CHAPTER 8

Microfinance and Climate Change: Threats and Opportunities

Paul Rippey[*]

Changes to the world's climate that were once imperceptibly slow are now clearly visible and happening quickly. Dying coral reefs, the disappearing arctic ice sheet, and proliferating invasive insects in temperate zone forests are among the most visible signs, but countless less dramatic phenomena show that climate change is real. The changing climate is part of a new global environment that impacts all countries, economies, sectors, and people. Microfinance, like everything else, will not be spared.

Climatologists say that the impact of climate change will fall disproportionately on tropical and semitropical regions. Poor countries, and the poorest people in these countries, will likely be hardest hit. Climate change is an immediate threat to economic development in poor countries, which have the least resources to cope with these changes. Development priorities, such as public health, that had been on a path to resolution are suffering from serious setbacks. Meanwhile, new challenges, including migrations of poor people displaced by drought, heat, flooding, and storms, are appearing (see Box 1).

Box 1: The Effects of Climate Change

The predicted impact of climate change goes way beyond the comfortable warmth suggested by the popular term *global warming*.

Water. Many of the most severe effects of climate change will be related in one way or another to water, fresh and salt, liquid and frozen.

Disappearing Glaciers. With very few exceptions, mountain glaciers are receding rapidly. Glaciers feed rivers that are used for irrigation and drinking water. Forty percent of the world's population gets at least half its water from runoff from the Himalayan glaciers. Runoff from melting glaciers will initially increase flood risk. Later, as glaciers disappear, water supplies will decrease, and people who depend on glacier-fed rivers will suffer.

[*] Consultant, Climate Change and Microfinance.

D. Köhn (ed.), *Greening the Financial Sector: How to Mainstream Environmental Finance in Developing Countries*, DOI 10.1007/978-3-642-05087-9_8,

Rainfall. The amount and the timing of rainfall are changing around the world. As a broad generalization, temperate areas will initially get more rain, subtropics will get less, and the tropics will have changes that vary widely from region to region. The percentage of land area experiencing extreme drought at any one time could increase from one percent to 30 percent by the end of this century.

Flooding. Two hundred million people, mostly in the developing world, live on coastal flood plains. A temperature increase of three to four degrees could lead to tens or hundreds of millions of people being affected by floods. Sea level rise continuing for centuries or millennia is now inevitable because of the stock of greenhouse gasses already in the atmosphere. But it is not too late for us to influence its extent and speed of change from these gasses.

Ocean Warming and Acidification. Ocean temperatures are increasing, and oceans are becoming more acidic as they absorb CO_2. The effect of warming on fisheries is poorly understood and is probably mixed, depending on the species and the location. Acidification is having unambiguous negative impacts, because acidity affects the ability of ocean creatures to form shells and skeletons. These changes, combined with systematic overfishing, mean that nearly all commercial marine species are declining. According to some projections, essentially all commercial fishing will end within the next 50 years with terrible repercussions: one billion people rely on fish as their principal source of animal protein. FAO estimates that 38 million people earn their living fishing or fish farming.

Heat. The earth is getting hotter, and this trend is accelerating. Temperatures will increase worldwide, though more so in higher latitudes. By cruel irony, many of the areas that will be most negatively affected are in the developing world. Some of the areas that will be least negatively affected, or have net short-term positive effects, are in the colder north, where some of the worst polluters are.

Some parts of the Sahel and other very hot regions may become uninhabitable. Some airports will have to limit flights because of thinner air. But the greatest effects from increased temperature will be on agriculture, because the climate in some areas will become increasingly inhospitable to common plant species.

Ecosystems, Disease Vectors, and Pests. With a 2º C increase in global temperature, 15 to 40 percent of existing species of plants and animals will be at risk of extinction. Unfortunately some harmful species will expand unchecked into new ecological niches that open up as the climate changes. At present levels of heating, the World Health Organization predicts 300,000 additional deaths a year from climate-related diseases (diarrhea, malaria, and malnutri-

tion). A 3º C increase could lead to 1 million to 3 million deaths from malnutrition, and a 4º C increase could lead to 80 million additional people being exposed to malaria. In some cases, the higher levels of CO_2 in the atmosphere may help plant growth through a phenomenon known as carbon fertilization. Unfortunately, carbon fertilization is limited in effect and only partially offsets other climate-related impacts.

Three factors keep insects and other pests in check: vibrant ecosystems with lots of competition; cold nights; and cold winters. All three are diminishing, and there are numerous documented cases of pests moving into new areas.

Extreme Weather Events. With higher temperatures, the frequency, duration, and severity of extreme weather events—flooding rains, high winds, hail storms, and others—are all expected to increase. The amount of damage caused by extreme events is being compounded by increased building on flood plains and other vulnerable areas.

Within the microfinance sector, the word *sustainable* has tended to be used in a very narrow way, mainly referring to institutions that are *financially viable*. In the past few years, the term has broadened to include social performance. Today, the increasing emphasis on responsible finance has added environmental impact to the factors considered as measures of success for a microfinance institution (MFI).

Proponents of responsible finance sometimes speak of the triple bottom line of "profits, people, and planet"—that is, maintaining financial viability while advancing the social interests of stakeholders and protecting the environment. Among many others, Calvert Funds specializes in socially responsible investments, and Triodos assesses social and environmental benefits as criteria for financing institutions and projects. Several MFIs, such as Grameen and BASIX, have begun to address specific aspects of climate change, including the need to reduce emissions. Other MFIs, including ACLEDA in Cambodia, Findesa in Nicaragua, FIE FFP in Bolivia, and Banco Solidario in Ecuador, report on social and environmental, as well as economic performance.

This evolution within microfinance around the understanding of what sustainability really means is positive (see Box 2). Microfinance that is sustainable in this sense meets the definition of sustainable development offered by the Bruntland Commission (1987): meeting the needs of today, without compromising the ability of future generations to meet their needs. The Commission was appointed by the United Nations to examine the "accelerating deterioration of the human environment"—by improving the lives of poor people today and their children's lives in the future.

Box 2: Key Advantages of MFIs in Clean Energy and Forestry

Large, well-managed MFIs are potentially key players in forestry and clean energy projects. In fact, they have the distribution channels, clientele, linkages, credibility, and efficiency that can enable them to reach millions of poor people.

Distribution channels. Financial institutions targeting the poor have an existing client base in the tens of millions of people worldwide.

Clientele and organizational resources. MFIs frequently already include small suppliers of renewable energy equipment and reforestation inputs among their clients and are eager to expand their client base.

Management information systems. Some MFIs have the experience and competence with information systems that will be necessary to track the thousands of small transactions necessary under large tree-planting or household clean energy schemes.

