICATIVE STAGES

Successfully transferring and applying the SMBA in Cambodia requires pursuing in-depth pipeline feasibility assessments and then implementing investments through a pilot portfolio with financing, technology, and other partners or through integrating SMBA principles and structures into an existing program on a trial basis. The pilot portfolio and trial programmatic structures would provide the basis for a potential scale-up initiative.

As described previously, an application of the SMBA in Cambodia requires working directly with entities and groups whose roles and activities are already supportive of or conducive to leveraged co-financing and related deal structuring and that have financial and human resources available (in hand or accessible through existing donor relationships). This filter must be kept in mind throughout the process, including through each of the following indicative stages[111]:

- Conducting an In-Depth Investment Pipeline Feasibility Assessment
- Developing Partnership Agreements
- Securing Funding and Financing
- Building a Pilot Investment Portfolio or Integrating SMBA Structures in an Existing Program

Conducting an In-Depth Technology Investment Pipeline Feasibility Assessment

Building on the recommendations and determinations presented in this Blueprint study, it becomes possible to undertake an in-depth assessment of the feasibility of a pipeline of specific investments in one or preferably all of the technology priority areas outlined above. This allows for the refinement of pilot portfolio opportunities and for a more strategic exploration of programmatic options[112]. This feasibility work should involve the local technology providers that have been highlighted as important players in their respective technology sectors. These investment-specific technical and financial feasibility studies should be sufficiently detailed and include issues of financial structure and where relevant, business plans, to satisfy the information requirements of potential FI partners.

For the different classes of priority technologies, it is necessary to assess applications and variations. For example, considerations for the pico-/micro-hydropower applications should encompass representative variations in water flow, designs, sizes, and different end-uses (including their associated additional equipment and costs). During these detailed feasibility assessments, the market potential for a scale-up would be thoroughly analyzed. This is particularly important in areas where there has been little or limited local experience or widespread application (for example, solar pumps for irrigation and other MSME productive-use investments from REEs). The objective would be to push market penetration of the classes of investment in an explicitly pro-poor manner.

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[111] Each stage is comprised of a set of activities that can be separately funded.

[112] The decision on which investment classes will be covered will be made by whatever donor supports this next feasibility stage of activities. But it would be preferable if work on all classes were taken forward.

Developing Partnership Agreements

A key to a SMBA application that leads to a portfolio of investments that are truly pro-poor and includes small-scale renewable energy and linked investments will be the complementary pairing of donors or other sources of financing and local practitioner partners. Donor-partner collaborations must be willing to undertake the pre-investment effort required to frame business models and ownership and operation structures in a manner that will benefit the poor.

This stage would include examining and discussing deal-specific partnerships (including co-financing) as well as further partnership options with potential FI hosts of a revolving facility or similar. These partnership dialogues should, if possible, be taken to the point of a draft memorandum of understanding (MoU) and clearly specify terms should the next stage go forward. This stage could also involve the coordination and signing of contracts with implementing agencies and groups in charge of overseeing, developing, and/or managing programs (if an application of the SMBA is pursued through a programmatic effort). Part of these partnership agreements would include having to address the question of whether, and if so how, to treat non-poor customers and beneficiaries. Assuming these populations will also be served, the partnership agreement should address how non-poor households are to be "charged" more of the soft costs that are being subsidized under the standard pro-poor SMBA application.[113]

The degree to which collaborations and partnerships will need to take on additional efforts to promote equitable investments in the recommended priority technologies and equipment varies. For example, key elements of the $2m^3$ biodigester investments (technical specifications, intended use, etc.) are already designed with a pro-poor lens, meaning that relatively little additional work would need to be undertaken to ensure that investments using this technology positively impact underserved populations. However, for other types of investments, the challenge of achieving truly equitable outcomes often places greater pre-investment burdens on businesses. For example, for rice-husk gasification systems that are owned by cooperatives or other third parties without explicit pro-poor objectives as part of their ownership and operation ethos, structuring such investments to achieve impact is much more difficult – but not infeasible. If these investments are supported by development capital, this should be an objective. It is important to note that merely creating a few additional jobs through some skill development does not make investments explicitly pro-poor. Creatively structured investment deals encompassing concepts of shared savings, separation of the gasifier investments, and build-own-lease-transfer (BOLT) structures where communities own the gasifiers need to be explored.

This will require the funding donor entity to have local practitioners/development partners, including, CBOs, NGOs or others with a commitment and resources (human and financial) to put such deals together and bring them to fruition. In addition to entities mentioned elsewhere such collaborations might benefit from an organization such as the Cambodian operation of Oxfam as a partner.

Securing Funding and Financing

Given that a SMBA application in Cambodia would already filter and prioritize investment opportunities based on partners and programs with existing financial resources available, this stage focuses on securing and delineating the terms of existing funding and financing and, when necessary, pursuing or coordinating additional financial support to fill in gaps. Securing funding and financing to support a pilot investment portfolio through local partners often involves creating blended capital structures from multiple sources. When integrating SMBA structures and principles into an existing program, at least partial funding is likely to be available, even if additional types of funding need to be secured (e.g. coordinating grant funds to pair with the program's concessional loan funds). In both options, however, preparatory work for seeking support should consider various donor interests and program constraints as well as implementation aspects. Programmatic characteristics and capabilities of donors that are of particular interest include:

- Donors with known renewable energy programs, especially those with some interest, if not experience, in supporting small-scale investments.

[113] The donor(s) should be an active participant in defining how these matters are to be addressed.

- Given the emphasis of the SMBA on the local private sector players and facilitating access to local finance for viable pro-poor investments, donor support may best be sought by dialogue with several different groups (for example, energy, private sector, financial sector) within the same donor institutions.
- Opportunities to pair donor funds to achieve blended capital arrangements when, for example, one donor only has concessional funds and another donor has grant funds available.
- Some donors may only be interested in one or two of the technology-specific investment priorities and willing to support only the next stages in those areas. Then, if possible, arrangements should be made to go forward while seeking possible complementary donor support for efforts on the other investment classes.
- Of particular note should be donors who could integrate carbon financing with other support, or if not, at least facilitate such coupling.
- Also of very special interest should be donors who have special programs that very explicitly focus on poverty alleviation, energy access and have the flexibility to implement different project and investment structures.

