



Theme On The Environment, Macroeconomics, Trade And Investment
(TEMTI)

Economic Perspectives on Global Sustainability
TEMTI Series EP 04/2013

Carbon markets: performance and alternatives

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Recommended Citation

Supan, Steve (2013), "A Critical Review of Market-Based Mechanisms for Climate Change Mitigation," TEMTI Series of Economic Perspectives on Global Sustainability, EP 04-2013, TEMTI –CEESP / IUCN.

Available at: http://www.iucn.org/about/union/commissions/ceesp/what_we_do/wg/temti.cfm

International Union for the Conservation of Nature (IUCN)
Commission on Environmental, Economic and Social Policies (CEESP)

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Introduction

The Institute for Agriculture and Trade Policy (IATP), a nonprofit organization based in the United States, has been an admitted observer to the United Nations Framework Convention on Climate Change (UNFCCC) negotiations since the Poznan Conference of Parties in 2008. IATP thanks the UNFCCC for this opportunity to submit our views to the Ad Hoc Working Group on Long-term Cooperative Action (LCA).¹

We note that the LCA discussion of mitigation finance has been dominated by various Party positions taken on “market based mechanisms.”² We hope that Parties will heed Bangladesh’s call for a “critical review” of market mechanisms,³ rather than take it as a given that market mechanisms will be the chief financial means by which to reduce greenhouse gases.

We understand the attraction of “market mechanisms” for many Parties and observers, to say nothing for those with a direct financial interest in carbon emissions trading. According to a 2008 study, “For governmental authorities, cap-and-trade systems impose a carbon price without the political costs of direct taxes. The market mechanism lends the carbon regime a semblance of depoliticization by distancing policy makers from direct decisions about allocation of emissions reductions and technology choices. NGOs find that carbon trading resonates with their “win-win” story about the opportunities for firms who proactively address climate change. There is even a minor industry of lawyers, economists and other academics engaged in constructing, evaluating and analyzing carbon trading.”⁴

¹ This paper was originally produced as “Submission in response to the request for comments by the Chair of the Ad Hoc Working Group on Long-term Cooperative Action under the United Nations Framework Convention on Climate Change” (FCCC/AWLCA/2011/L.4), March 5, 2012. The LCA guidelines are available at <http://unfccc.int/resource/docs/2011/awglca14/eng/l04.pdf>.

² E.g., “Possible Elements of Market-Based Mechanisms: A Summary of Views from Parties on the Elaboration of Market-Based Mechanisms in [the] Post-2012 Regime,” Institute for Global Environmental Strategies, Government of Japan, April 2011. <http://www.iges.or.jp/en/cdm/index.html>

³ *Ibid.*, 4.

⁴ Ans Kolk, David Levy and Jonathan Pinske, “Corporate Responses in an Emerging Climate Regime: The Institutionalization and Commensuration of Carbon Disclosure,” *European Accounting Review*, 17(4), 2008, 6. <http://ssrn.com/abstract=1268404>

Despite the political convenience that a mitigation finance discussion limited to “market mechanisms” or even a proposed “new market mechanism” may afford, we believe that there are some inconvenient truths about the climate finance and environmental performance of market mechanisms that should be discussed before the LCA further commits to supporting this approach to mitigation finance.

We are well aware that a number of Parties have invested, some heavily, in carbon emissions market trading and accounting infrastructure and/or “market readiness” projects. Perhaps the touchstone for those so invested is the World Bank’s belief that, “Looking forward, long-term carbon price signals are fundamental to deploy the currently not viable low-carbon technologies necessary to support the technological transformation to a low-carbon society.”⁵ IATP believes that a good understanding of the reasons for the present market and environmental performance of carbon emissions markets can help to assess their long-term viability as a source of predictable, reliable, adequate and new climate finance. This submission gives an overview of that performance and examines emerging new approaches to reducing corporate climate risk and climate liabilities being considered by private investors.

