GPFI Global Partnership for Financial Inclusion

G20 GERMANY 2017
HAMBURG

Federal Ministry
for Economic Cooperation
and Development

Climate Smart Financing for Rural MSMEs: Enabling Policy Frameworks

G20 Global Partnership for Financial Inclusion

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

WORLD BANK GROUP
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IFC International Finance Corporation

IMPRINT

Authors
Eva Csaky (IFC)
Angelika Frei-Oldenburg (GIZ)
Ulrich Hess (GIZ)
Saskia Kuhn (GIZ)
Calvin Miller (consultant)
Panos Varangis (World Bank)
Debra Perry (IFC)

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Desgin
Jeanette Geppert, pixelundpunkt kommunikation, Frankfurt

May 2017

TABLE OF CONTENTS

Acknowledgements

This policy document was produced on behalf of the G20 Global Partnership for Financial Inclusion (GPFI) in 2017. It was completed under the German Presidency and the leadership of the Co-chairs of the GPFI SME Finance Subgroup Natascha Beinker (Germany) and Aysen Kulakoglu (Turkey). In addition, other G20 GPFI members also provided valuable comments and contributions including Australia, Canada, Italy and India. The document was produced jointly by GIZ, the World Bank Group and the German Federal Ministry for Economic Cooperation and Development (BMZ).

The document was prepared by the following team of experts based on research and personal experience: Eva Csaky (IFC), Angelika Frei-Oldenburg (GIZ), Ulrich Hess (GIZ), Saskia Kuhn (GIZ), Calvin Miller (consultant), Panos Varangis (World Bank) and Debra Perry (IFC).

The authors have benefited tremendously from the chairmanship of Roland Gross (GIZ) and Brigitte Klein (GIZ) as well as from the very substantial support throughout the writing process of Silvia Heer (BMZ). The authors also wish to thank Peer Stein and the climate finance team at IFC, Financial Institutions Group, for their support.

Recognition is also given to Weijing Wang (consultant), Nancy McCarthy (LeadAnalytics), Vipul Sekhsaria (IFMR Holdings), Victor Kommerell (CIMMYT), Quyen Nguyen (IFC), Veronika Bertram-Huemmer (KfW), Sylvia von Stieglitz (GIZ) and Janina Wohlgemuth (GIZ) for their contributions to the case studies and other materials for this document.

It is important to recognize the support of BMZ and GIZ for their leadership and organization of the **G20 GPFI workshop** on **"Climate smart financing for rural MSMEs – enabling policy frameworks"** in February, 2017 in Frankfurt am Main, Germany, which provided the venue for review and discussion of the lessons and policy issues on this important topic. **The paper was presented at the G20 GPFI Forum and endorsed by the G20 GPFI at the Plenary in May 2017 in Berlin.**

In particular, it is important to recognize the sponsoring institutions, including the BMZ, GIZ and the World Bank Group for supporting this research and Roundtable, and especially the project leadership of Ulrich Hess from GIZ and Panos Varangis from the World Bank Group. We also recognize the support of contributing authors of case studies and workshop presenters.

Acronyms

CEEF	Commercializing Energy Efficiency Finance
CGIAR	Consortium of Agricultural Research Centers
CIMMYT	International Maize and Wheat Research Center
CP	Cleaner production
EE	Energy efficiency
EF	Energy finance
EU	European Union
ESCO	Energy Savings Company
FI	Financial Institution
FIAP	Financial Inclusion Action Plan
GEF	Global Environment Facility
GPFI	Global Partnership for Financial Inclusion
GHG	Greenhouse Gas
ICT	Information and communication technology
IFC	International Finance Corporation
MSME	Micro, small and medium enterprise
PCG	Partial credit guarantee
PO	Producer organization
PPP	Public-private partnership
RE	Renewable energy
RSF	Risk sharing facility
SDGs	Sustainable Development Goals
SEF	Sustainable Energy Finance
SME	Small and medium enterprise
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
VC	Venture Capital

Executive Summary

Climate change increases risks and presents significant challenges as well as potential opportunities for rural Micro, Small and Medium Enterprises (MSMEs.) However, financing is crucial for enabling these MSMEs to adopt needed practices and investments in technologies and approaches that are climate smart. This is particularly challenging for those MSMEs in the rural and agricultural setting which are most vulnerable and already have the most difficulties accessing finance.

The document presents a synthesis of the key lessons and implications of climate change needs and solutions for MSMEs in developing countries with an emphasis on the implications for governments and development agencies to consider. The document is enriched with many case examples of practices implemented around the world. Based on this analysis, evidence from the case studies and the modeling of climate smart MSMEs, the document elaborates policy options for G20 policy makers. These options are designed to help overcome market failures that prevent rural MSMEs' adaptation to climate change and help enable and incentivize MSMEs to access climate smart financing. These adaptations would not only reduce MSME vulnerability but also help reduce CO_2 emissions and pollution.

The paper first addresses the issues surrounding rural and agricultural MSMEs and constraints they face for finance and investment; it then assesses the gaps for climate smart MSMEs. The subsequent section describes climate smart adaptation and mitigation solutions for MSMEs. It does this by highlighting some of the current understanding of the climate financing problem as well as relevant lessons learnt from the sustainable energy financing area, followed by potential ways forward, with policy implications relating to adaptation. It then presents opportunities that can be realized from new climate smart technologies and efficiencies that can be gleaned from "green" finance and investment.

The document moves from outlining the needs, constraints and opportunities to focusing on the climate smart financial solutions for MSMEs. These financial solutions include financial tools and public-private collaboration for scale-up of climate smart investment with an emphasis on the policy implications. Policy is noted as an important driver of change and a policy assessment and options are presented with regards to how policy makers can promote financing MSME climate smart adaptation. The policy options are summarized into a Policy Toolbox with applications and examples to facilitate policy discussion.

Key policy messages highlight that climate smart adaptation and risk mitigation policies need to empower and provide an enabling environment for change, provide incentivizes to build capacity and facilitate financing and investment. Blended finance, partial guarantee schemes and insurance support may be required to promote and incentivize financial institutions to lend and for rural MSMEs to be able to borrow. Private financial institutions must play an important role in climate smart financing and public financing schemes can help "crowd in" their participation.

1. Introduction

Micro, Small and Medium Enterprises (MSMEs) are often not equipped to absorb the economic effects of losses climate change may bring. Investment in climate smart MSMEs, as well as investment that encourages rural MSMEs to become climate smart, is therefore needed to adapt and build resilience of rural communities, as well as to reduce greenhouse gas emissions from rural areas. .
(G20 GPFI SME Finance Sub Group Workshop, February 2017)

The 2014 Financial Inclusion Action Plan (FIAP) developed by the Global Partnership for Financial Inclusion (GPFI) highlighted ten action areas that were considered to be most important to advancing financial inclusion. Three out of the ten action areas are related to agribusiness and rural SME Finance: a) accelerate and replicate successful policy reforms that facilitate the expansion of financial services and investments to SMEs, b) establish the SME Finance Forum as global center for good practice knowledge exchange and promotion, and c) improve financial access through the SME Finance Compact, SME Finance Initiative, and key development achievements.

By endorsing the G20 Action Plan on SME financing in 2015, the G20 agreed, and encouraged non-G20 countries to fully develop credit infrastructure for Small and Medium Enterprises (SMEs), improve SME financial capability through targeted learning and support interventions, and enable competition through an enabling regulatory environment. The sub-group has therefore taken a closer look at recent developments in agricultural and rural finance through working papers on: a) agricultural value chain finance, b) gender finance, c) ICT solutions in agricultural finance, and d) agricultural insurance. After discussion and dissemination of the results of this study, further questions that the subgroup wanted answered include:

- What are the implications of climate change for Micro, Small and Medium Enterprises (MSMEs) in rural areas, in particular with regard to financing climate smart technologies?[(1)]
- What innovative financial approaches and initiatives are there?
- What are common success criteria for approaches/projects that have reached a larger scale?
- What policies are needed to address this issue?

This policy paper therefore elaborates policy options that would be relevant for policy makers striving to achieve the Agenda 2030 sustainable development goals and the Addis Abeba Action Agenda on Financing for Development. In 2015, the United Nations introduced the 2030 Agenda for Sustainable Development. It consists of 17 Sustainable Development Goals (SDGs) with 169 targets and aims on stimulating action in areas of critical importance for humanity and the planet. Policies for sustainable financing of MSME resilience to Climate Change and MSME adoption of new climate mitigation business models contribute to several SDGs. In particular they contribute to Goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture), Goal 6 (Ensure availability and sustainable management of water and sanitation of all), Goal 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation) and Goal 13 (Take urgent action to combat climate change and its impacts). Policy options elaborated in this paper can be adopted and tailored by countries according to their national circumstances as with different country settings, as the associated cost and benefits of proposed actions also differ.

1.1 OBJECTIVE – ENABLING POLICY FRAMEWORKS FOR CLIMATE SMART FINANCING FOR RURAL MSMES

Rural MSMEs are vital to the health of the rural economy and global food security. These MSMEs, which include primary producers, processors and traders, face increasing income and asset loss risks due to the changing climate in general and more frequent disasters in particular. They are often not equipped to absorb the economic effects of losses climate change may bring. This affects not only the families themselves, but also the communities within which they operate, the buyers and processors and consumers, and the food security systems in general.

Governmental policy can have a crucial role in fomenting finance and investment in MSMEs. Policies that address the financial bottlenecks they face are particularly important for the longer-term nature of climate smart investment. The objective of this document is to provide a synthesis of the finance and investment problems MSMEs face for adaptation when it comes to climate smart solutions needed and mitigation required and then to offer policy options for promoting climate smart adaptation for risk mitigation as well as fomenting investment in green technologies for MSMEs.

1.2 DOCUMENT STRUCTURE

This paper reviews existing policies incentivizing and regulating rural MSME climate smart financing and provides synthesis and illustrative evidence regarding performance and results of these policies. The review of experiences, literature, and lessons drawn from case study examples representing diverse approaches and scenarios for promoting climate smart MSMEs serve to formulate policy options. These options will be designed to help overcome market failures that prevent rural MSMEs from adapting climate smart practices change and prevent them from accessing climate smart financing.

The paper is structured as follows: Chapter 2 focuses on the need for addressing climate change and measures for risk reduction that rural MSMEs must adopt. First, it sets the stage by addressing the issues surrounding rural and agricultural MSMEs and constraints they face for finance and investment. It then assesses the gaps for climate smart MSMEs. The following section describes climate smart adaptation and mitigation solutions for MSMEs. It does this by highlighting some of the current understanding of the climate financing problem as well as relevant lessons learnt from the sustainable energy financing area, followed by potential ways forward with discussion and policy implications.

Chapter 3 follows a similar format but with a focus on the opportunities that can be realized from new technologies and efficiencies that can be gleaned from "green" finance and investment. It then addresses the financial bottlenecks inhibiting scale-up of this adaptive investment. Chapter 4 also presents examples of promising solutions that have been implemented or initiated, along with the policy implications.

Chapter 5 presents a summary of policy analysis methodologies and applications in a number of cases and examples. The final Chapter 6 provides a policy assessment and outlines how policy can promote financing and investment for MSME climate smart adaptation. This includes catalytic insurance solutions for rural MSMEs, opportunities for innovation and areas for public support, such as education, raising awareness and data improvement. These policy options are then summarized into a Policy Toolbox with applications and examples to facilitate policy discussion.

Annexes of eleven case studies are presented in Chapter 7 to illustrate and more comprehensively explain examples of implementation of climate smart financing and the policies and stakeholders involved.

2. Rural MSMEs adopting climate smart solutions

With climate change, 100 million persons are expected to fall into extreme poverty due to more disasters and changes in production due to climate. Micro, small and medium enterprises (MSMEs) are among the hardest hit.
(DFID, 2015)

Interventions regarding climate change can fall into three categories.

a. Building MSME resilience through adaptation and mitigation measures

b. Strengthening MSME resilience and economic opportunity through good risk management techniques and appropriate technologies.

c. Providing MSME relief through insurance and disaster relief

Post-disaster response in any form is very expensive in financial as well as the human and social costs of lives, livelihoods and assets that may be lost. Slow on-set disasters such as temperature rises affecting flooding, drought, diseases, etc. are less dramatic than sudden ones but also have devastating effects. Hence, a forward-looking focus for addressing the effects of climate changes necessitates preventative actions that reduce risks. Naturally, this focus requires adaptation and mitigation measures to reduce risk and build resilience, as addressed below. It also must go beyond and take the opportunity to promote new MSME technologies and business models that build resilience through improved efficiencies and practices. For example, improved energy technologies or water management not only help MSME resilience and growth, but also contribute to a global good for climate change.

2.1 RURAL MSME CHALLENGES FOR ADAPTATION

"If things continue to worsen, some 40 percent of the land that's currently growing maize in Africa will be barren by 2030. Any time there's an extreme weather event, the amount of damage to low-income countries in Africa will be much greater than to the high-income countries in Europe and elsewhere. We want to put adaptation on the table as one way of addressing directly the justice issues that we have to tackle."
(Jim Yong Kim, World Bank, 2015)

Becoming more resilient to climate change is a considerable challenge for MSMEs in developing countries and emerging economies. Rural MSMEs are burdened by the combination of various risks and transaction costs, which are also the leading barriers to their adoption of climate smart solutions. In addition, these firms lack the necessary resources and are often unaware of both the risks and opportunities associated with climate change. This leaves them and their communities and countries exposed and vulnerable to the risks of climate change, jeopardizing the development progress they have already made. The combined costs of providing financial services to rural MSMEs, combined with the risks outlined in Section 2.2, and the unfamiliarity of the underlying climate smart solutions, explain why the market for climate smart rural MSME finance is nearly nonexistent and indicates a possible need for policy interventions.

Increasing climate change resilience of rural MSMEs requires action on multiple fronts. These enterprises need to: a) understand the risks; b) assess what it means for their situation; c) accept that change is needed; d) prioritize actions to undertake, and e) take the actions needed. They must either have the human and financial the resources to address the actions needed, or have access to acquire those resources. These adaptation measures taken may reduce climate risks directly or transfer the risk through insurance and guarantees. In addition, they could also choose to capitalize on new business opportunities that arise as a result of climate change and/or build from their actions for climate change adaptation.

2.2 RISK REDUCTION NEEDS

MSMEs, as private enterprises, choose to invest in climate smart measures either to reduce the physical effects of climate risks directly, transfer the risk through insurance, or to capitalize on a new business opportunity that has arisen as a result of climate change. The most visible need for MSMEs to adapt their practices to a climatic change reality is to reduce their risks. They can diversify their production or their suppliers, they can prepare for drought through investing in irrigation, they can seek insurance coverage and/or a plethora of many other technological, business change or risk mitigating alternatives. However, without the resources to change and/or the awareness of the risks, they most likely will remain operating as is with increasing vulnerability to the climate risks.

Rural MSMEs already encounter a harsh business environment with many uncontrollable risks. They often lack access to reliable infrastructure of roads, electricity and storage, for example, which increases their vulnerability and costs of operation. They are usually price takers, affected by market and weather factors they cannot control and are not able to hedge against. Climate change increases those risks and a natural disaster leads to not

only a major loss for production but the whole MSME supply chain of goods and everyone involved being affected. The result are systemic ripple effects – both throughout the value chain and throughout the sector and region – since weather events, for example, can be widespread, leading to an increase in poverty for all involved.

MSMEs' already high risks for buyers, financiers and investors as well as for their own livelihoods become even higher and stifle innovation and investment and their access to funding. The tools for reducing risk through risk reduction, such as through new drought tolerant seed, or risk transfer such as insurance, are not available to many.

2.2.1. LIMITS OF TRADITIONAL RISK MANAGEMENT

Informal risk management arrangements, which can work for traditional individual level risks, frequently do not protect MSMEs from climatic risks. Poor households and their informal community support networks cannot cope when many are affected with income and asset losses (e.g. regional droughts or floods). The highly systemic, covariate nature of many of these catastrophic losses makes them especially difficult to manage. Local finance also becomes scarcer when everybody is seeking to borrow and few have money to lend. Local markets for crops, feed and livestock work against MSMEs when they all are trying to buy or sell at the same time. For example, because many MSMEs try to sell livestock in drought periods, they force animal prices down, and then when they try to restock in post-drought years, prices rocket. Local food prices can also spike when regional shortages arise, and many MSMEs may lose important assets (e.g. livestock) that make subsequent recovery slow and difficult (Dercon and Christiaensen, 2007) .

Covariate risks are a problem for not only producers but for everyone along the value chains. Input suppliers and financial institutions can be faced with widespread defaulting on loans and unpaid bills. Agricultural traders and processors lose when they face a shortage of raw materials, and rural shopkeepers and small businesses suffer when local incomes, and hence demand for their services, fall. Some of the most dramatic evidence of the failure of traditional risk management comes from studies of severe drought, showing that in percentage terms, income losses can far exceed initial production losses because of a resulting collapse in local agricultural employment and wages, non-farm income and asset prices.