While dialogue with candidate donors (once identified) can be initiated through emails and phone calls, there is no substitute for face-to-face discussion. And given the nature of the results of this study, the useful conversations are likely to be with multiple candidate donor entities: energy, agriculture and livestock, financial sector and MSME development.

Building a Pilot Investment Portfolio or Integrating SMBA Structures into an Existing Program

This stage builds a pilot portfolio of investments or further develops an existing program, illustrates outcomes, provides learning opportunities, and gives insights into likely requirements for a scale-up application of the SMBA. In most applications, S^3IDF would likely need to provide capacity building support, especially for deal structuring and technology supply chain extension. How much capacity building is integrated into this stage depends on the existing capabilities of the partners and how much supportive work is required to ensure that the investments are truly ready to move into implementation.

There would be close collaboration and coordination between key project partners, including the donor(s), FIs, the individuals, households or groups that are going to be the owners (or the operators) of the investments, and one or more providers of know-how and/or technology.

At this stage, the institutional arrangements outlined above would be put in place. Also, the draft MoUs prepared during earlier stages would be finalized for the implementation for a specific deal or the entire pilot portfolio. Again, these MoUs would need contingency language covering whether scale-up will occur, which will be largely donor-driven. The key MoU will be that of the FI facility host (or similar). Ultimately, the institutional structure of the proposed FI facility (or similar) could become part of the scale-up initiative.

If the findings of the feasibility and this pilot investment/program stage indicate that a subset of technical and FI or MFI co-financing partners are likely to be involved in many deals, considerable attention should be paid to the revision of MoUs with these players so that if and when a scale-up occurs, many of the necessary implementing relationships are in place. If revisions to existing contracts (in a program-focused application) are required, updates should take place during this stage.

The size of a pilot portfolio or program and the relative composition priorities (between classes of investment focus) will be a decision made by the donor or donors underwriting this stage of work. If this stage has not been explicitly integrated with the feasibility stage, the scope (and budget) of this "learning-by-doing" stage should be driven by the results of the feasibility stage that generated investment deals and their financial structuring and support arrangements for implementation. Similarly, the partnership MoUs and contracts should build on those drafts prepared during the feasibility stage.

POTENTIAL FOR SCALE-UP

The potential for scale up, in terms of numbers of investments, investment costs, and impacts of the initial investments in portfolio or program applications, will in large part depend on the framework and intention of the feasibility studies as well as the outcomes.

If the investments are structured around building a portfolio with selected project partners, then the next steps would involve setting a target number of deals to be developed (with an emphasis on replication of business models and increased use of financing structures) and key characteristics (e.g. geographic distribution) and in particular the composition (mix) of the investments types (e.g. all types of technologies or only some).

At this point, the potential metrics for scale up would be a function of a few factors: i) how many collaborations - between funding sources/donors and local partners/practitioners - are structured, noting that all of the latter will have constraints given their areas of current operation, renewable energy technology expertise, etc. and ii) the nature (especially costs) of the linked productive-use (or other) applications that are part of the investments and their totals. Donors or partners who have the resources to undertake the pre-investment are necessary. Depending on these influencing factors, the program costs of a multi-donor/collaboration would vary dramatically, from a few million dollars to many tens of millions of dollars.

If the pilot investments are framed within a broader construct, such as a programmatic initiative (e.g. SREP), the scale up process would adopt an "all technologies, all-Cambodia" mandate and would focus on expanding collaborations with all the local partners involved in the pilot investments and increasing the number of additional participating partners (especially those partners with project/investment pipeline ideas). A critical matter is bringing in other complementary donor programs (such as 3i) or partners who can support all or part of the pre-investment costs.

An "all technologies, all-Cambodia" scale-up is likely to require significant institutional effort between donors as well as local players and partners but the result of this type of collaboration will have significant impacts – both in terms of pro-poor benefits and equitable development as well as creating synergies and providing insights for other donor collaborations in other sectors. Pursuing a SMBA scale up initiative through existing programmatic efforts would cost, at a minimum, tens of millions of dollars.

ANNEXES

ANNEX I: Questions, Guidance, and Notes For Bank(s) Interviews And Others

BANKS AND OTHER FINANCIAL INSTITUTIONS

- National or even international bank
- Regional bank
- Microfinance Institution (MFI) – national or local – of different types including savings and credit cooperatives, or other cooperatives that provide financing
- Leasing company
- Any other FI entities that might be relevant, for example, if there are funds or other entities that offer debt and/or equity especially to MSMEs in the sectors of interest – renewable energy and productive-use equipment for agriculture and other purposes.

1. Briefing

Start with a short briefing of S^3IDF and its assessment to determine opportunities and challenges of disseminating the Social Merchant Bank Approach® (SMBA) in Cambodia. Briefly mention (if necessary) some information about S^3IDF's experience with banks in India and Nepal. Be sure to touch upon the possibly of a wide range of transactions and give examples. Emphasize that while investments are small scale, there is some range in investment and market size.

Indicate that the overall purposes of the interview are multiple:

- Where they operate
- The nature of their operations
- Instruments and terms for their financing
- Contacts for further bank/FI-specific information, both this office and others (e.g., their branches)
- Interest in participating in the possible dissemination follow-up in one form or another,but
    - especially as a provider of term loans for the small investments
    - perhaps as a "host" in the follow-up revolving fund if/when it is created.
- Would this interest vary depending on certain factors such as the location/district; other factors?
- Suggestions for other sources (bank and non-bank) of information and/or contacts that might be useful.
- If there is interest, after further discussion covering points below, schedule a follow-up interview.

2. Footprint

What is their footprint (for the larger banks/MFIs in terms of specific presence of branches/offices in various districts/provinces)?

- Number and distribution of branches
- Related matter of decision responsibility at the branch level, for the size of transactions we will be considering?

3. Scope of Their Businesses, Terms of Their Support and Related Matters

What is the overall scope of their businesses (in the markets we are interested in); what lines of business are they engaged in?

- What type of license do they hold, which regulators/regulations they operate under?
- What is the menu of financing (or other) support they offer and are these offered only through the bank as a legal (and regulated) entity, or in the case of large FIs also through subsidiaries/affiliated establishments; examples of some particulars of interest?
- Types of debt financing; especially term lending for MSME hard assets
  1) What are the terms and conditions
     - Tenure, interest rates
     - Security/hypothecation requirements
     - Any special non-security for HH, MSMEs
     - What kind of guarantees have been involved, if any
  2) Any special priority/deprived sector lending
  3) Any explicit small energy/infrastructure lending

- Sources, costs of funds, spreads
  1) Market, at what terms
  2) Wholesale sources at what terms
  3) What are the operating spreads
  4) How these vary by transaction type and/or source of funds.