The World Bank and bilateral donors are investing to build new asset classes of carbon offset credits, such as REDD, REDD+ and Sustainable Agricultural Land Management (SALM) practices credits.⁶ IATP has reviewed the World Bank’s initial SALM offset credit project in some detail,⁷ and will continue to analyze similar projects. We are concerned that such projects, with their high transaction costs and complicated accounting proxies for actual soil sequestration measurement, are an inefficient and needlessly indirect way to finance the World Bank-heralded co-benefits of climate adaptation.

We share the concern of soil scientists that “an over-emphasis on sequestering C in soil as a means of climate change mitigation may eclipse other issues that are at least as significant. One such issue is to identify ways to decrease emissions of non-CO₂ gases from agricultural practices,”⁸ emissions which have an exponentially greater negative effect on the climate than does CO₂. (See IATP’s submission on the request for more detailed comments on how and where agriculture might be treated in a UNFCCC context.) But the mere addition of asset classes to carbon markets does not repair the underlying structural weaknesses of the lightly regulated derivatives markets on which allowance (emissions permits) and offset credits trade. Furthermore, given the fierce and very well funded resistance to regulatory reform of the commodity derivatives market,⁹ it is by no means certain that legislative reforms will result in effectively implemented and enforced regulations.

⁵ State and Trends of the Carbon Market 2011, World Bank, June 2011, p. 57.

⁶ Ibid. 57-59.

⁷ Shefali Sharma and Steve Suppan, “Elusive Promises of the Kenya Agricultural Carbon Project,” Institute for Agriculture and Trade Policy, September 29, 2011. <http://www.iatp.org/documents/elusive-promises-of-the-kenya-agricultural-carbon-project>.

⁸ D.S. Powlson, A.P. Whitmore and K.W.T. Goulding, “Soil carbon sequestration to mitigate climate change: a critical examination to identify the true from the false,” *European Journal of Soil Science*, February 2011, 43.

⁹ E.g., Tom Schoenberg, “Wall Street Groups seek to delay CFTC limits on speculation,” *Business Week*, February 8, 2012.

The following submission consists of three parts; 1) a short analysis of the role of the carbon price signal in the climate investment landscape; 2) an overview of the relatively small extent to which carbon emissions markets have provided direct climate finance, not “leveraged” or “catalyzed” it in a subjective accounting attribution; and 3) a brief proposal to Parties and observers about using a calculation of material risk exposure, rather than a carbon price signal, as a bottom line factor for planning climate-related investments.

Betting on the climate price signal for guidance to long term climate investments

Those government officials and corporations who deny that climate change exists, and who muzzle scientists whose work demonstrates its existence and effects, are rightly stigmatized as allowing short-term electoral or corporate profit interests to interfere with longer-term environmental, economic and human rights interests.¹⁰ We are heartened that there is a small, but growing corporate resistance to the “quarterly capitalism” that focuses investments and evaluation on the very short-term reporting of publicly held firms to the financial markets.¹¹ Neglecting to evaluate the longer-term material risks of climate change, both to corporate assets, as well as to the public commons, and to invest on the basis of long-term sustainability, is not only a violation of fiduciary statutes, but surely a recipe for disaster.

We believe, however, that short-termism will plague even the most enlightened and long-term climate investor, if climate investment rate-of-return analysis continues to be factored in terms of carbon price signals. Carbon market price signals have been too low to induce adequate low carbon technology investments to reduce greenhouse gas emissions. Those price signals continue to be subject to multiple vulnerabilities in carbon market design, as well as to volatility induced by derivatives trading strategies, particularly Over the Counter or ‘dark market’ trading.¹²

The 285 investor group signatories to the “2011 Global Investor Statement on Climate Finance” “encourage governments” to provide “investment-grade climate and energy policy,” “appropriate incentives to invest” and “policy certainty” as pre-conditions for their investing a portion of their aggregate \$20 trillion in low-carbon technologies. Clearly, the signatories not only expect governments to ensure regulatory certainty for investment, but also to provide financial incentives and guarantees for private investments in public-private partnerships. Furthermore, these investor groups says that they require “strong and sustained price signals on carbon, well-designed carbon markets and other appropriate incentives to enable investment in clean energy.”¹³ However, the carbon market price signal continues to be weak and erratic in the largest compliance market, the European Union’s