2.2.2. AWARENESS

Climate change risk is relatively new and without a track record for reference. For MSMEs, the lack of awareness and information is a prominent barrier in investing in climate solutions since the extent of the risks are not known and the potential returns on their investment are not evident. However, many of these enterprises become convinced to make climate change adaptation investments once they understand how climate change can affect their individual business and when quantitative effects of loss and damages on their balance sheets or income statement can be demonstrated.

Financiers are also not aware of the risk to their portfolios from the effects of climate change, especially on their rural enterprise clients. They also do not recognize potential opportunities resulting from climate change (including slow onset events), which can influence their portfolio with positive (increased lending and new products and markets) and negative effects (increase in defaults).

2.2.3. RISK IDENTIFICATION

Risk and uncertainty come in many forms for MSMEs, and include both standard agricultural risks and financial risks. Standard agricultural risks occur all along the value chain, including typical weather-related production risks such as drought, flooding, pests and diseases, all of which bring about variations in production quality and quantity. In addition, MSMEs face regulatory risks through changes in food safety regulations and environmental regulations as well as industry demand changes – all of which can have an adverse effect on profitability. Normal financial risks include variability of input and output prices as well as financing costs affected by interest rate fluctuations, credit assessments and exchange rate volatility, etc.

Climate change adds a new layer to the usual risks. More extreme climate variations can lead to changing weather patterns, increased temperatures and prolonged droughts and floods. These variations may reduce yields and lower both the quality and quantity of production. With increasing temperatures, there is higher risk of product spoilage, or quality, as exemplified with the case of coffee rust disease shown below. Increased water scarcity, essential for agricultural production, is another side effect.

Coffee Rust Disease

Coffee Rust disease, which has caused USD 1 billion in damage to coffee plants across Latin America and the Caribbean since 2012. Rust is not a new coffee disease but could not thrive in colder temperatures and, as many of the higher quality coffees are grown in high altitude, rust was not a concern. However, with climate change warming the region, the fungus has been able to flourish, wiping out over half of the one million acres of coffee crops grown in the region. This has led to many job losses and a huge reduction in farmers' incomes, in turn leaving them unable to afford the maintenance required to counteract the disease.

Due to a growing global population with shifting consumption patterns, 60% more food will be required by 2050 (CGIAR, 2017). Unfortunately, these increasing risks are taking place at a time when food and water demand is also rising. The need to make food production more efficient and increase productivity is critical. In addition, the agricultural industry produces one of the highest levels of Green House Gas (GHG) emissions. Therefore, any measures that MSMEs can implement to optimize farm practices and reduce risks and emissions simultaneously are important.

In review, there are both demand (rural MSMEs) and supply side (financial institutions) issues that affect MSMEs' abilities to respond, and together they prevent the emergence and scale up of financial solutions to improve resilience. The key issues that prevent rural MSMEs from taking actions to become more resilient are:

- Lack of information and understanding of the incentives and benefits to adopt climate resilient practices in rural space and in agriculture.
- Lack of capacity and understanding of how climate risks affect the MSME.
- Lack of access to finance (proper financial solutions and products) due to lack of collateral, credit history, financial records, familiarity with financial institution procedures, systemic risks, etc.
- In addition, lack of financial education and literacy is keeping many rural MSMEs outside financial markets.
- Insufficient access to suitable insurance products as well as the affordability of insurance for rural MSMEs limits the demand for insurance.
- Insufficient clarity from government policies to promote resilient rural MSMEs.

2.3 TRANSACTION COST HURDLES

The combination of small scale operations and often remote locations put rural MSMEs at the greatest disadvantage among MSMEs and large businesses. It creates additional challenges and costs for marketing their own products as well as for obtaining necessary inputs and services, especially considering the poor rural infrastructure in most low-income countries. Nothing illustrates this point better than the statistics that farmers in Africa pay more than twice as much for fertilizer as farmers in Europe (Nature, 2012). This is the case not only for financial intermediaries but also often for input providers, off-takers and other market participants, potentially multiplying the transactions cost disadvantage faced by MSMEs and creating considerable need and opportunity for related innovation. With globalization and the evolution of global value chains (GVCs), the requirements and specifications imposed by lead firms are frequently applied in the form of standards and certifications. While this reduces the transaction cost of regulatory compliance and risk management for buyers and lead firms, they can represent a significant barrier to rural MSMEs' participation in modern value chains. Climate change generally tends to exacerbate and accentuate these structural, additional, transaction cost hurdles that rural MSMEs face.

Transaction costs also make it particularly challenging for rural MSMEs to obtain financing. The MSMEs' transaction cost burden is considered a risk for lenders. In addition, FIs face increased transaction costs themselves when dealing with rural MSMEs, translating into higher than average administrative costs for small loans.

2.4 CLIMATE SMART SOLUTIONS FOR RURAL MSMES

2.4.1. HOLISTIC APPROACH TO ACHIEVING CLIMATE SMART MSMES

The diversity of rural MSMEs and their operating contexts, their level of resources and market segment, including their positions in their value chains, means that a blanket response is not viable. While some important constraining factors such as transactions costs are common across all rural MSMEs, others are not. Hence, public and private interventions require a close look at market segments and contexts and should be developed in consultation with those involved. The types of MSME and their risks are different based upon their context and resource base, the sector or industry and the transaction linkages and role within their value chains. The risks of one MSME also affect other MSMEs and agribusinesses connected with that MSME through value chain relationships. The following holistic approach for support is recommended:

- Technical assistance and awareness raising to promote climate resilient solutions amongst rural MSMEs, showcases to understand benefits, and demonstrating impacts on the grounds. Systematic risk analysis to develop tailor made adaptation solutions. In addition, financial education and literacy can have positive effects for choosing the right financial solutions and products.

- Capacity building to agribusiness and value chain leaders to disseminate climate resilient solution to MSMEs.

- Capacity building to financial institutions to understand these technologies, ability to develop the right financial products, and assessment of investments/projects that promote climate resilient technologies accessible by rural MSMEs.

- Information systems and analysis of agro-climatic risks and development of suitable insurance products for various types of rural MSMEs. Some government support may also be needed to start agricultural or catastrophic insurance, at least in the beginning.

- An enabling government policy environment to ensure adequate incentives and the direction of government policies towards climate smart practices.

2.4.2. CLIMATE SMART PRACTICES AND TECHNOLOGIES

Risk reduction for MSMEs can be achieved both through investment changes and through practice changes, which commonly go hand in hand. New seeds and farming practices, such as changes in inputs are required for production adaptation. While the private sector invests in new technologies for improvement where it is profitable, governmental interventions, such as in Mexico, are also needed in order to reach low-income areas which need investment but lack the conditions and capacity to attract it.

There are many practical examples of investing for resilience, as solutions are very heterogeneous, depending on sectors, regions and types of business. Where water conservation is a critical issue, irrigation methods such as drip irrigation can help conserve water. The reuse of treated wastewater from food production and rainwater harvesting also helps preserve water. For example, farmers in the Philippines are taught how to harvest rainwater from a small type of water reservoir as a climate change adaption measure. A fish processing company in Morocco invested in water recycling treatment due to expected droughts and higher water prices based on a thorough climate assessment.

MasAgro – Comprehensive policy frameworks and programs to promote climate smart agriculture in Mexico

The 10-year, Ministry of Agriculture-funded Sustainable Modernization of Traditional Agricultural (MasAgro) program in Mexico aims to achieve a sustainable increase in production and maize and wheat yields, mainly among low-income farmers in rain-fed areas. The program combines research on seed enhancement, climate smart agronomic practices and provides capacity building for farmers and extension agents, inputs and crop input financing. A central aspect of the program is the building of a network of networks (e.g. 41 innovation platforms) that facilitates peer-to-peer learning.[(2)]

Diversification, crop rotation, improved seeds and no-till agriculture are some of the many common agronomic adaptations for reducing climatic risks. In addition, diversifying along the value chain can play a role in risk reduction as well. For example, improving the supply chain with respect to transport, storage and marketing can reduce post-harvest losses as well as greenhouse gas emissions.

Climate Expert – Adaptation strategy based on Climate Risk Assessment for MSMEs

The semi-arid coastal region of Souss-Massa in Morocco is affected by increases of average temperatures, changing rainfall patterns, droughts and a sea level rise. Several awareness raising workshops based on real case studies attracted private sector companies to conduct individual climate risk assessments. Multipliers, such as business associations (CGEMs), are now integrating climate resilience approaches on the national level within regular programs for their 88,000 company members. Such programs can be built by trained consultants who are able to execute vulnerability assessments for SMEs.

The Climate Expert methodology entails a practical 4-step approach using working materials that help companies analyze climate change risks and opportunities and generate strong adaptation strategies on cost-benefit basis.[3]

Information and communications technology (ICT) investment has been proven to promote awareness and practice change as well as service support and delivery. Among many examples, in Ghana, Farmerline[4], a local company, provides personalized voice alerts that communicate critical information related to price, weather and farming techniques, direct access support lines for advice, and data collection. Scale-up and replication of such technologies across the globe are relatively low-cost solutions for improving climate smart practices and in reducing risk and improving access to finance.

Scale-up through Training of Trainers (ToT) in Bangladesh

In Bangladesh, the Ministry of Industry is working to accelerate the incorporation of climate risk management tools and training concepts into the regular training offered by various training institutes and managed by the Ministry. It uses a TOT approach conducted for resource persons and partner institutes who then provide training for entrepreneurs, mainly women.[5]

2.4.3. ADDRESSING TRANSACTION COSTS

Organization

MSMEs which are organized and integrated in commercial market systems and value chains are able to reduce transactions cost, achieve economies of scale and be more competitive. This is critical in order to have the capacity to access financing for climate smart investments. Aggregation is especially important for reducing the high costs of transactions for financial institutions and for reaching smallholders and remote enterprises with services, as well as for improving MSMEs' economies of scale for obtaining inputs, marketing and financial services.

In addition, producer organizations often have access to some form of capacity building and information sharing for their members, often through support of government or non-governments development agencies. They have a convening power, which is therefore also useful for building awareness of the risks and implications of climate change and advocating for addressing needed changes.

It is important to take heed of an organization's capacity (for carrying out procedures) and to be realistic in assessing such capacity so as to avoid creating expectations that the organization cannot reach or fulfill. For example, whereas a producer organization may be effective in arranging training and inputs, they may not have the capacity to handle or manage loans.

Aggregation

Transaction costs are recognized as a critical bottleneck, both for rural enterprise activities as well as financing ones. Aggregation is one way to help address this challenge, especially for small producers, in order to help them achieve economies of scale in financing and in the production and marketing cycle. Organized groups, such as producer organizations, can also be essential for capacity development to meet standards and new technologies needed for smallholders' competitiveness. Yet, while aggregation is recognized as an important part of the solution (World Bank, 2010), it is also a fact that in many developing countries there are relatively few well-organized groups, such as producer organizations, with adequate governance and capacity. This significantly increases the risk for conventional financing, which may or may not be best done through the PO, or alternatively through VC financing or individual lending from FIs.

Aggregation is critical from a climate change perspective for two reasons. First, aggregation - if managed well - can lead to higher efficiency resource use and improved productivity through access to better inputs, information and technical advice and in many instances to storage, cooling and other infrastructure that can help reduce waste. Second, due to the transaction cost problems, rural MSMEs can have a better chance of obtaining information about and access to relevant climate smart solutions, and related financing, when participating in some form of aggregation.

Innovations of Distribution

Innovations that provide additional relief from the transaction cost burden of commercial entities interested in serving rural MSMEs are especially critical for climate smart development given the important role of climate smart inputs, technologies and know-how not commonly available in rural areas. Few private insurers have the required distribution networks in rural areas of developing countries, so they often work through an intermediary with an existing network of their own (e.g. a microfinance institution, supermarket, bank, input dealer, agro-processor, or NGO), or they work with groups of MSMEs. For example, Fresh Co in Kenya, SFS in the Philippines, and Pioneer and NWK AgriServices in Zambia (see case study 7.6), use private input dealers to market their insurance. Examples of the aggregator approach are the Zambian National Farmers' Union in Zambia (which arranges insurance for groups of its members), and Agroasemex in Mexico which reinsures MSMEs' self-insurance funds. To address the problem of collecting premiums and making payouts in a timely and cost effective manner, some insurers are taking advantage of mobile phone and mobile banking technologies. A good example is the ACRE program in East Africa, which enables MSMEs to pay their insurance premiums and receive payouts via the M-PESA mobile banking system. There are many donor attempts to foster aggregation mechanisms. We believe that any such attempts should be market driven, that is, foster and promote markets with "market pull mechanisms" rather than publicly funded projects that either displace or counter market forces. However, with thin or non-existent markets for some products, such as insurance, these market based mechanisms cannot take off. This is where market based business modeling approaches come in, that is, public funds target and help to develop scalable and replicable models. The G7 InsuResilience Initiative, for example, through its global implementation project carried out by GIZ, systematically develops business models for three aggregator types as well as public policy framework types. Another example is the GAFSP Private Sector Window which pulls in private financing into IDA countries with blended finance approach.

To address the challenges, it is important for policy makers to consider the demand side of the private entrepreneur as well as the supply side of the financier within three dimensions:

- Awareness raising – demonstrating the need for action for MSMEs and financial institutions
- Business advisory support – identifying, assessing and selecting options for action
- Financial advisory incentives – supporting investment decisions

2.5 FINANCIAL NEEDS ASSOCIATED WITH CLIMATE SMART RURAL MSME SOLUTIONS

Climate smart adaptation and financing is also needed for green investments. As discussed above, there are numerous financial constraints for MSMEs, and financial instruments alone are not sufficient and need to be within a broader framework of promoting additional solutions in parallel to, or part of a package of, measures that aim to enhance the resilience of rural MSMEs.

2.5.1. FINANCING CONSTRAINTS

As noted above, rural MSMEs often already lack sufficient financial resources and climate risk makes it even harder for them to access finance. Climate change can disrupt production as well as the whole value chain, making financing more risky. Financial risks also increase as input costs can fluctuate when there is a shortage due to weather variations, and outputs can be very dependent on the prevailing climate during the growing season. In addition, the difficulty of getting bank financing increases as banks perceive higher credit risk due to this unpredictability of the MSME's income. Reducing uncertainty is an important part of improving access and reducing the cost of financing.

MSMEs and financiers alike lack the necessary know-how to assess their climate risk and insurers specialized on assessing and pricing climate risks are most often not available. For financial institutions and investors, their

concern about climate risk is both for individual clients and for systemic risks across sectors. They may choose to avoid the risk by not financing or excessively cover the risks by increasing the cost of finance to MSMEs or the collateral required. Some of the risk avoidance is due to lack of information on how to adequately assess the risks, for example across a region or sector. This makes access to finance even more costly for rural MSMEs. It is particularly difficult to address risk assessment for slow onset events and the influence they have on their portfolio. This strongly affects longer-term finance, thus exacerbating the existing shortage of such financing.

The current state of financing available in rural areas fits only a small segment of the agricultural households and agro-enterprises. Poor micro-level agriculturalists are too poor and small to be attractive to financial institutions, and the somewhat larger agro-SMEs fall into the category of the "missing middle", being too large and with distinctive cash flow needs to fit within microfinance initiatives and too risky and small for the formal sector. Many are profitable and do grow, albeit slowly over time, mainly with their own reinvestment. However, they are nevertheless vulnerable to setbacks such as can occur with climatic or other disturbances or outright disasters. An example is "el Niño" and "la Niña" climatic effects that trigger droughts, floods and hurricanes. These MSMEs are unprepared to handle the losses of product, procurement, property damage and other effects of such events.

2.5.2. INADEQUACY OF MSME FINANCIAL PRODUCTS FOR CLIMATE SMART ADAPTATION

Most of the sources of finance flowing to rural and agricultural MSMEs are in the form of short-term value chain finance, either internally between buyers, traders and sellers or from financial institutions to one or more of the most secure value chain enterprises or companies, which in turn can help supply financing, often in kind, to its suppliers or buyers. The limitation is that this type of financing is tied to the value chain commodity or product and is generally short term. This does not provide an adequate avenue to finance investments, especially ones of a longer-term nature. As shown below, in order to address this issue, it is helpful to look at the various actual and potential sources and then work to adopt or combine them to provide the financing needed for climate smart investments.