- Do they do leasing, have leasing subsidiaries other than rolling stock (e.g., trucks) or any small energy/infrastructure leasing?
- Do they do refinance/on-lending to MFIs or other small FIs (local credit cooperatives, any NGO doing some banking functions).
- Do they do equity or other non-debt investment financing, do they have investment subsidiaries/affiliates that might be relevant (a MSME investment corporation)?
- Do they have an investment arm/affiliate/subsidiary that would be a candidate for involvement?
- Which, if any, of the above are "regulation driven"; how do they meet their priority sector lending requirements? (And how do we get details?).

4. Donor/Government Driven Intermediation Experience

What, if any, is their experience in implementing/cooperating with the programs of governments, donors (bilateral of multilateral) or others (foundations)? If experience exists, with which donors? What are some of the particulars regarding experience with the following:

- *Financing* as a financial intermediary. If experience exists, more details (only money from others, or some of own; who/how is deal flow originated, etc).?
  - Have they played an APEX vetting role for other FIs into the program
  - Other non-direct transaction roles (trustee accounts)
- *Financing* as a co-financer of deal flows originating an intermediation program/initiative or with a development bank?
- *Technical assistance* role in the provision of business/technical assistance, as the direct provider, or only as co-operating partner?
  - If experience exists, details of how this is organized, delivered:
    - unit in the FI
    - outsourced
    - some combination

5. Other Own Programs (could be part of #3)

Aside from any regulation-driven activity (e.g., priority lending), do they have any special internally driven programs and/or financing terms we should know about, for example, one for MSMEs or NGOs?

6. Drilling Down to Get Reactions and Solicit Interest

Might not be appropriate or feasible for the first interview, but may be important for follow-upinterviews if we determine interest in participating in the follow-up. Much of the additional questioning will depend on what is learned from questions above.

- If they have some relevant experience (e.g., MSME term lending, not necessarily for energy) go through typical transactions, see how they did them, where deal originated,what were the terms.
- Brainstorm; get their ideas about the possible follow-up and how they/others couldcooperate.
- Request that they provide contacts for selected pertinent transaction(s) so we mightinterview the source of the financing.

7. Special Client Relationships

This line of questions also might not be appropriate for the first interview or at all, and is likelyonly for "big" players. It is included here for completeness.

- Do they have existing client relationships with entities that might logically be partners? Examples: large business like NGOs; MFIs, cooperative banks. Are there any corporations with CSR programs.
- If willing, how do they suggest they help us build on these relationships?

OTHER ENTITIES, ESPECIALLY KNOW-HOW ANDTECHNOLOGY PROVIDERS

1. What technology/technologies, supply and/or know-how do they sell/provide?

2. Can they outline their supply chain?
   a) What provinces/areas do they serve?
   b) Branches or distributers or other mechanisms (e.g., via co-ops)?

3. Can they outline the pricing of their technology, etc.?

4. Can they outline how their customers pay/finance what they supply?
   a) Do they have an active financing role if any (e.g., supplier financing)?
   b) Do they have any special programs of their own or in collaboration with a bank?

ANNEX II: SMBA Workshop Presentation - Phnom Penh, 19 January 2015

Developing Pro-Poor Enterprises & Investments with the Social Merchant Bank Approach® (SMBA)

Phnom Penh, Cambodia
January 19, 2015

Workshop presented by
The Small-Scale Sustainable Infrastructure Development Fund (S³IDF)
and made possible with financial support from
Nexus Carbon for Development

S³IDF nexus

Presentation Organization

A small hydropower system provides electricity to run rice processing equipment in Nepal.

I. S³IDF's Mission and Approach
II. The Global Need for Basic Services and Challenges
III. Financing Structures for Pro-Poor Impact
IV. Technology Access and "Know-How"
V. Business Development Support
VI. SMBA in Action: Investment Development Process
VII. S³IDF's Current Portfolio and Example Project Structures

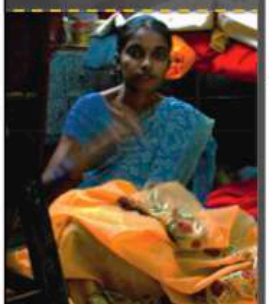
S³IDF's Mission and Approach

S³IDF's Mission and Approach

Financing vehicles that deliver milk and similar products increases the efficiency of entrepreneurs and enables them to grow their operations.

- **S³IDF supports small-scale enterprises and promotes inclusive market systems to:**
  - Improve access to basic services
  - Provide opportunities for economic advancement in developing countries
- **S³IDF's Social Merchant Bank Approach® (SMBA) connects entrepreneurs, financial institutions, technology suppliers and others to promote greater integration of poor households and communities into the mainstream economy**
- **Tailoring the SMBA to local conditions and markets enables the poor access to basic services, employment, and asset ownership opportunities**
- **S³IDF's work falls into three main areas:**
  - SUPPORTING ENTREPRENEURS by helping them to create and carry out effective business plans, access technology and equipment for their enterprises, and secure financing to operate and grow their businesses
  - DEVELOPING MARKET LINKAGES by strengthening value chains and working with various market players – from financial institutions to technology suppliers to enterprises – to develop linkages, often by removing barriers to business transactions
  - SPREADING THE APPROACH by building the capacity of other groups and institutions so that they can incorporate SMBA processes into their own projects and initiatives, ultimately affecting broader and greater impact within underserved communities around the globe

S³IDF's Mission in Action



A women's cooperative was able to gain access to a computer-aided embroidery machine, made possible with local financing and connections to technology suppliers.

