



International Financing of Responses to Climate Change

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Summary

Many voices, domestically and internationally, call for the United States to increase its international financing of measures to address climate change. Financing would help low-income countries pay for the extra costs of development incurred to reduce their emissions of greenhouse gases (GHG) and to adapt to climate variability and change. The United States and other industrialized countries committed to financial assistance in the United Nations Framework Convention on Climate Change (UNFCCC, 1992) and the Copenhagen Accord (2009). In the Copenhagen Accord, countries pledged (1) \$30 billion in 2010 to 2012 as *fast-start* financing, and (2) to seek \$100 billion annually by 2020, with funds to come from both public and private sources. The Obama Administration has not yet specified what shares of the two pledges it envisions the United States providing, nor a strategy to fulfill the 2020 pledge.

For FY2010, Congress appropriated approximately \$1,007 million for all “core” international climate assistance, up from \$315 million for FY2009. The Administration requested that this increase to \$1,391 million in FY2011, with another \$104 million proposed for complementary programs in other agencies, such as the Department of Energy. Alternatives to appropriations could generate new financing. (Some options are compared in **Appendix A**).

The United States incurs direct and indirect costs if subsidizing overseas investments to address climate change, and gains a variety of benefits. Financial assistance to low income countries could help achieve, more efficiently than domestic action alone, the global reductions of GHG emissions deemed necessary to slow and stabilize human-related climate change. Financing could facilitate more rapid advance and cost reductions of emerging low-emitting technologies, and assist U.S. companies to acquire access to and sell new technologies. Additional benefits could include suppression of world fossil fuel prices, improved international security, a reduction in longer-term demands for development and humanitarian assistance (including relief following natural disasters), and a boost to diplomatic credibility and effectiveness (by following through on past pledges).

Low income countries have stated that fulfilling their commitments under the UNFCCC will depend on financial and technical support from the industrialized countries. Low income countries seek resources that are *new, additional to previous flows, adequate, predictable, and sustained*. Studies have estimated the needs for incremental financing to range from US\$4 billion to several hundred billion annually for adaptation by the year 2030, in addition to comparable amounts for extra investment in clean energy and agriculture (**Table 1**). The International Energy Agency estimates that mitigation costs could be more than offset by energy cost savings.

Part of the U.S. pledge of climate change financing is being provided by federal appropriations. Congress may consider new mechanisms for further amounts, especially amounts beyond 2012. For example, the House-passed American Clean Energy and Security Act of 2009 (H.R. 2454) provided for a portion of allowances or revenues generated by a GHG cap-and-trade program to fund international climate-related actions. Congress also may exercise oversight of the operations and performance of existing programs that provide financial and other assistance.

Internationally, climate change negotiators continue to debate priorities among assistance recipients and activities, mechanisms for generating and disbursing funds, and other questions. If negotiations were to produce a new treaty intended to be legally binding, the Congress would have to consent to its ratification before it could legally bind the United States.

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Introduction

The Earth's climate has changed over the past century, and several expert assessments have concluded that human activities, particularly emissions of greenhouse gas (GHG), have very likely caused most of the observed change of the past three decades.¹ Extra costs would be incurred by low-income countries to the degree that they must reduce their shares of world-wide GHG emissions to help stabilize climate change and must adapt to avoid disease and other damages in a changing climate. These extra costs are particularly challenging to countries that have low incomes compared to the United States, consider alleviating acute poverty as their first priority, and conclude that they have contributed only a minor share of the historical GHG emissions that force climate change.

Developed countries, including the United States, committed to such assistance in the United Nations Framework Convention on Climate Change (UNFCCC, 1992) and the Copenhagen Accord (2009).² In the Copenhagen Accord, the wealthiest countries³ committed to provide \$30 billion in 2010 to 2012 as "fast start" financing, and to seek \$100 billion annually by 2020 in climate change assistance, to come from both public and private sources. The Obama Administration has not yet specified what shares of those pledges it envisions the United States providing, nor a strategy for how to fulfill the long-term pledge.

This report describes many of the questions that are under debate in international climate change fora. It aims to inform Congressional decision-making on the magnitude and mechanisms of financial assistance that the United States may provide to low-income countries to address climate change. It identifies rationales presented for enhanced international financing, including commitments made by the wealthy economies to provide financing under the United Nations Framework Convention on Climate Change (UNFCCC) and subsequent agreements. The report then reviews estimated levels of financing needs (**Table 1**), specific monetary pledges (**Table 2**), and the variety of proposed mechanisms to generate (**Appendix A**) and disburse funding.⁴ The final section summarizes international financing proposed by the Obama Administration and in bills in the 111th Congress.

¹ Among others: U.S. Global Change Research Program, *Global Climate Change Impacts in the U.S.* (Washington DC, GPO, 2009) at <http://globalchange.gov/publications/reports/scientific-assessments/us-impacts/key-findings>; Intergovernmental Panel on Climate Change Working Group I, *Climate Change 2007: The Physical Basis* (Cambridge, UK: Cambridge University Press); National Research Council, *Reconciling Observations of Global Temperature Change*, Board on Atmospheric Sciences and Climate (BASC) (Washington DC: National Academy Press, 2000); National Research Council, *Climate Change Science: An Analysis of Some Key Questions* (Washington DC: National Academies Press, 2001); National Research Council, *Abrupt Climate Change: Inevitable Surprises* (Washington DC: National Academies Press, 2002). For background information on climate change science and impacts, see CRS Report RL33849, *Climate Change: Science and Policy Implications*, by Jane A. Leggett.

² For background on the history of international climate change agreements, see CRS Report R40001, *A U.S.-centric Chronology of the International Climate Change Negotiations*, by Jane A. Leggett.

³ Which countries provide funds and in what amounts remains an element of negotiation.

⁴ Richard Lattanzio of CRS provided information included in this report, in CRS Report R41302, *Climate Investment Funds (CIFs): An Overview*, and CRS Report R41165, *Global Environment Facility (GEF): An Overview*. Melissa Ho of CRS also provided information regarding agriculture.

Rationales Against and for Climate Change Financing

Calls continue domestically and internationally for wealthy countries to increase financial assistance to low income countries to address climate change, even though governments in most countries are pressed for fiscal resources to address current economic challenges and to maintain levels of public services. Financing is sought both to mitigate⁵ climate change and to adapt⁶ to projected climate changes. Many issues surrounding climate change financing differ from broader issues of foreign aid, and are discussed in this paper.

Many in Congress and the public may question why the United States should help to finance other countries to reduce their GHG emissions or to adapt to climate variability and change. International financing would incur costs, and could offer potential benefits to the United States. Among benefits, some international financing could be more efficient than domestic actions alone. These are outlined in the next section. Second, there are legal reasons—and binding commitments the United States has made—for financial assistance. Third, some people identify fairness and humanitarian reasons to help low income countries to avoid specific climate damages and reduce GHG emissions while continuing to eradicate poverty and increase incomes toward levels of well-being enjoyed here. The next three sections review a variety of rationales raised to support climate change financing.

Costs and Benefits to the United States

Some advocates seek provision by the wealthiest countries of international financial assistance that could rise to hundreds of billions of dollars annually by 2020. The costs to a donor of extending such financing include direct outlays of funds; secondary costs to the economy for investing abroad at concessional terms; and losses by passing funds through governments or other intermediaries. Some Members may view additional financing as costing political capital as well, to the degree that their constituents do not support international assistance for climate-related or other purposes.

As for benefits, various experts have advocated financing to achieve efficiencies in addressing climate change. Any given GHG reduction globally could be achieved most efficiently if low cost emission reductions could be harvested in low income countries. Also, developing countries could be motivated and enabled by financial assistance to contribute to a global effort to slow and then stabilize climate change. In addition, providing financing for adaptation and mitigation could:

⁵ To *mitigate* climate change is to take actions that would reduce or reverse forces, such as greenhouse gas (GHG) emissions, that contribute to global climate change. It could also entail actions that act to reduce the climate change, for example by removing carbon dioxide from the atmosphere and sequestering it permanently, or through other geoengineering technologies.

⁶ To *adapt* to climate change has been defined by the Intergovernmental Panel on Climate Change as “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (IPCC Working Group II, Third Assessment Report, 2001).

- avoid capital and other losses (e.g., buildings, infrastructure, etc.), domestically and internationally, that could be damaged or need modification due to a changing climate or intensified natural disasters;
- minimize redirection of strategic development resources to ad hoc disaster response and urgent humanitarian needs;
- avoid chronic humanitarian crises, such as additional food insecurities, particularly for the resource poor in developing countries who have few options or resources for resilience or adaptation;
- boost international security by relieving climate stressors (e.g., droughts, floods) that could aggravate weak governance and political instabilities in some countries; some adaptation measures could also strengthen regional cooperation and other mechanisms and help to avoid cross-boundary resource conflicts;
- provide competitive returns on investment if assistance is oriented to overcoming barriers to commercial financing;
- improve advancement and commercialization of U.S. technologies, gaining economies of scale by engaging in rapidly growing international economies and by accelerating “learning by doing;” participating private entities may also make competitive inroads into rapidly expanding markets; and
- facilitate marketing of U.S. products and services in “green” technologies and know-how.

One reason for urgency in financing cleaner and more resilient investments is that “[e]ach year of delay will lock in an increased amount of old technology,” according to the United Kingdom’s Secretary of State for Energy and Climate Change.⁷ As pressures increase for structural changes consistent with pollution abatement and resilience to a changing climate, old technologies limit the flexibility and increase the costs to economies to respond efficiently. (Sometimes this is called a problem of “stranded capital.”) Economists view some level of early investment as efficient, to hedge against those future risks.⁸

Existing International Commitments and Negotiations

Most, if not all, low income countries have argued that their success in fulfilling their pledges to abate greenhouse gas emissions and curtail deforestation will depend critically on receipt of international financial and other support. Some believe the credibility and diplomatic effectiveness of governments that have pledged financing may be influenced by the degree to which they follow through on those commitments.

Under the United Nations Framework Convention on Climate Change (UNFCCC), signed in 1992, the United States and all other Parties committed to promote adaptation, cooperate to develop and deploy new technologies, and pursue a host of additional but unquantified

⁷ As quoted in Greenwire, *Energy Ministers Endorse Clean-Tech Measures, Back CCS Group*, July 20, 2010. <http://www.eene.ws.net/Greenwire/print/2010/07/20/4>

⁸ See, for example, Robert J. Lempert, Michael E. Schlesinger, and Steve C. Bankes, “When we don’t know the costs or the benefits: Adaptive strategies for abating climate change,” *Climatic Change* 33, no. 2 (6, 1996): 235-274.

obligations.⁹ The wealthier countries (including the United States) listed in Annex II also committed to provide financial and technical assistance to underpin developing countries' efforts to meet their UNFCCC obligations.¹⁰ The obligations under the UNFCCC are legally binding but vaguely defined. As a result, they have been impractical to quantify consistently and enforce.