¹⁰ Stephen Leahy, “Scientists denounce climate change denial, censorship,” IPS News, February 21, 2012. <http://www.ipsnews.net/news.asp?idnews=106834>

¹¹ Mindy Lubber, “Ending quarterly capitalism,” Forbes, February 21, 2012. <http://www.forbes.com/sites/mindylubber/2012/02/21/ending-quarterly-capitalism/>

¹² E.g., Michelle Chan, “Ten Ways to Game the Carbon Market,” Friends of the Earth, May 2010.

¹³ “2011 Global Investor Statement on Climate Change,” 2-3. October 2011. http://www.iigcc.org/_data/assets/pdf_file/0017/15281/2011-Investor-Global-Statement-FINAL-NOT-EMBARGOED.pdf

Emissions Trading Scheme (ETS), as buyers abandon the market.¹⁴ According to the Swiss bank UBS, “By 2025, the ETS will have cost consumers 210 billion euros. Had this amount been used in a targeted approach to replace EU’s dirtiest plants, emissions could have dropped by 43 percent, instead of almost zero impact on the back of emissions trading.”¹⁵

Denial of carbon market failure may be nearly as dangerous as climate change denial itself, since continued efforts to “fix” carbon markets, so that carbon market revenues become the major source of mitigation finance projects, have very high opportunity costs. The most serious opportunity cost, though not attributable to carbon market failure alone, is the continued increase in greenhouse gas (GHG) emissions, as the carbon price signal continues to be too low and too volatile to induce major investments in conservation and mitigation technologies and practices. Faced with this market and environmental performance failure, European lobbyists opposed to more ambitious emissions reductions have even argued that “a lower carbon price is therefore proof of the system actually achieving its [cost effectiveness] objectives” for major emitters.¹⁶ Furthermore, public policy and financial interventions to salvage the carbon markets will delay consideration of other approaches to mitigation finance, one of which is outlined in the third part of this comment.

Any critique of the “opportunities for using markets” for mitigation finance should present an alternative to dependence on carbon markets, one which repurposes the carbon emissions accounting infrastructure that is to carry out Monitoring, Reporting and Verification of emissions reduction commitments. We hope that this submission will contribute to a discussion of “various approaches,” other than carbon markets, by Parties and observers, as requested in paragraph 76 of the LCA Chair’s conclusions.

The poverty of carbon emissions trading revenues for adequate, reliable, predictable and new climate finance

Since the UNFCCC advent of “market mechanisms” in the 1997 Kyoto Protocol, it is striking how relatively little mitigation finance has been provided by investors in carbon emissions trading. Despite the 3.2 billion euros (USD 4.25 billion¹⁷, little more than USD 2 billion of a 2009¹⁸) of publicly financed emissions allowance credits (Assigned Amount Units) given to just the 10 largest of about 11,000 emitters under the ETS-2010 average of

¹⁴ Michael Szabo, “EUAs could crash to 3 euros next year, says UBS,” *Point Carbon*, November 18, 2011, and Szabo and Marton Kruppa, “Analysis: Uncertainty abounds as CO2 buyers evaporate,” *Point Carbon*, November 21, 2011.

¹⁵ Michael Szabo and Jeff Coelho, “EAUs could crash to 3 euros by next year, UBS,” *Point Carbon*, November 18, 2011.

¹⁶ Cited in “Caught in the crosshairs: how European lobbyists are gunning for climate targets,” Corporate European Observatory and Carbon Trade Watch, June 2011, 4. http://www.carbontradewatch.org/downloads/publications/Caught_in_the_cross_hairs.pdf

¹⁷ 3.2 billions euros multiplied by the euro to dollar exchange rate of 1.3283, as averaged from 2008-2012, the period of allowance issues.