- **Portfolio of Enterprises and Investments in India**
  - Since 2002 S³IDF has been employing its results-driven, enterprise-centric SMBA in southern India to build its portfolio of explicitly pro-poor, pro-environment small-scale deals
  - Portfolio includes infrastructure and related productive-use (income-generating) investments
- **SMBA Dissemination Activities**
  - S³IDF has explored opportunities for transferring the SMBA beyond India to East Africa, Pakistan, Bangladesh, Sri Lanka, Nepal, and Myanmar
  - Opportunities in Sri Lanka and Nepal have been pursued through reconnaissance studies and, in the case of Nepal, through additional investigation and pilot project implementation (to expand Nepal's Improved Water Mill Programme)
  - A larger scale application of S³IDF's SMBA in Nepal is now progressing and has the potential to impact hundreds of thousands of households as it expands

The Two S³IDF Organizations

S³IDF's Russell deLucia and T.L. Sankar at an opening ceremony for a clean energy project in rural India.

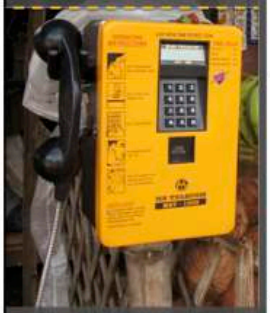
- **S³IDF is a partnership between two institutions:** S³IDF-US and S³IDF-India
  - Both institutions are members of the S³IDF family, share a common vision and pursue a common mission
  - Both are registered charities in their respective countries, however both are atypical charities operating in a very business-like fashion
  - Both are part of an "umbrella" strategic partnership with SELCO and SELCO Foundation
- **S³IDF-US** operates from a base in Cambridge, MA USA
- **S³IDF-India** assists entrepreneurs from an office in Bangalore, India

SMBA Application: Who Benefits & How

Through business development support services, women gain opportunities to increase their incomes and become asset owners.

- **SMBA can be applied across various geographies, sectors and with particular foci (e.g. women-owned enterprises)**
  - Some economies of scale can be captured, but not critical to SMBA applications
  - With use of multiple fund/facility windows, priorities of particular donor/investors can be respected and integrated into SMBA implementation
- **SMBA is a "win-win" for all parties involved with the small-scale enterprise-centric investments**
- **Donors and investors (including government entities) can be more confident in the efficiency and effectiveness of the use of their donations or investments and the impacts achieved**
  - SMBA incorporates intermediation with tight procedures that have explicit criteria
  - Pre-investment procedures are detailed and rigorous
  - Donor and investor funds are leveraged to facilitate local bank and other financial institution (FI) co-financing through de-risking mechanisms (e.g. partial risk guarantees on loans)
- **Entities providing "know-how," technology and/or business support services for the investment/deal benefit from increased business opportunities**
  - Commerce partners will be paid fair prices for their services and have the possibility of being preferred suppliers
  - SMBA includes the possibility of investing in such entities
  - SMBA implementation will grow their market
  - Non-commercial partners mission objectives are respected and incorporated

SMBA Application: Who Benefits & How *(continued)*



Small shops that add additional services like pay-as-you-go phones can increase business and connect people to the outside world.

- **Beneficiaries – clients, employees, and owners of the investments**
  - In all cases, incomes will increase
  - If clients (customers): the fees/tariffs for services will be non-exploitive and will reflect their "ability-to-pay" post investment implementation
  - If owners (ultimately in BOT and other schemes): asset ownership will grow significantly when the bank/FI debt has been paid or lease completed
- **Local banks or other financial institutions (FIs) providing co-financing for the SMBA-fostered investments**
  - Their risk will be mitigated, but they should have at least some exposure through modification of their "business-as-usual" practices
  - They will be able to charge their standard terms paid for such investments taking note of the risk mitigation
  - They will make profits if they are efficiently operated
  - Their market will grow both in numbers and in new classes of clients (many, if not all, of the poor beneficiaries will become customers for other forms of financial services)
- **Bottom line: SMBA implementation is not rocket science just hard work to achieve poverty alleviation in a "win-win" manner**

The Global Need for Basic Services and Challenges

Formation of S³IDF and the SMBA

LED Lantern rental enterprises provide affordable and reliable access to lighting that can improve the quality of life of consumers.

- **Why and how S³IDF founders came to advocate for pro-poor small-scale private infrastructure provision and an alternative paradigm**
  - Widespread Experience: 70+ countries
  - Understood that most poor are working poor with some ability-to-pay/willingness-to-pay for infrastructure services and the widespread needs
  - Development paradigm shortcomings
  - Influenced by diverse US experience especially early New England Merchant Bank approaches
  - Saw technical and material evolutions enabling smaller scale projects
  - Knowledge of small scale players, many in informal sector
  - Understood accessing local financial markets for the deals is critical

The Global Need for Basic Services

Solar panels provide a source of energy that can be harnessed for a variety of uses, including running grain grinders, small refrigeration devices, and sewing machines

- **Poverty alleviation and economic development is not possible without access to a minimum bundle of infrastructure services:**
  - Modern energy services
  - Potable water
  - Sanitation
  - Transport
  - Information and communication
  - Other infrastructure services
- **Micro-, small-, medium-sized enterprises (MSMEs) are well-positioned to provide infrastructure services in underserved areas of developing countries but barriers exist**

Challenges & Realities of Applying Enterprise-Based Solutions

A LPG-powered "rasoi-ghar" (common kitchen) enables poor families to prepare meals for relatives being treated at hospital in Hyderabad.

- **Lack of Enabling Ecosystem**
  - Absence of favorable physical, legal, regulatory, and political environment cripples entrepreneurs and industry when adopting market-driven approaches to deliver solutions
- **Scarcity of Development and Philanthropic Capital and Underuse of Capital Market Linkages and Local Synergies**
  - There is simply not enough development and/or philanthropic capital to meet the poor's infrastructure needs; local private capital must be part of the financing solutions
- **Limited Access to Financing**
  - Poor do NOT have collateral to access bank finance and bankers often view the poor as "non-bankable"
- **Mismatched Capital and Investment Structures**
  - Debt, equity and/or grants are important at different stages of pro-poor enterprise growth but standard use of these financing instruments do not always meet business needs (need more blended capital)
  - Need more financing for small-scale enterprises with longer and/or more flexible repayment schedules
  - More financing is often also needed for technology suppliers along supply chains
- **Limited Menu of Institutional Arrangements and Ownership Models**
  - Standard enterprise and project designs often neglect to consider more innovative structuring (for example, pro-poor "build-own-operate-transfer" models)

Challenges & Realities of Applying Enterprise-Based Solutions *(continued)*

Solar-powered computers at a school give students the chance to access the internet and learn basic computer skills.