Linkages. Strong MFIs have good relationships with local governments, and they already understand the performance and reporting requirements of international partners.

Credibility and transparency. Financial institutions are necessarily held to high standards of transparency. All credible MFIs have annual audits, and many have been rated or evaluated by international firms.

Efficiency and standardization. At present, prices paid for offsetting carbon emissions are low, which puts a high premium on scale, efficiency, and product standardization. MFIs have already demonstrated, sometimes in the face of skepticism, that they are able to conduct large numbers of small transactions profitably.

This paper proposes ideas for what we can do to combat climate change at the household, microbusiness, MFI, and systemic levels. We hope that MFI managers will be inspired by some of the examples provided. However, each MFI should find its own way of addresing climate change, weighing the risks of inaction against the cost and risks involved in institutional change.

1 Climate Change and Economic Development

Economic development has been possible in large part thanks to the burning of huge quantities of fossil fuels—coal, petroleum, and natural gas. Over the past 50 years, there has been growing realization, first among scientists and now among the broader public and policy makers, that the atmospheric residue of burning fossil fuels, primarily carbon dioxide (CO_2), has created a big problem.

CO_2 and other greenhouse gasses trap the earth's heat and inexorably make the planet hotter and stormier, change rainfall patterns, facilitate invasive pests and diseases, raise sea levels, and generally make life more difficult and less predictable for wealthy people and more precarious for poor people (see Box 3).

Box 3: A Quick Overview of the Science of Climate Change

Anyone who has stood outside on a sunny day has directly experienced the way sunlight heats the earth. It is less obvious that the earth also gives off heat in the form of infrared radiation. This is the heat one can feel radiating up from, say, a paved road in the sun at midday. Most of the heat that is radiated up escapes into space, but a bit is trapped by heavy molecules in the atmosphere, a process called the **greenhouse effect**. Although it is sometimes thought of as a bad thing, the greenhouse effect keeps the world warm enough for plants and animals to live. If all the infrared heat were allowed to escape into space, the earth would be 30º to 50º C cooler, and there would be no life as we know it.

The gasses that trap outgoing infrared radiation are called **greenhouse gasses**. Although there are many such gasses, most efforts to mitigate climate change concentrate on two of them: carbon dioxide (CO_2) and methane. The heat-trapping effect of other greenhouse gasses is often expressed as **carbon dioxide equivalents** (CO_2e), that is, the amount of CO_2 alone that would be required to trap the same amount of heat.

Around the middle of the 19th century, new technologies and industries began to make life easier by enabling us to heat and cool buildings, generate electricity, fuel vehicles, and power machines by burning **fossil fuels**—coal, petroleum, and natural gas. The steady spread of industrialization, the expansion of technology into more and more human activities, and a five-fold increase in the world's population since the beginning of the Industrial Age have meant that the use of fossil fuels has grown rapidly, with a corresponding increase of greenhouse gas emissions into the atmosphere. About half of these gasses are absorbed by the oceans or by growing plants or are broken down by natural processes, while the other half stay in the atmosphere and constitute the stock of greenhouse gasses that is heating the planet today and will do so in the future.

We know from the study of ice cores and other sources that the concentration of CO_2 in the atmosphere never exceeded 300 parts per million (ppm) for a period of at least a million years up to the beginning of the Industrial Age. Since then, the concentration of CO_2 has risen to about 380 ppm. This increase is enough to be the principal cause of the changes we have already seen in the earth's climate; the stock of greenhouse gasses in the atmosphere will continue to cause changes for many years, under any scenario. In fact, there is a time lag between the emissions of climate change and their effects on climate: by the time negative effects begin to be apparent, it is too late to take steps to reverse them.

The amount of CO_2 and the increase in global temperature are related in complex ways. While increases in CO_2 in the atmosphere lead to increases in temperature, the reverse is also true: as temperature increases, the amount of CO_2 in the atmosphere also tends to increase. This surprisingly vicious circle is due to three things: (*i*) as the oceans and soils get hotter, they lose their ability to capture CO_2 from the atmosphere;(*ii*) the frozen soils of northern Asia and North America hold huge amounts of CO_2 and methane, which are released as the soils melt; (*iii*) an increase in temperature may lead to massive destruction of tropical forests, which will release enormous amounts of stored greenhouse gasses.

There is a real danger that the climate is moving out of our control and into a state at which the amount of greenhouse gasses in the atmosphere will continue to increase, independent of our actions. This will happen when **sinks**, or areas that absorb carbon from the atmosphere, turn into **sources**, or areas that release carbon.

While the concentration of CO_2 has increased to about 380 ppm since the beginning of the Industrial Age, the earth's mean temperature has increased about 0.8º C. Scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) predict temperature increases of between 1.8º C and 4.0º C by the end of this century. To put this in perspective, the difference between present temperatures and the last Ice Age, when sheets of ice a kilometer thick covered large parts of North America and Europe, is only about 5º C. There is a developing consensus that the least increase in temperature this century that it is realistic to hope for is 2º C, a large increase, but one we will have to live with. Scientists fear that beyond 2º C, it will be impossible to prevent further increases of a greater magnitude, because of the problem of sinks turning into sources and other natural processes. For instance, the reflectivity of parts of the earth is already decreasing as the glaciers and ice sheets, particularly the Arctic Ocean ice cap, disappear, and instead of millions of square kilometers of ice reflecting most of the sunlight that hits it, dark ocean water or rocky mountain tops are absorbing most of the sunlight that falls on them.

Rising temperatures lead to rising sea levels for two reasons: (*i*) water expands as it gets hotter, and (*ii*) the amount of water in the oceans is increasing as glaciers and ice sheets melt. Since the beginning of the Industrial Age, the oceans have risen about 200 millimeters. IPCC projects sea level increases in the rest of this century to be between 0.18 and 0.59 meters, although IPCC specifically excludes from its projections the possibility of "rapid dynamical changes in ice flow," by which is meant the possibility that significant amounts of the ice sheets in Greenland or Antarctica might slip into the sea. Because some semi-permanent increase in global temperature is inevitable, ice is expected to continue to melt for millennia, which means that sea levels will rise indefinitely. The rate and degree of melting, however, are still under our control.

No one knows the exact point of no return at which sinks become sources and catastrophic changes begin. Some, like the British futurist James Lovelock,

think we have already passed the point of no return, while a handful of optimists are more sanguine about the future. A majority of climatologists think that there is still time to avert the worst aspects of climate change, but very little time—IPCC's Fourth Assessment Report (see Box 6) said that we have perhaps 4–8 years to stabilize emissions, while Nicholas Stern said in late 2006 that we had 10–20 years.