SOURCES OF RURAL AND AGRICULTURAL MSME FINANCE

Type of finance	Existing models	Recipients of financing
Working capital	1. Conventional banking and lines of credit 2. Microfinance credit union finance 3. Value chain finance and trade finance 4. Digital and mobile finance 5. Self-finance	1. Well-established SMEs with conventional collateral 2. MSMEs with regular cash flows and needing short-term financing 3. Producers and MSMEs in organized, competitive value chains relationships 4. Emerging option in some areas to all MSMEs for short-term MF and money transfers 5. Personal/family savings and assets
Medium term finance (2-5 years)	6. Conventional banking finance 7. Value chain finance 8. Self-finance 9. Mezzanine finance	6. Well-established SMEs with collateral 7. Available to some MSMEs in value chains with regular cash flows 8. Personal savings and assets 9. Well-established medium enterprises with collateral and investor linkages
Long term finance (>5 years)	10. Banking long term finance 11. Investment funds	10. SMEs with strong mortgage assets 11. Medium enterprises with strong mortgage assets and cash flows, particularly export oriented
Equity and venture capital	12. Co-investors 13. Investment funds 14. Private-public investment	12. Integrated VC partnerships 13. Medium enterprises and organizations capable of mezzanine and equity finance 14. SME organizations qualifying for blended finance and private-public collaboration

2.5.3. LIMITED ACCESS TO INSURANCE

Insurance is an effective risk-sharing instrument. However, five challenges lead to its failure in obtaining widespread outreach for effective risk management for MSMEs in most countries:

» The demand problem. Few insurance schemes for MSMEs have achieved scale without being heavily subsidized and/or the insurance is made compulsory (e.g. for bank borrowers in India). Otherwise, relatively few MSMEs seem willing or able to purchase insurance products, so there seems to be a lack of demand (Binswanger-Mkhize, 2012). This can result because MSMEs do not properly understand the risks and/or they may be willing to purchase insurance but are financially not able to do so.

» The Index problem. A fundamental requirement for insurance is the availability of an index that correlates highly with the agricultural risk to be insured, and for which there is a suitable and reliable database to perform actuarial calculations and objectively determine when an insured event has occurred. The index also needs sufficient spatial granulation (geographical detail) to minimize basis risk. These can be daunting requirements in countries and regions with limited weather stations, or where the data is unreliable or released too late to be useful for determining payouts.

» The distribution problem. There are serious difficulties and costs in marketing index insurance to large numbers of MSMEs, and in collecting their premiums and making payments. Few private insurers have the required distribution networks in rural areas in developing countries, so they often work through an intermediary with an existing network of their own (e.g. a microfinance institution, supermarket, bank, input dealer, agro-processor, or NGO), or they work with groups of MSMEs that can be insured as single entities (e.g. farmer associations and mutual funds). For example, Fresh Co in Kenya, SFS in the Philippines, and Pioneer and NWK AgriServices in Zambia, use private input dealers to market their insurance. Examples of the aggregator approach are the Zambian National Farmers' Union in Zambia (which arranges insurance for groups of its members), and Agroasemex in Mexico which reinsures MSMEs' self-insurance funds. To address the problem of collecting premiums and making payouts in a timely and cost effective manner, some insurers are taking advantage of mobile phone and mobile banking technologies. A good example is the ACRE program in East Africa, which enables MSMEs to pay their insurance premiums and receive payouts via the M-PESA mobile banking system.

» Public goods and first mover problems. Although private insurers are actively engaged in most of the weather index insurance programs, they have rarely initiated programs. This suggests there may be important public roles that need to be met, without which the private insurers face high set-up costs and barriers to entry. There is also a first mover problem: the high initial investment costs in research and development of index insurance products might not be recouped given the ease with which competitors can replicate such products if they prove profitable to sell. Private insurers may be particularly wary of this issue; unlike public insurers, they are not subsidized and may miss the opportunities that public insurers have as early movers.

2.5.4. LIMITS OF INFORMAL RISK SHARING

There are various types of financial solutions. Financial reserves are a simple but important risk reduction tool. These include savings, stand-by lines of credit and contingency funds. There is also informal risk financing. Financial help from family, friends, traders, solidarity groups and community organizations provide a layer of protection against losses. Religious funds, credit groups, and kin-support networks provide reciprocal means through which individuals can help each other in times of need. Sharecropping also emerged in many societies as a way of sharing risks between landlords and tenants. In pastoral areas, reciprocal arrangements between spatially dispersed communities enable mobile or nomadic grazing practices that reduce the risk of livestock having insufficient forage in any one location. Studies of traditional risk management practices show they are surprisingly effective, even in many drought prone areas. While these should be considered and strengthened, it is noted that they are very limited for longer, larger-scale and systemic effects of climate change. Nevertheless, the local organizations do offer an avenue for awareness building on climate change and its solutions.

2.5.5. LACK OF UNDERSTANDING AND DATA

Constraints in awareness and understanding of climate risk for MSMEs have also been issues for Sustainable Energy Finance (SEF) (see also Section 4.2.1 – "Lessons learned from SEF"). The main issues that financing for

sustainable energy projects faced, at least in the early stages, also included the lack of awareness and capacity to evaluate technologies, profits and cost-benefits. First, energy and resource efficiency was not considered part of their core business so investments in this area were not considered as critical or strategic, and business decision makers underestimated potential energy savings. Second, cleaner production, increase in energy efficiency and renewable energy projects could not find financing because financial institutions did not have experience with evaluating such projects and often lacked longer-term finance. Lending against potential savings from these investments or generation of revenues, instead of conventional collateral, was outside their core lending business model and their capacity to assess. As with climate risk, SEF also poses uncertainties such as performance risks of the new technologies, services or new equipment to generate the promised savings or revenues.

There are some significant differences between the experiences to promote SEF solutions and financing solutions for rural MSMEs. First, SEF projects target medium and larger companies with financial information, assets and acceptable collateral. For rural MSMEs the lack of assets, collateral and financial information for banks to process loans can be a much higher hurdle compared to SEF projects. A second difference is that for SEF projects, the cash flow calculations (to show the repayment capacity), due to the adoption of new technologies, was challenging at the beginning but soon there was a methodology to calculate. For rural MSMEs, particularly in the agricultural sector, cash flows to help quantify the costs and benefits from adopting climate smart investments can be more challenging, particularly since these cash flows have fluctuations in commodity prices and weather conditions. Therefore, the level of uncertainties and errors or deviations in forecasting cash flows can be much higher for rural MSME climate smart investments compared to SEF investments.

3. Climate smart rural MSME opportunities and business models

The daunting challenges of climate change risk are, however, not without opportunities. Climate smart finance and investment will importantly be able to open new opportunities, for example sustainable energy production that improves overall efficiency and income.

"Mainstreaming" climate change considerations throughout financial institutions' operations, and in their investing and lending activities, will enable financial institutions to deliver better, more sustainable, short-term and long-term results – both developmentally and financially.
(European Bank for Reconstruction and Development, 2016)

3.1 OPPORTUNITIES FOR CLIMATE SMART GREEN BUSINESS MODELS FOR MSMES

There is an array of potential products, technologies and approaches to help MSMEs take advantage of new "green" business models. The many practical examples of investing for resilience show to be very heterogeneous, depending on sectors, regions and types of business. Water conservation, for example, not only improves resilience, but irrigation investment, such as drip irrigation, can improve the business returns as well as conserve water. Investment in rainwater harvesting and the reuse of treated wastewater in the Philippines is a different type of example with a similar objective, as is the example of a fish processing company in Morocco investing in water recycling treatment due to expected droughts and higher water prices based upon a thorough climate risk assessment (see example in Section 2.4.2. – "Climate smart practices and technologies").

Diversification, crop rotation, improved seeds and no-till agriculture are some of the many common agronomic adaptations for reducing climatic risks. Also, improving the value chain processes with respect to transport, storage and marketing can reduce post-harvest losses while reducing greenhouse gases. However, all of these opportunities require additional investment.

Another opportunity for MSMEs of a different type is created by data, sometimes called "big data." As mentioned earlier, while there is limited historical data on the correlation between crop yields and climate, this is rapidly changing with data becoming more available, along with the higher computing power to analyze it. The increasing amount of big data being collected in the field in real-time is allowing more research to be done on climate variability, pests, soil and diseases.[6] Precision agriculture or satellite farming, based on observing and measuring farming conditions using technology such as remote sensors, GPS, etc. is a growing area and can help farmers choose appropriate crops, fertilizers and irrigation systems. These advancements and opportunities will increase financing needs even more.

3.2 OPPORTUNITIES FOR FINANCIAL INSTITUTIONS AND INVESTORS TO FUND CLIMATE SMART TECHNOLOGIES AND GREEN BUSINESS MODELS FOR MSMES

The financial industry benefits when its clients invest to upgrade their technologies and business models, especially when these new investments improve their efficiency and lower their risks. This is the case for MSME climate smart investments. The opportunities come in various forms. First, there is a growth in the financial institution's lending or investment portfolio for MSMEs. Second, the MSMEs' upgrades and changes lower their risks from climate change production and marketing risk, such as fewer production losses, fewer storage losses and improved product quality, etc. Third, the investments improve their efficiencies and hence their bottom line. For example, investments in improved water use lowers costs of production and adapting green energy can lower operational costs throughout the value chain, especially on the agribusiness and processing end of the value chain.

Two other very important opportunities arise for financing climate related investments. First, there is a whole new industry of carbon trading and financing. This is an opportunity for financiers and MSMEs to develop and fund business opportunities that previously did not exist. Second, climate smart adaptation is a global public good since it has global benefits to all. Hence, international investors and donor agencies naturally want to support such investment and may be willing to offer concessional funding, guarantees and other incentives to encourage such investment, which is an opportunity for the financial industry.

3.3 NEW OR ADDITIONAL FINANCING NEEDS AND OPPORTUNITIES FOR UPGRADING TO GREEN MSME BUSINESS MODELS

Social as well as governmental requirements and/or incentives can create new financing needs and opportunities. On the governmental side, water or energy use requirements can stimulate or even force change: for example, China uses progressive agricultural water pricing, incentives for water conservation, and grants to support water saving facilities and technical assistance. New investment in water reduction technologies and improvements may then be required. Farmers and agri-businesses who adopt new technologies, and therefore increase water efficiency, have dual benefits: a) save on water bills, and b) generate additional earnings by selling the extra water quota (see Annex).

Investment needs by companies can be expected for developing services (engineering, consulting, forecasting, modeling, monitoring and risk management), and data and technology development (climate and weather modeling, sector specific data aggregation and analysis). Another financing need is for investments in companies that provide products and solutions in sectors such as water, agriculture, healthcare, energy, coastal area and finance. Examples include: Water – companies developing water efficiency software, meters, water infrastructure development, and reuse and desalination technologies; food and agriculture – companies developing drought resistant seeds, drip irrigation and precision agriculture; healthcare – companies in sub-segments such as vaccine and treatment pharmaceuticals and products addressing tropical disease vectors; extreme weather event-resilient facilities and management systems; energy – companies in sub-segments such as extreme weather-resilient generation and energy distribution; coastal areas – companies in sub-segments, such as early warning systems and climate resilient materials; financial services – accompanies in sub-segments such as climate-related risk insurance, risk assessment and parametric insurance (GARI) .[7]

The awareness or opportunities for "green" financing is also growing. Financial leasing (lease to buy), for example, lends itself well to helping cash strapped MSMEs needing equipment and new technologies since they can access finance with no up-front payments and lower cost payments that match the term of use of the asset they are purchasing. Leases also allow more loan security as there is easier repossession in case of default.[8]

There are a growing number of other financing mechanisms. Small-scale funds are being set up by entrepreneurs to exploit new green technologies and those that prove promising will become bankable and eventually be scaled up. Green bonds are another growing area of climate smart finance, however, not necessarily for MSMEs. Green bonds are standard bonds but whose proceeds are earmarked for green or climate-friendly projects. There is no binding international standard which classifies a bond as a green bond. Nevertheless, there are several private led standards which are increasingly gaining acceptance in the market (see for example ICMA green bond principles).

Carbon markets are another source of financing for adaptation projects with mitigation co-benefits. These markets are created from the trading of carbon emission allowances to encourage countries and companies to limit their carbon dioxide (CO_2) emissions. It is a results-based financing instrument that monetizes the removal or reduction of GHG emissions. These reductions can then be purchased from industrial facilities that emit above their GHG emission allowances under their applicable emission trading scheme. Many international or domestic carbon market schemes recognize the GHG offsets from activities implemented by smallholder farmers or their aggregators under a programmatic approach, e.g. adoption of drip irrigation to substitute flood irrigation would provide mitigation benefits besides improvement to climate resilience in drought prone regions. In addition, some governments collect proceeds or levies on carbon market transactions, such as the China Clean Development Mechanism Fund, and provide funding and support to climate resilience projects with the proceeds.

Finally, there are a growing number of exchange traded-funds (ETFs) that focus on green investments in funds that invest in green MSMEs. An ETF is an investment fund traded on a stock exchange and which holds assets such as stocks, bonds or commodities, most of which track an index. Green ETFs focus on companies that offer environmental friendly technologies and which enable investors to make environmentally sound investment decisions.

4. Financial solutions for MSME adaptation to climate change and MSME green business models

There are both demand (rural MSMEs) and supply side (financial institutions and investors) issues that often prevent the emergence and scale up of financial solutions to improve resilience in the rural space. Demand may be latent and need to be viable for financing, and financiers may need assistance to be able to address financing demands and opportunities resulting from climate change that are not a part of their current financing portfolio.

One critical element of all solutions for supporting climate change adaptation and green investment is the availability of accurate and timely data. Accessible "open" data supported by governments can provide timely weather forecasts, disease and plague information, food forecasts for food security and investment guidance, and be available for insurance assessments. For instance, a government program in Uganda used SMS messaging to inform farmers about a disease affecting the banana crop, reaching 190,000 people in the first five days and helping prevent an epidemic.

4.1 FINANCIAL SOLUTIONS FOR MSME CLIMATE SMART ADAPTATION FOR RISK MITIGATION

Successful financing for rural MSMEs requires both appropriate delivery systems as well as financial instruments. As noted in section 2, organization and aggregation of MSMEs can lower transaction costs benefitting both MSMEs and rural service providers. The costs of financing and loan supervision, as well as some risks, can be reduced through working with organized groups, especially at the micro and small enterprise level.

4.1.1. DATA, INFORMATION AND COMMUNICATIONS TECHNOLOGY SOLUTIONS

Technological development and access to mobile phones and services, even in some of the most remote areas of the world, provide an important tool for information and knowledge sharing at much reduced transaction costs. The same mobile device can also enable data collection and financial services. Mobile financial services and the trends towards digitization of both business-to-person and government-to-person payments for rural MSMEs can reduce the time and cost associated with traditional cash payments, including insurance, and results in improved security and transparency. For unbanked, digitizing payments also offer the potential to create a financial identity, a step towards a broader access to financial services, such as savings and credit.

Improvement in climate information and analysis reduces risks of climate change adaptation for agricultural finance for both the financiers and the MSMEs across the value chains. Agri-tech companies, like S4 Agtech below, provide data information and analysis for decision-making tools to improve agricultural yield and manage risk.

S4 Agtech, Argentina (formerly Solapa)

S4 Agtech, an agricultural IT company, provides a platform to help farmers analyze their crop strategy and yield by combining market data with sensory and GIS data. It integrates multiple sources of information by geo-referencing it and mapping production data against Google maps. The company creates and manages proprietary indicators from multiple sensors; and geo-localizes and embeds the information on the biological processes. It offers its data analytics to financial services providers, agricultural suppliers, large food suppliers, and other agribusinesses. The company provides its services to help clients improve their production processes and protocols.[9]

Risk assessment and promotion of technology adaptations can also be led by the financial institution as illustrated in Bolivia.

Sembrar Sartawi Agricultural Risk Financial Solution, Bolivia

Sembrar Sartawi comprehensively addresses risk in financing small farmers and agro-enterprises with tailor designed, value chain linked financing, improved inputs and technology linkages, together with provision of technical assistance, market risk information and partnerships for securing markets. While many financial institutions would stop with that risk analysis, this institution's approach is more comprehensive and uses GIS technology collaborating with the National Climate Service to create risk map layers with relevant time-series data. It also manages systemic risk through geographical and ecosystem diversification (Hernandez, 2016).

4.1.2. GUARANTEE MECHANISMS

The use of guarantee funds has been found to be an effective financial instrument, if guarantees are prudently provided, to consider for some of the longer-term, uncertain investments required for climate adaptation. A guarantee is one type of blended finance instrument that is often employed by donors to credit enhance lending. There are several ways guarantee funds can be utilized. One way is to extend the term of a loan through a guarantee. If the lender views the borrowers as particularly risky for a long-term investment, a donor can guarantee the extension in tenor to enable the borrower to receive a loan that matches the capital expenditure and reduces monthly payments. Another type is a partial credit guarantee (PCG) that represents a promise of full and timely debt service payment up to a predetermined amount. The payouts under the guarantee covers creditors, often irrespective of the cause of default. The guarantee amount may vary over the life of the transaction based on the borrower's expected cash flows and creditors' concerns regarding the stability of these cash flows.

IFC Partial Credit Guarantee

The IFC program "Commercializing Energy Efficiency Finance (CEEF)". Its objective was to encourage financial intermediaries to finance energy efficient and renewable energy investments. At the time, local financial institutions were not lending for these types of projects due to the small project size and relatively high transaction costs, coupled with a perception of high credit risks because of very little experience with energy efficiency project finance.