- **Few Consumer Financing Choices**
  - Poor consumers need higher quality products and services but require cash flow-based financing which must include often overlooked opportunities, such as connection financing
  - Consumers also do not always have the necessary knowledge/know-how to select and implement choices
- **Unmet Demand for Business Development Services**
  - Entrepreneurs often have unmet skill development needs in financial and/or operational management such as inventory, accounts, marketing etc.
- **Overlooked Need for Value Chain Development**
  - Too little attention is paid to developing supply chains and distribution networks with finance, "know-how," and technology access/upgrading
  - More must be done to emphasize after-sales service models to sustain access gains
- **Insufficient Attention Paid to Connecting Energy-Generating Technologies to Productive-Use Technologies**
  - Expanding access to consumptive-use technologies improves quality of life but most poverty alleviation benefits result from technologies that can be used to generate income
- **Difficulty Maintaining Pro-Poor Focus of Development Capital**
  - Issues of who captures economic rents - ideally the poor through asset ownership but it is often the intermediaries
  - Unrealistic expectations for financial returns often mean it is difficult to be truly "impact-first" and serve the very poor

A Proven Alternative, Results-Driven Paradigm: Social Merchant Bank Approach® (SMBA)

Micro-Small Enterprise
(strengthening, existing & creating others)

Investment Criteria:
- Pro-poor
- Pro-environment
- Financially viable
- Replicable
- Entrepreneur has "skin in the game"

- **Bundled Support**
  - A ***merchant banking*** approach provides **integrated business development, technical and financial support** to portfolio enterprises
- **Leverage Local Financing**
  - Drawing on a Revolving Fund (RF), ***local financial institutions (FI)*** and various investors are engaged in portfolio projects with a ***'gap-filling'*** menu of debt, equity, partial guarantees, etc.
  - Target leverage is 2:1 or better
- **Technology Innovations**
  - Develop and/or integrate technology ***options that are appropriate for low income users*** – adapting off the shelf technology and using new evolutions in technology to meet the **needs of the poor**
- **Value Chain**
  - Works all along the technology and know-how chain and includes linked productive-use applications
- **Incubation of Enterprise Entrepreneurs (with partners)**
  - Using lessons learned to help **create/strengthen energy/infrastructure enterprises** and **facilitate partnerships** with local FIs and foster livelihood improvement investments

Financing Structures for Pro-Poor Impact

Current Status of Development Financing

An entrepreneur services a biogas plant in rural India to ensure that it performs at optimal levels, giving its users a valuable clean burning fuel and rich fertilizer.

- **"Development Boom" has bypassed the poor in many parts of the world – this means more significant requirements for donors and governments to meet poverty and productivity challenges**
  - Demographics mean that donors, governments, and others need to move faster, better, and innovate much more
- **Major development finance players and paradigms are evolving but changes must accelerate with greater innovation**
  - Changing individual development professionals' mindsets is challenging but quite feasible; changing development institutions' paradigms is much more difficult but must accelerate
- **Thought leaders are ahead of many development entities on need for pro-poor investing for impact**
  - Evident in OECD Development Co-operation Report 2014, "Mobilising Resources for Sustainable Development"
  - Such leadership found in many "worlds" - government, academia, business, commercial and development finance, foundations and in multiple faiths as reflected in the documentation of the recent Vatican Conference on Impact Investment
- **Foundations and others have (and can continue) to change the paradigms**
  - Needs to be more Foundation ODA donor/investor collaborations
- **Entry of new players (e.g. Kiva, Kickstart, Rang De) may prove important due to their flexibility**

Key Principles for Pro-Poor Financing & Structuring Mechanisms

SIDF mitigates risk for financial institutions through partial loan guarantees and other credit conditioning tools, helping "unbankable" entrepreneurs enter the formal economy.

- **Development and philanthropic capital for risk mitigation, pre-investment, capacity building, other soft costs and very smart pro-poor subsidies**
- **Local commercial finance leverage is critical**
- **Careful intermediation, technical assistance and partner coordination is required**
  - Intermediation must be well-designed and implemented with experienced entities with direct connection to projects/enterprises to minimize "intermediary capture" and inefficiencies
  - Financial institutions involvement requires raising awareness/comfort levels with technologies, cash flows
  - Technology suppliers may need support with supply chain extension, integrating after-sales servicing in new areas
- **Need to deliver finance, know-how, and technology all along the supply/value chain**
- **Invest so the poor's livelihoods/incomes improve and their asset ownership increases**
  - Cannot happen without infrastructure access; such investments are a precondition
  - Deal structuring for poor ownership of assets underwritten by development and philanthropic capital
  - Incorporate working poor's entrepreneurial skills and develop their capabilities

Pro-Poor Financing & Structuring Mechanisms *(continued)*

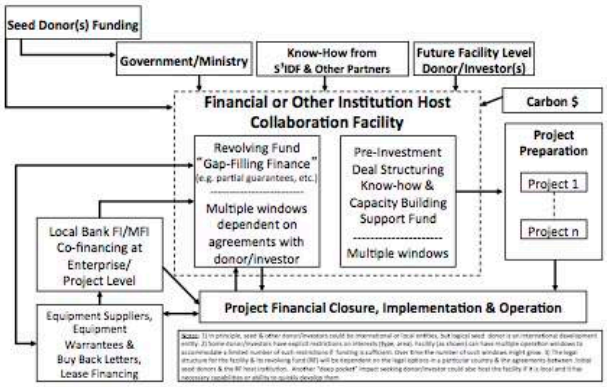
Innovative business models, such solar lantern rental and delivery, provide new livelihood opportunities in rural areas while also improving the quality of life for households.