Reliable accounting of pledges made for financing, or what has actually been provided for climate change activities, does not exist—as potential recipients frequently point out. The unsteady flows of financing in the 18 years pursuant to the UNFCCC have not boosted the international credibility of the Annex II countries.¹¹ Pledges of funding have been lower than low income countries requested and expected.¹² Many pledges remain only partially fulfilled. U.S. accounting has been similarly ambiguous. (**Table 2**, discussed in a later section, summarizes scattered information about funds pledged and provided to various funds.)

Developing countries have called for the wealthier countries to provide financial resources that are “new, additional,¹³ adequate, predictable and sustained,”¹⁴ to support mitigation of greenhouse gas (GHG) emissions, adaptation to climate change, development and transfer of technologies, and reduction of deforestation and forest degradation (REDD). Low-income countries most often call for the resources to be publicly financed (not private), because they believe it would be more predictable and negotiable, and to be subsidized as grants or concessional loans. While a wide variety of mechanisms have been established or proposed to generate and disburse funding in conformance with the UNFCCC, most low income countries prefer assistance to flow through specialized funds directly overseen by the UNFCCC, where they would presumably have stronger representation than in, for example, such donor-coordinated trust funds as the Climate Trust Funds. A set of funds and mechanisms were established by decisions under the UNFCCC, and later under the Kyoto Protocol (to which the United States is not a Party). These and other options are identified later.

In December 2009, Parties to the UNFCCC were unable to agree as scheduled on a legally binding instrument to tackle climate change beyond 2012, when the first commitment period of the Kyoto Protocol ends. Instead, a smaller set of countries negotiated the Copenhagen Accord, to

⁹ United Nations Framework Convention on Climate Change, May 9, 1992, 1771 U.N.T.S. 107; S. Treaty Doc No. 102-38.

¹⁰ For more information on international negotiations regarding climate change, see CRS Report R40001, *A U.S.-centric Chronology of the International Climate Change Negotiations*, by Jane A. Leggett.

¹¹ See, for example, South Centre, *Developed Country Climate Financing Initiatives Weaken the UNFCCC*, January 2009. http://www.southcentre.org/index.php?option=com_content&task=view&id=909&Itemid=1; or, Megan Rowling, *Murky Climate Finance Risks Undermining Trust at U.N. Talks*, Reuters, June 4, 2010. http://www.alertnet.org/db/an_art/20316/2010/05/4-161507-1.htm

¹² See, for example, The National Religious Partnership for the Environment, *Climate Fairness Agenda: A Religious Call to Address Climate Change and Poverty*, 2009. http://otrans.3cdn.net/32a2929fe45d623e2f_ofm6ibt11.pdf

¹³ The terms “new” and “additional” are subject to different interpretations and controversy. For example, “new” compared to what? If one funding program closes and a new one, substantially similar one opens by the same donor, is it “new”? “Additional” is meant to denote an increment beyond what existed at a given point in time or to some expected or projected baseyear. Observers are concerned that funding not be merely shifted from one type of development assistance to climate change assistance, with little or no incremental increase comparable to the stated needs. Judging “additionality” is always problematic, but particularly in a period in which overall foreign aid may decline under fiscal pressures.

¹⁴ This is text regarding financing in the Copenhagen Accord, December 2009. http://unfccc.int/documentation/documents/advanced_search/items/3594.php?rec=j&preref=600005735#beg,

which more than 120 governments have acceded.¹⁵ The Copenhagen Accord lays out political but not legally binding commitments. The finance-related pledges were made as a package with commitments by China and other countries to implement mitigation actions, and to be subject to reporting, review, and international “consultations” requirements. The specific finance provisions of the Copenhagen Accord are:

- **Immediate establishment of a mechanism including forest conservation (REDD-plus),**¹⁶ to enable mobilization of international financing.
- **Goals for developed countries to mobilize finance for adaptation, mitigation, technology, and capacity-building:** Pledges of \$30 billion during 2010-2012, and a goal of \$100 billion annually by 2020 “in the context of meaningful mitigation actions and transparency on implementation.” Funding will come from public and private, bilateral and multilateral, and alternative sources.
- **Establishment of the Copenhagen Green Climate Fund** under the Global Environment Facility, managed by the World Bank to support international financing.
- **Establishment of a Technology Mechanism** to “accelerate technology development and transfer” and to be “guided by a country-driven approach.”

In addition, the Copenhagen Accord specified new “monitoring, reporting, and verification” (MRV) mechanisms to apply to financial obligations as well as to GHG mitigation efforts, beyond the reporting already required for Parties’ national communications. This partly stems from frustrations with lack of transparency regarding countries’ financing pledges and flows to date.

In meetings since Copenhagen, more progress has been made to flesh out the financing provisions than others elements of the Accord. However, the United States and some other countries insist that any further agreement must be a balanced package (‘nothing is decided until everything is decided’), including incorporation of GHG mitigation pledges and definition of MRV commitments. China and some other countries have avoided definition of their MRV obligations until the pledges and MRV of financing have been met.¹⁷

Even before the Copenhagen Accord, some Members of Congress and U.S. constituents pressed for provisions in climate change legislation to generate and distribute funding to assist mitigation and adaptation internationally. They would also finance cooperation on clean technology development and deployment, as well as “market readiness” and capacity building. For example, in June 2009 the House passed H.R. 2454, the American Clean Energy and Security Act (ACESA or Waxman-Markey bill), with provisions to allow up to 1 billion emissions offsets to come from international sources annually, which could provide a many-billion-dollars per year stream of private finance for projects in developing countries.¹⁸

¹⁵ <http://unfccc.int/home/items/5262.php>.

¹⁶ “REDD-plus” is Reducing Emissions from Deforestation and Forest Degradation plus enhancing carbon sequestration.

¹⁷ See, for example, Su Wei, “China’s Expectations for the Cancun Conference” (September 19, 2010), paragraphs 18 and 19. http://www.china.org.cn/opinion/2010-09/19/content_20964016.htm.

¹⁸ For more information on provisions in GHG proposals in the 111th Congress, see, for example, CRS Report R40896, *Climate Change: Comparison of the Cap-and-Trade Provisions in H.R. 2454 and S. 1733*, by Brent D. Yacobucci, Jonathan L. Ramseur, and Larry Parker.

Status of Negotiations on International Climate Change Financing

Since agreement on the Copenhagen Accord in December 2009, countries have continued negotiations on how to address climate change beyond the year 2012, when the first (and only negotiated) commitment period of the Kyoto Protocol ends. Although 120 governments formally acceded to the Copenhagen Accord, the commitments embodied in it are political, not legally binding. Negotiations proceed on two tracks: further commitments for “Annex I” Parties under the Kyoto Protocol (to which the United States is not a Party); and, long-term cooperation among all Parties to the UNFCCC. How the single Copenhagen Accord might be translated into those two tracks, or an alternate approach, remains a key disagreement. Some countries appear to be backing away from the Copenhagen Accord, insisting that a new instrument be based on the 2007 Bali Action Plan. Currently, finance is one of six topics of discussion, the others being a shared vision, mitigation of climate change, adaptation, technology, and capacity-building.

A number of meetings have been held throughout 2010, to lead to the next Conference of the Parties in Cancun, Mexico in December 2010. Some meetings proceed under the auspices of the UNFCCC, but others, such as the UN Secretary-General’s High Level Advisory Group on Climate Change Financing, are pursued through alternative paths. Few expect that these negotiations will lead to a legally-binding agreement by Cancun. Rather than proceeding with the Copenhagen Accord, China contends that developed countries must first agree on deeper, legally binding GHG mitigation commitments beyond 2012 in an extended Kyoto Protocol, and “set up a mechanism for developed countries to fulfill their promises to provide funding, technology and capacity training to developing countries.”¹⁹ China’s chief negotiator in Copenhagen, Su Wei, says that “the [Kyoto] protocol negotiations are a vital precondition for the success of other negotiations,” which would include GHG mitigation by lower income countries, and monitoring, reporting, and verification of commitments. India’s environment minister has expressed pessimism because “the financial commitments made by developed countries at Copenhagen have not been fulfilled.”²⁰ In contrast, the United States and other countries have urged the major economies (including China, India, and others) to “maintain the fundamental balance achieved in Copenhagen” among elements of the package of issues and across countries. The United States’ position is that GHG mitigation and monitoring of national pledges must be agreed, along with financing, as part of a “balanced” package.

Finance is high on the agenda, regardless of how negotiations proceed, and particularly the details of establishing a new climate fund, sometimes called the Copenhagen Green Fund. While there is general agreement to establish a climate fund, likely recipient countries prefer a new entity to coordinate and oversee funding, while likely contributing countries prefer to build on existing organizations. Differences of view exist over the balance of the fund’s board among representatives of net contributing and net receiving countries. A few Parties propose contributions of 6% or more of Gross Domestic Product, likely aware of the roadblocks to agreement that such proposals can create.

In parallel, the Secretary General’s High-Level Advisory Group on Financing is due to present its recommendations to the Conference of the Parties in Cancun. It is studying possible sources of funds, both public and private, that could provide new and additional financing of \$100 billion per year by 2020.

Avoidance of Climate-Related Damages, and “Fairness”

Repeated scientific assessments have concluded that the global climate is changing,²¹ and scientific expectations are strong that natural and/or human-related changes will continue in largely unpredictable degrees and patterns. Those changes driven by greenhouse gases²² are

¹⁹ Su Wei, “China and the Cancun Climate Change Conference” (September 22, 2010, China.org.cn).

²⁰ Financial Express Bureau, “Climate Negotiations at Cancun Headed Nowhere” (India, September 21, 2010), at <http://www.financialexpress.com/news/Quick-view/684927/>.

²¹ See footnote 1.

²² There is strong but not unanimous agreement among experts on climate that greenhouse gases have very likely been responsible for most of the global warming that has occurred since the late 1970s, and the proportion of GHG- to natural-driven climate change will continue to increase for decades after GHG concentrations in the atmosphere are stabilized. See, for example, Intergovernmental Panel on Climate Change Working Group I, *Climate Change 2007: The Physical Basis* (Cambridge, UK: Cambridge University Press, 2007).

expected to continue for centuries after the emissions occur. No matter whether future climate changes are driven by natural or human-related causes, the range considered likely in coming decades could lead to property and ecosystem damage; human illnesses and deaths; interruption of food and water supply for some populations; and potential catastrophes. For example, the International Food Policy Research Institute (IFPRI) predicts that climate change will result in yield declines and food price increases globally for important food crops, which could reduce both meat and cereal consumption, as well as overall calorie availability in developing countries.²³ By 2050, IFPRI predicts that child malnutrition globally would increase by 20% relative to a world with no climate change. Several reports have warned of adverse effects on economic development and security. At the same time, it is also likely that some regions and populations would benefit by future changes in climate, such as greater access to vast fuel and mineral wealth under the Arctic Ocean.

There is general agreement that some populations will be better off, at least in the short term, while others will be worse off. Expectations are that populations will be best able to manage if they have the resources to make use of new opportunities and otherwise to adapt to climate changes; the most vulnerable populations will be those that experience the most acute climate change and that lack the financial, technical, or governance capabilities to adapt (including by migration).