Portfolio guarantees cover a proportion of the losses on the package of loans (or projects) as a whole. A 'first loss' guarantee covers part of the first tranche of losses—for example, 100 percent of losses up to a value of 10 percent of the portfolio as a whole. A 'second loss' guarantee would cover a second tranche of losses—for example, 90 percent of losses between 10 percent and 20 percent of the portfolio, etc. Since the guarantor has very little control over the projects or loans being originated, a second loss guarantee provides more incentives to the originator to keep to an agreed upon underwriting standard. In other words, this model is most efficient if a proportion of the first loss is kept with the originator of the loans.

Guarantee funds for climate risk adaptation have found it necessary to have some level of subsidy due to the nature of the investment. This can be through use of public funds invested into the guarantee scheme, start-up support, premium subsidy and first loss coverage.

4.1.3. INSURANCE AND RISK TRANSFER FOR RESIDUAL RISK

Insurance is a critical instrument to reduce risk and improve willingness to provide or incur debt. For climate risks, insurance and especially index-based products are particularly relevant to broaden the scope for insuring against named perils, opening the way for writing identical contracts for larger numbers of MSMEs who can be served by the same index contract. Indexed approaches to insurance offer a promising solution to many of the risks of climatic insurance with its often-widespread effects. However, to implement this solution, investment is needed on many fronts, including data collection, weather stations, research, training, start-up support and likely ongoing support.

Climate smart agriculture and the role of agricultural insurance in Zambia – survey and simulation request

Farmers try to manage risks associated with severe weather events by implementing several risk reduction strategies including the adoption of CSA practices. Using household-level data collected by the Central Statistical Office of Zambia and the Indaba Agricultural Policy Research Institute (IAPRI), it was found that nearly 30% of cotton farmers use minimum tillage techniques, 33% use soil and water conservation structures, and about 10% engage in practices that keep the soil covered after harvest. To estimate the impact of insurance on CSA adoption, and evaluate the costs of supporting the adoption of CSA, a simulation model has been baselined using information obtained from a detailed household dataset and included access to an insurance product modeled on the NWK AgriServices contract (see case study on weather index insurance in Zambia). Results indicate that access to insurance increases cotton farmers' use of CSA practices by about 8% given low coverage levels offered. With access to weather insurance covering 50% of expected revenues, the use of CSA increases by 51%. Additionally, having access to insurance decreases the costs of programs that aim to incentivize CSA adoption, and is particularly effective when combined with a direct payment for CSA adoption and use. An insurance subsidy of 50% can double farmers adoption rate of CSA, but only at relatively high coverage levels. Overall, insurance has modest impacts on increasing CSA alone, but can complement other activities designed to increase CSA as well.

Policy implications of these results are that well-designed premium subsidies could generate three benefits: 1) increased adoption of CSA, 2) enhanced agricultural growth and 3) more resilient smallholders and agricultural systems. Targeting and smart design of the subsidies are key for their effectiveness. The modeling results also demonstrate that subsidies could be cost effective, particularly as insurance coverage increases. Besides the direct impact on reducing smallholder losses when a severe weather event occurs, expansion of insurance can also increase the effectiveness of other projects and programs aimed at increasing adoption of CSA practices, additionally reducing their vulnerability to severe weather events.[10]

While insurance can enhance the reach of the private sector and reduce its administration and transactions costs, private insurers have had only limited success by themselves in scaling up insurance. Most insurance schemes of any size involve various kinds of public-private or non-profit private partnerships. This is in part because the use and understanding of agricultural insurance of all types is low, and hence, well-conceived public support and participation needs to be one of the solutions for increasing participation and improving the quality and scale of the services. Sometimes, the expansion of insur-

ance is even forced, as in some cases such as India, where rural and social sector obligations imposed by India's Insurance Regulatory and Development authority spurred investment by insurers in rural and social sectors that are otherwise not attractive, given transaction cost levels in rural areas.

The use and understanding of agricultural insurance of all types is low, and well-conceived public support and participation is one of the solutions for increasing insurance uptake and improving the quality and scale of the services.

The private insurance sector has become active in providing a reinsurance market to underwrite some of the tail end risks of the portfolio of agricultural insurers. Reinsurance is more accessible to insurers who sell insurance products because the insurance is based on a reliable and independently verifiable index. There is a large international reinsurance market that could easily absorb much more agricultural risk if suitable insurance programs could be established on a commercially viable basis.

Private insurers have sought to expand their market in recent years by developing and underwriting index-based products. Sometimes insurers use their own networks to sell insurance directly to MSMEs, but more often in developing countries they work through other players along value chains who sell directly to MSMEs. For example, they may link up with agro-processors, input suppliers, or seed companies that offer MSMEs insurance along with credit, seeds, fertilizer, or contract farming arrangements. They may also link up with microfinance organizations and banks that offer MSMEs insurance along with loans or savings accounts.

Subsidies may be warranted to kick start insurance markets for non-poor MSMEs, for example, by offsetting some of the initial set-up, administration and reinsurance costs. These subsidies may also be a part of the strategy to assist farmers in adapting to climate change, where the subsidy is set to cover the part or all of the difference in the premium rate between pre- and post-climate change scenarios.

Kukua low-cost, solar weather stations

Kukua has developed replicable models of low-cost, solar weather stations that are connected to the internet and operating across five African countries. Through a grant from the European Union, Kukua is currently rolling out 70 weather stations in Nigeria with the International Institute of Tropical Agriculture (IITA). In partnership with Foreca, a leading forecasting company, Kukua is able to make localized weather forecasts that can empower smallholder farmers and through partnering with Agri-SeedCo, a leading African seed company, can reach over 3,000 smallholder farmers with weather-based interventions in the pilot phase.[(11)]

4.1.4. FINANCING CONTINGENCY FUNDS

Insurance solutions cannot only be at the MSME level. Interventions must also address macro risks in a proactive manner rather than emergency response. Countries and donors can create catastrophic risk insurance pools at the macro level to share risks. The highly covariate nature of the payouts for index insurance poses a challenge to a private insurer. The insurer can hedge part of this risk by diversifying its portfolio to include indices and sites that are not highly and positively correlated, an approach that works best in large countries. Most often, it is also necessary to sell part of the risk in the international financial or reinsurance markets.

Lessons from Sustainable Energy Finance (SEF) for financing green MSME business models

Useful lessons and potential solutions for financing climate smart adaptation can be drawn from the SEF experience to date in climate financing and other areas of frontier finance with uncharted pathways. Many of these lessons drawn from 10 years of SEF financing of sustainable energy, started as a new, longer-term finance with uncertainties of return income flows. Key features of an enabling environment that assisted the promotion of sustainable energy finance are as follows:

- **Fiscal incentives** such as subsidies (e.g. equipment) and tax credits for Cleaner Production (CP), Energy Efficiency (EE) and Renewable Energy (RE) investments

- Policies to promote RE as a **country strategy** to promote energy diversification

- **Specific public funding** and/or **first loss capital** through commercial banks for CP, EE and RE projects
- **Market awareness raising** on new technologies for CP, RE and EE
- **Targets for EE and cleaner energy production**
- **Guidelines by banking regulators** to promote "green" lending and assessment of environmental and social risk in bank lending operation
- Appropriate **pricing** of energy (and water)

A main issue to address for financing for sustainable energy projects in the early stages was the lack of awareness and capacity to evaluate technologies for cleaner production, energy efficiency and renewable energy by MSMEs and larger corporations. Models for lending against potential savings or generation of revenues from these technologies instead of collateral was outside their core lending business model (challenging and lack of capacity to assess) and they had uncertainties (e.g. performance risks of the new technologies or new equipment to generate the promised savings or revenues). Increasing in the penetration of SEF across various markets depended on adopting a programmatic approach that involved: a) working with financial institutions; b) working on the market development side; and c) working on the enabling environment.

4.1.5. WORKING WITH FINANCIAL INSTITUTIONS

Financial institutions benefited significantly from capacity building and technical assistance to build internal technical skills to assess SEF investment projects, develop specific tools for financial analysis of such projects, create new loan products focusing on this market sub-segment, and find ways to select clients initially by "mining" their existing client list of companies particularly in energy intensive sectors. IFC and other multilateral and bi-lateral development financial institutions and agencies like GiZ helped local financial institutions in various countries in three important areas:

- Tailored financial products such as lines of credit and loans, guarantees and shared-risk products and venture capital
- Advisory services to develop internal capacity, identify and analyze project pipeline, including market analysis and product development, training of credit officers and risk and marketing staff, and tools to add value with low transaction costs
- Alliances to build pipeline primarily with ESCOs, vendors and technology provides, and project developers
- Multi-lateral and bi-lateral development in which financial institutions used various financial products to support sustainable energy finance through local banks/financial institutions---the financial intermediation model

FINANCIAL PRODUCTS FOR SUSTAINABLE ENERGY	POTENTIAL USE
Risk Sharing Facilities (funded or unfunded)	Risk management and exposure
Credit Lines	Liquidity
Long term credit lines	Liquidity matching/liquidity
Sub-debt/mezzanine financing	Risk appetite/financing shortfall
Investing in sustainability-focused private equity funds	Risk capital for climate friendly projects/companies
Trade guarantees	Trade risk mitigation

The ability of project finance to tap into "soft" money for the lines of credit and on risk sharing facilities and blend it with commercial funding played an important role in financing sustainable energy projects, at least in the early stages of promoting sustainable energy finance. This blended finance for lines of credit and/or a first loss sharing in risk sharing facilities helped a lot in the beginning to fund early projects.

4.1.6. WORKING AT THE MARKET LEVEL

The SEF work at the market level was to raise the awareness of various stakeholders about the existence of technologies and show potential for energy savings and/or generation of renewable energy. It also provides information to allow end-users to make informed decisions about energy use, and promote partnerships between financial institutions, vendors of energy efficiency equipment (and/or renewable energy equipment), and project developers. An important element in working at the market level is the creation of aggregation mechanisms to enable the financing of smaller investments particularly focusing on smaller companies.

4.1.7. WORKING AT THE ENABLING ENVIRONMENT LEVEL

Policies, regulations and incentives played a very important role in promoting sustainable energy finance. One of the key issues is the pricing of the resource, which can be energy but also can be water. Policies that reduce considerably the cost of the resource reduce the incentives of users to economize and/or find other alternative sources.

Fiscal incentives and/or policies for promoting renewable energy for diversification played an important role in countries such as for example Brazil, Chile and Honduras. In China, energy efficiency and cleaner production targets were important to promote sustainable energy finance. As shown below, the mobilization of Chinese government funds to complement international development funds to share first losses was also one of the key success factors for their sustainable energy finance programs. Some governments in countries with high energy-intensive sectors have provided subsidies for energy efficient equipment and renewable power generation technologies. In Thailand, government activities played a key role in raising awareness.

China Utility-based Energy Efficiency Finance Program (CHUEE)

The large CHUEE program was started in 2006 under the request from China's Ministry of Finance (MOF) to IFC to support the im plementation of energy efficiency (EE) and renewable energy (RE) projects in China. While banks in China have been highly liquid they were risk averse and access to EE/RE credit was limited especially for SMEs due to lack of access to finance and lower awareness for EE/RE. By June 2016, projects directly supported by IFC's China Climate Finance Advisory program have: reduced annual CO_2 emissions by about 22 million tons; mobilized over USD 2.3 billion to finance over 231 EE/RE projects. In addition, CHUEE partner banks have become more confident on China's green lending market, CHUEE SME partner banks have issued over 1500 green loans independently, which helped to mobilize another USD 12 billion and achieved more CO_2 emission reduction. Cumulatively, beyond IFC's Risk Sharing Facilities (RSFs), IFC's eight partner FIs have now provided over USD 100 billion to green projects, according to China's Banking Regulatory Commission.

Over the last 10 years, CHUEE has constantly been supporting the market move to the next level. From helping raise awareness of the general business case of EE/RE financing, IFC has since supported FIs move into new EE/RE market opportunities such as: waste energy recovery, biomass, solar, building efficiency, SMEs, ESCOs, and carbon among others.

In Bangladesh, with assistance from IFC, the Central bank and high-level officials in the financial sector developed landmark Environmental Risk Management Guidelines to help integrate environmental risk considerations in credit risk management for all types of financing as well as to provide an incentivize to banks to increase lending for "green" projects and activities. The IFC launch of a Sustainable Banking Network in 2012 was followed by an online knowledge exchange tool and platform for banking regulators and associate partners in order to promote environmental and social risk management and green credit in banking lending.

4.2 SEF LESSONS FOR FINANCING CLIMATE SMART INVESTMENT OPPORTUNITIES IN RURAL MSMES

Cleaner production, energy efficiency and renewable energy can play a key role also among the types of investments needed for rural MSMEs to become climate smart. The organizations of forums, development of Environmental Risk Management Guidelines in Bangladesh, launch of an Environmental Risk Management Guidelines for the Sustainable Banking Network and development of knowledge exchange platforms as a tool for banking regulators and associate partners were all key interventions for promotion of the SEF.

Key lessons from financing sustainable energy projects that can apply also in promoting financing for climate smart rural MSMEs are summarized below.

TARGET	POTENTIAL INTERVENTIONS BASED ON THE LESSONS FROM SUSTAINABLE ENERGY
Financial institutions	• Technical Assistance and development of skills to assess opportunities for climate smart agricultural investments • Assistance to develop internal processes and financial products to serve climate smart rural MSMEs • Exploring linkages with vendors, project developers, etc. • Mobilizing lines of credit, risk sharing/guarantees, blending finance for on-lending to rural MSMEs • Assistance in developing a pipeline of bankable projects early on
Market	• Market scoping studies • Sector vulnerability assessments • Awareness creation, promotion of climate smart solutions for rural MSMEs and evidence based case studies • Diagnostic Climate Risk Assessments for MSMEs
Enabling Environment	• Fiscal incentives and policies to promote climate smart investments • Availability of public funds for risk sharing or dedicated lines of credit which can also crowd in private sector funding • Climate change related targets • Regulatory guidelines for promoting climate smart financing

4.3 OTHER INNOVATIONS FOR GREEN GROWTH FINANCING AND INVESTMENT

One innovation for financing that can be used if there is a regular income flow is that of an Energy Savings Company (ESCO). This company provides design, installation, maintenance and servicing of energy efficient solutions for a specified period, normally between five and twenty years. The energy savings generated from the project are first used to pay back the ESCO's capital investment and the remaining savings are then shared between the client and the ESCO. In a variation of the model, the client pays a fee to the ESCO for the energy efficient solution and the savings are guaranteed to always exceed the specified fee. In these models, the up-front investment is kept on the ESCO's balance sheet and becomes an operating expense for the client, hence saving it any initial capital outlay.

5. Policy implications for supporting MSME adaptation to climate change

Policy is an important driver of change. Climate smart adaptation and risk mitigation policies need to empower, provide an enabling environment for change, provide incentivizes to build capacity and facilitate financing and investment. Blended finance, partial guarantee schemes and insurance support are useful tools to promote and incentivize financial institutions to lend and also rural MSMEs to be able to borrow – if prudently implemented/granted. Private financial institutions also deemed to play an important role to promote market-driven financing. Thus, the various public financing schemes should aim to "crowd in" private financial institutions.

There are several policy lessons learnt and implications that arise from the discussion above. These are summarized below:

5.1 POLICY IMPLICATIONS FOR AGRICULTURAL RISK REDUCTION

- Government support is essential for **investment in research, technology and systems** including work on disaster resistant crops, loss reduction and other risk reduction methods.
- Support or provide vulnerability studies for priority sectors.
- **Regulations** that promote production resilience, such as diversification, tolerant seeds, etc. should be promoted. In particular, **regulations on certification, product differentiation, disease control and monitoring are needed**.
- Support **investment in public infrastructure** that reduces MSME risk, such as flood control, watershed management and early warning systems.
- Co-invest with private sector investors and MSMEs through **matching grants and credit enhancement to provide incentives** for adaptation investment.
- **Strengthen capacities** of individual businesses, business multipliers and banks in assessing their risks and developing adaptation strategies.