- **End-user/small-scale enterprise finance overcomes up-front capital cost barriers for technologies**
  - Some end-users can pay for technologies allowing lower costs through savings from traditional energy sources but poor cannot pay full cost upfront so financing is critical
  - Small-scale enterprises often have capital requirements beyond upper limit of micro-finance so "beyond micro-finance" is critical
- **Mechanisms for investment structuring of pro-poor investment and their risk management**
  - Guarantees or other credit conditioning mechanisms overcome collateral constraints
  - "Gap-filling" enterprise financing – debt (primary and/or secondary) and/or equity
  - Equipment supplier financing
  - Budget Intercept
  - New ownership and/or operations structures that lower costs and make infrastructure services viable
- **Investing for impact not necessarily impact investing (as many define it)**
  - Too much ODA failure due to lack of investing for impact without well-designed and implemented intermediation
  - "Devil is in the details" with nuance for cost of capital, financial vs. commercial viability

Need for a Spectrum of Financing Types

- **All financing sources must be part of the solution; challenges for financing pro-poor energy access**
  - Poor are often best served by decentralized solutions (remote areas, low population densities) but the challenges of providing services make it more difficult to mobilize private sector financing (tighter margins, untested business models, less than commercial rate returns, etc.)
  - Yet private sector financing is critical; not enough other financing available to handle the magnitude of the need
- **Investing for impact requires use of a "spectrum" of financing types with the "blend" of these financing types differing with the investment phases (pre-investment, implementation, operation)**
- **Investing for explicitly pro-poor impact is not rocket science; it is just hard work**
  - Move from "risk-return" to "risk-return-impact" calculus with strong emphasis on impact
  - Critical to note "color of money" and move from just "primary color financing money" to a spectrum (or rainbow) of colors
  - Often need to blend the "colors" and little/no role for impact investors if truly pro-poor unless absolutely impact first
  - Blend will vary depending on the different phases in the investment cycle

Example Multi-Party Collaboration Facility to Transfer/Apply S³IDF's SMBA



Financial Sustainability

A locally owned and operated Integrated Energy Centre (IEC) provides community members with access to a variety of services, ranging from solar light rental to internet access to community TV.

- **Investment Cost Categories**
  - *Hard Investment Costs:* All equipment/materials costs to "put project into implementation," all the capital financing costs (e.g. debt and equity charges) and OM&R
  - *Soft Investment Costs:* Investment or enterprise-specific pre-investment costs (a special challenge). In larger infrastructure projects these costs are normally capitalized into the investment costs, effectively becoming part of the "hard" costs in the financial structure of the project
  - *Other Soft Costs:* More programmatic – helping develop players – upstream entities, government/ regulators – and organizing community groups, etc.
- **The Challenge**
  - Small pro-poor projects do not allow full capitalization of soft costs into the financial cost of the project.
  - It requires considerable time and experience to learn the range of possible soft cost recover/capitalization
- **Levels of Sustainability**
  - Maximum sustainability – covers all hard and soft costs
  - Conventional sustainability – all hard, soft investment costs
  - Partial sustainability – All OM & R, some capital costs (financing and RsE)
  - OM & R sustainability – no capital costs covered
- **S³IDF aims for conventional sustainability less soft investment costs (sometimes partial coverage)**
  - Raise grant monies to cover other costs
  - Address trade-off of increasing efforts (and therefore soft costs) for certain partner collaborations and for accessing government/other support programs that may reduce revolving fund requirements
  - Innovate with fees and deal structuring to capture some producer surplus while keeping deal viable and pro-poor

Perspectives on MSME Technology Integration

Working with technology suppliers to expand supply chains for pico-hydropower systems made it possible for farmers in India's Western Ghats to access electricity for their homes and enterprises.

- **Implications of Incremental (often consumptive-use) vs. Transformational (often livelihood supporting) Technologies**
  - Transformational technologies provide opportunities for livelihood development and income-generation; important for poverty alleviation
  - Examples of Incremental Technology: improved efficiency lighting, ovens, etc.
  - Examples of Transformational Technology: submersible electric pumps
- **Transformational Technologies Often Combine Energy-Generating Technologies and Productive-Use Technologies**
  - Examples of Energy-Generating Technologies: pico-/micro-hydro turbines, PVs, micro-turbines (gas)
  - Examples of Productive-Use Technologies: Submersible lower cost water pumps, small-scale refrigeration units, grain grinders
  - Examples of Supporting Technologies: Low cost "customized" solid state controls, smart & pre-paid meters (manage demand, lower commercial costs)

Perspectives on MSME Technology Integration *(continued)*

S³IDF's work with technology providers includes extending critical after-sales service and maintenance networks.

- **Supply Chain Considerations**
  - Must determine sales, service and continuing input requirements (e.g. diesel, lubricants)
  - Important to assess current supply chains to understand whether they will be sufficient or if new chains (or significantly strengthened chains) will be required
  - Technology suppliers' operations affect MSME operations; often suppliers need or benefit from separate support and financing
- **Complementary Institutional and Regulatory Developments**
  - Easing of licensing and sub-franchise constraints; tolerance of illegal/unlicensed providers
  - Creation and active work by trade associations
  - Leasing, management contracts, sales or other "off-loading" of small/rural systems to local players
  - Various creative collaborations between the multinational development institutions (local or international) and local small players (lowers costs, making infrastructure services viable)

Perspectives on Business Support Services

S³IDF works with local practitioners to help them increase their own capacity to provide enterprises with business development and support services.

- **MSME entrepreneurs often require or benefit from commercial knowledge and technical "know-how" to develop viable business strategies and plans**
  - Common skills gaps include:
    - Understanding how to integrate technology options into new or existing enterprises to maximize productivity and increase reliability and quality of products and services
    - Projecting and planning for business growth, risks
    - Assessing and securing financing
    - Marketing and selling strategies
- **"High touch" business support *(e.g. training and incubation programs, frequent one-on-one support sessions, etc.)* can increase the likelihood of MSME success but more intensive support is more costly**
  - Important to assess trade-offs