Many advocates make an ethical argument for concessional financing to address climate change: To the degree it is driven by greenhouse gases, the major contribution has come from the currently wealthy countries. The responsibility of developed countries for current and near-term climate change arguably calls for them to provide funding to reduce the current and future risks imposed on others by past behavior. Some would contend that developed countries should pay because their emissions per person are many times those in poor countries, and they have the ability to pay. A few stakeholders would argue that financing is owed as compensation to those already experiencing adverse effects of climate change to which they contributed very little.

A wide array of religious coalitions, opposed by others, have called for “climate justice,” to avoid human interference with the climate and to help poor populations respond to potential floods, natural disasters and droughts associated with warming temperatures. For example:

[m]any religious groups consider international adaptation assistance to help developing nations cope with climate change a moral responsibility and a matter of climate equity. Those who benefited from years of indiscriminate pollution must now make provisions for developing nations to chart a prosperous path for their people through a cleaner energy economy while protecting their populations from the harmful effects of climate change.²⁴

²³ Gerald C. Nelson and International Food Policy Research Institute, *Climate change: impact on agriculture and costs of adaptation* (Washington, DC: Intl Food Policy Res Inst, 2009).

²⁴ See, for example, Center for American Progress, “Religious Communities Press for Climate Justice” (April 22, 2010) http://www.americanprogress.org/issues/2010/04/climate_justice.html; or Christa Marshall, “New religious coalition joins push for adaptation funding” *ClimateWire*, October 9, 2009, <http://www.eenews.net/climatewire/2009/10/09/10>.

Should Governments of Wealthy Countries Be Engaged in Climate Change-Related Financing?

On the one hand, many experts have articulated economic reasons that some special financing to address climate change is merited: Many potential actors who would seek to invest in abating emissions or avoiding future damages have limited access to financial capital. They may have low incomes, few assets to offer as collateral, or high debt loads already. Many of the actions to address climate change are not profitable unless the external costs²⁵ of climate change are factored into prices in efficient markets; even if entities are willing to undertake such investments, private financiers may not be willing to invest. In other cases, the benefits of investments (e.g., for higher seawalls) may be spread too far into the future to be justifiable using market interest rates or rates of return. In many cases, the projects may be too risky, because of novel technologies, politically risky locations, or other factors.

On the other hand, in the United States, funding for international purposes in general is unpopular.²⁶ Many constituents are unaware or unconvinced of the risks of climate change or of reasons to offer financing to other countries.²⁷ Some commentators argue that international financing would create more benefits if applied to other priorities, such as improving public health systems or stimulating entrepreneurial activities in low income countries.²⁸ Others argue that Americans need any available funds to foster renewed economic growth and create jobs domestically, and should not be burdened with higher taxes or prices for investments abroad.²⁹

What Kinds of Actions Might Be Financed?

There is an extremely wide array of possible projects or programs that could be financed to abate greenhouse gases, avoid deforestation or forest degradation, or to reduce vulnerabilities to current climate variability and future climate changes. On the GHG mitigation side, financing may develop, test, and deploy advanced new technologies, such as carbon capture and sequestration, electric vehicles, or shade-grown crops. It could assist “market readiness” in transitional countries, to create governance, skills, and other conditions favorable to investments. For

²⁵ “External costs” or “externalities” are the costs born by people, social systems, or the environment, other than those who pay market prices for a product or service. For example, buying fossil-fuel generated electricity leads to air pollution and health effects, the costs of which (monetary, and non-monetary such as suffering or curtailed activities) must be carried by other people, not necessarily those electricity consumers. In most cases, those external costs are not factored into the price of electricity. Economists say that, to be efficient, markets need to internalize into prices all those external costs.

²⁶ For example, see PollingReport.com/Foreign Aid: <http://www.pollingreport.com/defense.htm#Foreign%20Aid>.

²⁷ For example, Anthony Leiserowitz et al., “Climate Change in the American Mind: Americans’ Climate Change Beliefs, Attitudes, Policy Preferences, and Actions” is based on a nationally representative survey of 2,164 American adults conducted in October 2008. http://www.climatechangecommunication.org/images/files/Climate_Change_in_the_American_Mind.pdf; But see also PollingReport.com/ Environment: <http://www.pollingreport.com/enviro.htm>.

²⁸ For example, Bjorn Lomborg and the “Copenhagen Consensus.” However, Lomborg considers mainstream climate change science to be hyperbole and currently is engaged in evaluating alternative options to mitigate it and to adapt. See, for example, <http://www.cup.cam.ac.uk/uk/catalogue/catalogue.asp?isbn=9780521138567>.

²⁹ Economist, “Americans want to cut foreign aid...to whom?” http://www.economist.com/blogs/democracyinamerica/2010/04/deficit_reduction.

example, civil servants or others may be trained on the importance of protection of intellectual property, on developing legal frameworks, and on enforcing them; alternatively, workers may be trained and certified in accounting and verification of GHG reductions to facilitate certification for sales of emission offsets.

Some projects may serve both mitigation and adaptation, such as construction of more energy efficient and weather resistant buildings, or improved forest fire detection and management. More specific adaptation investments may, for example, distribute malaria bed nets in areas newly infested with parasite-carrying mosquitoes; improve water management infrastructure; or establish early drought or storm warning systems. Adaptation efforts could test and deploy improved cooling systems to prevent shut-down of nuclear power plants when temperature tolerances for cooling water are exceeded. Or, adaptation may mean managing retreat from some shores vulnerable to rising sea levels.

What Do Estimates of Needs Conclude?

A variety of international institutions and non-governmental organizations have tried to estimate the extra costs of adaptation and GHG mitigation in low income countries, and from these, the associated needs for additional financing. (Many estimates assume that some portion of the incremental costs will be covered by the recipient countries themselves.) Methods, definitions, and scopes of adaptation in these studies vary, accounting for some of the differences in cost estimates. In particular, some studies attempt to consider “all” costs of adaptation to climate change and remaining damages (although none are comprehensive); some include just large-scale adaptation costs (i.e., not most private measures taken by individuals); and some try to discern just the need for public financing for adaptation. As a result, figures range from \$4 billion to several hundreds of billions of dollars annually by the year 2030.³⁰

The United Nations Development Programme estimated that an additional US\$86 billion per year would be needed in 2015. In a 2008 update of earlier estimates, the UNFCCC Secretariat estimated that, by 2030, an additional US\$200-210 billion per year (2005 dollars) would be needed for mitigation, and for adaptation, an additional US\$8 billion to US\$130 billion annually. For adaptation alone, the World Bank updated a previous study in September 2009, now estimating the average adaptation cost from 2010 to 2050 to be \$75 billion to \$100 billion annually.³¹ For GHG mitigation in the energy sector, the International Energy Agency’s World

³⁰ Martin Parry et al., *Assessing the Costs of Adaptation to Climate Change: A Review of the UNFCCC and Other Recent Estimates* (London: International Institute for Environment and Development (IIED), August 2009), <http://74.125.93.132/search?q=cache:KCCoQ47xQdMJ:www.iied.org/pubs/pdfs/11501IIED.pdf+%22Assessing+the+costs+of+adaptation%22&cd=2&hl=en&ct=clnk&gl=us&client=firefox-a>.

³¹ World Bank, *Economics of Adaptation to Climate Change: New Methods and Estimates (Consultation Draft)* (World Bank, September 2009), <http://beta.worldbank.org/climatechange/content/economics-adaptation-climate-change-study-homepage>. Concerning the problem of defining adaptation costs, this report says,

One of the biggest challenges of the study has been to operationalize the definition of adaptation costs. The concept is intuitively understood as the costs incurred by societies to adapt to changes in climate. The Intergovernmental Panel on Climate Change (IPCC) defines adaptation costs as the costs of planning, preparing for, facilitating, and implementing adaptation measures, including transaction costs. But this definition is hard to operationalize. For one thing, “development as usual” needs to be conceptually separated from adaptation. That requires deciding whether the costs of development initiatives that enhance climate resilience ought to be counted as part of adaptation costs. It also requires deciding how to incorporate in those costs the adaptation deficit, defined as
(continued...)

Energy Outlook 2009³² concludes that, in a scenario to stabilize atmospheric GHG concentrations at 450 ppm,³³ “the energy sector in non-OECD³⁴ countries would need around \$200 billion of additional investment in clean energy and efficiency in 2020—including \$70 billion for nationally appropriate mitigation actions (NAMAs) and a similar amount to achieve sectoral standards in transport and industry.” The extra investments would be more than offset in the industry, transport, and buildings sectors, says IEA, by savings from energy efficiency improvements. McKinsey and Company reaches a similar conclusion for an increment of more than \$1 trillion in 2030 to projected fixed asset investment.³⁵ For agriculture and food security, an IFPRI study estimates that agricultural productivity investments in the range of US\$7.1-7.3 billion annually are needed to adapt and raise productivity rates in order to overcome the negative impacts of climate change on the health and well-being of poor children globally.³⁶

Table 1 compiles a variety of estimates for incremental climate-related financial needs in low-income countries. As mentioned above and in the table footnote, these different estimates are not comparable though some are the basis for certain amounts of financing proposed.

Some studies are available that are not globally comprehensive and therefore generalized, but estimate needs of specific countries or activities. For example, a 2010 report from the UNFCCC Secretariat³⁷ has itemized the mitigation and adaptation measures needed and associated costs in a number of countries.³⁸ These types of studies are likely to provide greater clarity and confidence in the more general estimates of global financing needs to address climate change.

(...continued)

countries’ inability to deal with current and future climate variability. It requires defining how to deal with uncertainty about climate projections and impacts. And it requires specifying how potential benefits from climate change in some sectors and countries offset, if at all, adaptation costs in another sector or country. (p. 19)

³² IEA, *World Energy Outlook*, November 2009. <http://www.worldenergyoutlook.org/>.

³³ Current atmospheric concentrations of all GHG are roughly 435 ppm (parts per million), more than one-third higher than around 1850. Without aggressive public policies to abate GHG emissions, a number of analyses anticipate that GHG concentrations could rise to 750 ppm or higher by the end of the 21st Century.

³⁴ Organisation for Economic Cooperation and Development.

³⁵ McKinsey & Company, *Version 2 of the Global Greenhouse Gas Abatement Cost Curve*, 2009.

³⁶ See footnote 23.

³⁷ This study is not included in **Table 1** because it is much narrower in scope than the others referenced.

³⁸ UNFCCC, National Economic, Environment, and Development Study for Climate Change (NEEDS): Initial Summary Report, 2010, http://unfccc.int/resource/docs/publications/needs_initial_sum_rep_2010.pdf.