G4INDO IT Platform, Indonesia

The Government of Indonesia embarked on a policy to bring crop insurance to all of Indonesia's farmers. A program started in 2014 helps 200,000 smallholder farmers improve rice crop harvests and gives crop insurance policies to assist farmers protecting them from losses caused by bad weather and disease. It uses state-of-the-art remote sensing technology (radar and optical images) combined with hydrological data of concrete river basis with crop growth models in a digital platform that allows the insurer to monitor crop growth and assess abnormalities. Insurance expertise is available to advise on the most suitable insurance products for small farmers, client registration practices and claim registration and processing.[12]

5.2 POLICY IMPLICATIONS FOR PROMOTING FINANCIAL MODELS FOR RISK MITIGATION AND ADAPTATION BY MSMES

- **Support awareness raising campaigns** for insurance and anything else that helps ensure that MSMEs' climate smart agricultural projects are more bankable and are considered a better credit risk for financial institutions
- **Promote new insurance products** such as livestock insurance, weather insurance and technology risk insurance for equipment like solar panels, etc.
- Support **leasing** as much as possible by enabling legal rights and a collateral registry, especially for moveable assets
- Support and enable **climate smart technical assistance** as much as possible
- Support improvement of **credit scoring models for MSMEs/rural credit rating systems**
- Establish or support financially and environmentally sustainable **guarantee mechanisms** to share risks and enhance finance and investment for climate smart adaptations

5.3 POLICY SOLUTIONS FOR PROMOTING AN ENABLING ENVIRONMENT AND REGULATORY FRAMEWORK FOR CLIMATE SMART RISK MANAGEMENT FOR RURAL MSMES

Policies need to empower MSMEs to take their own risk management decisions and not weaken the incentives of MSMEs to reduce these risks.

- **Build/support weather stations and data infrastructure and data systems:** Weather requires a reliable weather station infrastructure, and these must be sufficiently dense to avoid excessive basis risk of index-based insurance. There is need to collect, maintain, and archive data and to make it available on a timely basis in relation to insured events.

- **Support agro-meteorological research and good product designs:** These investments should be targeted at feasibility studies and pilot tests of new products with the involvement of local private-sector partners.

- **Establish a legal and regulatory environment for enforcing contracts** that both buyer and seller can trust; this is a fundamental prerequisite for MSME insurance. Additionally, laws and regulations need to be consistent with international standards to improve the chances of insurers gaining access to global markets for risk transfer.

- **Facilitate initial international risk pooling or access to reinsurance:** The highly covariate or "systemic" nature of the payouts for index insurance poses a challenge to a private insurer. Government can facilitate national and international risk sharing.

- **Provide smart subsidies:** There are good arguments for subsidizing insurance for poor MSMEs, especially if this helps them to graduate from more costly types of public disaster aid programs, or to access game changing credit, technologies or markets. Subsidies might also be warranted to kick start insurance markets MSMEs, for example, by offsetting some of the initial set-up, administration and reinsurance costs.

- **Compensate MSMEs for the climate change induced premium delta:** Subsidies would assist MSMEs to adapt to the impact of climate change on risk and therefore premium levels. This subsidy would be set to cover the difference in the premium rate between pre- and post-climate change levels, thus compensating MSMEs for the climate change "delta" in premiums.

- **Support diagnostics** in climate risk assessments for MSME to target adaptation risks on the individual level.

5.4 POLICY IMPLICATIONS FROM SEF FOR AN ENABLING ENVIRONMENT FOR FINANCING CLIMATE SMART MSMES

Features of an enabling environment, as drawn from sustainable energy finance, may include:

- **Fiscal incentives** such as subsidies (e.g. equipment) and tax credits for CP, EE and RE investments
- Policies to promote RE as a **country strategy** to promote energy diversification
- **Specific public funding** and/or **first loss capital** through commercial banks for CP, EE and RE projects
- **Market awareness raising** on new technologies for CP, RE and EE
- **Targets for EE and cleaner energy production**
- **Guidelines by banking regulators** to promote "green" lending and assessment of environmental and social risk in bank lending operation
- Appropriate **pricing** of energy and water

5.5 POLICY IMPLICATIONS FOR PROMOTING GREEN MSME BUSINESS MODELS

- Public funds and **public-private blended finance** are important to leverage private funding, including for green business models
- Support to **FinTechs** as market innovators and enablers for climate smart financing especially in the rural areas is observed to be effective for promoting green MSME business models
- Support for financially and environmentally sustainable **Guarantee Schemes** are effective in order to facilitate the longer term nature and level of uncertainty of repayment flows

6. Conclusions for policy makers

6.1 POLICY ANALYSIS AND DESIGN

Supporting climate smart rural MSMEs from a policy perspective is a mostly unchartered territory, an issue that is complicated further by the shortage of empirical evidence and track record for many climate smart rural solutions. This warrants utmost care and caution when considering policy design. Nonetheless, there is significant policy experience in related fields that can, and should be drawn upon. This includes experiences with rural development, agriculture and MSME promotion policies, as well climate change. Second, climate change adaptation is highly context specific. As a result, assumptions about the replicability of specific policy solutions need to be diligently examined.

It should also be highlighted that in addition to domestic policies and instruments, international public finance also plays an important role to catalyze additional resource mobilization from other sources, public and private, as noted in the Addis Ababa Action Agenda, which constitutes an integral part of the Agenda 2030 for Sustainable Development.

Care is needed when "prescribing" specific policies based on the current state of understanding and considering the inherent complexities of this topic. Instead, a broader policy analysis methodology design that takes a toolbox approach is presented with the aim of assisting policy makers in carefully considering appropriate policy options. The most relevant experiences of practical applications at hand are those related to the area of rural sustainability and sustainable energy efforts discussed earlier. Therefore, the toolbox approach, shown below, builds on those lessons and experiences.

6.2 POLICY TOOLBOX – POLICY OPTIONS

POLICY INSTRUMENT TYPE	TOOLS	POTENTIAL POLICY OPTIONS	APPLICATIONS POLICY MAKERS CAN SUPPORT	EXAMPLES
LEGISLATIVE/ REGULATORY	Codes, zoning rules, permitting, reporting, impact assessments	**Property rights** or royalty systems including land and other rural assets as well as intellectual property	Policy interventions to both protect ownership and usage rights and royalties while seeking changes that promote climate smart and sustainable impact	
		Regulatory requirements or incentives to encourage financial institutions and agribusiness and other companies active in the rural economy directly or through their value chains to assess **and report environmental and social risks** in their operations by issuing guidelines and reporting standards	Regulations that can promote value chain sustainability and transparency Regulations and reporting guidelines for environmental efficiency assessments and standards Promote green lending through guidance and reporting Promote standards, certification and programs that help ensure MSME access and affordability for the adoption of standards and certification	The Sustainable Banking Network (SBN) is a community of financial sector regulatory agencies and banking associations that aim to advance sustainable finance through the sharing of best practices.
		Insurance regulatory guidelines and/or incentives that encourage insurance coverage for MSMEs affected by climate risks	Provide an enabling legal and regulatory environment for MSME climate risk insurance Improving the legal and regulatory environment for contract enforcement of buyers and sellers so insurance can be offered.	
ECONOMIC/ FISCAL (government led international/national actions)	Government taxation/tax incentives, funding/grant, strategic investments and subsidies,	Government financial support for catastrophic risk insurance programs that facilitate risk insurance accompanied by risk prevention measures to vulnerable households and MSMEs to support their risk reduction and risk transfer strategies	Facilitate, as applicable, initial international risk pooling or access to reinsurance Partner among development agencies and governments to support reinsurance to mitigate insurance risks to facilitate insurers to service micro and small rural households and enterprises.	
		Public grants for technical assistance to build the capacity of market actors so that the private sector is better able to respond to the changing market conditions created by climate change	Capacity building for banks/FIs and MSMEs Positive impacts of private adaptation activities on other actors can be provided by technical guidelines or adjusted training programs Supporting climate change specialists to work alongside the agricultural and building capacities for vulnerability and risk assessments Strengthen capacities for multipliers such as business associations Strengthen the capacity of aggregators	Global Index Insurance Facility is a good example of donor/public funds to promote feasibility studies, pilot applications, legal/ regulatory work for introducing index based insurance solutions in various countries in Africa, Asia and Latin America and the Caribbean. Capacity building with local financial intermediaries through training, information about market potential and the economics of climate smart projects, tools for assessing climate smart projects and support in pipeline development. MasAgro Productor: Financial support mechanisms via FND and FIRA at state and federal levels

POLICY INSTRUMENT TYPE	TOOLS	POTENTIAL POLICY OPTIONS	APPLICATIONS POLICY MAKERS CAN SUPPORT	EXAMPLES
AGREEMENT/ INCENTIVE BASED (Private - Public Partnership / collaboration)	Utility pricing, guarantee programs, insurance risk/ cost sharing, Investment of public savings	**Utility pricing policies** to encourage adaptation to climate risks, particularly utility pricing related to energy and water as to encourage conservation and efficient use of resources	Review and revision of water and natural resource costs and design related pricing structure to encourage improved efficiency and conservation Feed-in tariffs to make prices paid by utilities predictable	In the case of sustainable energy finance, long term feed-in tariff commitment help ensure the predictability of project revenues and therefore can serve as a key enabler of financing for the investment.
		Public sector financial support for climate smart risk financing, risk sharing, blended finance instruments and climate insurance, through public-private partnerships	Direct public funding and credit guarantee schemes to promote investments by MSMEs to adapt and mitigate climate risks Indirect public funding or risk sharing, through private financial intermediaries (including funds), and particularly focusing on longer term finance for climate smart MSME investments Guarantee mechanisms supported by public funds. Support to MSME insurance, such as upfront investment cost sharing co-investment	Use of credit guarantees and special lines of credit to promote investments. (Although guarantees and lines of credit are not specific to climate smart, various programs do promote such MSMEs and agribusiness investments in general, e.g. FINAGRO in Colombia, FIRA in Mexico.)
		Government financial support for catastrophic risk insurance to catastrophic, multi-year, climate risk insurance programs that provide risk insurance accompanied by risk prevention measures to vulnerable households and MSMEs to support their risk reduction and risk transfer strategies	Facilitate as applicable initial international risk pooling or access to reinsurance Partner among development agencies and governments to support reinsurance to mitigate insurance risks to facilitate insurers to service micro and small rural households and enterprises. Provide financial support in the form of premium cost sharing and/ or reinsurance capacity (public funds for risk sharing) to promote insurance solutions.	For example, CCRIF for the Caribbean, ARC in Africa and a similar scheme for Pacific islands. Also, schemes in Mexico, Peru and Mongolia, amongst other countries focus on protecting vulnerable populations. At a country level, Mexico and Peru public support to promote catastrophic insurance for family agriculture.
		Grants, guarantees, insurance and other financial enhancements to increase the expected risk-adjusted return of investments for climate smart activities, especially ones where the lack of track record results in high risk perception.	Temporary incentives and support to mobilize funding for climate smart MSME investments to help establish track record for risk assessment.	The mobilization of Chinese government funds to complement international development funds to share first losses was one of the key of success factors for the creation of the Chinese sustainable energy finance market MasAgro Productor: Financial support mechanisms via FND and FIRA at state and federal levels
		Blended funds (grants with commercial finance) to promote climate smart MSMEs' practices	Matching grants or co-investing to mobilize funding for facilitating climate smart technology investments, such as upfront cost barriers to reach strategic or most vulnerable MSMEs and sectors/ regions, including like irrigation, energy efficiency, storage, mechanization, works to control floods. Investments, i.e. through a guarantee to the financers of the adaptation investment or longer term credit lines	Various countries use matching grants to encourage private sector stakeholders invest in longer-term projects that could promote climate smart agriculture. For example, in Mexico, the federal local governments promote irrigation and improved storage through matching grants and incentives for private capital to fund the non-grant component

POLICY INSTRUMENT TYPE	TOOLS	POTENTIAL POLICY OPTIONS	APPLICATIONS POLICY MAKERS CAN SUPPORT	EXAMPLES
AGREEMENT/ INCENTIVE BASED (Private - Public Partnership / collaboration)		**Climate smart "pull mechanisms"**, such as competitive R&D grants to spur innovations, including the support of pilot projects and scale up strategies for new technologies and approaches	Providing incentives to mobilize innovation and learning, including experiences from matching grants, or partial guarantees.	The G7 InsuResilience Initiative (launched by Germany/BMZ in 2015) aims for reaching an additional 300 million beneficiaries through sovereign risk transfers, and 100 million beneficiaries of climate risk insurance through insurance market scale ups by 2020. For the market creation purpose, it deploys a series of "pull mechanisms" to facilitate market entry of insurers, including capital injections loans, premium subsidies and a challenge fund (KfW/CIF), along with technical assistance for new products and business models (GIZ). MasAgro Yucatan, scoping project: Experiences on sustainable rural development and biodiversity conservation in the Yucatan peninsula
		Aggregation and transaction cost reduction	Government supporting aggregations mechanisms and/or aggregators of rural MSMEs through various financial and non-financial tools Government playing an active role in aggregation and transaction cost reduction through its convening power and by leveraging technology	Hungary's Ministry of Education created an awareness campaign and related online platform for energy efficiency improvement in publicly owned schools. Rural municipalities in particular had significant challenges accessing financing. By standardizing the upgrades, organizing the market and pooling USD 250 million in prospective investments (with an IFC risk-sharing), all major banks, ESCOs and technology vendors were interested in a market segment that they previously would not touch. The winning consortium of local bank/ESCO/ technology vendors to implement the upgrades was selected through a competitive tender.
		Public Private Dialogue and Collaboration	Private Public Partnerships Multi-stakeholder consultations Government playing the role of coordinator and honest broker to facilitate systemic collaborative solutions	Government or international development organization convening relevant stakeholders for sharing of lessons and experiences. In Costa Rica awareness raising and trainings on climate risk analysis and adaptation strategies are implemented by the Ministry of Tourism with several stakeholders from tourism business, banks and public sector (chamber of tourism/ eco-tourism). Basis is the Climate Expert Approach, developed by PSACC Program

POLICY INSTRUMENT TYPE	TOOLS	POTENTIAL POLICY OPTIONS	APPLICATIONS POLICY MAKERS CAN SUPPORT	EXAMPLES
AGREEMENT/ INCENTIVE BASED (Private - Public Partnership / collaboration)		Establishment of agroclimatic **information systems** to collect, analyze and disseminate information that would enable decision making	Build knowledge for business multipliers such as business association, chambers, business service provider, including on green business models. Provide central and target group tailored climate data (E.g. Establishing a Climate Data Center) Plan, collect, analyze and process climatic information to be used by various stakeholders to map, quantify and analyze risks and use this information to take decisions on climate smart investments. The Government could also use such information for policy making related to climate smart rural MSMEs and agriculture. Establish protocols for sharing data amongst public entities and sharing data and feedback mechanisms with the private sector.	In Kenya, outbound messaging provides personalized voice alerts that communicate critical information related to price, weather and farming techniques. Mobile surveys allow farmer-based organizations to conduct surveys to capture the impact of their interventions. The company's support line gives farmers direct access to expert advice. All content is provided in local languages. It helps these small-scale farmers (less than 1.2 hectares) increase their yields by adopting improved farming practices and aims to reach 500,000 by 2019, many of whom are women. MasAgro Movil: Mobile phone-based, comprehensive information and decision support for farmers (pilot stage).
		Improved infrastructure for **measuring** climate phenomena	Building weather stations and data infrastructure and data systems. Support for improved quality of data to collect and make available to all on a timely basis.	MasAgro Productor: Online producer data collection and sharing platform, used also for adoption tracking; Platform Conservation Earth, linked to SIAP
		Creation of **awareness raising** programs to disseminate information around technologies and investments that promote climate smart investments for MSMEs to assist in stimulating the demand side for financing and address incomplete information. Financial literacy campaigns to increase awareness and knowledge regarding characteristics and functioning of debt instruments and potential debt traps.	Foster understanding among Financial Institutions that: a) climate change will affect their portfolio and, b) an increase of adaptation investments is expected. Promote experience exchange between FIs nationally and internationally. Raising awareness among MSMEs about the benefits of climate smart solutions. This may include training, demonstration projects, media, etc. Raising awareness among MSMEs of the effects of financial decisions can help to better deal with climate change and, more generally, uncertain events.	MasAgro Productor (Take It To the Farmer), 2011-2022: Promotion of climate smart agricultural practices (focus water use efficiency, soil health) developed under MasAgro Trigo and Maiz and other sources, via certified technicians and innovation hub networks in 30 Mexican states; Greenseeker and Green Sat decision support tools for extension agents and farmers Morocco is promoting climate smart approaches with focus on risk management through its private sector organisation building on awareness raising, training and capacity development.

7. Annexes: Case Studies

The following are a number of diverse cases of mature interventions collected in order to attempt to analyze the extent to which the above policy tools have proven effective in fostering the development of climate resilient rural MSMEs. Due to time constraints, the number of cases is limited and therefore the ability to extrapolate from their analysis is also limited. We envision a later phase of this paper that will build a robust database of relevant cases and examples which will be able to support a more nuanced analysis with greater potential in systematically applying findings to the design of new interventions.

The cases collected for this paper fall into two main categories: those related to access to climate finance and those related to insurance. The analysis of these cases clearly revealed the need for comprehensive interventions. At the very least, access to finance related tools, such as risk sharing facilities, needs to be applied in combination with technical assistance to both partner FIs as well as to other market players. Partners are very sensitive to the transaction cost of such new initiatives, especially in the initial years when the profitability of the new climate smart lending activities is often very limited. Therefore,

interventions need to take into account such transaction costs when actively engaging partner FIs, especially when it comes to TA support provided and/or potential fees charged for TA support. The transaction costs arising from the administration of risk sharing facilities is a critical area that has undermined their efficacy and some built-in flexibility is highly recommended to enable timely adjustments.