Example SMBA Investment Development Transactions

SMBA Investment Project Deal Cycle & Need for Grant, Carbon, Concessional Funds

Pre-investment phases (studies, surveys, feasibility analysis and arranging co-financing) Timelines after start detailed pre-investment, generally minimum 3-8 months; some more than one year due to complexities & deal structuring	Implementation/Construction Phase Timelines: few moths to year+, depending on complexity	Operation Phase Timelines: Monitoring & Evaluation (M&E) for at least 2-3 years. For some projects at least until the debts are paid
Financial Closure ▲	Implementation Begins ▲	Implementation Ends ▲ Operation Starts ▲
	Project Operates Financially	
•Some cost share with partners, cost cannot be absorbed by the project (because of small size and pro-poor characteristics) •These costs must be supported by grant/carbon funds or other soft costs •Some of the costs are applicable to broader project replicability •IF (capitalized by various sources) need for concessional versus "hard" funds. Deal-specific carbon financing can be a source	•Capital implementation, construction costs covered •Some monitoring done as part of financing procedures by both S³IDF &co-financing banks in both this and operations phase (until debt, etc. repaid). •Technical support, SME capacity building must be covered in part/whole by grant funds	•Project operates in a financially viable fashion including operations cost, loan, guarantee fee, etc. payments to IF. •Post-implementation M&E and Lessons Dissemination critical to replication and to S³IDF's broader mission of dissemination •These costs must be supported by grant funds •Some deals can cover commercial ROI targets; poor people have different ROI targets •On a portfolio basis, need reserves for failures
MAJOR RISKS: •No/poor terms co-financing •No agreement on deal structuring	•Various implementation/construction delay •Unforeseen regulatory barriers/delays •Community/partner reneging on agreements (e.g. land acquisition & compensation) •Cost overruns	•Technology performance •Fuel/feedstock/resource (e.g. stream flow availability and/or costs) •Market: insufficient demand, non-payment, exchange rate •Operator performance

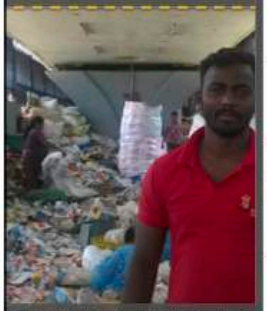
Implementation Monitoring and Evaluation Support ■ Post Implementation Monitoring and Evaluation Lessons, Dissemination ■
Start of Phase ▲

S³IDF's India Portfolio Today

Battery and light rental enterprises give street vendors the ability to sell products long into the night.

- **Young** in operation since **2001** (US); **2002** (India)
- Almost 200 **projects** in the India portfolio
- Investments all **along the supply chain** and **productive use applications**
- Dozens of projects in the pipeline
- **Instruments** include Debt; (Primary and Secondary) Partial Guarantees; Equity; Supplier Buy Back Agreements
- Revolving Fund leverage ≥ **2:1**
- Partnership with **12 banks**
- Strategic partnership with **SELCO** and **SELCO Foundation**
- Partnership with **~30 technology suppliers**

Characteristics of Portfolio Projects



Supporting the development and expansion of dry waste collection center enterprises in Bangalore, India has improved incomes.

- **Small-scale sustainable infrastructure and associated productive-use investments**
- **Explicitly 'pro-poor'**
  - The poor benefit as: clients, customers, enterprise employees, and/or investment asset owners
- **Financial viability**
  - Enterprises' cash flow must cover capital and operating costs from implementation onwards
- **Highly replicable**
- **Micro-meso-small finance**
  - Debt, equity, guarantees ranging from US$500 to US$40,000
- **'Skin in the Game'**
  - Entrepreneur has capital (cash and/or sweat equity) at risk

Straight Forward Project Example: Solar Lighting for Silk Cocoon Rearing Centre

Solar panels atop the cocoon rearing center

Solar lights being used to assist in feeding the worms

Silkworms placed in the 'Chandrika' where they form cocoons.

S³IDF provides technology and financial linkages
(partial guarantee with the local bank for loans taken by the farmers)

Modest Complexity Project Example: Street Hawkers' Light Points

Entrepreneurs with solar charging station and batteries for lanterns

Transportation of batteries

Lighting for hawkers

In light point projects, S³IDF arranges the business development, technology and financial assistance to help the entrepreneurs increase their income, generate employment and provide cost savings and improved lighting for street vendors.

Quite Complex Project Example: Last Mile Electricity Distribution Franchising

Discussions with Cherlapateiguda Panchayat.

The Ibrahimpatnam Substation – 33/11 KV

Meter reading at the feeder level.

Franchisee/Entrepreneur Mr. Reddy addressing attendees at the inauguration ceremony.

Interactions with the community about the franchisee operations.

In partnership with ASCI, S³IDF implemented a unique business model using franchisees for providing better electricity services to the villagers in Cherlapatelguda. Over time, the franchisee provided other value-added services to the community such as access to finance, potable drinking water, & information services.

Different Type of Project Complexity Example: Osmania General Hospital Rasoi Ghar (Kitchen)

LPG (liquid petroleum gas) is a cleaner burning fuel which makes HPCL a strategic partner as S3IDF works to provide safe technologies and clean fuels for the poor.

The kitchen provides a clean, safe environment for poor families visiting patients to prepare meals. Previously, food was either cooked on open fires or purchased at prohibitive costs.

S³IDF worked with a strategic partners – HPCL, hospital administrators and other key players – to implement this rasoi ghar (common kitchen) in the 2000-bed Osmania General Hospital.
Families pay an hourly fee for use of the LPG connections and cooking utensils.

ANNEX III: SMBA Workshop Attendees

	First Name	Last Name	Job Title	Company / Organization
1.	Richard	de Ferranti	Director	Climate Change Services Australia
2.	Julien	Brewster	Livelihoods and Environment Program Manager	People in Need
3.	Sokha	Huot	Chief Business Officer	AMK
4.	Savoeurn	Meang	Project Manager	Agronomes et Vétérinaires Sans Frontieres
5.	Chhuon	Sokcheth	Brand & Promotion Unit Manager	Thaneakea Phum (Cambodia) Ltd.
6.	Dina	Lim	AVP & Manager of Marketing Unit	ACLEDA Training Center Ltd.
7.	Louise	Robb	Director of Operations	Nexus Carbon for Development
8.	Thomas	Blackburn	Program Development Manager	Nexus - Carbon for Development
9.	Jeanne	Everett	Consultant, community-based infrastructure and ser	Independent and ADB
10.	Rachel	Pringle	General Manager	Hydrologic Social Enterprise
11.	Ella	Dodson	Communications Officer	Nexus
12.	Alba	Topulli	Private Sector Engagement Manager	GERES Cambodia
13.	Sokunthea	Soeum	Editor	Stuff Cambodia magazine
14.	Michael	Tharamangalam	Consultant	SEAM Opportunity Network
15.	Antoine	Collet	Analyst	Uberis Capital
16.	San	Dara	National Market Development Manager	Habitat for Hummanity Cambodia
17.	Danielle	Wilkins	Program Coordinator	IESC
18.	Kaklyda	Huy	Sales and Marketing Manager	Stuff Cambodia Magazine
19.	Peter	Roggekamp	Team Leader	3i: Investing In Infrastructure
20.	Nicholas	Wolf	Second Secretary (Development Cooperation)	Australian Embassy, Phnom Penh
21.	Timol	Pen	Investment Officer	Arun LLC
22.	Jean-Baptiste	Lanoe	Intern	Devenco
23.	Haitao	Yu	Junior Consultant	Devenco Investment & Consulting
24.	Julien	Jacquot	Manager - Technical Advisors Unit	GERES
25.	Mao	Sun	Director	EcoSun Energy Cambodia
26.	Ky	Chanthan	Managing Director	CCDE
27.	Hak	Ham	Technical Advisor to WOMEN organization	Women Organization for Modern Economy and Nursing (WOMEN)
28.	John	McGinley	Managing Partner	Mekong Strategic Partners