Table I. Estimates of the Needs for Incremental Climate-Related Finance in Low Income Countries

(billions of real US\$; excludes savings from investments, such as lower energy or health expenditures)

Source of Estimate for:	2010-2020 (annually) ^a	2030 (annually)	2050 (annually)
Mitigation Needs			
UNFCCC (2008)		\$200-210	
McKinsey & Co. (2009) for all countries ^b	in 2010, \$706 (5-6% of all fixed asset investment)	\$1,080 (5-6% of all fixed asset investment)	
International Energy Agency (energy only)	\$200		
Adaptation Needs			
UNFCCC (2008)		\$8-130	
International Monetary Fund (IMF)	\$10-60		
World Bank (2009)	\$75-100	\$75-100	\$75-100
World Bank (2010)		\$275	
UNDP	\$86-109 by 2015		
IFPRI (agriculture sector only)			\$7.1-7.3

Source: UNFCCC, *Investment and financial flows for a strengthened response to climate change: an update*, FCCC/TP/2008/7, November 26, 2008; McKinsey & Company, *Version 2 of the Global Greenhouse Gas Abatement Cost Curve*, 2009; Martin Parry et al., *Assessing the Costs of Adaptation to Climate Change: A Review of the UNFCCC and Other Recent Estimates*, (London: International Institute for Environment and Development (IIED), August 2009); World Bank, *Economics of Adaptation to Climate Change: New Methods and Estimates (Consultation Draft)* (World Bank, September 2009); IEA, *World Energy Outlook*, November 2009; Hugh Bredenkamp and Catherine Pattillo, *Financing the Response to Climate Change*, IMF Staff Position Note, March 2010.

Notes: Figures are developed with differing scopes and methods. The figures are not additive, nor are they comparable. They also are in different years' dollars (i.e., not adjusted for inflation by year).

- a. Some estimates are for a particular year; others seem to be the annual average during the decade.
- b. McKinsey concludes that "many of the opportunities would see future energy savings largely compensate for upfront investments."

Should Funding Sources Be Public or Private?

Countries differ on the appropriate sources of funds for climate change financing internationally. The G-77³⁹ and China argue that contributing nations' governments should provide public funds as the main source of climate change financing for mitigation, adaptation, technology cooperation, and capacity building. They may believe public financing would be easier to generate and direct, and therefore more predictable and sustained. They may not recognize (or care about) the challenges in the United States and some other countries in appropriating federal funds for international purposes. Many people in developing countries are deeply suspicious of foreign private investors; some would prefer the funding to be under the control of local governmental decision-makers, hoping this would better reflect local priorities and indigenous cultures. An opinion piece in the *Jakarta Post* adds that, "Financial support from [public and multilateral] entities is also necessary to signal, in particular to the private sector, the need to shift investment flows towards decoupling economic growth from increasing emissions, and towards a low carbon and climate resilient future."⁴⁰

The wealthier, contributing nations tend to underscore the importance of private sector finance through GHG trading mechanisms, foreign direct investments, or other mechanisms. They may see public funds as appropriately a much smaller share, used for selective purposes. The United States and the European Union (EU) generally agree that some public financing should be provided, in particular for capacity building and adaptation, but seek mechanisms so that the large majority of financing would flow from the private sector through market incentives. (For example, GHG "offsets" would be authorized by H.R. 2454, the American Clean Energy and Security Act (ACESA or Waxman-Markey bill).⁴¹

To support private sector financing internationally, views diverge on whether to retain and revise the existing international GHG trading mechanisms under the Kyoto Protocol as vehicles for private investment in GHG mitigation.⁴² Many countries seek to retain the Kyoto Protocol's trading and offset system (the Clean Development Mechanism) because they are established (and took many years to become so) and function, though not as efficiently or transparently as desired. The EU and United States have pressed for new, more efficient mechanisms than, for example, the Clean Development Mechanism has been thus far.

Many different proposals for new mechanisms have surfaced, including crediting for GHG reductions in Nationally Appropriate Mitigation Actions (NAMAs); NAMA-based emissions trading; and sectoral crediting and trading.⁴³ Many such options are identified in the glossary in **Appendix B** of this report.

³⁹ G-77 is short for "The Group of 77," established in 1964 to represent developing country signatories, formed at the end of the first session of the United Nations Conference on Trade and Development (UNCTAD). It is a means for developing countries to articulate and promote their economic interests and negotiating capacity on major international economic issues, <http://www.g77.org/doc/>.

⁴⁰ Ardiansyah, Fitriani, "Climate Solutions: Climate Financing: The devil is in the details," *Jakarta Post*, May 11, 2010.

⁴¹ For explanation of how "offsets" may contribute to financing GHG reductions, see CRS Report RL34241, *Voluntary Carbon Offsets: Overview and Assessment*, by Jonathan L. Ramseur.

⁴² Because the United States is not a Party to the Kyoto Protocol, its trading and offset credit mechanisms are not a mechanism for U.S. private financing to furnish part of the U.S. total contribution, as they contribute, for example, to the European Union's pledged financing.

⁴³ See, for example, UNFCCC, Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention, (continued...)

Funding Currently Pledged and Provided

Before and since the UNFCCC entered into force, funding has been provided by the United States and other donors to low income countries to build cleaner energy and transportation systems and to make them more efficient; to encourage greater renewable energy production; to improve capacities for environmental and energy management; and to many other climate-related projects. Expectations for increases in financing after 1992 were raised by the UNFCCC and its vague but legally binding financial obligations. Many times, countries or groups of countries have pledged to increase funding for climate change mitigation and adaptation activities; often the follow-through on such pledges was arguably met partly by shifting funds from one development assistance account to another (no “additionality”). In other instances, pledges were followed by no change in funding at all. Funds sometimes are delivered years late, and/or in amounts well below the pledges. Weaknesses in reporting on financial commitments and delivery, particularly the meaning and transparency of data, have been an on-going topic of evaluation and negotiation, and will be addressed in future negotiations under the Copenhagen Accord.⁴⁴

The “monitoring, reporting, and verification” (MRV) for financing is generally expected to mirror analysis and consultation procedures and other MRV of mitigation action taken by non-Annex I Parties. China, for one, insists that MRV of financing precede discussion of MRV for developing country actions.

A number of different sources of funds have been used to finance climate change-related projects: foreign direct investment (FDI), bilateral overseas development assistance (ODA), donations to multilateral development banks (MDBs) and the Global Environment Facility (GEF, the official financial mechanism of the UNFCCC), offering of export credits, loan guarantees, etc. Private philanthropy has provided a large share to date, but often is not counted in the flows. **Figure 1** shows one group’s recent estimates of how these different sources of finance may add up.

However, and in line with many countries’ complaints about lack of transparency of financing, it is challenging to find consistent statements on contributing countries’ pledges, and on what they have already committed or provided, to meet the aggregate Copenhagen Accord pledge of \$30 billion in fast-start funding during 2010 to 2012. So the estimates in **Figure 1** must be viewed with caution.

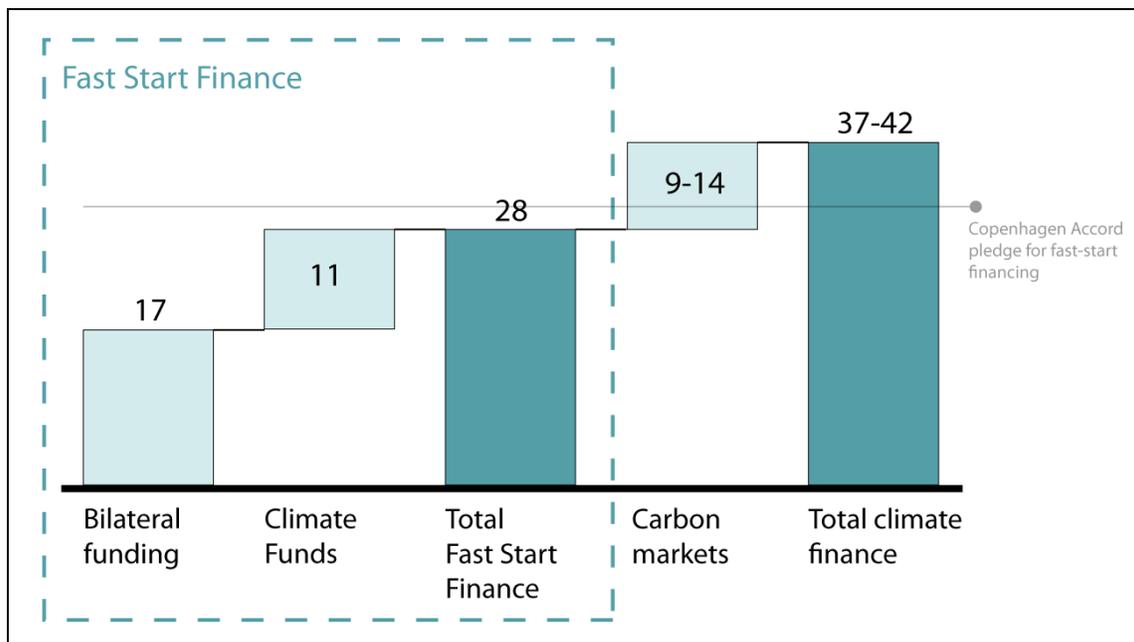
(...continued)

Ideas and Proposals on the Elements Contained in Paragraph 1 of the Bali Action Plan: Submissions from Parties, May 22, 2009, <http://unfccc.int/resource/docs/2009/awglca6/eng/misc04a01.pdf>

⁴⁴ Jan Corfee-Morlot et al., *Financing Climate Change Mitigation: Towards a Framework for Measurement, Reporting, and Verification*, Organisation for Economic Cooperation and Development, October 2009.

Figure 1. One Estimate of How Climate Funding May Add to Copenhagen Accord Pledges

(billions of US dollars)



Source: CRS, reproduced from Project Catalyst, “Making Fast Start Finance Work” (Climate Works Foundation and the European Climate Foundation, June 2010).

Foreign Direct Investment⁴⁵ (FDI) has been, and may continue to be, the largest source of finance for climate-related projects. FDI is not shown in **Figure 1** (but see **Figure 3**) in large part because whether and how it could be counted under the UNFCCC is debatable. Nonetheless, FDI is critical in establishing the economic foundation that largely determines GHG emissions and a population’s vulnerability to climate change impacts; FDI also creates economic and physical opportunities to reduce GHG emissions and vulnerabilities.

Using data that are available, amounts of climate-related financing provided by selected OECD economies are compared in **Figure 2**. On average for the period 2003 through 2007, the United States reported having provided \$25,678 million annually in that period in total Overseas Development Assistance (ODA), and \$31.1 million annually specifically relating to climate change, according to OECD.⁴⁶ The United States contributed the lowest percent of Gross National Income (GNI) to total ODA (0.16%) of any OECD country except Greece (not shown), and the lowest percentage of ODA to climate change-related assistance (0.1%) except for Luxembourg (not shown).