¹⁸ Jutta Kill et al, *Trading Carbon: How it works and why it is controversial*, Chart 1: Value of spare permits held in 2008 by the ten most profiting companies, FERN, 2010. http://www.fern.org/sites/fern.org/files/tradingcarbon_internet_FINAL.pdf

USD 97 billion in annual climate finance flows from came from the auction of ETS emissions permits and sale of AAUs. Sales of emissions offset credits under the Protocol's Clean Development Mechanism and trading on voluntary markets brought the total contribution of carbon trading to less than USD 3 billion, or less than four percent of estimated total climate finance flows.¹⁹ By contrast, about an average annual \$56 billion of carbon finance flows are attributed to market rate loans and \$18 billion to equity investments for mitigation technologies, above all in the energy sector, according to the Climate Policy Initiative.²⁰

Nevertheless, the U.N. Secretary General's High Level Advisory Group on Climate Change Financing report states, "Based on a carbon price of US\$20-US\$25 per ton of CO2 equivalent, auctions of emission allowances and domestic carbon taxes in developed countries with up to 10 per cent of total revenues allocated for international climate action could potentially mobilize around US\$30 billion annually."²¹ IATP judged a draft of the report to be "unduly optimistic" about the prospect for predictable, reliable and adequate climate change finance to be generated from carbon emissions markets.²² IATP still holds this view, if anything, more strongly than we did in 2010.

The Climate Policy Initiative estimated contribution of emissions trading revenues to climate finance was based on the higher ETS prices of 2009-10 that averaged 15–18 euros CO2/Mt.²³ These prices had fallen to less than 9 euros by the time the LCA Chair, under his own authority, presented his conclusions to the 17th Conference of Parties (CoP 17), including the present request for comment on market mechanisms, both old and new, for mitigation finance. Following the conclusion of the CoP, the averaged carbon price fell to 6.30 euros.²⁴ In the LCA sessions open to observers, there was no discussion about consequences for mitigation of sharply falling and volatile carbon prices.

We didn't expect to hear a diplomatic variation on the declaration of the CEO of the German energy firm EON, that "the ETS is bust, it's dead."²⁵ Certainly diplomatic protocol and reluctance to criticize market failure or the regulatory failures of any one Party contributed to this avoided debate. But hopefully, the LCA workshops requested in paragraph 76 will result in a frank and full debate, in which observers will be allowed to

¹⁹ Barbara Boucher et al, "The Landscape of Climate Finance," Climate Policy Initiative, October 2011, iii. <http://climatepolicyinitiative.org/wp-content/uploads/2011/10/The-Landscape-of-Climate-Finance-120120.pdf>

²⁰ Ibid, iv.

²¹ "Report of the Secretary General's High Level Advisory Group on Climate Change Financing," November 5, 2010, 5-6. http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGF_reports/AGF%20Report.pdf

²² Steve Suppan, "Trusting in (Dark) Carbon Markets?: The UN High-Level Advisory Group on Climate Finance," Institute for Agriculture and Trade Policy, October 2010. <http://www.iatp.org/documents/trusting-in-dark-carbon-markets-the-un-high-level-advisory-group-on-climate-finance>

²³ "Point Carbon EUA OTC Assessment", November 25, 2011.

²⁴ Ben Garside, "EU carbon plungs to record low of 6.30 euros," Point Carbon, December 14, 2011.

²⁵ Michael Szabo, "Set-aside should not lift EUAs over 30 euros: policymakers," Point Carbon, February 8, 2012. www.pointcarbon.com

participate, about the realistic prospects for climate finance sources from market mechanisms and a new market mechanism that incorporates the old.

Investors were fleeing carbon markets before and during CoP 17,²⁶ but Parties and multilateral banks continue to discuss about how to use public funds and policy to subsidize market-like arrangements. The World Bank is the prime financial source of paying for “market readiness” projects until such time, presumably, as mandatory emissions markets and other approaches to financing mitigation would lead to “real, permanent, additional and verified mitigation outcomes.”