Recent news is more bad than good:

- The rapid industrialization of some developing countries and the accelerating clearing of tropical rainforests have helped increase emissions to near the top of the range of projections.
- Recalcitrance and political inertia have slowed progress toward international agreements to limit emissions.
- For reasons not fully understood, the rate of absorption of CO_2 by the oceans seems to have decreased faster than predicted.

What is certain is that rapid reductions in emissions are extremely urgent.

Industrial development can still proceed, and life can continue to become better for most people, but we have to rethink the ways we power industrialization and reexamine some of our basic concepts of what development means. Climate change and poverty reduction may well be the two greatest challenges of the century. We need to address both. But poor countries should not pay disproportionately for the price of climate change. Finding innovative solutions and long-term responses require that we think of climate change and poverty reduction as intricately linked and mutually reinforcing. Poor countries have a right to develop, and to do so will require energy; rich countries can help them use energy wisely, but should not try to stop their legitimate aspirations of offering a better life to their citizens.

2 Mitigation and Adaptation

Responses to climate change fall into two broad categories: mitigation and adaptation. Mitigation focuses on reducing the severity of climate change by limiting greenhouse gas emissions. Adaptation focuses on taking measures that help people adjust to changed conditions. Many actions, like promoting clean energy products and agricultural innovation, support both mitigation and adaptation.

In selecting and prioritizing responses—whether for mitigation or adaptation—both intended and unintended consequences must be taken into account. Some actions are clearly benign and have few negative impacts. Other actions have impacts that are complex or subject to debate. For instance, using agricultural land to grow biofuel crops instead of food crops might seem to be a good way to reduce carbon emissions while increasing revenue in poor countries. However, as discussed

Table 1. Areas Where MFIs Can Respond to Climate Change

Customer Level (actions that affect microfinance clients directly at the household and microbusiness levels)	Clean energy products – Lighting – Cooking Forestation, avoided deforestation Biofuels Low-carbon agriculture Community-level projects Crop choices and farming practices Financial products to help clients manage risk
Institutional Level (actions that affect the function and finance of MFIs)	Reduced emissions Carbon finance and aggregation
Systemic (actions at national and international levels)	Monitoring and using information about climate change Smart subsidies Advocacy and contribution to policy debate

later in this paper, biofuel production often fails to reduce net emissions significantly and is likely to reduce food security for poor people.

Table 1 indicates areas in which MFIs can work in response to climate change. The sections that follow will describe possible activities in each area.Most of this paper addresses customer-level interventions (customers include both households and microbusinesses), because this is where MFIs are likely to have the greatest impact and the most varied activities. However, the customer level is also where MFIs face the greatest risk in addressing climate change. There is little risk for an MFI in such institutional actions as in-house energy savings and customer and staff education or in an advocacy role, but customer-level actions often involve changes in products that can put pressure on the competencies of the institution and put its loan portfolio at risk.

Although all MFIs can find some role to play in responding to climate change, management needs to think carefully about their ability to take on the different customer-level activities presented in this paper. In many cases, MFIs' contributions to protecting the environment will take shape through partnerships with other organizations.

3 Promoting Clean-Energy Products

Financial services can help customers reduce their carbon emissions by enabling them to switch to energy sources that emit less greenhouse gas. At present, by far the greatest amount of energy used by most microfinance customers around the world is for home cooking and lighting. There are 200 million households in Af-

rica alone that could switch from kerosene to solar/LED lighting. Clean energy products present an opportunity for developing countries to leapfrog over some of the intermediate technologies that the developed world has passed through. Just as millions of people in developing countries are using mobile phones and may never see a wired telephone, perhaps in some cases, they will never use electricity from coal or oil, but can jump directly to clean sources like solar and wind.

There are two main entry points for microfinance for clean energy, whereby MFIs can acquire large numbers of new customers and grow their portfolio. MFIs can lend directly to households so that they can purchase household-sized, proven energy savings devices. MFIs can also provide financing to microbusinesses. MFIs could provide financing to microenterpreneurs who supply the energy savings devices to households as a business. The appropriateness of either entry point will depend on several variables, including average loans sizes, availability and cost of equipment, etc. A third option, discussed only briefly in this paper, is for MFIs to support community-level mitigation efforts.

Lending to Households. Working together with the suppliers of household-sized proven energy savings devices, such as small solar panels or biogas digesters, MFIs can provide credit to households to buy the equipment. Financing can be an incentive for households to switch to these cleaner, cheaper sources of energy, since it may take several years for the energy cost savings to equal the upfront investment.

A recent study (Morris, Winiecki, Chowdhary, and Cortiglia 2007) on the use of microfinance for energy found that end-user finance can work for home products, if repayments are matched to existing energy expenditure patterns. The study identifies mutually beneficial partnerships between MFIs and suppliers of clean energy products as the key to determining success. Most success stories linked to end-user finance for clean energy successes come from South Asia, with thousands of households switching from dirty energy sources like wood, dung, or coal to cleaner ones like improved cook stoves or biogas digesters and wind generators.

However, in many cases, financing end-users to purchase clean energy products may not be appropriate. This is often because the products are in a price range too low for MFIs to lend, and many purchases can be covered by personal savings or informal sector credit (IFC 2007). This appears particularly true across Africa, where loan sizes are on average much higher than in South Asia.

Lending to Microbusinesses. There are many opportunities beyond end-user finance, and MFIs should think of financing other parts of the production and distribution chain. Suppliers and in some cases importers and manufacturers will need working capital in amounts MFIs may be able to supply. Where loans are relatively high and products are relatively inexpensive, it may make much more sense to fund existing or start-up retailers.

Lending to Communities. Most discussion in the rest of this section is directed toward working with household-level activities or small entrepreneurial businesses providing clean energy to households. These are most important from the perspective of many MFIs. However, MFIs have options to support community-level mitigation efforts as well. BASIX, a prominent livelihood promotion organization in India, offers a wide variety of services through a group of linked firms, including financial institutions serving the poor. Among its many interventions, BASIX promotes off-grid decentralized community-level power projects that not only bring energy to off-grid villages, but also enable the creation of small enterprises. Small-scale hydropower projects are particularly promising and have a relatively low cost per ton of reduced greenhouse gas emissions.

MFIs that have the scale and management ability and can mobilize the technical competence necessary to work at the community level will likely find gains in efficiency and scale, and advance social objectives of decentralization and local control.

Partnering Is Key. Grameen Shakti, a nonprofit company that is part of the Grameen family, is distributing clean energy products in remote areas of Bangladesh. As of December 2007, it had installed over 130,000 solar home systems, 5,000 improved cook stoves, and 2,000 biogas plants. Grameen Shakti attributes its success to linking solar installations to income-generating activities and to fostering a network of local energy entrepreneurs to ensure installation and service. Also in Bangladesh, BRAC has a similar program run through the BRAC Foundation in which it links its customers to a supplier of solar energy systems, Infrastructure Development Company Limited. And Sewa Bank in India has formed a close partnership with SELCO, a supplier of solar panels. SELCO, Sewa, and other financial institutions have brought solar electricity to over 100,000 households, while creating new enterprises and employment. In all three cases, there is a three-way partnership among the supplier of the energy-saving device that also provides installation and servicing, the MFI that provides financing and identifies customers, and the household acquiring the new device.