The policy analysis also reveals the importance of aggregation and supporting aggregators in the market, which at times is a lesson learnt. Awareness raising is revealed to be an important high impact policy tool but its design needs to carefully consider the local context.

7.1 COMMERCIALIZING ENERGY EFFICIENCY FINANCE (CEEF)

Highlight summary

CEEF, via partner bank CSOB, supported a (i) biogas energy system investment in a rural MSME pet food factory, using sorrel produced next to the factory; (ii) biomass gasification investment in a rural carpentry MSME that used the waste wood from making windows and doors as fuel.

Background

IFC's Commercializing Energy Efficiency Finance (CEEF) Program was launched in April 2003 with the support of the Global Environmental Facility (GEF). The CEEF program represented the expansion of the 1997 Hungarian Energy Efficiency Co-financing Program (HEECP) into the other countries. The CEEF program was successfully completed in 2008.

Barriers /problems the intervention aimed to overcome

- Weak credit and unfamiliar risk of Energy Efficiency (EE) investments and energy service companies, resulting in high interest rates and/or shorter tenors than needed, if financing available at all;
- Lack of collateral value of EE related equipment;
- Lack of relevant expertise and capacity in local FIs;
- Poor capability on the part of project hosts and Energy Service Companies (ESCs) to prepare bankable projects;
- High transaction costs associated with EE project development and finance;
- Lack of medium- to long-term finance needed to allow EE projects to be self-financing through savings.

Tools applied to address above barriers

- Risk sharing with local FIs;
- Technical assistance for capacity building for FIs, ESCs, project developers, and project hosts.

Intervention

14 FIs and 41 project developers and ESCs participated in CEEF and a total of 829[(6)] projects were financed with CEEF risk sharing support, none of which defaulted. The program achieved significant progress toward the objective of expanding the availability of commercial financing for energy efficiency (EE) projects in the target markets. CEEF is estimated to have led to USD 330 million of ENERGY EFFICIENCY investments, annual reductions of 310,500 tons of CO_2, and annual energy savings of 1,956 terajoules. The technical assistance provided by the CEEF program led to substantial capacity building in the FIs as well as in the Energy service companies and project development companies. The commercial EE financing activities of the participating FIs increased substantially because of the program, and the FIs have developed new financing products tailored to the EE market. Furthermore, the EE financing activities of these FIs continued after the end of the CEEF program, thereby demonstrating the sustainability of the program.

The CEEF program interventions effectively addressed challenges and market failures related to both the uncertainty and transaction cost aspects of information and awareness barriers, both the uncertainty and transaction cost aspects of technology adoption barriers, and both the uncertainty and transaction cost aspects of the access to finance challenge. Production related uncertainties and transaction costs were partially addressed by reducing energy cost in highly energy intensive MSMEs.

Policies applied.

Economic / fiscal

» **Grants to provide technical assistance (TA).** GEF and bilateral donors funded TA to FIs, MSMEs and ESCOs, which was implemented and administered through local offices and staff. Seminars and training programs were also part of the TA. The flexibility of the TA program was key to its success.

Agreement / incentive-based

» **Utility pricing policies.** Energy price liberalization (was not implemented in coordination with the project but played a key role in the economics of the climate smart upgrades).

» **Financial support for climate smart risk financing, risk sharing and climate insurance.** Risk sharing was the key financial instrument to support local FI lending and in addressing risk perceptions and lack of track record. IFC also made changes to improve the flexibility of the risk sharing tool to make it more user friendly and aligned with partners FIs' operations, which was key to the success of the risk sharing tool in achieving its objective.

» **Aggregation and transaction cost reduction.** Technical assistance and advisory support for ESCOs since these serve as aggregators and help address transaction cost for FIs and MSMEs.

» **Public private dialogue and collaboration.** Ongoing periodic meetings and structured consultations with all relevant stakeholders to inform the program.

Information / communication-based

» Awareness raising programs. Various forms of awareness raising efforts and demonstration projects.

7.2 PHILIPPINES: SUSTAINABLE ENERGY FINANCE (SEF II)

Highlight summary

Partner FIs facilitated USD 3 billion worth of investments in contrast with the target of USD 200 million.

BACKGROUND

Sustainable energy finance promoted with the overall goal being to increase access to local sources of financing for Sustainable Energy (SE) projects in order to stimulate private sector investment and reduce Green House Gas (GHG) emissions. The main objective of the Program is to strengthen the capacity of partner Financial Institutions (FIs) in developing and managing a SE portfolio. Parallel to that, it aims at assisting end-users, as well as service and technology providers in implementing SE projects. This program was preceded by SEF I which had no risk sharing element.

Barriers /problems the intervention aimed to overcome

» Weak credit and unfamiliar risk of renewable energy projects

» Lack of relevant expertise and capacity in local FIs

» Lack of awareness and information in the market

» Limited private sector participation

Tools applied to address above barriers

» Risk sharing with local FIs

» Technical assistance and capacity building of FIs' as well as other market participants

» Regulatory advisory

» Awareness raising

Intervention

SEF II is expected to have facilitated the financing of SE projects amounting to USD 200 million, saved 77,500 MWh from Energy Efficiency (EE) projects, generated 350,000 MWh from RE, and avoided 600,000 MT of GHG emissions. In addition, it should have facilitated the development of at least 200 SE projects in the partner FIs' pipeline; assisted service and technology providers in providing audit/training/ consultancy services to around 100 SE projects; developed an energy efficiency policy

note for the DOE, and assisted relevant government agencies in streamlining the registration, licensing and permitting for RE projects; and produced SE evaluation tools and materials used by at least 150 partner FI account officers, end-users, service and technology providers.

Policies applied

(i) Partnerships with existing partner FIs to develop portfolios for SE projects; (ii) Established relationships with end-users, service and technology providers to increase the number of projects and project proponents that will require access to local financial markets; (iii) Playing convening as well as catalyst roles for regulatory improvement and participating in or leading market awareness raising activities to create conditions for greater private sector participation.

Economic / fiscal

- **Grants to provide technical assistance (TA):** TA to FIs and other market participants. Seminars and training programs were also part of the TA.
- **Grants to support project development, including energy audits.**

Agreement / incentive-based

- **Support for climate smart risk financing, risk sharing:** RSF has played a decisive role in the growth of partner banks' climate smart portfolios.

Information / communication-based

- **Awareness raising programs:** innovative approaches, such as field trips, etc. that have proven highly effective.

7.3 SRI LANKA: PORTFOLIO APPROACHES TO DISTRIBUTED GENERATION OPPORTUNITIES (PADGO)

Highlight summary

Sri Lankan banks were averse to funding renewable energy projects because of their inherent risks. The Portfolio Approach to Distributed Generation Opportunities (PADGO) helped them gain experience in such financing, which increased their confidence and risk appetite. The increase in risk appetite, along with higher credit supply, led to more investments in newer renewable energy technologies such as bio- mass, waste-to-energy and solar photovoltaic (PV) while maintaining the investment momentum in traditional technologies such as mini-hydropower projects. PADGO also supported some emerging technologies through the risk-sharing facility.

Background

The PADGO project was launched by the International Finance Corporation (IFC) and the Global Environment Facility (GEF) to encourage distributed generation through renewable energy sources among people with very little or no access to electricity, predominantly in rural areas. PADGO was operational between 2008 and 2015 and this case study is based on its independent third party evaluation report.

Barriers /problems the intervention aimed to overcome

- Weak credit and unfamiliar risk of renewable energy projects
- Lack of relevant expertise and capacity in local FIs

Tools applied to address above barriers

- Risk sharing with local FIs
- Technical assistance for local FIs and other market participants
- Sector studies

Intervention

Risk sharing facilities with 2 local FIs were implemented which led to the implementation and financing of 10 distributed generation projects and the development of 2 new financial products for renewable energy. An additional 19 loans and 20 distributed energy generation projects were supported via the technical assistance program. The program led to financing of over USD 80

million. The uptake of the risk sharing facility was lower than expected but overall the program achieved its targets for financing generated.

PADGO achieved the objectives set out for the program. Some key lessons of PADGO include the importance of: (i) maintaining flexibility and ability to adjust to changes in external and internal environment; (ii) when developing a market for relatively newer technologies, a rounded offering of investment services and advisory services is necessary; (iii) addressing transaction cost and working with ESCOs/aggregators.

Policies applied

- Risk sharing with local FIs
- Technical assistance for capacity building for FIs
- Sector assessments
- Project development support
- Energy audits
- Awareness raising and capacity building targeting the tea sector

Economic / fiscal

- **Grants to provide technical assistance (TA):** TA to FIs and other market participants. Seminars and training programs were also part of the TA.
- **Grant to provide market studies.** Assessment of the market for high potential climate smart solutions such as biomass and high potential market segments such as the tea sector.
- **Grants to support project development, including energy audits.**

Agreement / incentive-based

- **Support for climate smart risk financing, risk sharing:** Risk sharing was the key financial instrument to support local FI lending and in addressing risk perceptions and lack of track record. The importance of flexibility was a key lesson learnt.

Information / communication-based

- **Awareness raising programs:** for the tea sector

7.4 MASAGRO, CLIMATE SMART AGRICULTURE IN MEXICO[13]

Highlight summary

The climate smart agriculture (CSA) concept reflects an ambition to improve the integration of agriculture development and climate responsiveness. It aims to achieve food security and broader development goals under a changing climate and increasing food demand. CSA initiatives sustainably increase productivity, enhance resilience, and reduce or remove greenhouse gases (GHGs), and require planning to address tradeoffs and synergies between these three pillars: **productivity, adaptation, and mitigation. Mexico introduced CSA through a large-scale program, MasAgro, with a focus on adaptation**. The program has reached 300k farmers and trained 10k farmers and introduced smart nutrition, smart mechanization, smart resource management and smart communication. Participating farmers produced 67 percent more rain-fed maize (1.6 t/ha above national average of 2.4 t/ha), had 25+ percent reduction of postharvest losses and a 50+ percent reduction in nitrogen use. For maize, they saved 60+ percent in soil preparation costs and generated 23 percent more income for rain-fed maize farmers.

Background

Agriculture is the third most important economic activity, contributing 3.18 percent to the country's gross domestic product (GDP). This low percentage is due to a diversified economy that is transitioning into secondary (industry and manufacture) and tertiary (tourism and services) activities. Roughly 22 percent of Mexico's population lives in rural areas (almost 24 million people), with a little under half (44 percent) of the rural population actively employed in agriculture. Mexico encompasses four main agricultural regions: irrigated, maize-bean, dryland-mixed, and coastal plantations. The two systems with the largest land area are the irrigated region (north) and the maize-bean region (central and southwest).

Barriers / problems the intervention aims to overcome

Mexico's agriculture sector faces several challenges. Although the country is the world's eighth largest food producer, national food production does not meet the internal demand for basic products, such as yellow maize, rice, oilseeds, and wheat. Productivity, competitiveness, and profitability in Mexico have stagnated. Sixty percent of agriculture production is obtained in irrigated land,

while rain-fed plots are increasingly exposed to climate change effects. In northern Mexico, farmers are vulnerable to extreme climate events, such as drought and frost. Smallholder farmers in Mexico are highly vulnerable to climate variability and change. Their vulnerability is related to lower than average crop yields (e.g., average maize yields are less than half those of commercial farmers), small land tenure size (73 percent of farmers own less than 5 hectares), reliance on rain-fed systems (90% of subsistence farmers, in comparison to 63 percent of commercial farmers) and thus dependence on regularity of environmental conditions for production is high. Fewer resources (finances, savings healthcare, subsidies, tools, and inputs) are available to help cope and adapt to climate impacts. The percentage of farmers implementing CSA practices is often low (see Table 1).

Tools applied to address above barriers

CSA technologies and practices present opportunities for addressing climate change challenges, as well as for economic growth and development of agriculture sectors. For this profile, practices are considered CSA if they maintain or achieve increases in productivity as well as at least one of the other objectives of CSA (adaptation and/or mitigation). Farmers in Mexico have begun to adopt a variety of CSA techniques: agroforestry and organic production in coffee, silvo-pastoralism, bio-digesters, energy efficiency, renewable energy, improvement of intensive systems environment, improved fodder, genetic improvement in livestock, crop rotation in maize, wheat, and beans, and conservation agriculture practices in maize and wheat. The percentage of farmers implementing CSA practices is often low. Along with field practices, such as the ones mentioned above, there are also important ongoing programmatic activities worth noting in Mexico, such as payments for ecosystem services, sustainable forest certifications, pilot projects of REDD+8 activities, insurance against natural disasters, loans, guarantees, and farmers organizations.

Intervention

Conservation Agriculture (CA) (a bundle of practices including no-tillage, crop rotation, crop association, and improved varieties) is being promoted in a joint effort between the International Wheat and Maize Improvement Center (CIMMYT) and the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) through the Sustainable Modernization of Traditional Agriculture (MasAgro) program. **MasAgro** disseminates CA technologies through innovation hubs that promote synergistic investment and interaction between stakeholders in the agricultural supply chain. Up to 180 institutions collaborate with MasAgro, including federal and state government entities, 35 private seed companies, and 33 research institutions across the world. MasAgro's efforts have led to the adoption of CA throughout the country, either as demonstrative platforms or at full-scale implementation. Central Mexico has the highest rates of adoption; states, such as **Guanajuato, Michoacán, Queretaro, and Jalisco have an uptake rate of up to 50 percent**. The total uptake area in these states is 36,547 hectares, primarily in maize systems. MasAgro Productor tracks CSA adoption process via an *Online producer data collection and sharing platform* and the Platform Conservation Earth. Conservation agriculture has increased farmers' profitability through higher productivity and lower input costs. The next steps for MasAgro are to replicate the program at different scales and in other regions in the country and the world. The knowledge hubs model will likely surpass its agricultural development goals to be applied in other spheres, such as environmental conservation or the provision of weather forecasts through information and communication technologies.

Policies applied to promote CSA

Legislative / Regulatory

- Climate Change General Law LGCC (2012)
- National Climate Change Strategy ENACC (2013)

Economic / fiscal

- Climate change special program PECC
- Sectoral program for agriculture, livestock and fisheries PSAGP (2013-2018) by SAGARPA (Ministry of Agriculture). It promotes: sugarcane green harvest, crop rotation, irrigation, protected agriculture, livestock vulnerability information, efficient machinery, bio-fertilizers, fuel efficiency, small dams, water reservoirs, soil improvement, cogeneration of energy, bio-fuels, bio-digesters, thermic solar systems, photovoltaic systems, organic fertilizers, natural disaster risk insurance for states and municipalities (CADENA program for the attention of natural disasters), and development of Nationally Appropriate Mitigation Actions (NAMAs) in livestock production, among others.

Information / communication-based

- GHG inventories

7.5 CATASTROPHE INSURANCE FOR MSMES BY IFMR HOLDINGS IN INDIA[14]

Highlight summary

IFMR Holdings ("IFMR") was incorporated as a private limited company with the mission to achieve complete financial inclusion in India. It operates, incubates, invests in and provides strategic direction to commercial companies that have significantly scalable business models, as well as furthers IFMR Trust's mission of financial inclusion. IFMR currently has a network of 100 plus originators that serve 20.5 million end-clients in 481 districts across India, including 0.7 million that are served by IFMR directly through its remote rural operations. IFMR believes that access to finance supported by well-functioning markets is critical for low income households, and intends to leverage its network to introduce new and innovative financial solutions for these households. Developing the Natural catastrophe risk insurance ("Cat insurance") solution for financially excluded households in India is one such idea that IFMR has started working with in collaboration with BMZ/GIZ InsuResilience project.

Background

Natural disasters remain a major driver of poverty in India but Catastrophe Insurance in India is particularly under-developed. India is prone to natural catastrophe risks and was the Top 3 disaster hit country in 2015. 60 percent of people globally affected by floods reside in India. Over 40 million hectares (12 per cent of land) in India is prone to floods and river erosion. Of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis which again drive coastal floods. According to the World Resources Institute (WRI), India tops the list of 163 nations affected by river floods in terms of number of people (around 4.85 million people). Every year, the lives of 4.85 million Indians are disrupted by floods (USD 14.3 billion of gross domestic product at Risk). The Chennai Floods in December 2015 led to economic losses of USD 2.2 billion.

A survey of 500 SMEs registered in the Chennai District suggested inadequate sources of finance and insurance as a key issue for the high losses.

The Indian MSME sector is an important pillar for the national economy. 50 million MSMEs – of which many reside in rural areas – employ 111 million people. The sector accounts for 37 percent of GDP and 40 percent of exports. However, their financial needs are served insufficiently. Thus, MSMEs are not equipped to absorb the economic effects of losses related to extreme weather and natural events, exacerbated by climate change.