As Parties and observers are well aware, 2011 prices under the ETS fell about 50 percent, hitting 6.30 euros per metric ton of carbon emissions (four euros for CDM offset credits), before rising to 9 euros (USD 12) in February 2012, in anticipation of an “exceptional one-off fix” to the carbon market failure. The policy design “fix” currently under discussion is to reduce, perhaps by ten percent, the volume of emissions permits given away free to major emitters, as an oversupply of permits is forecast at least until 2025.²⁷ We do not believe that a one-time reduction can be calibrated to sustain a managed target price of about 30 euros CO₂/Mt. It will be very, very difficult to sustain an adequate carbon price for climate finance under the voluntary ‘pledge and review’ architecture of the Copenhagen Accord. The ongoing shocks to the ETS’ market and environmental integrity extend beyond various criminal activities related to emissions trading.²⁸

We hasten to add that carbon market policy design and regulatory failures in carbon markets are not confined to European markets or governments. The vulnerability of Clean Development Mechanism offset credits to fraud is widely acknowledged by traders,²⁹ as well as by NGOs. When governments are the sole supplier of a commodity that is traded often Over the Counter, i.e., bilaterally and still with little regulation,³⁰ the likelihood is that carbon markets will fail to realize their environmental objectives, particularly if those objectives are voluntary. What makes carbon emissions trading an unreliable, unpredictable and inadequate source of climate finance is the fragile environmental integrity of the underlying asset of the carbon derivatives market. Utter lack of environmental integrity has been admitted in the case of particularly fraudulent kinds of CDM offset credits, e.g., for Hydro-Fluorene Carbon 23 emissions offsets.³¹

However, we believe that the environmental integrity problems of offset credits, as tradable financial instruments, are more profound and widespread than what measures to prevent

²⁶ Michael Szabo and Marton Kruppa, “Analysis: Uncertainty Abounds as CO₂ buyers evaporate,” Point Carbon, November 21, 2011.

²⁷ Szabo, “Set-aside should not lift EUAs over 30 euros: policymakers,” and “Deutsche Bank follows UBS in slashing carbon forecast,” Point Carbon, November 29, 2011.

²⁸ E.g., Michael Szabo, “French court convicts five of carbon VAT fraud,” Point Carbon, January 11, 2012, Vera Eckert, “German court finds six guilty in carbon fraud trial,” Point Carbon, December 21, 2011.

²⁹ “CDM/ JI fraud by country,” chart 2.12a, “Return of the sovereign,” Point Carbon, March 3, 2010.

³⁰ “UN under pressure to halt gaming and abuse of CDM,” CDM Watch, June 2010. http://www.cdm-watch.org/wordpress/wp-content/uploads/2010/06/hfc-23_press-release_gaming-and-abuse-of-cdm1.pdf

³¹ “Hedegaard doubts integrity of HFC offsets,” *Carbon Market Europe*, October 29, 2010.

and/or prosecute fraud can fix. The Munden Project, in a recent analysis of REDD based offset credit trading, showed how the uncertainty and impermanence of GHG reductions under land-based offset activities makes them an unstable underlying asset for carbon derivatives trading. This structural weakness in the legal definition of the underlying asset means that clearing (a credit management process to protect against counterparty default) the asset for trading will result in too many financial and legal risks to create a transparent, fair and sustainable market for REDD related offset credits.³²

Remarkably, the Carbon Markets and Investors Association response to this report neglects to comment the problem of clearing trades of high risk financial assets.³³ ³⁴ Whether the REDD credits are traded on regulated commodity exchanges or over the counter (bilaterally), under Group of 20 financial market reform commitments, OTC derivatives will have to be cleared. The credit worthiness checks of a clearing system would have helped to prevent the cascade of counterparty defaults that would have destroyed the global financial industry, were it not for massive public bailouts of the industry, e.g., \$29 trillion in emergency loan support at from the U.S. Federal Reserve Bank to U.S. and EU financial firms.