Lighting. Electric grids often fail to reach rural areas, especially in Africa, and even when they do, hook-up costs and minimum monthly charges are too expensive for many people. About 2 billion people around the world use kerosene (paraffin) for household lighting; they often rely on locally produced lanterns with an open flame. Globally, household kerosene lighting consumes the equivalent of 1.7 million barrels of petroleum a day, more than the petroleum production of Libya (Mills 2002). Kerosene lanterns, particularly locally produced ones, are unsafe, smelly, and dirty and give mediocre light. People use household kerosene lighting because they lack affordable alternatives.

Until recently, solar lighting has been too expensive for poor people, with solar lamps costing USD 100 or more and solar installations with fixed panels costing even more. However, new technologies, in particular inexpensive, reli-

able solar/light-emitting diode (LED) systems,[1] have opened up the possibility of consumer lighting products that are cost-competitive with kerosene lighting, even for very poor people. Replacing kerosene with solar/LED lamps has been identified as the most effective way to reduce greenhouse gas emissions from lighting (Mills 2002).

Prices for the least expensive solar/LED lamps—perhaps the only way to reach large numbers of rural poor in some regions—have become so low that most MFIs will not want or need to finance end-user purchases. Rather, these purchases can be covered by personal savings or informal sector credit.

In such cases, MFIs may consider making loans to entrepreneurs who purchase solar arrays to charge battery-powered home lighting systems. This approach, which can run in parallel to solar home systems, is useful because fixed-panel systems that need to be installed by skilled technicians are too expensive for many poor people; solar lamps with small panels that require no installation may be preferable. A promising initial market for solar/LED lamps is street vendors, who need lighting to sell their goods in the evenings and usually have the cash necessary to purchase small systems without needing credit. (See Box 4 for a short case study.)

Box 4: Lighting Africa Initiative

The Lighting Africa initiative is designed to promote clean lighting solutions in Africa through deepening market intelligence, working with partners to establish quality assurance criteria, administering a competitive small grants program, and developing a streamlined carbon finance approach. Its web site (www.lightingafrica.org) features lists of suppliers looking for partners, including financial partners.

MFIs should insist that recycling systems be put in place before promoting solar/LED solutions. Specifically, lead and nickel cadmium (NiCad) batteries must be recycled, to prevent their heavy metals from entering the local environment. Nickel metal hydride (NiMH) batteries are less toxic, but should be recycled if they are distributed in large numbers. There will be a market for recycled lead batteries that will cover some or all of the cost of recycling in most countries. This recycling market probably won't exist for other types of batteries, however, and MFIs should ask how NiCad and NiMH batteries are being disposed. Including a small deposit in the purchase price of the lamp is a straightforward way to motivate consumers to return batteries for recycling.

[1] As this is written, LEDs seem to have compelling advantages over their technological rivals, compact florescent bulbs. However, technologies are evolving rapidly, and it goes without saying that we are not endorsing any particular product or approach.

Cooking. Kirk R. Smith, professor of Global Environmental Health at the University of California at Berkeley, describes typical stoves as toxic waste factories, because they involve incomplete combustion of fuel and convert from 6 to 30 percent of carbon into methane, a potent greenhouse gas, or a wide variety of toxic substances.[2] Smith describes the use of traditional fuels in developing countries as "the most wasteful, unhealthy and [greenhouse gas] intensive fuel cycle in the world."[3]

New cooking approaches include cookers that use bottled gas, solar cookers, biomass digesters, improved cook stoves, and biomass briquettes.[4] Improved cook stoves vary in design and are known by different names around the world. In all cases, the stoves are designed to control the rate of fuel burning; retain the heat from combustion in a small, insulated space; and concentrate the heat on the cooking pot. The typical result is a 50 percent decrease in the fuel needed for cooking, although consumer education in proper stove use may be necessary to attain this theoretical level of fuel savings. In some cases, the stoves are manufactured and movable, like jiko ceramic stoves in Kenya and many other countries. In other cases, they are fixed installations that must be constructed in the customer's cooking area. Beyond mitigation of climate change and financial savings to users, replacing traditional biomass stoves that use wood, charcoal, grass, or dung with cleaner cooking sources also has enormous public health benefits.

Using cookers that run on bottled gas reduces emissions of greenhouse gases and toxic byproducts and provides a better cooking experience. Of course, relying on a nonrenewable fuel source cannot be a definitive solution, and the price of all fossil fuels is destined to rise substantially in coming decades. Nonetheless, using bottled gas can be a good interim solution. Solar cookers, which use reflecting surfaces to concentrate sunlight onto a cooking pot, are inexpensive and rely on sunlight, a nonpolluting free resource that is plentiful in most parts of the world. However, solar cookers are fragile, take a long time to heat food, stop functioning

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[2] The list of toxic substances produced by traditional stoves is intimidating to chemists and nonchemists alike, and includes n-hexane; 1,3 butadiene; benzene; styrene; benzo(α) pyrene; oxygenated organics; formaldehyde; acrolein; alcohols and acids, such as methanol; phenols, such as catechol and cresol; many quinones, such as hydroquinone, semiquinone-type and other radicals, and chlorinated organics, such as methylene chloride and dioxin.

[3] Presentation at Sustainable Development Network Conference, World Bank, February 2008.

[4] MFIs should be wary of products that require the use of charcoal, which uses four or five times the quantity of wood to produce the same amount of heat as simple firewood. Douglas Barnes, Priti Kumar and Keith Openshaw have produced a series of detailed country reports on improved stoves available on the World Bank web site. The most up-to-date of these will be published later this year in: "Cleaner Hearths, Better Homes: Improved Stoves for India and the Developing World" (Oxford University Press, forthcoming).

at a time of day when many women are traditionally still cooking, and require frequent attention (to refocus the reflective panels). They are accepted in some areas where there are few alternatives, but they face market resistance in most cases.

Home- or village-level biomass digesters have become an affordable, reliable technology. Biomass digesters convert dung and other waste into methane, which is piped to the kitchen for cooking. They also produce solid digested waste that can be used in fields as fertilizer. (Because they use dung as an input, they are an especially good way to add value to chicken farms). Methane is an acceptable cooking fuel, although one barrier to consumer acceptance is the low amount of heat it generates relative to bottled gas or wood, and thus the longer time needed for cooking or boiling water.