29.	Eng	Tongngy	Head, HO Relationship Management	Canadia Bank
30.	Channrong	Rem	Partnership Development Director	Teuk Saat 1001/1001 Fontaines
31.	HAK	Norin	Research Manager	Chamroeun MFI
32.	Sut	Samedy	Chief Manager	Cambodian Rural Development Team (CRDT)
33.	Lo	Chay	Executive Director	Tuek Saat 1001
34.	Len	Si	CEO	Maxima Mikroheranhvatho Plc
35.	Sok Kea	Cheang	Social Performance & Integratin Manager	VisionFund Cambodia
36.	Hany	Fiya	Executive Director	Phnom Srey Organization for Development
37.	Rith	Bon Roeun	Executive Director	Action for Development
38.	Sokchea	Em	Executive Director of Phum Baitong	Phum Baitong
39.	Jim	Gramberg	CEO	Solar Partners Asia Cambodia Ltd.
40.	Daline	So	Business Development Coordinator	VisionFund Cambodia
41.	Hong	Ngin	Business Development Advisor	SNV
42.	Raphaele	Deau	Consultant	Free Lance
43.	Brian	Lund	Regional Director	Oxfam America, East Asia Regional Office
44.	Nikhil	Agarwal	Analyst	Insitor Management
45.	Dominque	DuFieux	Operations Director	Tuek Saat 1001
46.	Sudhakar	-	Chief Executive Officer	Hand in Hand Cambodia
47.	Rem	Chanrroug	-	-
48.	Tony	Knowles		SME Renewable Energy
49.	Claire	Dufour	Executive Director	Nexus Carbon for Development

ANNEX IV: Meetings in Cambodia (Pre-/Post-Workshop)

	Name	Organization	Position
1.	Jeanne Everett	Independent Consultant	Independent Consultant
2.	Ford Thai	Khmer Solar Ltd.	President
3.	Thul Kosal	Foreign Trade Bank of Cambodia	Official
4.	Ou Sarinda	Credit Officer	Rural Development Bank (RDB)
5.	Keo Moly	Business Development Manager	Comin Khmer Co., Ltd.
6.	Tes Bunheang	Sale Manager	Energy Saving Supply Co., Ltd.
7.	Ponn Dalyn	Deputy Director, Economic Research Department	National Bank of Cambodia
8.	Sun Chhavivann		National Bank of Cambodia
9.	Silas Everett	Country Representative	The Asia Foundation
10.	Heang Sarim	Executive Director	Cambodian NTFP Development Organization (CANDO)
11.	Tep Chansothea	Program Officer – Climate Change	Forum Syd
12.	John Week	Communication Officer	Forum Syd
13.	Zhihong Zhang	Climate Investment Funds	Senior Program Coordinator
14.	Dan Millison	Transcendergy LLC	Manager
15.	Raphaele Deau	Independent Consultant	Constultant – Climate and Development
16.	Jim Gramberg	Solar Partners Asia	CEO
17.	Nick Wolf	Australian Embassy	Second Secretary (Dev. Cooperation)
18.	Sok Kea Cheang	VisionFund Cambodia	Social Performance and Integration Manager
19.	By Virak	VisionFund Cambodia	Social Performance and Integration Officer
20.	Frederic Dubois	Devenco	Managing Director
21.	Christophe Forsinetti	GL Finance/Devenco	Executive Director/Managing Partner
22.	Rebecca Black	USAID	Mission Director to Cambodia
23.	Leav Dara	Teuk Saat 1001	Financial Director – from biz card not meeting?
24.	Dominique Dufieux	Teuk Saat 1001	Operation Director
25.	Ren Channrong	Teuk Saat 1001	Partnership Development Director
26.	Arjen Luxwolda	Kamworks	Managing Director
27.	Nick Lazos	Insitor Management	Investment Director
28.	Anthony Watanabe	Asia Clean Innovations	Managing Director
29.	Alba Topulli	GERES	Private Sector Engagement Manager
30.	Mathieu Ruillet	GERES	Cambodia Country Director
31.	Mean Channarith	FTB Bank	Senior Manager of Credit Department
32.	Jason Steele	SNV	Sector Leader Renewable Energy Cambodia
33.	Ngin Hong	SNV	Business Development Advisor, Waste to Energy (WtE) Project
34.	John McGinley	Mekong Strategic Partners	Managing Partner
35.	Manon Plouchart,	AFD	Project Officer – Banking Sector, Urban Dev and Partnership with NGO
36.	Thomas Husson,	AFD	Project Lead - green microfinance

37.	Cyril Renault	AFD	Project Manager, Sustainable Energy and Transport Division
38.	Ten Ra	ASSIST	Project Manager
39.	Sut Samedy	CRDT	Enterprise Development and Marketing Manager
40.	Jan Jaap Kleinrensink	Plan International	Country Director
41.	Andrew Hill	Plan International	
42.	Symantha Holben	Harvest - USAID/Fintrac	Deputy Chief of Party, Operations and Funds Director
43.	Susan Novak	Harvest - USAID/Fintrac	Director Social Inclusion &Capacity Development
44.	Brian Lund	Oxfam America	Director – East Asian Regional Office
45.	Timol Pen	ARUN	Investment Officer
46.	Jon Exel	Exel Energy	Director
47.	Sun Mao	EcoSun	Director
48.	Savoeurn Meang	AVSF Cambodia	Project Manager of Speu Ka Project
49.	Sophoan Min	AVSF Cambodia	Country Coordinator
50.	San Sreymom	SME Renewable Energy	Assistant to Director
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