A frequent theme in negotiations and international public discussions is whether the United States will provide its “fair share” of financial assistance internationally to address climate change. Moreover, the United States’ credibility is likely undermined by being almost \$170 million in

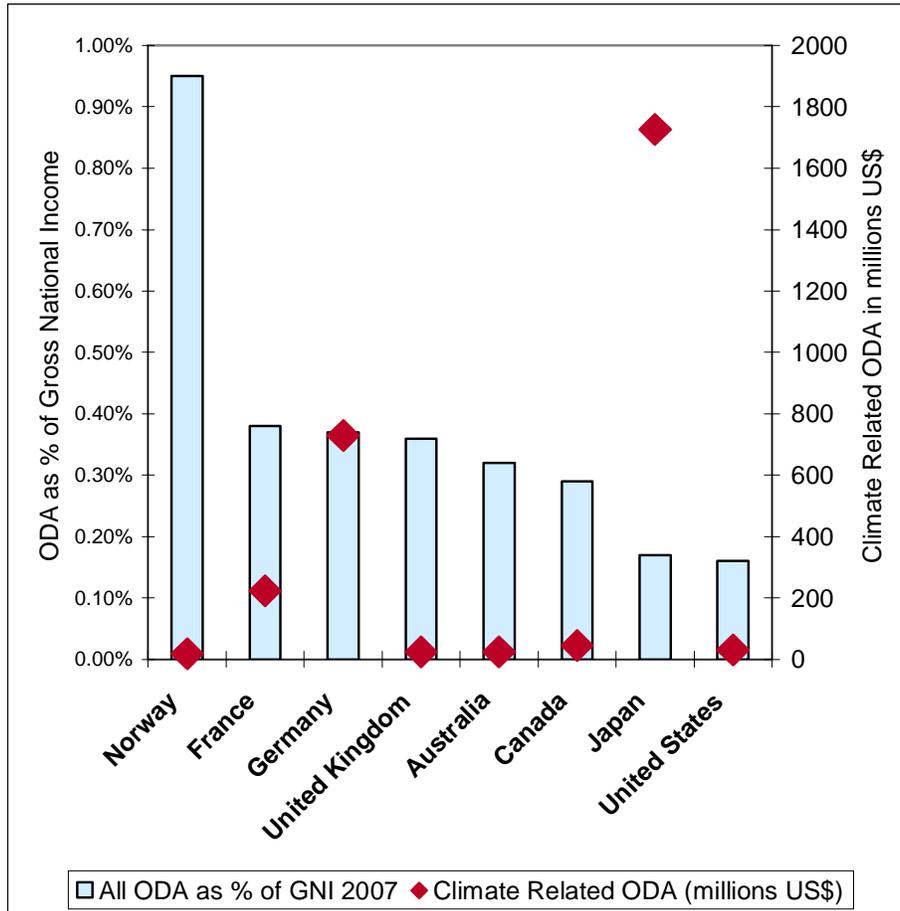
⁴⁵ Foreign Direct Investment is a lasting investment of foreign assets into another country’s infrastructures, equipment, or organizations. FDI does not include investments in stocks, as through a stock market, as these are not considered “lasting.”

⁴⁶ Ibid. Table 1.

arrears for its assessed contribution to the Global Environment Facility—a major international fund for environmental loans and grants to low income countries.

Figure 2. Bilateral Overseas Development Assistance (ODA) for Climate Change from Selected Developed Countries, Ordered by GDP per Capita in 2008

(averaged over 2003-2007, in billions of constant 2007 US dollars)



Source: Data from Jan Corfee-Morlot et al., *Financing Climate Change Mitigation: Towards a Framework for Measurement, Reporting, and Verification*, Organisation for Economic Cooperation and Development, October 2009. Table I.

Notes: ODA is Overseas Development Assistance (bilateral). Climate related assistance amounts are “Rio Climate Change Related” as determined in cited source from data reported by countries to the Development Assistance Committee Creditor Reporting System.

An important part of the fast-start (and long-term) funding will likely flow through multilateral mechanisms, including the MDBs, the Global Environment Facility, the Climate Investment Funds, and other funds (discussed later). **Table 2** identifies the monies pledged and delivered as of June 2010 to the most prominent international climate change funds. (The funding actually disbursed to date by the various funds is a minor portion of the total pledged.) The two fund mechanisms promised in the Copenhagen Accord—the Copenhagen Green Climate Fund and a REDD-plus mechanism—have not yet been established.

The pledges identified in **Table 2** to flow through multilateral funds are not additive. For example, the U.S. Department of Treasury has identified about \$500 million in 2010 and \$750 million in 2011 that would flow through USAID grants or other mechanisms. The Administration’s budget proposal for FY2011 identified another \$104 million that would flow through “complementary agencies.”⁴⁷ Private financing, especially for Kyoto Protocol Parties, may contribute billions more (**Figure 1**).

A High-Level Advisory Group on Climate Change Financing has been established by United Nations Secretary General Ban Ki-moon to study potential sources of revenue to finance mitigation and adaptation to climate change. Rather than focusing on the “fast-start” pledges, most of the work of the High-Level Advisory Group focuses on “mobilizing jointly \$100 billion a year by 2020,” as envisaged in the Copenhagen Accord. While the results of this group are not yet finalized, the report will likely contain a number of market-oriented options. Some of the possible mechanisms to generate funding are identified in the next section, including fees on sales of international shipping or aviation fuels.

⁴⁷ U.S. Department of State et al., FY 2011 Budget for International Climate Change Financing.

Table 2. “Fast-Track” Financing Pledged and Delivered Under Various Climate Change Funding Mechanisms

(millions of US dollars, as of June 2010, where authoritative data are available; U.S. pledges and funds delivered are identified in parentheses where available)

Authority or Agreement and Host Organization(s)	Financing for Adaptation	Financing for Mitigation Total (US) Contributions
Financial Mechanisms Agreed Under the Copenhagen Accord		
		Copenhagen Green Climate Fund, to be established under the Global Environment Facility (to be an operating entity of the GEF, see below) Mechanism for REDD-plus
Climate Investment Funds		
World Bank Group, African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank	Strategic Climate Fund: Pilot Program for Climate Resilience Pledged: \$920 (US: \$145 proposed) Delivered: \$263 (from US: \$55)	Clean Technology Fund (CTF) Pledged: \$4,200 (US: \$1980) Delivered: \$ ^a (US: \$300) Leveraged: \$36,000 Strategic Climate Fund: Forest Investment Program (FIP) Pledged: \$522 (US: ^a) Delivered: \$98 (US: ^a) Strategic Climate Fund: Program for Scaling Up Renewable Energy in Low Income Countries (SREP) Pledged: \$283 (US: ^a) Delivered: \$22 (US: ^a)
World Bank/Global Environment Facility (GEF)		
Funds established under the United Nations Framework Convention on Climate Change (UNFCCC)	Least Developed Countries Fund (LDCF) Pledged: \$222 (US: \$50) Delivered: \$169 (US: ^a) Special Climate Change Fund (SCCF): Windows on (1) Adaptation; (2) Transfer of Technologies; (3) Energy, transport, industry, agriculture, forestry, and waste management; and (4) Activities to assist developing countries whose economies are highly dependent on fossil fuels. Pledged: \$121 Delivered: \$101	

Authority or Agreement and Host Organization(s)	Financing for Adaptation	Financing for Mitigation Total (US) Contributions
Financial Mechanisms of the Kyoto Protocol		
	Adaptation Fund ^b —financed by 2% of the proceeds from certified emission reductions under the Clean Development Mechanism Estimated 2008-2012: \$300-600 Pledges: \$2.78 (US:\$0.01) Delivered: \$2.78	Clean Development Mechanism (CDM) No estimate identified of incremental financing of CDM projects during 2010-2012
Global Environment Facility (GEF): Additional Climate Change Funds		GEF Trust Fund (Fifth Replenishment, 2010–2014) ^c Pledged: \$4250 (from US: \$116 ^d) Delivered: \$ ^a (from US: \$26) Leveraged from other sources: \$17,200 Forest Carbon Partnership Facility Pledged: \$174 (from US: \$25) Delivered: \$86 (from US: \$10) Forest Investment Program (FIP) Pledged: \$522 (US proposed: \$115) Delivered: \$98 (from US: \$20) Carbon Partnership Facility Pledged: \$500 Delivered: \$ ^a
African Development Bank		Congo Basin Forest Fund(CBFF) Pledged: \$161 (from US: ^a) Delivered: \$161 (from US: ^a)
European Investment Bank		Global Energy Efficiency and Renewable Energy Fund (GEEREF) Pledged: \$170 Delivered: \$33
United Nations		United Nations-Reduction of Deforestation and Forest Degradation (UN-REDD) Pledged: \$50 Delivered: \$ ^a

Source: Primarily, *Statement on Fast Start Financing*, Presented by Australia, Canada, Japan, New Zealand, Norway, and the United States, June 2010; *The Climate Funds Update*, <http://www.climatefundsupdate.org/>. Also, Corfee-Morlot, Jan et al., *Financing Climate Change Mitigation: Towards a Framework for Measurement, Reporting, and*

Verification, OECD, October 2009; GEF, *Record Funding for the Global Environment Facility*, Press Release, <http://thegef.org/gef/node/3010>.

Notes: “Delivered” means that the funds have been transferred from the pledging entity to the fund or mechanism that will disburse the funds. A lesser amount than that “delivered” has been disbursed by the funds and mechanisms identified here.

- a. If no figure is provided then no amount has been identified authoritatively.
- b. The Adaptation Fund is financed by proceeds from the Clean Development Mechanism (CDM). The estimate in this table for funding is based on an estimate of the Certified Emission Reductions forecast to be issued by the CDM in the period 2010 to 2012.
- c. The GEF pledged figure includes pledges for all “windows” of the facility, not only those related to climate change and forests.
- d. The United States remains about \$169 million in arrears to the Global Environment Facility.

Mechanisms for Generating Funding

Public finances have been proposed to come from a variety of levies, including emissions fees (e.g., carbon taxes); levying a percentage of sales of GHG offsets internationally (such as exists now under the Kyoto Protocol’s Clean Development Mechanism); contribution of a share of national allowances to auction (i.e., where emission permits are auctioned); charges on maritime and aviation fuels, etc. Below is a sampling of the options that are being used or have been proposed.

Revenues from Emission Allowances or Permits, including “Cap and Trade” and Emission Reduction Offsets

- A share of emissions allowances or certified emission reductions⁴⁸ could be transferred to one or more entities which could sell them to raise revenues for international finance.⁴⁹ This could occur through a cap-and-trade program, or by sale of non-tradeable permits (in which case, it would essentially be an emissions fee). If the latter, the fee could be graduated to reflect emissions performance relative to sectoral benchmarks.
- A government issuing permits or allowances to emit GHG (or other pollutants) could sell or auction them to emission sources and use a share of the revenues for international finance. (In this case as well, the permits or allowances operate like emission fees, see below.)
- A fee could be levied by a government for registering the transfer of an emission allowance or emission reduction credit to another entity, or for banking it for use in the future. This is similar to the 2% fee on the proceeds from issuance of

⁴⁸ For further explanations of how emission control systems, including cap-and-trade, may work, see CRS Report RL33799, *Climate Change: Design Approaches for a Greenhouse Gas Reduction Program*, by Larry Parker; CRS Report RL34436, *The Role of Offsets in a Greenhouse Gas Emissions Cap-and-Trade Program: Potential Benefits and Concerns*, by Jonathan L. Ramseur; and CRS Report R41049, *Climate Change and the EU Emissions Trading Scheme (ETS): Looking to 2020*, by Larry Parker; among other relevant CRS reports available at <http://www.crs.gov/>.

⁴⁹ This kind of provision has been included in several U.S. legislative proposals.