The Biogas Support Programme (BSP) in Nepal is a model for massive rollout of biogas digesters. Between 1992 and 2007, BSP worked with 145 MFIs and 70 construction firms to finance the installation of 172,858 village or household biogas plants. BSP estimates the total potential market in Nepal to be as much as 1.5 million units. Over 95 percent of the plants are functional; 65 percent use waste from the household toilet as well as animal waste. BSP has been able to access funding of as much as USD 1 million annually through the Clean Development Mechanism (see Box 5), which will help the project to confront one of the major hurdles to more widespread acceptance—the high initial cost.

Box 5: Carbon Markets

Carbon markets exist because of the desire to set a limit, or a cap, on the amount of greenhouse gasses companies or other entities are allowed to emit. Carbon markets are a way of financially rewarding those that emit less than they are allowed and penalizing those that emit more.

There are two types of carbon markets, compulsory and voluntary. The compulsory market is funded by businesses that are required by international agreements to keep their greenhouse gas emissions below a certain cap or, failing that, to offset additional emissions by paying to reduce emissions elsewhere. The principal compulsory market was established under the UN Framework Convention on Climate Change, under which the Kyoto Protocol was signed in 1997. Under the Kyoto Protocol, there are three mechanisms for capping carbon emissions. The most relevant one for microfinance is the Clean Development Mechanism (CDM), which allows businesses to offset emissions above their caps by investing in projects that will reduce emissions in developing countries (called *nonannex 1 countries* in the language of the Protocol). About 1,000 CDM projects worth over USD 5 billion had been funded by the end of 2007, but a large majority of them were in just a handful of countries, including China, Brazil, and India.

CDM funding has become more accessible to MFIs and their partners because of the decision to allow a group of separate activities to be treated as a

Programme of Activities (popularly, Programmatic CDM). Under Programmatic CDM, activities can be in multiple locations, even multiple countries, and not all of them need to be analyzed or even identified before the funding mechanism is approved. Thus, an MFI carrying out several activities in, say, clean energy could be approved for Programmatic CDM funding.

The compulsory market requires that any investments to offset carbon emissions have extensive independent certification of baseline emissions, the amounts of reductions, additionality (evidence that the reduction would not have happened anyway), registration of offsets to avoid double counting, indication that the benefits will be persistent, and an analysis of leakage or increases in emissions elsewhere caused by the project. Such certification is expensive, typically costing tens of thousands of dollars per case and requiring skills that very few MFIs possess. To date, few MFIs have received carbon payments under any compulsory carbon cap and trade scheme, with Grameen Shakti being an important exception. Institutions that are confident of their ability to deal with complexity might want to consult the useful guide to CDM funding at www.cdmrulebook.org. Others will want to use the services of a specialized intermediary, such as the MicroEnergy Credits Corporation (www.microenergy-credits.com).

In addition to the compulsory carbon market, there are hundreds of voluntary mechanisms that allow people or firms who choose to do so to make voluntary contributions to offset emissions. The amount of money that flows through the voluntary market, around a USD 100 million a year, is tiny compared to the amounts in the compulsory markets. The rigor of the voluntary schemes in terms of independent evaluation, efficiency, and transparency varies quite a bit. The best voluntary traders subscribe to rigorous standards, such as the Gold VER Standard, the CCB Standard, and the Voluntary Carbon Standard (now in draft).

Two voluntary schemes will soon begin functioning in North America: the Regional Greenhouse Gas Initiative unites nine northeastern U.S. states, and the Western Climate Initiative involves five states and one Canadian province, led by California. Also, the Chicago Climate Exchange is a scheme through which participants voluntarily sign legally binding agreements to reduce their net emissions with rigorous verification.

The cost of carbon offsets under any of these schemes is usually expressed in terms of the value of a ton of emitted carbon. This price varies according to the supply of offsets and the demand by industries that are over their cap; it is much less under voluntary than under compulsory schemes. The cost, typically about USD 20 per ton, is widely considered much less than the damage done by greenhouse gasses emissions and too low to force needed changes in the way energy is used in Europe and North America.

To give a rough example of what carbon credits could mean in practice, a single kerosene lantern typically emits about 100 kg, or 0.1 ton, of CO_2 a year. If the lantern were replaced by a solar lamp, the savings would be worth about

USD 2 a year, if carbon credits were going for USD 20 per ton. However, the substantial cost of applying for credits and administering the program would need to be subtracted from the carbon income, and a program would be profitable to an MFI supporting the distribution of solar lamps only if it were able to reach large numbers of people.

There is strong pressure to require more rigorous caps, which will increase the cost of a ton of carbon, thus leading to larger flows of carbon funds toward developing nations.

Digesters cost USD 400–800 to construct, and even with various subsidies, each end-user household must pay USD 300 or more—a large expense for rural homes, but within the range of typical MFI financing.

In Uganda, the Ugandan Ministry of Energy and Mineral Development and GTZ are supporting a network of entrepreneurs who have installed 350,000 stoves, mostly Rocket Lorena fixed stoves. Entrepreneurs are trained to build the stoves. Homeowners provide the bricks and other materials needed for construction and make a small payment to the entrepreneurs. This is an example of how MFIs might finance the entrepreneurs who construct and sell the stoves. MFIs could promote a similar program and make small loans to the entrepreneurs to get them started. Barnes, Openshaw, Smith, and van der Plas (1994) report that the factors leading to massive acceptance and sustained use of improved cook stoves include awareness-raising campaigns, training in correct use, and stoves that are distinguishable from traditional stoves through shape, color, or brand.

Finally, almost any form of organic material, from agricultural waste, to newspapers, to sawdust, can be turned into a firewood substitute through the production of biomass briquettes. Organic material is shredded, made into slurry, compacted in a hand-operated press, and then dried in the sun. A biomass briquette production unit typically employs about six people and requires an investment of a few hundred dollars. This could be a good loan for an MFI, provided that the cost of labor, the price of alternative fuels, and the availability of raw materials are favorable. Practical documentation on briquette economics and manufacturing is available at www.legacyfound.org.

As with lighting, MFIs should also look beyond simple end-user consumer financing to find the points at which their funds will be most useful in the manufacturing and distribution chains for clean cooking products. It may make more sense to finance people who sell or install improved cooking products, rather than end users.

Forestry. The amount of carbon locked up in trees and other parts of forest ecosystems is greater than that in the atmosphere, and the preservation of forests is one of the most cost-efficient strategies for reducing worldwide emissions. Emissions from the destruction of forests constitute one-fifth of global emissions of greenhouse gases (Stern et al. 2007). Clearing land always involves great amounts of emissions because of brush fires, greenhouse gases from disturbed soils, and accelerated decomposition of forest waste. Planting new trees (*reforestation*, if

trees are planted in areas that had previously been forested, *aforestation* otherwise) helps to reduce greenhouse gases in the atmosphere and possibly to create cooler and wetter microclimates. However, far greater carbon savings come from preserving existing forests.