Barriers / problems the intervention overcomes

- The demand of the MSME sector for finance (INR 32.5 trillion) is met only partially (30%)
- Only 7.3% of the enterprises of the MSME sector have access to formal sources of finance
- Economic losses resulting from a disaster are only insured partially
- Poorly structured insurance, e.g. delays in claim settlement
- Tools applied to address above barriers
- Customer centric approach targeting low income individuals and small enterprises
- Innovative product design aiming to build catastrophe risk protection solutions
- A potential digitally enabled technology platform that can enable deep customer centricity in delivery models

Intervention

IFMR designs lifecycle products in collaboration with Financial Product manufacturers for their customers, reconciling risks and goals that are prevalent in certain stages of life. By putting the customer first, the financial well-being of the respective customer segments is maximized.

IFMR, Weather Risk Management Services and GIZ are currently jointly developing an insurance product for natural catastrophe risks to be integrated into IFMR's lifecycle solution, along with savings products that will also protect the customer's saving goal against disruptions emerging from risks like life/accident/health. This design is guided by specific design principles, e.g. the product shall not be credit-linked, will cover multiple perils (flood, drought, cyclone, in some parts earthquake). The coverage of income is as important as the coverage of assets since the customers, who are mostly laborers, farmers/farm laborers and shopkeepers, depend for their livelihoods on labour income and other income sources which are all affected by extreme weather events. Immediate early recovery cash payments, thanks to the natural catastrophe insurance payout, then protects the few assets of the customer because he/she does not have to sell those assets to get back on his/her feet.

IFMR envisages solving the delivery challenge through a technology-enabled wealth management platform approach, with data- and analytics-backed product design that can enable true digitization.

Policies applied / policy implications

Legislative / regulatory

» **Adequate regulation.** An enabling regulatory framework supports the development of innovative insurance products

» **Rural sector obligations.** The insurance regulator requires all insurers to underwrite a certain share of their portfolio in rural areas, which incentivizes insurers to develop also rural business

Fiscal/Economic

» The natural catastrophe product will not be subsidized, but some MFIs under the IFMR capital platform might use existing crop insurance products for the farmers in their portfolio. The government of India and state governments highly subsidize these area-yield index based crop insurance products through the PFMBY program (USD 4 billion in premiums, 40 million farmers covered)

Information / communication-based

» **Delivery platform.** IFMR's vision of such a technology platform is to create a bridge between financial product manufacturers and existing distribution networks (IFMR Originator) like Micro-Finance Institutions, enabling them to become more deeply customer centric in their approach

» **Trainings and awareness campaigns.** IFMR Originators shall receive regular trainings, and benefit from the Government's general awareness programs and biometric ID creation for all Indian adults

7.6 WEATHER INDEX INSURANCE IN ZAMBIA[15]

Highlight summary

NWK AgriServices, a large cotton contract farming operator offers a weather index-based and funeral expense insurance scheme to smallholder cotton farmers who take part in NWK's outgrower scheme. The product is designed to help cover the costs of inputs when bad weather strikes.

Background

The vast majority of Zambia's smallholder farmers is dependent on rain-fed agriculture and therefore exposed to the impacts of severe weather events, including droughts, erratic rains throughout the growing season, and floods. Smallholder cotton farmers in Zambia often contract with cotton ginning companies, such as NWK AgriServices, at the beginning of the cropping season. They receive inputs such as seeds and pesticides and pay for the inputs at the end of the season at crop delivery. NWK then deducts the costs of the inputs from the proceeds for the delivered cotton. In very poor years, then, farmers will receive very little income or even incur debts after the costs of inputs are deducted. The weather-index insurance product thus covers the costs of the inputs supplied by NWK AgriServices, ensuring debt free earnings throughout good and bad seasons for farmers. The evidence from four consecutive seasons shows that this "safe farming" cover in combination with the funeral expense insurance enables farmers to farm more cotton and reduces their incentives to side-sell their crop.

Barriers / problems the intervention aims to overcome

Smallholder farmers are often reluctant to invest in their farms and crops since they perceive it as too risky, so they underinvest in cash crops and overinvest in food crops and assets such as livestock. Side-selling, whereby farmers may receive inputs on credit from a company but after harvesting break their contract agreement and sell their produce to another company often occurs. They are then likely to default on their input loans at the end of the season. As a result, the contract farming operator will not contract with the smallholder in the next season.

Tools applied to address above barriers

Weather index-based agricultural insurance

Agricultural insurance gives farmers the necessary confidence to invest in their farming businesses as the risk of production loss is reduced. This, for instance, may result

in the cultivation of two hectares instead of one. Moreover, the risk of side-selling and credit default can be reduced through agricultural insurance as the farmer receives a payout after a bad weather event has occurred with which she is able to pay back the loan.

Life insurance / funeral cover

In the case of the death of the farmer, the family receives a payout that covers the loan as well as funeral expenses. This reduces the financial burden of the surviving relatives.

Intervention

NWK AgriServices started with an agricultural insurance pilot in the 2013/2014 growing season. Since then, the project scaled up with 52,000 insured farmers out of the approximately 70,000 farmers who were under contract with NWK AgriServices during the 2015/2016 growing season. The agricultural insurance is offered to farmers on a voluntary basis and is linked to a life insurance product. The specific feature of the weather index-based product is that the insurance premium is pre-financed by NWK AgriServices and recovered at the end of the season when the farmer delivers the cotton. It is this feature that probably results in the high take-up rates as farmers' liquidity constraints at the beginning of the season prevent them from buying insurance. Contract farming operators have proven to be good distribution channels for agricultural insurance because the insurance powers their business models and directly impacts their top-line revenues, thanks to farmers producing more, and as the bottom-line because of less side-selling losses. In addition, farmers trust NWK AgriServices and their field staff.

The weather index-based product is based on satellite estimations of rainfall using Dekadel (10-day) data from TAMSAT. It was designed using a participatory process with information collected from agronomists from NWK AgriServices, agricultural research institutions such as the Indaba Agricultural Policy Research Institute (IAPRI) and a wealth of information collected from farmers via focus group discussions.

The life insurance / funeral cover pays out in the event of an insured farmer's death from 1 January to 31 August. Initially, there were reservations against the product due to social taboos, but after farmers saw the benefits, the insurance became well received. Now there is a high demand for life insurance not only to cover the farmer but also to cover other family members and dependents.

Policies applied / Policy implications

Legislative / Regulatory

- Enabling policy framework

- Support for the types of expected benefits governments might expect when adopting insurance regulations that provide a sufficient enabling environment to spur greater insurance coverage and range of products in typically under-served rural environments.

- Contract farming legal and regulatory framework. This is important to frame the contract farming operator – farmer relationship and allow for proper recourse and market conditions to allow farmers to switch from one operator to the other.

Economic / fiscal

- Pre-financing of insurance premium. The NWK AgriServices case study shows that pre-financing of the premium by either government or companies can be an effective tool for increasing agricultural insurance coverage.

Information / communication-based

- Risk awareness raising programs and trainings

- Awareness raising programs for the main risks that farmers face and trainings on how these risks can be transferred through insurance was key in this successful agricultural insurance program.

7.7 ACCELERATING PRIVATE SECTOR AGENCIES FOR CLIMATE RESILIENCE TRAINING IN BANGLADESH[16]

Highlight summary

Accelerating the strategy focuses on the incorporation of climate risk management tools and training concepts into the regular training offered by the various training institutes managed by the Ministry of Industry in Bangladesh. The result is: a) climate adaptation trainings that include knowledge building on climate change risks in business, showing adaptation strategies and integrating a developed and tested climate finance module and b) climate change adaptation integrated into the standard training program of two public owned institutions that offer training to the private sector. The "Private Sector Adaptation to Climate Change (PSACC)" program has been in partnership with BSCIC (Bangladesh Small & Cottage Industries Cooperation), BIM (Bangladesh Institute of Management) and SME Foundation in respect to developing training concepts for integrating climate change perspective into existing training formats. Both institutes (BIM and BSCIC) are in a process of incorporating the training concept into their curriculum. Based on PSACC's recommendation and advisory input, the Ministry of Industry had incorporated the topic "promotion of climate resilient industry" into Bangladesh Industrial Policy 2016.

Background

Bangladesh is one of the pilot countries out of the BMZ funded Global Program "Private Sector Adaptation to Climate Change (PSACC)". In Bangladesh, SMEs absorb 70 to 80 percent of industrial workers and constitute over 95 percent of business, while the capital intensive industry cover just three to four percent. It was decided to start awareness on adaptation and possible adaptation strategies together with relevant private sector organizations to understand specific needs in adaptation and mobilize SMEs towards climate resilient.

Barriers / problems the intervention aims to overcome

- Knowledge Gap for SMEs on how to adapt
- SMEs do not have capacities to invest in resilience
- No specific financing options for SMES who need to invest in resilience

Tools applied to address above barriers

- Sector specific climate vulnerability risk assessment by using Climate Expert (CE) methodology
- Training Programs
- Training of Trainers (TOT)

Intervention

Since one year testing, two partner institutes BSCIC and BIM have provided training to more than 300 entrepreneurs, TOT conducted for the resource persons, and development of navigation training for inland water transport sector. Two case studies were conducted to develop adaptation strategy for companies in the Inland Water Transport sector and Agro-Processing sector. For instance, the case study for a water transport sector's company showed that climate challenges in the inland water transport sector might encompass heavier storms, stronger currents due to changing and intense rainfall patterns as well as less water and lower lean flows due to longer drought periods. The assessment proved that ship accidents can be related to those extreme weather events and business activities and transport routes have to close. As this is cost-intensive, ship owners are convinced to support trainings for captains and crew navigation in changing climate conditions. Additional financial support will be necessary.

Policies applied / Policy implications

Legislative / Regulatory

- Results from the global program were the basis for the Ministry of Industry to conventionalize the promotion of climate resilient industries

Information / communication-based

- Ongoing periodic meetings and structured consultations with all relevant stakeholders to inform the program, especially the water transport sector, of better navigation due to climate change issues
- Knowledge sharing on private sector adaptation within state owned private sector organizations
- Sectoral Vulnerability Assessments, case studies, training curriculum, and use of a Climate Risk Management approach

7.8 JOINT ACTIONS FOR MOBILIZING TOURISM ACTORS FOR CLIMATE RESILIENCE IN COSTA RICA[17]

Highlight summary

Ministry of Tourism in Costa Rica developed a "resilience" package for SME tourism. It consists of: a) Awareness raising based on a vulnerability study for selected pilot destinations, b) development of evidence with real case studies in the pilot destinations, c) training programs for consultants and resource persons, d) standardized climate risk assessment for tourism enterprises and development of individual adaptation strategies, e) now starting matching financial needs with local banks offers. The creation of a steering committee with different members of the tourism sector significantly contributed to the success of the project throughout the pilot phase. Ongoing discussion on integrating the climate risk assessment into the certification system of the country.

Background

Costa Rica is one pilot country of the BMZ funded Global Program "Private Adaptation to Climate Change (PSACC)". Tourism accounts for 8.1 percent of the country's GDP, representing 13 percent of direct and indirect jobs. Since the beginning of the 2000s, tourism has generated more income for the country than the export of bananas and coffee together. Different approaches for SMEs were tested. After analyzing relevant sectors and their vulnerabilities, the tourism sector was chosen for intervention due to its high economic relevance and vulnerability. PSACC is working on the demand side (preparation of the market) but also addressing financial gaps in adaptation finance for the SMEs.

Barriers the intervention aimed to address

- Vulnerability assessments for different destinations necessary to clearly address needs and start awareness raising
- Lack of knowledge in general as to what adaptation is
- Evidence in successful adaptation is still lacking as only few cases exist - more examples would be necessary
- Traditional banks in Costa Rica still do not understand the concept of adaptation to climate change and in general commercial banks do not offer very favorable interest rates for SMEs
- Small capacity of business management that many SME show is mostly a hindrance to successful financing

Tools applied to address above barriers

- Climate Risk Assessment Tool
- Training Program
- Risk sharing with local FIs
- Technical assistance for capacity building for FIs, ESCOs, project developers, and project hosts

Intervention

The program is still in progress. On the national level 18 consultants and multiplier organizations, including the Ministry of Tourism (Instituto de Turismo, ICT), and the Chamber of Ecotourism (CANAECO) were trained and several assessments are now in progress conducted by the trained consultants. As a result, ICT is planning to integrate the Climate Expert Approach into their Certification for Sustainable Tourism (CST) that is awarded to tourism companies in 5 levels, covering several aspects of sustainability. In two pilot destinations, awareness raising workshops reached several companies and local multiplier organizations. CANAECO is now planning to conduct an additional awareness-raising event among its members and conduct further assessments as a result of the training program. In addition, a Lab of Financing will be established to discuss financing concerns of SMEs with financial sector.

Policies applied

Regulatory/Economic/ Fiscal

- Risk Assessment Approach is discussed for being integrated in national tourism certification system

Information / communication-based

- Consultative Committee as platform for ongoing periodic meetings with all relevant stakeholders
- Climate Adaptation Trainings are disseminated to relevant trainers (ToT), several case studies established for attracting demand side
- Establishing a Lab of Financing Private Sector between Financial Sector (supply side) and Enterprises (demand side)

7.9 RISK-SHARING MODEL TO FACILITATE CLIMATE SMART FINANCING IN CHINA[18]

Highlight summary

A risk-sharing model that effectively enhances MSMEs' access to rural credit has drawn much attention in China. This model is implemented through a Public-Private-Partnership (PPP) whereby: (i) governments establish guarantee funds; (ii) insurers underwrite credit insurance, or Payment Protection Insurance (PPI); (iii) agricultural insurance provides another layer of protection; and (iv) financial institutions share the rest of credit risk. Through this model, MSMEs who have neither collateral nor credit history are able to get loans from formal financial institutions, invest in climate smart activities and enhance their adaptation to climate change.

Background

Thanks to the legislative improvement on land rights as well as other favorable agricultural policies over the past years, rural MSMEs, in the forms of farmers' associations, rural enterprises called "Dragon-Head Enterprises", family farms and others are in full swing and changing the landscape of rural China. Unlike the traditional small holders who plant staple food for self-consumption, these MSEMs are more engaged in marketing and value chain development as their livelihoods heavily, if not exclusively, rely on agriculture.

Despite generally having higher returns from agriculture than traditional smallholders otherwise do, they actually face higher climate risk, among other risks, and this vulnerability is increasing in the context of climate change. MSMEs have incentives to take measures to prevent, mitigate and reduce risks, but their financial difficulty has always been a barrier. This issue was addressed in recent years by a risk sharing mechanism among governments, insurers and financial institutions (FIs).

Barriers/problems the intervention aimed to overcome

- Formal financial institutions traditionally serve big clients such as state-owned enterprises and do not have enough experience working with rural MSMEs
- FIs are not particularly interested in small clients due to the high transaction costs
- FIs are not willing to provide credit to rural MSMEs because of the high risk and the lack of collateral and/or credit history of rural MSMEs
- Tools applied to address the barriers
- Risk-sharing mechanism under a PPP model to facilitate rural lending
- Public financial support to facilitate climate smart investment through a guarantee fund

Intervention

This risk-sharing mechanism could have several highlights as presented below:

- The professional risk carriers, i.e. insurers, are involved. Insurers are believed to have better expertise and knowledge than other institutions in managing risks. It makes the whole mechanism steady and robust;
- Agricultural insurers have very broad networks in rural areas, i.e. 93% of townships being covered, which is much higher than banks' networks (CIRC, 2016) . These can be leveraged to overcome the information asymmetry when underwriting the loan;
- It encourages MSMEs to invest in innovation and adopt new technology. Innovation and new technology (i.e. drought resistant seeds) actually present high risk. MSMEs alone may be unable, or are unwilling, to take all the risks;
- The guarantee funds, either proportionally or based on excess of loss, enhance insurers and FIs' confidence, reduce their risks and eventually kick off the program;
- MSMEs do not need collateral or credit history, although agricultural insurance is the pre-requisite.

This risk-sharing model has developed fast in recent years. For instance, in Jiangsu province, the Provincial Government leveraged RMB 600 million (around USD 86 million) in loans prioritizing disaster risk reduction and recovery through a USD 10 million guarantee fund. In this program, People's Insurance Company of China (PICC) provides credit insurance and agricultural insurance and The Postal Savings Bank of China issues the credit (China Post News, 2016). In Gaoyou, Yangzhou, PICC carries 80% of credit risks and China Agricultural Bank co-shares the remaining 20%, supported by a 7 million RMB (USD 1 million) guarantee fund as last resort. At the same time, a weather index insurance (WII) covers the loan applicants (Gaoyou Government, 2016).

With the Anxin Agricultural Insurer in Shanghai, it only takes three days for MSMEs to get the loan from Shanghai Rural Commercial Bank if the amount is less than RMB 1 million (USD 143,000). In Longhua, Hebei province, this model is extended to poverty alleviation: an aggregator (e.g. rural enterprise or farmers' association) is eligible for additional RMB 50,000 credit (about USD 7,200) with a possible interest discount every time it recruits a poverty household (Chengde Poverty Alleviation and Agricultural Development Office, 2016).