Certified Emission Reductions by the Clean Development Mechanism under the Kyoto Protocol.⁵⁰

- Emissions allowances could also be allocated internationally for selected sectors, primarily international aviation and marine transport, for which national governmental programs could be undermined by the inherent mobility of these emission sources. An international entity authorized to auction, sell or otherwise allocate emissions permits would not have to have other “governance” authorities delegated to it, though a rigorous monitoring and enforcement mechanism would be necessary to maintain integrity of the system. Any revenues generated could be used for international finance.
- In a national emissions control program, an emissions source could be allowed to meet part of its requirement by purchasing emission reduction credits, or offsets, from low-income countries. This would likely result in the private financing of projects directly, or through markets for these offsets.⁵¹

Emissions Fees

- A fee could be levied on GHG emissions in proportion to each source’s emissions. It may be levied on all or some GHG emissions (affecting the total revenues and scope of affected entities, and any incentives to abate emissions). This is sometimes called a “carbon tax”; under guidelines of the U.S. Office of Management and Budget, a “tax” is primarily for generating revenues, while a user (i.e., emissions) fee⁵² is primarily to charge for an entity’s use of a resource (i.e., the atmosphere as a place to discharge its waste emissions).

Other Levies

- taxes on consumption (sales) of marine or aviation bunker fuels.
- taxes on air passenger tickets.
- taxes on financial transactions (a “Tobin Tax”).
- taxes on insurance premiums.

Use of Special Drawing Rights or Gold Reserves

- Special Drawing Rights (SDRs) could be placed into a “green fund” for disbursement. SDRs are an accounting mechanism, sometimes called a “virtual currency,” with value tied to a basket of real country currencies. In financial organizations such as the International Monetary Fund (IMF), SDRs typically are held as a reserve asset to provide liquidity. To capitalize the fund, SDRs would be issued in exchange for real currency, which would generate revenues for climate-related financing. Each SDR would represent a potential claim on the currencies of holders of the Climate-related SDRs. IMF would not necessarily be the entity issuing these proposed SDRs or managing the system.

⁵⁰ <http://cdm.unfccc.int/index.html>

⁵¹ This kind of provision is included in nearly all proposals for emissions cap-and-trade programs.

⁵² See, for example, <http://www.whitehouse.gov/omb/rewrite/circulars/a025/a025.html>.

IMF Green Fund Proposal

- Similar to the general proposals to create SDRs for climate-related finance, several staff of the International Monetary Fund (IMF) have proposed a Green Fund, that would be capitalized by contributions of “reserve assets” in exchange for an equity share in the Fund.⁵³ Governments could contribute their SDRs issued by the IMF in 2009 (i.e., an exchange of reserve assets between the two Funds). Private entities might also be permitted to purchase SDRs. Because this Green Fund would be highly credit-worthy, it would issue “green bonds” to private or public investors. This would yield a multiple of the reserve asset capital. The proceeds from issuing green bonds would be combined with on-going subsidy donations (e.g., ODA) from donor countries. It could also levy a small lending rate surcharge on borrowers from the Fund. It might also generate interest on its capital base.

Governmental Appropriations

- Typically, ODA and current contributions to Multilateral Development Banks, and to the GEF and other existing climate-related financial mechanisms, are generated by appropriations of general governmental revenues.

Philanthropy

- Philanthropic organizations already provide financing that may contribute to climate change mitigation or adaptation.

Voluntary “Offsets”

- This option would be similar to the “carbon neutral” certificates that are sold by some private entities in exchange for assurance that the funds will be used to reduce GHG emissions (e.g., by planting trees).⁵⁴ This may differ from general philanthropy in the sense that funds are, in principle, directly in exchange for quantified emissions reduction performance and could be issued through aggregators of small, diversified projects or through brokers. They would be like emissions offsets, except that they would not offset any legal obligation.

Each of the options identified above, potentially able to generate funds to address climate change, has advantages and disadvantages. There is no single set of criteria for comparing these options, however. Some of the criteria implied by many commentators include the potential magnitude of funds that could be generated by each mechanism; predictability of generating funds; plausibility of assessing “additionality”⁵⁵ of funds; accessibility to financing; the transparency of how much is provided and its uses; likely fiduciary standards of the mechanism; and the overall efficiency of

⁵³ Hugh Bredenkamp and Catherine Pattillo, *Financing the Response to Climate Change*, IMF Staff Position Note, March 2010.

⁵⁴ See, for example, Terrapass, <http://store.terrapass.com/store/c/18-carbon-offsets.html>.

⁵⁵ “Additionality” means additional to what currently exists or to would otherwise have occurred. Additionality of financing expresses the concern of current aid recipients that donors could merely shift existing development aid into climate-related funds, with no incremental assistance comparable to the extra costs they perceive to be incurring by addressing climate change.

the mechanism. A simple comparison of the various options for sources of funds is offered in **Appendix A**.

Methods for Disbursing Financial Assistance

A variety of mechanisms for disbursing financing already exists, with varying degrees of widespread acceptability and efficiency. Principal mechanisms using public monies are through bilateral assistance (ODA), export credits and guarantees, contributions to multilateral development banks (MDBs), such as the World Bank Group, contributions to the Global Environment Facility (which is the agreed financial mechanism of the UNFCCC) and, for some countries, direct purchases of emission reduction credits (offsets) or emission allowances for Parties of the Kyoto Protocol (which excludes the United States).

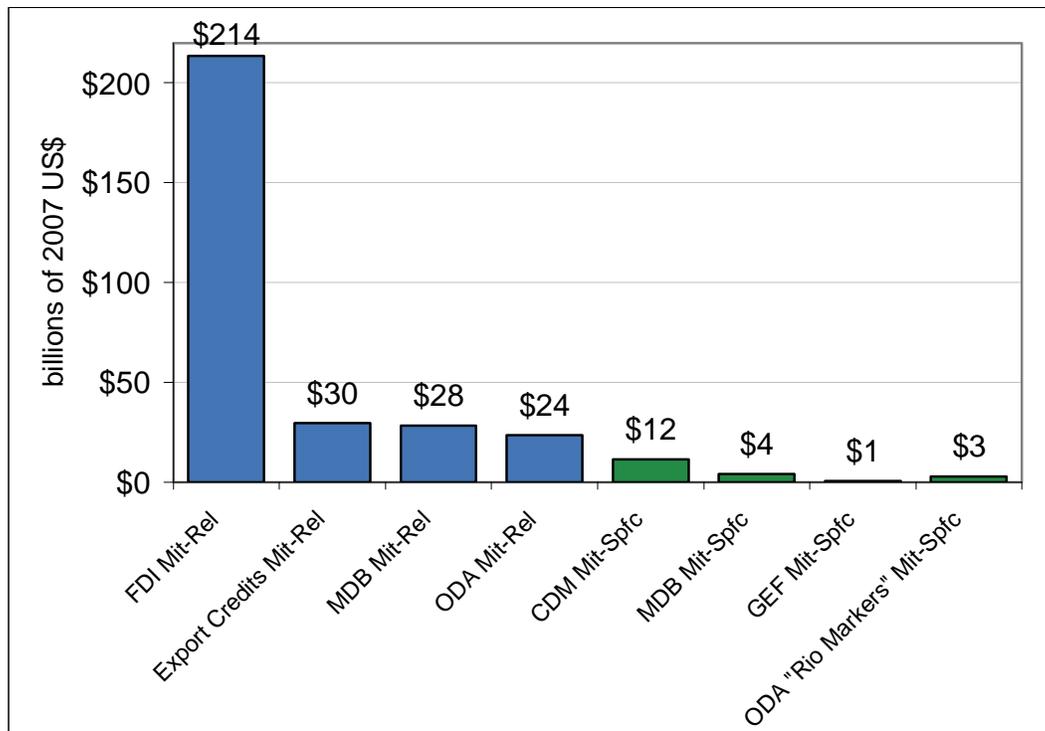
The Organisation for Economic Cooperation and Development (OECD) considers financial flows as being either mitigation-specific, or mitigation-relevant⁵⁶—these distinguish between flows primarily intended to address climate change, or that are relevant to mitigation or adaptation to climate change but are not primarily for that purpose. The OECD notes that the “relevant” flows establish infrastructure and other economic context, and may add to, or reduce, GHG emissions directly, or potentially reduce GHG, or modify vulnerability (positively or negatively) to climate change impacts.

As **Figure 3** shows, mitigation-relevant funds exceed by many times the mitigation-specific funds in 2007. Foreign Direct Investment (FDI) is by far the largest component of mitigation-relevant and all climate-related financial flows. Export credits are much smaller but currently the second most important component of climate-related financial support.

⁵⁶ “Mitigation-specific” as defined by OECD is defined “to achieve greenhouse gas mitigation in developing countries as its main objective; it may also finance fulfillment of related reporting requirements”; “mitigation-relevant” support is defined “to include funding for development in key sectors that will share emissions in developing countries and thus mitigation potential.”

Figure 3. How Mitigation-Specific and Mitigation-Relevant Investments Flowed in 2007

(total estimated at \$314 billion)



Source: Jan Corfee-Morlot et al., *Financing Climate Change Mitigation: Towards a Framework for Measurement, Reporting, and Verification*, Organisation for Economic Cooperation and Development, October 2009. Figure 9.

Notes: The four left columns are Mitigation-Relevant; the four right columns are Mitigation-Specific. See footnote 56 for definitions of mitigation-specific and mitigation-relevant investments. Numbers add to more than the total of \$314 billion due to rounding.

Overseas Development Assistance (ODA, (bilateral financing) from public agencies (e.g., the U.S. Agency for International Development, USAID) is also an important component of climate-related assistance (in **Figure 3**, ODA Mit-Rel plus ODA “Rio Markers” Mit-Spfc), though it represented about 8.6% of all climate mitigation-related bilateral ODA. The OECD report estimated bilateral, climate-specific support to low-income countries at an annual average of about \$3.4 billion from 2003-2007, as reported in their Creditor Reporting System.⁵⁷ This climate-specific financing represented about 0.01% of those countries’ Gross Net Income (GNI) for that period, and about 3.4% of those countries’ total bilateral overseas development assistance (ODA). By comparison, the United States’ contributions represented about 0.002% of GNI and about 0.1% of all bilateral ODA.

Given the vagaries of definitions and reporting, the OECD estimates that all bilateral financing support for climate mitigation represented about US\$8 to \$53 billion in 2007—no more than 1/6 of the total estimated flows of about US\$314 billion going to the sectors relevant to climate mitigation (i.e., energy, transportation, agriculture, water supply, industry, minerals, and mining.)

⁵⁷ Jan Corfee-Morlot et al., *Financing Climate Change Mitigation: Towards a Framework for Measurement, Reporting, and Verification*, Organisation for Economic Cooperation and Development, October 2009. Table 1.

Besides the magnitude and terms of financing available, substantial disagreement continues over appropriate mechanisms that would manage publicly provided financing under the Copenhagen Accord or a new agreement. Much assistance passes through bilateral arrangements, although some countries complain that these are difficult to verify and may represent a shift in funding, not additional funding. For better or worse, bilateral funding may be offered as part of a country's broader political strategy.