People who cook with wood, build wooden houses, or live where there is a market for firewood or lumber, as well as farmers who see the value in windbreaks or tree crops, likely already have a predisposition to plant trees. Whether woodlots can make for a viable loan in the absence of subsidies depends on local conditions and interest rates. It would be difficult for MFIs with their short loan periods and high interest rates to finance forestry projects. However, carbon credits are likely to become increasingly available for forestry projects, as awareness of how incentives can work to address preserve forests and increase planting grows. Small holders who plant trees are possible recipients of payments through both the voluntary and compulsory carbon markets. This approach, however, poses particular challenges because of the need to aggregate many small actions and to keep accurate records over the long periods needed for trees to capture enough carbon to justify receiving payments. (See boxes 2 and 5.)

MFIs that support work in forestry often do so in partnership with specialized institutions, such as the Nature Conservancy and Conservation International. In those cases, the MFI's role is usually limited to the support of income-generating alternatives to deforestation.

Biofuels. Biofuels are made from recently living plants or animals, in contrast to fossil fuels, which come from long dead plants or animals. Where organic wastes are already collected for some other purpose, such as from domestic animals, breweries, chicken farms, sugar mills, or coffee processing, biofuel production is likely both to be profitable and to lead to the mitigation of climate change. This is because the costs (both financial and in terms of emissions) of growing the plants or animals, harvesting, and transporting the waste to one place have already been incurred; the additional cost of processing the waste is low.

However, growing plants specifically for biofuel is questionable financially and from the point of view of net greenhouse gas emissions. Biofuel production in the developing world is already leading to the destruction of forests, conversion of farmland away from food crops, and exclusion of local communities from participating in decisions that affect their livelihoods and environment. Nonetheless, biofuels are being widely grown in the developing world, in part because of government subsidies and mandates and in part because of the widespread, but false, belief that they are a benign way to keep automobiles supplied with fuel. The impact on the world's food supply is extremely damaging: recent worldwide food shortages are blamed in part on the conversion of farm land to biofuel production.[5]

[5] Jatropha, a genus that includes small plants, shrubs, and trees, may be an exception to this rule. It grows around the world in tropical and semitropical areas and is resistant to drought and pests. Its seeds are crushed and transformed into biodiesel. Small farmers can intercrop jatropha so that its production does not compete with food crops. However, even jatropha schemes should be examined carefully to evaluate their nonfinancial impacts.

Low-Carbon Agriculture. Agriculture emits greenhouse gasses through the decay of farm wastes, the reduction in the amount of organic matter in tilled soils, the emission of gases by farm animals, and indirectly through the production of chemical fertilizers, whose manufacture is particularly energy intensive.[6] The green revolution was made possible in large part by the widespread adoption of chemical fertilizers and other chemicals, as well as farm mechanization and irrigation. Any large reversal in the use of these inputs is both unlikely and undesirable unless other ways can be found to feed a growing world population.

Agriculture presents some of the most delicate tradeoffs between economic development in poor countries and climate change mitigation. Active campaigns in Europe and North America urging consumers to buy local produce to reduce carbon emissions from transporting the food actually work against the immediate interests of small farmers from Africa, Asia, and Latin America. Climate-conscious MFIs in rural areas of developing nations will feel contradictory pulls.

The challenge in much of the developing world lies in helping farmers who are modernizing their traditional agriculture to adopt low-carbon paths to increased production. Depending on the region, this might mean no-till agriculture rather than tractor plowing, integrated pest management instead of insecticides, intercropping and crop rotation to reduce the need for fertilizer, and drip irrigation rather than other methods. These low-energy options will become steadily more competitive as the cost of fuel drives up the cost of chemical fertilizer and of operating farm machinery. Norman Uphoff of Cornell University argues that farmers can double their rice production with no increase in inputs, simply through adopting improved cultivation practices: planting times, irrigation, and plant spacing.[7]

MFIs working in agricultural finance could look for opportunities to partner with institutions that are promoting low-carbon agriculture. Some innovations, such as vaccinations to reduce methane emissions from animals or drip irrigation equipment, help to mitigate climate change but are costly to poor farmers and may offer them little or no financial benefit in return. New farming technologies have little chance of being adopted, and less chance of being used correctly, unless they are accompanied by agricultural extension. Sometimes subsidies will be necessary. In situations where education in the use of sustainable agricultural techniques is available from other sources, MFIs should consider partnering.

We now turn from farming choices that lead to lower emissions to choices that enable farmers to adapt to changing climate conditions.

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[6] Also, although it seems laughable, burps from livestock consist of methane, a greenhouse gas that is 20 times more potent than CO_2. Cattle emit about 1 kg of methane for every 2 kg of meat they give. Results from experimental work suggest that vaccination or changes in diet, including adding yeast and garlic to feed, can reduce the emission of methane from farm animals by up to 50 percent.

[7] An accessible presentation of Uphoff's ideas is at http://www.nytimes.com/2008/06/17/science/17rice.html or http://tinyurl.com/5yokyp.

Adaptive Agriculture. Sometimes, farmers can adapt to small changes in rainfall and temperature by choosing either more resilient varieties of existing crops or different crops. In other cases, more difficult changes will be required for survival. In many cases these changes will lead to loss of culture and social identity, and will likely meet initial resistance from MFI clients.

For example, for people from the Bolivian and Peruvian altiplano, adaptation may mean that they will need to raise cows instead of llamas, alpacas, and vicuñas. Similarly, in Uganda, it is estimated that 90 percent of land on which Arabica coffee, the chief export crop, is now grown will soon become unsuitable for coffee production because of an increase in temperature. Ugandan coffee is grown on the lower slopes of mountains, and as the temperature increases, coffee cultivation is expected to become possible at higher elevations on the same mountains, leaving lower slopes of the mountains available for other crops. These changes will involve complicated issues of property and land-use management, but they will be less painful than the alternative of lost livelihood.

In some countries, areas that have traditionally supported rain-fed agriculture will find that changing weather conditions require introducing irrigation. Again, this type of change is unlikely to succeed without some sort of extension service, because introducing irrigation involves risks and a steep learning curve for farmers.

An MFI that wants to help its clients stay ahead of changes in the climate should realize the uncertainties in climate predictions and urge clients toward gradual diversification and incremental introduction of new approaches, rather than risky wholesale adoption of new technologies.