The risk-sharing model overcomes the market failure and effectively leverages climate smart financing. The efficiency is fairly good because: a) compared to direct subsidies or allowances, this model avoids the "leakage" in the process of distribution; and b) much of the climate smart investment (e.g. risk reduction, prevention) and insurance are ex-ante, which is believed to be more efficient than ex-post measures. This risk-sharing model also has a positive long-term impact because it can enhance MSMEs' financial literacy, increase awareness on climate smart investment and build resilience against the climate change. Regarding sustainability, it is the private sector, with its professional expertise, that manages the risks without much intervention from government except during the initial setup of the guarantee fund. Therefore, it shall be sustainable, although there is a strong need for insurers and FIs to regularly review, assess and manage the risks.

The risk sharing mechanism effectively overcomes the information shortage and therefore reduces the transaction costs related to information. This model is viewed as a new market opportunity for insurers and FIs, so the transaction costs for acceptance is low. The implementation presents a medium level of uncertainty though, as this is a new market with new clients and a new model. Insurers and FIs are still in the process of learning. However, with the improvement of clients' data and credit history, insurers and FIs will be able to better assess and manage the risks. The transaction costs can be significantly reduce thanks to economies of scale and the participation of aggregators.

Policies applied

Agreement / incentive-based

- Public sector financial support for climate smart **risk financing, risk sharing and climate insurance**, through public-private partnerships

- **Guarantee mechanisms** supported by public funds, private financial intermediaries and risk carriers co-share the risks, making loans accessible to MSMEs for climate smart investment. Climate insurance is promoted through governmental premium subsidies to provide additional protection

- **Public Private Dialogue and Collaboration.** Government playing the role of coordinator and honest broker to facilitate systemic collaborative solutions

Information / communication-based

- Establishment of **database system** to collect, analyze and disseminate information that would enable decision making

- Plan, collect, process and analyze **data** (e.g. client data, agro climate data) for risk assessment and management

7.10 AGRICULTURAL WATER PRICING REFORM IN CHINA[19]

Highlight summary

China has completed Agricultural Water Pricing reform pilots and is expanding the pilots to national wide reform. This national reform is implemented through: (i) government grants to support water saving facilities and technical assistance; (ii) water quota allocations to counties and villages; (iii) progressive water pricing; and (iv) market liberalization for water permit trading. Farmers who adopt new technologies and therefore increase water efficiency have dual benefits: a) save on water bills, and b) generate additional earnings by selling the extra water quota.

Background

China's Agricultural Water Pricing was commenced in 2007, starting from water planning and water right allocation. When the water right decentralization to each county was completed, the Chinese government began to pilot agricultural water pricing, starting from 2 counties in 2014 and expanding to 80 counties in 27 provinces in 2015. Good practices and lessons were elicited and in 2016 China launched the nation-wide Integrated Reform on Agricultural Water Pricing.

Barriers/Problems the intervention aims to overcome

- Water resources in China are scarce, and the temporal and spatial distribution is very uneven;
- Climate change, coupled with water pollution, is accelerating the shortage of water resources;
- The price for agricultural water was very low, leaving little incentives for water saving, and contributing to poor maintenance of water infrastructure;
- The price was based on irrigation areas instead of actual volume of water used;
- Some local governments deliberately charge very low water fee to attract investment;
- Arguments or even conflicts happen between villages and/or individuals due to unclear water rights.

Tools applied to address the barriers

- Government funding/grants to reduce start-up cost such as drip irrigation or pipelines
- Utility pricing providing incentives for MSMEs to adopt new technologies and efficient use of water resources
- Remove Trade Barrier and Liberalize "Climate Smart" Market so that investors could get economic return from the climate smart investment

Intervention

The key intervention of this round of agricultural water pricing reform includes (State Council, 2016):

- Given the water quota a county receives, the county government takes the overall responsibility to decentralize it to villages, WUA, and eventually individual water users;
- Government and/or its agencies is the preliminary entity for water pricing, which shall take into consideration the cost, affordability and scarcity of water resource and so on;
- Differentiated prices applied for different crops types and activities: water consuming crops, high-value added cash crops and livestock shall pay higher prices;
- Progressive water pricing is adopted;
- Ground water price shall be higher than run-off water;
- Water prices are to be reviewed and improved on a regular basis.

Along with the price signal, other incentives and measures are in place to promote water saving:

- Encourage water right trading. The trading includes those traded between government agencies, and those among water users and WUAs
- Government purchases back unused water quotas at higher prices
- Awards to water-saving farmers who adopt water-saving technologies, or change crops to save water

As China just launched the nation-wide reform in 2016, it might be too early to draw conclusions. The pilots demonstrate very positive outcomes. In Cangzhou, Hebei province, SMEs and farmers use Smart Cards (chip card) to pay for irrigation costs. The water fee is reinvested into water-saving irrigation, infrastructure maintenance, and to cover the cost of WUA. The Head of WUA reported that previously the water consumption was about 80 m3 per

mu, and now it has been reduced to 50 m3 per Mu. (Hebei Daily, 2016). In Liangzhou, Gansu, differentiated water prices for different crops are implemented: irrigation for green house, high efficiency water-saving irrigation as well as eco trees enjoys 50% of price discount; while using traditional practice to irrigate water-consuming crops like wheat, corn, and barley would have to pay 50% of extra cost. In Zhangye, Gansu, manufactories' water permits have ceilings but they could invest in water saving irrigations in rural areas in return for extra water permits. In Mianyang, Sichuan, farmers are motivated to invest in irrigation infrastructures. Farmers self-organized to improve water channels by replacing the soil-floor with concrete. This in turn saves farmers 30% of water (Sichuan Daily, 2016).

The water pricing effectively incentivizes MSMEs to invest in climate smart activities and in turn helps them adapt to climate change. The utility pricing and water permit trading are both market oriented. Water pricing creates few distortions and is fairly efficient. Much of the collected water fees are reinvested in better infrastructure and therefore lead to long-term positive welfare gains. In addition, it increases farmers' awareness and changes their behavior and farming practices, which would have long-term impact too. Once set up, this mechanism would function smoothly without much invention required and thus prove sustainable as well.

The Agricultural Water Pricing provides clear price signals to farmers; therefore the transaction cost related to awareness is low. Farmers, however, are concerned that the water quotas allocated to them would be reduced if they consistently save water. Therefore, it is critical to improve the legislative framework to enhance farmers' confidence. Besides, it may not be surprising that some farmers resist the reform initially, but once the demonstrations show that this is a fairer, more transparent mechanism, that eventually allows them to save on water bills, farmers would be willingly to adopt it. Then the transaction costs will be significantly reduced thanks to economies of scale. Regarding implementation, there is little financial support required from externals, so the uncertainty and transaction costs are also quite low as well.

Policies applied

Legislative / regulatory based

Property rights and usage rights identified to reduce the confusion and uncertainty of the climate smart investment, and to promote climate change adaptation

Agreement / incentive-based

- **Blended funds** (grants with commercial finance) to promote climate smart MSME practices, through co-investing by public funds and MSMEs that facilitate climate smart investment. The blended funds help to overcome the upfront cost barriers, and have the chance to demonstrate the investment return from new technologies. This is particularly important for regions and areas where awareness is low.

- **Utility Pricing policies.** Very immediate, but also fundamental, ways to encourage conservation and efficient use of resources.

Information / communication-based

- **Awareness Campaign Programs.** Various forms of awareness raising efforts are in place such as media reports, demonstration projects, public campaign, training, and field visits.

7.11 GAFSP PRIVATE SECTOR WINDOW

Highlight summary

Improving agricultural performance in low-income countries is the most effective way of reducing poverty and hunger. In addition, studies have shown that growth originating from the agricultural sector has been two to four times more effective at reducing poverty than growth originating in other sectors.

The Global Agriculture and Food Security Program (GAFSP) is a multi-donor fund established in 2010 by the World Bank Group at the request of the G20 in the wake of the food price crisis. The program aims to put policies in place to help people from the poorest countries in the world strengthen food and nutrition security. Allocations are determined by a Steering Committee composed of a balance of representatives from donor and recipient countries, civil society organizations, and multilateral organizations, following advice from a technical committee of independent experts. Eligible countries must demonstrate a high level of need and submit a comprehensive, technically sound project proposal.

Background

GAFSP picks up where emergency funding leaves off and works with countries in a sustainable way so that they can be more resilient to future climate, political and market shocks.

Barriers/Problems the intervention aims to overcome

GAFSP focuses on agricultural productivity growth, linking farmers to markets, as well increasing their capacity and technical skills. GAFSP is country-led, supporting countries' priorities reflected in their national agriculture and food security investment plans, and provides a platform for coordinated donor financing around country programs and sustainable private sector investment.

Tools applied to address the barriers

GAFSP is already setting a new standard for development effectiveness. It stresses country ownership, good governance, inclusivity, high-quality projects, and intensive monitoring and evaluation of factual results.

Intervention

GAFSP is divided into two distinct financing windows: the Public Sector Window (PSW) and the Private Sector Window (PRSW). To date, USD 1.59 billion has been pledged of which USD 1.241 billion is for the Public Sector Window and USD 356 million is for the Private Sector Window.

The Public Sector Window assists strategic country-led or regional programs that result from sector wide country or regional consultations and planning exercises (such as CAADP in Africa). It is funded by eleven donors - Australia, the Bill & Melinda Gates Foundation, Canada, Germany, Japan, Ireland, the Netherlands, South Korea, Spain, the United Kingdom and the United States.

The Private Sector Window is managed by the International Finance Corporation (IFC) who co-invests its funding along GAFSP. It aims to provide innovative and affordable financing solutions through loans (including longer-term loans), credit and/or first loss guarantees, risk sharing facilities and equity that support private sector activities for agricultural development and food security. Its investments cover the entire value chain from farm inputs to processing with an aim to increase farmer productivity and promote resource efficiency. It attempts to address market failures by providing funding to projects in the agricultural sector with high developmental impact and good potential financial sustainability that may not attract commercial funding due to their higher perceived risks. Through the use of blended finance, it can offer financing on more favorable terms and/or lower the perceived risks for its private sector partners. It couples this with technical assistance and provides on-the-ground training and advice for businesses and farmers in improving farmer productivity, strengthening standards, reducing risks and mitigating climate change effects. Of the USD 356 million, USD 331 million is for its lending activities and USD 25 million is used for technical assistance. The PRSW is funded by six countries - Australia, Canada, Japan, the Netherlands, the United Kingdom and the United States.

Policies applied

Agreement / incentive-based

» GAFSP fosters public-private partnerships.

» Blended finance, i.e. using public sector funds to leverage private sector funds in the form of lower interest rates, partial credit guarantees, risk sharing facilities, etc.

Information / communication-based

The GAFSP PSW projects have demonstration effects and therefore lead to replications, thanks to targeted communication campaigns.

Endnotes

(1) The inclusion of rural Microenterprises with SMES is important given the large number and importance of micro-level agricultural households and the fact that climate adaptation anywhere in the agricultural value chain includes, and is affected by, their vulnerability to climate risks.

(2) Written by Victor Kommerell (CIMMYT).

(3) Written by Angelika Frei-Oldenburg and Sylvia Maria von Stieglitz, Mohammed Rahoui (GIZ Germany, Morocco), Global Program on Adaptation of Private Sector (PSACC) on behalf of German Federal Ministry of Economic Cooperation and Development.

(4) http://farmerline.co/services/

(5) Written by Abu Yousuf (GIZ Bangladesh), Global Program on Adaptation of Private Sector (PSACC) on behalf of German Federal Ministry of Economic Cooperation and Development.

(6) Big data is a term for data sets that are so large or complex that traditional data processing applications are inadequate to deal with them.

(7) Global Adaptation and Resilience Investors Working Group (GARI).

(8) However, one caveat is that the country needs a good legal and enforcement system.

(9) http://www.s4agtech.com/

(10) Written by Nancy McCarthy (LEAD Analytics Inc.)

(11) https://www.kukua.cc/

(12) Of these, 72 were individual and 757 were portfolio based. Portfolio based risk sharing was an innovation developed to address the particularly high transaction cost associated with small loans.

(13) Writen by Victor Kommerell (CIMMYT).

(14) Written by Vipul Sekhsaria (IFMR Holdings).

(15) Written by Saskia Kuhn, Ulrich Hess (GIZ), Agrotosh Mookerjee and Joseph Kakweza (Risk Shield Consultants). Technical Assistance for NWK AgriServices for the insurance implementation is supported by GIZ Global Project InsuResilience, implementation component .

(16) Written by Abu Yousuf, Angelika Frei-Oldenburg (GIZ), Global Program on Adaptation of Private Sector (PSACC) on behalf of German Federal Ministry of Economic Cooperation and Development, 2017.

(17) Written by Janina Wohlgemuth, Angelika Frei-Oldenburg (GIZ), Global Program on Adaptation of Private Sector (PSACC) on behalf of German Federal Ministry of Economic Cooperation and Development, 2017.

(18) Written by Weijing Wang, GIZ Consultant.

(19) Written by Weijing Wang, GIZ Consultant.

Bibliography

Binswanger-Mkhize, Hans Peter, 2012. Is there too much hype about index-based agricultural insurance? The Journal of Development Studies, Volume 48, Issue 2.
CGIAR, 2017. http://www.cgiar.org/about-us/our-programs/cgiar-research-program-on-climate-change-agriculture-and-food-security-2017-202/
Chengde Poverty Alleviation and Agricultural Development Office, 2016, http://www.cdsfpb.cn/onews.jsp?id=965
CIRC, 2016. Consultation with China Insurance Regulatory Commission (CIRC), June 2016.
Dercon, Stefan and Luc Christiaensen, 2007. Consumption Risk, Technology Adoption, and Poverty Traps: Evidence from Ethiopia. https://openknowledge.worldbank.org/handle/10986/7417.
DFID, Agricultural Strategy Paper, 2015.
European Bank for Reconstruction and Development, Agence Francais de Development, the Africa Development Bank, Asian Deveopment Bank, CAF Latin American Development Bank, European Investment Bank, Inter-American Development Bank, International Bank for Reconstruction and Development, International Finance Corporation, Japan International Cooperation Agency, KfW Bankengruppe, Multilateral Investment Guarantee Agency, 2016. Mainstreaming Climate Action within Financial Institutions - Emerging Practices. https://climatefinanceadvisors.com/wp-content/uploads/2017/02/fi_mainstreaming_epp_en.pdf
Gaoyou Government, 2016. http://gys.jsnc.gov.cn/xwzx/ggl/2016/10/11153236085.html.
Hazell, Peter B. R. and Ulrich Hess, 2010. Drought insurance for agricultural development and food security in dryland areas. Food Security, pp. 395 - 405.
Hazell, Peter B. R., J. Anderson, N. Balzer, A. Hastrup Clemmensen, U. Hess and F. Rispoli, 2010. Potential for scale and sustainability in weather index insurance for agriculture and rural livelihoods. International Fund for Agricultural Development and World Food Programme. Rome.
Hazell, Peter B. R. and Ulrich Hess, 2017. Beyond hype - another look at index-based agricultural insurance. In: Prabhu Pingali and Gershon Feder (eds.): Agriculture and rural development in a globalizing world. Routledge.
Hernandez, Emilio, 2016. Adapted from Sembrar Sartawi in Estrategias innovadoras de gestión de riesgos en mercados financieros rurales y agropecuarios: Experiencias en América Latina. FAO y Academia de Centroamérica, Rome, Italy.
Hess, Ulrich, Peter B. R. Hazell and Saskia Kuhn, 2016. Innovations and emerging trends in agricultural insurance. GIZ.
Kim, Jim Yong, 2015. Remarks at launch of the Africa Climate Business Plan, World Bank. November 30, 2015. http://www.worldbank.org/en/news/speech/2015/11/30/remarks-by-world-bank-group-president-jim-yong-kim-at-the-launch-of-the-africa-climate-business-plan-at-cop21-in-paris
Nature, 2012. http://www.nature.com/news/african-agriculture-dirt-poor-1.10311
Sichuan Daily, 2016. http://news.scol.com.cn/gdxw/201611/55726770.html
State Council, NDRC policy documents, including the Opinions of State Council on Integrated Water Price Reform, 2016.
Trabacchi, C., J. Brown, R. Boyd, D. Wang and J. Falzon, 2016. The role of the Climate Investments Funds in meeting investment needs.
World Bank, 2010. World Development Report 2010. Development and Climate Change. https://openknowledge.worldbank.org/handle/10986/4387
World Bank Group, 2016. Making Climate Finance Work in Agriculture. Discussion Paper. http://documents.worldbank.org/curated/en/986961467721999165/Making-climate-finance-work-in-agriculture

www.gpfi.org/publications