Multilaterally, existing mechanisms include the Global Environment Facility (GEF) as the financial mechanism of the UNFCCC; the Special Climate Change Fund; and funds for specialized activities (e.g., the Adaptation Fund of the Kyoto Protocol) or groups of countries (e.g., the Least Developed Countries Fund of the Kyoto Protocol). In 2008, multilateral development banks with several governments and stakeholders established the Climate Investment Funds (CIF) under management of the World Bank. Many additional sources of funding, such as through other MDBs, are active. Their processes, terms, and responsiveness vary. The amounts of funding pledged, and actually delivered, to the most prominent funds and programs are given in **Table 2**.

Some countries are concerned about the plethora of funds, administrative and management costs, and a lack of coherent strategy to maximize the effectiveness of the monies. Some of the existing mechanisms are identified here. The Global Environment Facility (GEF) has been agreed to be the official "financial mechanism" of the UNFCCC.⁵⁸ (Simultaneously, it serves as a funding mechanism on forests (in general), biodiversity, international waters, land degradation, protection of the stratospheric ozone layer, and persistent organic pollutants.) There also are two special funds established under the GEF, as the UNFCCC financial mechanism, particularly aimed at supporting the lowest income countries: the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF).

There exist many additional funds in other MDBs and other organizations. The Adaptation Fund was established by Parties to the Kyoto Protocol to finance adaptation projects and programs in developing countries. The Kyoto Protocol provided that the Adaptation Fund should be financed by 2% of the proceeds from issuance of "Certified Emission Reductions" (CERs, similar to emission offsets) by the Kyoto Protocol's Clean Development Mechanism (CDM). The CDM stimulates investments by both the private and public sectors by allowing creation of CERs as emission offsets within the Kyoto Protocol system, which can be sold to entities that would use them in order to comply with their GHG reduction requirements. Though the CDM has been used far less than many envisioned thus far (in part because of slow processes), its Board says that it has issued more than 1.7 billion tons of CO₂-equivalent GHG reductions (2.9 billion expected by end of 2012), and has leveraged US\$33 billion from investors in 2007 alone.⁵⁹ The World Bank also set up a Carbon Finance unit, which uses donations from private and public entities to purchase GHG emission reductions in client countries.

These existing funds, and new ones proposed, may be candidates to channel revenues generated to address mitigation and adaptation needs in countries. Many low income countries complain that much financing is managed bilaterally or through the Multilateral Development Banks,

⁵⁸ See CRS Report R41165, *Global Environment Facility (GEF): An Overview*, by Richard K. Lattanzio.

⁵⁹ Danieli Violetti, "Clean Development Mechanism: Achievements and Developments," (presented at the 6th Session of the High-Level Task Force on the Implementation of the Right to Development, Geneva, 2010).

particularly the World Bank. They may feel that they are not as responsive to the priorities of the recipient countries as to those of the donors. These critics prefer financing to be managed by institutions created under the UNFCCC, in which they have “one-country, one-vote,” or at least equal regional representation to the industrialized nations.

A sampling of additional options for further financial flows include:

- The Copenhagen Accord calls for establishment of the Copenhagen Green Climate Fund (CGCF), to be an operating entity of the financial mechanism of the UNFCCC. It would be aimed at supporting mitigation including REDD-plus, adaptation, capacity-building, and technology development and transfer. Its governance would have equal representation of developed and “developing countries” (the distinction between which remains undefined). A “significant portion” of “new multilateral funding” for adaptation is to flow through the CGCF. No further decisions have been made on this to date.
- The Climate Investment Funds (CIF) have been established under the World Bank Group in collaboration with a number of additional MDBs and organizations.⁶⁰ The structure of the group of “Climate Investment Funds” are illustrated in **Figure 4**. Thus far, the United States has favored the CIF, and particularly the Clean Technology Fund (CTF) as a funding mechanism. The various funds receive public financing, both as donations and loans, and use it for technology deployment or for investments that could “transform” the emissions paths of recipient countries.

Figure 4. Structure of the Climate Investment Funds

(hosted under the World Bank Group)



Source: Climate Investment Funds at <http://www.climateinvestmentfunds.org/cif/designprocess>.

- Several staff of the International Monetary Fund (IMF) have proposed a Green Fund, described in the section on Mechanisms for Generating Funding.⁶¹ To disburse funds it has mobilized, it would offer loans and grants to developing countries, perhaps through other existing climate funds or a newly created entity. (The proposal is not fully developed.)
- “A New Proposal” has been made by a private international finance expert⁶²: An independent Global Fund for Mitigation of Climate Change (MITIGA) would finance large mitigation projects in the developing world. It would give representation proportionate to each donor’s contribution to the fund, with a limit

⁶⁰ See CRS Report R41302, *Climate Investment Funds (CIFs): An Overview*, by Richard K. Lattanzio.

⁶¹ Hugh Brendenkamp and Catherine Pattillo, *Financing the Response to Climate Change*, IMF Staff Position Note, March 2010.

⁶² http://www.climatefund.info/a_new_proposal.

of 33%. The Global Fund for Financing Adaptation to Climate Change (OBLIGA) would finance large or small projects to assist adaptation to climate change in developing countries. OBLIGA would give equal voice to donors and recipients (50% each). Both funds could receive contributions from public and private sources. Both would provide only grant financing.

U.S. Legislative Provisions for Potential International Finance

The United States at this time relies on appropriations for most financing of climate change activities internationally, although some private and philanthropic funds flow voluntarily. No legislated means exists to require or assure future, predictable private and public financing for international assistance (e.g., by GHG cap-and-trade mechanisms, which could generate private funds or allocation of GHG allowances for public funds). Moreover, the United States is currently in arrears in delivering on some international financing, for example to the GEF, to which the U.S. Government has agreed.

In June 2009, the House passed H.R. 2454, the American Clean Energy and Security Act (ACESA or Waxman-Markey bill), with provisions to allow domestic sources to meet their compliance requirements by acquiring up to 1 billion emissions offsets internationally each year. This could provide a many-billion-dollars stream of private finance for emission abatement projects in developing countries. The bill also would auction a share of domestic allowances to generate funds to help prevent tropical deforestation, build governance and private sector capacities, support cooperation to advance and deploy clean technologies, and to support adaptation to climate change in vulnerable and low-income countries.

A parallel bill in the Senate, S. 1733, the Clean Energy Jobs and American Power Act (CEJAPA) or Kerry-Boxer bill, contains similar provisions. Some Members of Congress and advocates have sought to increase allocation of allowances and/or appropriations for international finance, from \$2 billion to \$38 billion for international adaptation.⁶³ A U.S. coalition of religious organizations has called for at least \$3.5 billion per year to help poor populations respond to potential floods, natural disasters and droughts associated with warming temperatures.⁶⁴

The United States' credibility on international climate change financing has been impaired by under-funding. The United States is almost \$170 million in arrears for its assessed contribution to the Global Environment Facility. Also, though the Bush Administration helped establish a new Clean Technology Fund under the World Bank and pledged funds to it, the U.S. Congress declined to appropriate the first U.S. payment of \$400 million requested by the Administration for FY2009.

⁶³ See, for example, <http://www.eenews.net/climatewire/print/2009/10/09/10>; and http://docs.google.com/gview?a=v&q=cache:I3tTCuJatQMJ:www.actionaid.org/assets/pdf/Climate%2520finance%2520briefing%2520in%2520template%2520May%25202009%2520FINAL.pdf+Oxfam+adaptation+funding+%2412&hl=en&gl=us&sig=AFQjCNEbYHV2hIASCb0s3v5II56_ZBB0Q.

⁶⁴ Christa Marshall, "New religious coalition joins push for adaptation funding" *ClimateWire*, October 9, 2009, <http://www.eenews.net/climatewire/2009/10/09/10>.

Approximately \$1,007 million was appropriated for FY2010 for all “core” international climate assistance, up from \$315 million for FY2009.⁶⁵ The Administration proposed that this increase to \$1,391 million in FY2011 (**Table 3**). Another \$104 million was identified in the Administration’s budget proposals for other “complementary” agencies, such as the Department of Energy, to supplement that core international climate assistance. These amounts, cumulatively, fall far short what many countries envisage for the United States’ share of the \$30 billion pledged for “fast start” financing in 2012 to 2012.⁶⁶ A strategy for funding the U.S. share has not been articulated.

Improving fiduciary standards has been a theme in U.S. appropriations for foreign assistance, including that aimed at climate-related activities. One example in federal legislation is the Omnibus Appropriations Act, 2009 (P.L. 111-8), which permitted up to \$10 million for the Least Developed Countries Fund, under the UNFCCC, to support grants for climate change adaptation programs. To receive the funds, the Global Environment Facility (GEF) must annually report on the criteria it uses to select programs and activities that receive funds, how funded activities meet such criteria, the extent of local involvement in these activities, the amount of funds provided, and the results achieved.

Table 3. Summary of Core U.S. International Climate Assistance
(budget authority, US\$ million)

	FY2009 Estimate	FY2010 Estimate	FY2011 Request
Adaptation	32	237	334
Clean Energy	153	544	710
Forests & Land Use	150	167	347
Total	335	948	1391

Source: U.S. Department of State et al., FY 2011 Budget for International Climate Change Financing.

⁶⁵ U.S. Department of State et al., “FY 2011 Budget for International Climate Change Financing,” February 2010.

⁶⁶ Although the United States declines to consider a defined percentage as an appropriate means to share the pledged financing, other countries often consider that the United States should provide 20-30% of the amount, or \$6-10 billion over three years.