4 Institutional Level

Financial Products to Help Clients Manage Risk. The climate crisis provides another reason, if one were needed, for MFIs to diversify the financial services they offer and to stop relying exclusively on loan products. Whatever the merits or drawbacks of credit, this product becomes riskier the more borrowers undergo economic stresses, including those due to a less hospitable climate. Savings are a critical buffer against losses and stress, and institutions that can offer secure deposit services to their customers should do so. There is evidence from MFIs all over the world that when the poor are offered a safe and convenient way to save money outside the household, they will use it. In many, perhaps even most, cases savings are a preferred financing means when compared to borrowing.

For rural customers, another valuable risk management instrument can be insurance. A lot of work is being done on crop and weather insurance. Crop insurance carries the risk that farmers whose crops are insured may let a dubious crop fail rather than take extraordinary measures to protect it. Weather insurance does not offer the same perverse incentive, and it can protect against the risk of unusual intense weather events, which are increasingly likely, according to climate change projections. However, it is important to note that while insurance is useful in help-

ing smooth out highs and lows, it is not relevant in the face of a trend. Climate change is certainly a trend, and so while weather insurance can be useful to farmers, it is not a viable, long-term response to climate change.

Since an MFI's sophistication, financial resources, mission, market, management information systems, and the regulatory environment will influence its ability to develop and offer new products, especially savings products, product diversification will not be practical or relevant for all institutions.

Reducing an MFI's Emissions. Many MFIs want to reduce their carbon footprint—the net emissions coming from their business operations—simply because it is the right thing to do and is consistent with their mission. There are additional reasons, of course: reducing emissions can improve their image or brand, and it can serve as a way to urge staff to be more efficient.

Many actions that reduce the carbon footprint of businesses are simply good business practices that save money in the long run. Not all rich country solutions will apply to poor country MFIs, but many will, including switching to low-energy light bulbs or reducing paper waste and trips in vehicles.[8] Investments that lead to more efficient energy use will save more money as the cost of fossil fuels rises. In light of the magnitude of global climate change, companies may want to develop a top-to-bottom corporate commitment to responding to climate change, touching all areas of operations, in the same way that some companies have embraced customer service or total quality management as cross-cutting values. Having a green brand—that is, being thought of as a company committed to environmental concerns—is now widely recognized as an important business consideration.

Strategic Thinking for MFIs on Climate Change. Climate change should be part of MFIs' strategic planning, and those plans should include concrete steps for both mitigation and adaptation. If the strategic plan of a financial institution does not address climate change, it is time to revisit the plan. A simple way to ensure that climate change is included is through a climate SWOT analysis, looking at the institution's strengths, weaknesses, opportunities, and threats in the face of the changing climate.

MFIs need to think through the sequence of their actions in response to climate change. There are many steps institutions can take quickly, before tackling the demanding tasks of developing new financial products or approaching carbon markets:

- Starting with simple energy-saving measures like using low-energy lighting and taking other measures to reduce waste. Many of these measures can be easily implemented, can save money, and can help to sensitize staff.
- Organizing awareness campaigns aimed at customers about the availability of renewable sources of energy (or cleaner sources) for cooking and lighting.

[8] For an example of one microfinance bank's approach to this issue, see ACLEDA Bank's Sustainability Report: http://www.acledabank.com.kh/EN/BP_sustainabilityReport.asp.

- Seeking information about other local climate initiatives whether by donors, government, or the private sector. Looking for win–win ways to collaborate is good business and may lead to unanticipated benefits through discovering new markets and sources of finance.
- Conducting on-going research to understand the economic activities and other realities of clients. Market research has long been considered a microfinance best practice, and this activity can be broadened to gain a better understanding of client energy use and environmental risks.
- Holding meetings to sensitize staff and boards about current science and economics of climate change. These can be included as part of on-going training and information management.

Once these and other easy steps have been taken, MFIs can move progressively to more challenging tasks.

An MFI's scale and outreach, the regulations to which it must adhere, and the depth and skills of its staff will all affect its ability to diversify product offerings and take on new risks. MFIs that are able to diversify the products they offer should begin with accepted good practices in product development, including the important steps of market research, careful planning, pilot testing, and meticulous implementation.

Carbon Finance and Aggregators. Funding designed to address issues around climate change flows through the compulsory and voluntary carbon trading markets—that is, payments that are contingent on, and proportional to, specific reductions in greenhouse gasses. With increased concern about climate change, there will be substantial funding available to companies, including MFIs, that take measures to address the issue. At present, carbon markets provide USD 60 billion for mitigation and nothing for adaptation, but increasingly donors have identified adaptation as an important funding need.

Qualifying for carbon funding is complex and requires extensive documentation and specialized knowledge that MFIs are unlikely to possess. Specialized firms are being created to aggregate reductions from multiple interventions or to help develop proposals for carbon finance. One interesting start-up in this area is MicroEnergy Credits (www.microenergycredits.com). This complex subject is addressed in more detail in Box 6.

Box 6: Implications for Donors and Investors: Smart Subsidies

The use of fossil fuels has inflicted an enormous cost on our planet. Yet, rather than make people pay the real cost of using fossil fuels, many governments have done the opposite, subsidizing the use of fossil fuels through public subsidies for roads and airports, energy companies, carbon-intensive agriculture, and other drivers of greenhouse gasses. Nicholas Stern (2007) famously summa-

rized this situation by saying that "climate change is the greatest market failure the world has ever seen."

The International Energy Agency estimates that world subsidies on energy (net of taxes) are in the order of USD 250 billion to 300 billion per year, equal to 0.6 percent to 0.7 percent of world gross domestic product. Fossil fuels are the most heavily subsidized energy sources, totaling an estimated USD 180 billion to 200 billion per year. But support for the deployment of low-carbon energy sources amounts to only USD 33 billion a year, with a mere USD 10 billion going to renewable energies. The smart use of subsidies would mean reversing the subsidy balance in favor of sustainable energy solutions.

So what role can microfinance subsidies play in protecting the environment, and what can donors and investors do?

Donors and investors that want to work with MFIs in combating climate change might consider these broad ideas:

1. Providing support through technical assistance or an equity investment to help strengthen MFIs' systems and management is perhaps one of the most important contributions donors and investors can make. Only the strongest and best managed institutions will be able to fully integrate climate change into their strategic and business planning, and remain flexible and creative enough to meet new challenges.

2. MFIs may need help developing new products or adapting existing ones so that clients can meet their evolving needs and adapt to changing climatic and economic realities. Examples of new products are found throughout this paper.

3. MFIs may also require support to look beyond traditional microfinance models, and to create linkages with suppliers of clean energy devices. Figuring out the supplier, distribution, and finance chain may require investments in new technologies or other innovations to create more efficient delivery channels. Donors can also underwrite the costs of linking to extension workers and others who provide farmers with market information and advice on alternative agricultural products and methodologies.