Investing to prevent climate change loss and damage, including reduction of private sector risk exposure

The present UNFCCC discussion of loss and damage due to climate change is limited to the Subsidiary Body on Implementation for the purpose of evaluating adaptive measures needed by the most vulnerable developing countries. While reporting for this SBI agenda item should, of course, continue, we believe that there are lessons to be learned for mitigation finance from new research on econometric estimates of loss and damage. As corporate climate risk exposure reporting improves to include anticipated loss and damage that is factored into insurance premiums, loss and damage estimates can become a factor in calculating investments needed to prevent that risk not only for the assets of domestic and multi-national corporations, but for the public commons and resources in all Parties.

The LCA discussion of “various approaches” to mitigation finance has been guided by the standard of making mitigation measures “enhance the cost effectiveness” for emitters, i.e. to reduce mitigation costs to the extent possible, above all for the largest emitters. This standard, whatever its original intent, has been degraded to the point where BusinessEurope lobbyists believe that a low carbon price is proof that the carbon trading system has worked to reduce costs for the emitters, who have received billions of euros without making technological investments to comply with an emissions cap consistent with climate science

³² “REDD and forest carbon: A market-based critique and recommendations,” The Munden Project, March 7, 2011.

³³ “Response to the Munden report,” Carbon Markets and Investors Association, August 10, 2011. <http://www.cmia.net/Portals/0/Repository/CMIA%20Munden%20resp20110810.d78631fa-7239-4c4d-8455-de77470bb7a1.pdf>

³⁴ James Felkerson, “\$29,000,000,000,000: A Detailed Look at the Fed’s Bailout by Funding Facility and Recipient,” Levy Economics Institute, Working Paper No. 698, December 2011. <http://www.levyinstitute.org>

consensus.³⁵ IATP believes that LCA Parties and observers should consider whether restricting discussion of “various approaches” to this “cost-effectiveness” standard is the only—or even optimal—framework for planning, executing and evaluating mitigation investments.

We believe that another standard for mitigation finance performance should be discussed, that of reducing material risk exposure to climate change. Agreeing on what should be reported is a first step towards estimating loss and damage at the sectoral level and of corporate risk exposure. An LCA workshop could survey current research in both climate risk exposure reporting and in the econometric estimation of loss and damage. Parties and observers could report on their corporate climate risk exposure reporting requirements for publicly held and privately owned companies. Experiences with international reporting guidelines, such as the United Nations Global Framework for Climate Risk Disclosure could also be discussed. The Framework has four objectives: “companies should disclose their total greenhouse gas emissions, perform a strategic analysis of climate risk and emissions management, assess the physical risks of climate change, and analyze the risks of regulation at the state, local, and national level.”³⁶ To a discussion of these reporting categories could be added reporting on sectoral estimates of loss and damage that could figure in more detailed risk disclosure reporting.

One study estimates that investment funds will have a climate risk exposure of USD 8 trillion by 2030.³⁷ ³⁸Such exposure may be transferred in part through insurance products, but longer-term investors will want to invest to reduce the climate causes of the financial risks, since a cascade of climate risks could become uninsurable. The LCA should invite such researchers to discuss how such global and sectoral calculations of risk exposure can be used to guide mitigation investments. Companies that are trying to calculate premiums to ensure against corporate loss and damage likely have company and sub-sector specific data that can be used anonymously in an LCA seminar. Investors are beginning to demand that corporations report their actions to reduce their greenhouse gas emissions as a condition of attracting more investment capital.

Parties and observers should draw on new research in climate economics to consider whether loss and damage due to a ton of CO₂ equivalent, called the Social Cost of Carbon (SCC), is a more reliable and accurate metric for evaluating rate of return on climate investment than calculating mitigation investment in terms of a carbon price signal. SCC calculations depend on both up to date climate science and up to date econometric model.