Appendix A. Comparison of Sources of Climate Change Financing

Table A-I. Considerations Concerning Sources of Climate Change Financing

Criteria/Options	Public Funds, Bilaterally	Public Funds, Multilaterally	GHG Reduction Credit Markets	“Share of the Proceeds” of GHG Markets	Other Private Investment	Philanthropic and Other Private
Magnitude likely available^a	Currently largest portion of pledged fast-start funds	Smaller share than bilateral funding, perhaps comparable to current GHG credit markets	In long run, potentially the largest trackable quantity, dependent on a policy framework that establishes a premium for GHG reductions (i.e., prices on emission reductions)	Likely a small percentage (e.g., 2-5%) of the size of GHG markets	Potentially the largest quantity, but distinguishing from non-climate-change investment may be problematic	Possibly comparable to recent bilateral funding ^b
Predictability	Fair to moderate. Dependent on national appropriations processes and macro-economic conditions. May be subject to changes in priorities of budgets. Predictability may be improved by legal provisions enacted nationally to generate a flow of funds outside of annual or regular appropriations ^c	Fair to moderate, depending on pledges and prompt payment into multilateral funds. May be subject to changes in priorities of budgets of countries and multi-purpose multilateral funds	Fair to moderate. Dependent on the existence and stability of policy frameworks, energy and macro-economic markets, technological advance, competition among suppliers and purchasers, and other factors. Once legal frameworks are in place, GHG markets may be more predictable than annual governmental appropriations.	To the degree established by rules, the percentage may be highly predictable. The absolute flow of funds would be dependent on the predictability of the size of GHG reduction credit markets.	Moderate. Dependent on the existence and stability of policy frameworks, energy and macro-economic markets, technological advance, competition among suppliers and purchasers, and other factors. Once legal frameworks are in place, GHG markets may be more predictable than annual governmental appropriations.	Likely least predictable of options

Criteria/Options	Public Funds, Bilaterally	Public Funds, Multilaterally	GHG Reduction Credit Markets	“Share of the Proceeds” of GHG Markets	Other Private Investment	Philanthropic and Other Private
“Additionality”	Difficult to evaluate, in most cases, because of typically variable aid flows, and no projections of baseline aid. The “strength” of mainstreaming into development priorities makes discerning additionality difficult.	Possibly the easiest to track as “additional” to past flows.	Difficult to evaluate, although detailed methods and rules have been established for evaluating baselines and projects. Demonstrating additionality makes financing more difficult and slow, and reports exist of inappropriate approvals.	As clearly additional as the GHG reductions made.	Likely difficult to discern, especially in flows of Foreign Direct Investment and where modifications to investments have been made to mitigate GHG emissions or forest destruction, or to avoid damages.	Unknown. However, there may be few incentives to misrepresent the additionality of new climate-related initiatives and grants.
Access	Typically direct access by countries and other institutions where existing partnerships and priorities exist in donor countries. Possibly difficult access for countries that are small and not high priority bilateral partners of donors.	Typically provide broader access than bilateral funding.	Dependent on ability of seekers to participate in markets (i.e., sufficient skill, stability, credit-worthiness, etc.); Likely access for GHG mitigation, but not adaptation. Requesting entity must meet any eligibility criteria and present a project that meets standards for transparency and performance.	Theoretically, open access to any government or entity that is meets eligibility criteria.	Access is greatest to private sector projects that would be profitable without or with further public incentives (e.g., a price on carbon or a renewable energy quota). Access is unlikely for adaptation projects, small projects, and projects without reliable revenue flows, and proponents with poor access to credit.	Unknown. Access is likely best for larger projects managed by well established entities with a proven record of positive performance. Some philanthropic organizations, however, specialize in higher risk projects and micro-finance. Public and private funds may diminish philanthropic contributions.
Transparency	Poor to moderate. Dependent on availability of public reports on details of funding. Poor transparency of performance on funded projects and programs.	High, because of public reporting and review requirements.	High, because of public reporting and review requirements.	Highest because of clear share of proceeds from emission reduction credit markets.	Poor to fair, as there is unlikely to be a requirement for reporting publically such flows in detail and with verification.	Poor to moderate, as there is unlikely to be a requirement for reporting publically such flows in detail and with verification.

Criteria/Options	Public Funds, Bilaterally	Public Funds, Multilaterally	GHG Reduction Credit Markets	“Share of the Proceeds” of GHG Markets	Other Private Investment	Philanthropic and Other Private
Fiduciary Standards	Unclear. Dependent on practices of donor and recipient entities, and of willingness to report in detail to public	Moderate and improving.	Theoretically high, but expensive and time-consuming to ensure. Some limited reports of fraud in existing markets. Will depend on efficacy of project performance verification as well	Depends on the requirements of the project review, disbursement, and accountability mechanism	Presumably high, as private investors have incentives to set high standards	Varies with the requirements of each philanthropic organization
Efficiency	Easiest to “mainstream” into development priorities	Possibly least efficient the more centralized the review and disbursement mechanism	Financing is directly tied to mitigation performance. Theoretically the most efficient, but realistically dependent on the absence of failures or inefficiencies, such as existing externalities, lack of information, unequal access	Possibly least efficient the more centralized the review and disbursement mechanism, and the greater the requirements for project proposal, review, and verification	Theoretically efficient. If transaction costs rise too high, the investment becomes unprofitable and funds flow to more efficient investment.. Efficiency would be compromised if actual project climate-related performance is poor	Varies with the requirements of each philanthropic organization. Likely more efficient than large, public funds with public review and decision-making processes

Source: CRS assessment.

- a. The judgments in this table about the likely magnitudes of funding are based, in part, on analyses of past flows, pledges, and theoretical analyses of the potentials (based also on historical evidence). See, for example, Jan Corfee-Morlot, Bruno Guay, and Kate M. Larsen, *Financing Climate Change Mitigation: Towards a Framework for Measurement, Reporting and Verification* (Paris: Organisation for Economic Cooperation and Development, October 2009), <http://www.oecd.org/dataoecd/0/60/44019962.pdf>.
- b. Although compilations are not available of philanthropic support to address climate change, the magnitude is likely in the billions of dollars, based on press reports. See, for example: <http://philanthropy.com/article/Grant-Makers-Pour-More-Than/56848/>; <http://philanthropy.com/article/Rockefeller-Commits/62676/>; <http://philanthropy.com/article/Doris-Duke-Foundation-Gives/54670/>; <http://philanthropy.com/article/Soros-Pledges-100-Million-/57718/>; etc.
- c. Consideration of mechanisms to assure funding through public institutions has occurred in a number of fora, and has been enacted by the European Commission. In the United States, several legislative proposals (e.g., H.R. 2454, the American Clean Energy and Security Act passed by the House in June 2010) would allocate a portion of revenues generated by the bill to international financing. Whether such revenues would be subject to further appropriation is often controversial. Internationally, a high-level panel convened by United Nations Secretary General Ban Ki-Moon is studying proposals for levies on international bunker fuels, redirection of fossil fuel subsidies, etc. that willing countries might enact to generate a relatively reliable flow of funds.

Appendix B. Glossary of Options for Generating and Disbursing Financing to Address Climate Change

Table B-1. Glossary of Finance Options

(explanations are neither comprehensive nor definitive of the many proposals that exist)

Fund Generation Mechanisms	
Private Compliance Market	Private sales and purchases of emission allowances, or credits for emission reductions, as under many Cap-and-Trade schemes, the Clean Development Mechanism of the UNFCCC, and other proposals.
Government Compliance Market	Purchases of emission reduction credits by governments from private entities or governments, such as through Joint Implementation under the Kyoto Protocol. Some European governments appropriate funds to acquire such credits, to be applied to meet the national Greenhouse Gas (GHG) target.
National Auctioning of Allowances	Designating for international finance a percentage of the proceeds of governmental auctioning emission allowances under national (or sub-national) emission control systems, including Cap-and-Trade.
Levy on Certified Emissions Reductions	A share of any certified emission reductions might be collected, to be sold or auctioned to generate revenues. Alternatively, a fee could be levied on issuance of certified emission reductions, proportionate to the quantity or at a fixed transaction cost.
Share of Proceeds on Emissions or Offset Trading	Collection of a percentage of the funding associated with sales of traded emission allowances or certified emission reductions (offsets), as part of registering the trade. This could happen in a domestic or international program.
Emissions Fees (Carbon Tax)	A fee levied on each unit of GHG emissions from sources.
Public Appropriations	Appropriations of funds for international finance (i.e., drawing on general purpose government revenues from income taxes, etc.)
International Auctioning of Allowances	Emission allowances or offsets from national programs could be transferred to an international or inter-governmental entity, which could then auction them internationally to generate funds.
Levy on Surplus or Banked Allowances	A fee on the transfer of unused allowances from one compliance period into a later one.
International Emissions Allowances, with or without Trading, on Aviation and/or Maritime Transport	An international entity would be authorized to allocate or sell emissions permits to emission sources that are easily mobile across national boundaries, such as aviation and marine transport. This could be through an intergovernmental agreement among sovereign nations, not necessarily delegating any “governance” authority.
International Levy on Aviation or Marine Bunker Fuels	A tax could be levied on fuel use of emission-related entities, such as aviation bunker fuels or marine bunker fuels. This is very close to an emissions fee but may not be strictly proportionate to GHG emissions.
Levy on International Aviation and Maritime Transport	A tax could be levied on activities or per-use of emission-related entities, such as tickets for air travel. This is very close to an emissions fee but may not be strictly proportionate to GHG emissions.
Sovereign Wealth Funds	A publicly owned investment fund, using equity shares, bonds, or other assets (e.g., gold reserves).

Special Drawing Rights	Financial reserves held in the International Monetary Fund or a new entity could be issued to public or private participants, possibly in exchange for equity shares in the financial institution, that could be used to raise further capital (e.g., through bond sales) or to disburse as climate financing.
Debt Swap Programs	A country or financial institution holding debt from another country (or conceivably a private entity holding debt) could agree to “swap” that debt (in lieu of repayment) for performing specified actions to mitigate or adapt to climate change, as in Debt- for-Forest Swaps.
Climate Bonds	An entity could issue bonds in order to raise capital for climate-related investments. If not issued by an existing, credit-worthy entity, provisions would need to be made for reserve capital, payment of interest, and other financial requirements.
Foreign Direct Investment	Investment and ownership by entities outside of a country of productive assets, such as low emissions equipment, etc. The foreign investor could acquire shares in an enterprise in exchange for some action (e.g., emission reduction credits), participate in a joint venture, purchase land for forest plantations, etc.

Fund Disbursement Mechanisms

National Official Development and Climate Change Assistance (bilateral or multilateral)	Typically bilateral funding as part of overseas development assistance to assist mitigation or adaptation in the context of economic development in low-income countries.
Project-level Emissions Reduction Market	Like other project financing, project developers could seek financing, including concessional financing, in return for getting emission reductions from the project certified and selling them. Initial financing or purchase of the certified emission reductions could be by the private sector, or governments, or some combination.
Program or Sectoral Emissions Reduction Market	Governments or industry associations in a country could sell offsets or certified emission reductions achieved by broad programs (e.g., tighter energy efficiency standards) or sector-wide actions (e.g., installation of carbon capture and sequestration on all powerplants).
Reverse Auction	A government or other large entity could request bids and then purchase certified emission reductions offered at the lowest cost per unit (or other criteria). Alternatively, an entity could purchase and aggregate certified emission reductions from a variety of sources and then sell them to highest-bidding private sector or governmental entities.
Grants	A transfer of cash, goods, or services for which no repayment is required. Grants can supplement other forms of financing, including leveraging of private resources.
Performance-based Grants	A transfer of cash, goods, or services for which no repayment is required, but requiring demonstration of performance (i.e., emissions reductions or forest preservation), typically before the entire transfer is made.
Concessional Debt	Transfer of funds (e.g., loans) for which repayment of the funds is required, but at lower-than-market interest rates or other favorable treatment (e.g., extended repayment periods).
Equity	Funding provided in exchange for a share of ownership of a project or entity (i.e., corporation).
Loan Guarantee	A legal commitment by one entity to take on the debt of a borrower if that borrower is unable or unwilling to repay according to the terms of the loan. Loan guarantees could be given for specific projects or for broad program or sectoral investments.

Source: CRS, terms (not definitions) are modified from list of options in Global Canopy Programme, *The Little Climate Finance Book: A Guide to Financing Options for Forests and Climate Change*, December 2009. <http://www.globalcanopy.org>; OECD, 2009.

Notes: For more information about cap-and-trade systems and emission offsets, see CRS Report RL33799, *Climate Change: Design Approaches for a Greenhouse Gas Reduction Program*, by Larry Parker.

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