4. Donors and investors can help fill the information gap on: what works in environmental finance and where microfinance can fit in; impacts of climate change on the end-client and scenario planning to help prepare for the future; new energy-efficient products and technologies that work; and successful cases of MFIs that have incorporated adaptation responses as part of their business.

5. Donors and investors can combine forces with MFIs to raise a strong policy voice. Many MFIs are well known and well respected, and combined advocacy efforts may have a greater impact.

6. Development finance institutions and other investors can offer appropriate financial instruments, such as credit lines and debt facilities, to support the strongest MFIs to lend to small and medium enterprises innovating with renewable energy. Guarantees and other risk-sharing facilities also can play a role in facilitating commercial money for environmental projects.
7. Obtaining carbon credits and carbon credit aggregation are outside the scope of most MFIs, but these could be important ways to bring funds from the carbon markets closer to the people who will be most affected by climate change. Carbon credit aggregators and consultants are usually independent businesses, but a competent MFI apex organization could take on that job. Donor assistance might be necessary to help these meso-level firms get established.

5 Reinforcing Institutions' Actions to Combat Climate Change or Systemic Level

Monitoring and Using Information about Climate Change. Observable impacts of climate change are happening fast, and the strategies and resources to mitigate and adapt to those changes are developing quickly. Box 7 presents some resources for readers who want to learn more about climate change; even these sources of good information are changing rapidly.

Box 7: More Information on Climate Change

The following sources are starting points for those wishing to learn more about climate change.

Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC is a scientific intergovernmental body set up by the World Meteorological Organization and the United Nations Environment Programme. It is the most authoritative voice on climate change, representing the consensus view of the participating governments. About every five years, IPCC has released an assessment report with sections documenting the physical science basis of climate change; impacts, adaptation, and vulnerability; the mitigation of climate change; and a synthesis report. The Fourth Assessment Report (AR4) was released in 2007. AR4 represents a consensus of 130 participating countries, reflecting the work of 2,500 scientists over six years. No other source of information on climate change has the broad circulation and general acceptance of AR4. IPCC was awarded the Nobel Peace Prize in 2007. The reports are necessarily technical, reflecting the nature of the subject matter, but they are written for knowledgeable generalists. Available at www.ipcc.ch.

IPCC's assessments of *regional impacts and vulnerability* can be found at http://www.grida.no/climate/ipcc/regional/index.htm.

The *Stern Review of the Economics of Climate Change* was commissioned by the U.K. Government to assess the costs and economic implications of climate change. Nicholas Stern, the principal author, is a former World Bank chief economist and a lecturer at the London School of Economics. The document is clear and persuasive. Stern argues that the cost of doing nothing about climate change is higher than the economic cost of taking urgent strong actions to mitigate it. The report is available in three versions, ranging from the full report of almost 600 pages to a short executive summary of four pages. The executive summary is available in a dozen languages at http://xrl.us/Stern or http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm.

The 2007–2008 Human Development Report of UNDP, *Fighting Climate Change: Human Solidarity in a Divided World*, stresses that climate change threatens to reverse much of what has been achieved in human development and exhorts governments and people to take effective action quickly. The information is very current and very alarming. It is available at http://hdr.undp.org/en.

World Resources Institute has an informative web site that tends toward policy and scientific analysis. www.wri.org.

www.realclimate.org offers a great deal of information about climate science, much of it technical but written to be as accessible as possible.

The World Environmental Organization gives its opinion of the 100 top climate change sites at www.world.org/weo/climate. It lists the Pew Center on Global Climate Change as the number one site: www.pewclimate.org

Former U.S. Vice President Al Gore's film *An Inconvenient Truth* is an alarming presentation that makes the complicated science of climate change accessible to lay people.

ACCION International's Center for Financial Inclusion is producing a series of podcasts called Energy Links, available on Apple's iTunes—search for *Energy Links* under podcasts.

The World Bank has a lot of useful resources at http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTCC/0,,menuPK:407870~pagePK:149018~piPK:149093~theSitePK:407864,00.html
The April 2008 issue of the World Bank Institute's *Development Outreach*, available at www.worldbank.org/wbi, also has interesting, accessible, and relevant articles on climate change and development.

The *United Nations Framework Convention on Climate Change* (UNFCCC) is the agreement formalizing the intentions of UN member countries to collaborate on climate change. Each participating country has a designated national authority, which represents the country on climate issues (http://cdm.unfccc.int/DNA/index.html). Less developed countries have also written *National Adaptation Programmes of Action* (NAPAs). The country representatives and NAPAs are useful resources for understanding the particular challenges in a country and the adaptation responses that have been recommended by technical experts. NAPAs are available through UNFCCC's Web site: http://unfccc.int.

On the impact of climate change on the oceans, see *The End of the Line* by Rupert Murray, Daily Telegraph: http://www.endofthelinemovie.co.uk/facts.htm and http://www.washingtonpost.com/wp-dyn/content/article/2006/11/02/AR2006110200913.html.

A discussion of subsidies, important for donors and investors, can be found in Morgan, Trevor, *Energy Subsidies: Their Magnitude, How They Affect Energy Investment and Greenhouse Gas Emissions, and Prospects for Reform*, UNFCCC Secretariat/Financial and Technical Support Programme, June 2007. Available at http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/morgan_pdf.pdf.

Agriculture and Climate Change by William Cline, predicts changes in temperature and rainfall on a country or subcountry basis. Available at http://www.cgdev.org/content/publications/detail/14090/.

Although predictions of the future can help guide today's actions, inevitably there will be changes over the next few years and decades that are now largely unimagined. In any case, MFIs need to stay informed about the repercussions of a changing climate so that they can make wise strategic choices. At a time when some commentators argue that the future of our civilization as we know it is at risk, it is not an exaggeration to say that the future of the microfinance industry as we know also may be at risk.

6 Advocacy and Contribution to Policy Debate

MFIs are widely perceived as representing large numbers of the world's poor. As such, they can have a prominent role in raising awareness around climate change, adding their voices to those who are demanding prompt, effective action. Some MFIs may want to play a direct role in national and international policy debates, education, and activism; in other cases, a national or regional association, if one exists, might be an appropriate interlocutor. Large and stable MFIs—sometimes

significant employers in their countries as well as providers of financial services—may be well placed to contribute to policy debates on issues such as land use, flood plain management, energy, transportation, water infrastructure, forest use, family planning, and pro-poor carbon markets. To make the best decisions in any of these areas, it is important that all voices be heard, and MFIs can play a role in making sure that the interests of their clients are considered.

MFIs cannot and should not be expected to be the world's environmental police.

But the world's response to climate change does not yet measure up to the size of the problem. Advocacy and contribution to the policy debate is one of the ways that almost all MFIs can contribute to its solution.

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