One study, which availed itself of both, stated that a U.S. government study on SCC underestimated this measure of loss and damage by a factor of about 45 (\$21 CO₂/Mt. vs.

³⁵ “Caught in the crosshairs: how European lobbyists are gunning for climate targets,” Op cit.

³⁶ Constance Wagner, “Corporate Environmental Reporting and Climate Change Risk: The Need for Reform of Securities Exchange Disclosure Rules,” *Transactions: The Tennessee Journal of Business Law*, Vol. 11 (2009), 154. <http://trade.tennessee.edu>

³⁷ “Sustainable Capitalism,” Generation Investment Management, February 15, 2012, 15. <http://www.generationim.com/media/pdf-generation-sustainable-capitalism-v1.pdf>

³⁸ E.g., “CDP Europe Report 2011: Carbon Materiality,” Carbon Disclosure Project. <https://www.cdproject.net/CDPResults/CDP-2011-Europe-300-Report.pdf>

\$900 CO₂/Mt.) in 2010, according to a worst-case scenario.³⁹ Econometric projections involve many policy scenario and computer modeling variables, and thus merit vigorous debate and peer review. However, one of the virtues of the application of econometrics to climate risk analysis is that econometric modeling can incorporate climate science factors which describe various stages of imminence of worst case scenarios.

Such studies provide a data framework for difficult decisions by policymakers trying to assuage the concerns of individual firms that they could be punished in the financial markets for being “first movers” to make investments to reduce their climate risk. But there is increasing evidence that corporations that integrated sustainability as a bedrock operational principle perform better financially.⁴⁰ The LCA should consider how Nationally Appropriate Mitigation Actions (NAMAs) can be designed to incorporate mitigation investments in all the countries in which corporations operate and source raw materials. As the LCA discusses various approaches to mitigation finance, besides carbon markets, it should keep in mind the need to ensure that private sector mitigation projects are coherent with the Parties’ NAMAs.

As econometric studies become more refined, to focus on the climate risk and SCC of production and distribution factors in specific economic sectors,⁴¹ the political case for “business as usual,” or letting somebody else invest to reduce climate risk, becomes ever less tenable. Furthermore, as corporate climate risk becomes more accurately and completely reported to regulatory authorities, investors may demand reporting of climate risk not just in terms of mitigation compliance costs, but of adaptation costs to prevent unacceptable amounts of loss and damage. The private sector is beginning to evaluate how it can incorporate adaptation costs into its financial and operational planning.⁴² And not a moment too soon.

Conclusion

In our view, the LCA workshop requested in paragraph 76 should discuss “various approaches” to mitigation finance other than continued efforts to fix carbon emissions trading schemes. Carbon price signals, even though supported by government interventions to salvage the markets, have not driven major investments to reduce greenhouse gases. Emissions offset trading is plagued with design and implementation flaws that may not be fixed, if they can be, until we are living in a 4-degree C warmer world, by which time loss and damage will be far, far more expensive to fix. We believe that the LCA should move to

³⁹ Frank Ackerman and Elizabeth Stanton, “Climate Risks and Carbon Prices: Revising the Social Cost of Carbon,” Economics for Equity and the Environment Institute, 2011. <http://www.e3network.org>

⁴⁰ Andrea Moffat et al, “The 21st Century Corporation: The Ceres Roadmap for Sustainability,” November 2011. <http://www.ceres.org/resources/reports/ceres-roadmap-to-sustainability-2010>

⁴¹ Ackerman and Stanton, “Climate Economics: The State of the Art,” Stockholm Environmental Institute, November 2011, 58-68. http://sei-us.org/Publications_PDF/SEI-ClimateEconomics-state-of-art-2011.pdf

⁴² Agrawala, S. et al. (2011), “Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks”, OECD Environment Working Papers, No. 39, OECD Publishing.

discuss how new research into loss and damage can inform corporate climate risk exposure and the design of both private- and public-sector projects within the NAMAs.