FLEXIBLE MECHANISMS FOR CLIMATE CHANGE COMPLIANCE: EMISSION OFFSET PURCHASES UNDER THE CLEAN DEVELOPMENT MECHANISM

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INTRODUCTION

From 2005 through 2006, the international market for carbon credits experienced tremendous growth and reached an annual market value of over US$30 billion.[1] As part of this growth, new tools, skills, and capital have been introduced into the international carbon market to address the global problem of climate change.

Broadly speaking, the international carbon market has involved two types of market-based tools to reduce greenhouse gas emissions. The first tool is a cap and trade program. Under such a program, emissions are capped at a certain level by regulatory fiat, regulated entities are allocated allowances to emit a certain amount of greenhouse gases (GHGs), and these entities can then trade allowances to meet their compliance obligations. An entity whose emissions fall below its allocated amount can sell unneeded allowances for compliance purposes. An entity whose emissions are higher than its allocated amount can purchase allowances from others who are willing to sell them.

The second type of program is an emission offset, or "project-based" program. As opposed to a cap and trade regime, offsets involve a "baseline and trade" regime. These offset credits are generated from projects that reduce GHG emissions below a certain baseline *outside* of a regulated cap. These credits can then

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[1] KARAN CAPOOR & PHILIPPE AMBROSI, STATE AND TRENDS OF THE CARBON MARKET 2007 3 (World Bank 2007), *available at* http://carbonfinance.org/docs/Carbon_Trends_2007-_FINAL_-_May_2.pdf.

be sold to entities that can use them to meet regulatory compliance obligations *inside* a cap.

This article focuses on a specific type of offset program—the Clean Development Mechanism of the Kyoto Protocol (CDM).[2] This article (i) begins with an overview of the Kyoto "flexible mechanisms" (including the CDM), (ii) explains how CDM offset credits are generated, (iii) examines the growth of the international carbon market, (iv) explores aspects of CDM offset purchase agreements, and (v) summarizes several lessons learned. In sum, the international carbon market has shown how market-based mechanisms can muster capital to address global climate change and transfer climate-friendly technology to the developing world. This article provides an overview of recent developments in the CDM and an understanding of how market based mechanisms may address global climate change. This is, however, only an overview, and other sources delve into these topics in greater detail.

I. OVERVIEW OF THE FLEXIBLE MECHANISMS

The United Nations Framework Convention on Climate Change (UNFCCC) established an international system for addressing the issue of climate change.[3] In doing so, it set a broad objective of stabilizing GHG emissions "at a level that would prevent dangerous anthropogenic interference with the climate system."[4] The UNFCCC sought to achieve such a goal "within a time frame sufficient to allow ecosystems to adapt naturally" while still allowing economic development to proceed in a sustainable manner.[5]

Furthermore, the UNFCCC established an "aim" of reducing GHG emissions to 1990 levels.[6] In doing so, the UNFCCC

[2] *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change art. 12, Dec. 10 1997, U.N. Doc FCCC/CP1997/L.7/Add.1, *available at* http://unfccc.int/resource/docs/convkp/kpeng.pdf, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

[3] *See* United Nations Framework Convention on Climate Change, May 9, 1982, S. Treaty Doc. No. 102-38 (1992), 1771 U.N.T.S. 107, 165, U.N. Doc. A/AC/237/18, *available at* http://unfccc.int/resource/docs/convkp/conveng.pdf. UNFCCC is used hereinafter to refer both to the treaty document and to secretariat charged with overseeing its execution.

[4] *Id.* at art. 2.

[5] *Id.*

[6] *Id.* at art. 4.2(b).

acknowledged that there could be some degree of co-operation between the parties to the UNFCCC, when it stated that these GHG emissions could be attained individually or "jointly."[7] However, the UNFCCC did not itself set binding emission reduction commitments.[8]

Unlike the UNFCCC, the Kyoto Protocol, negotiated in December 1997, sets out firm GHG emission reduction targets for developed countries (listed in Annex I to the UNFCCC) to be met within an agreed commitment period (2008–12).[9] The Protocol requires the Annex I parties to reduce their emissions by an average of 5.2% from 1990 levels.[10] The specific targets (or assigned amounts) were set out in Annex B of the Protocol.[11] The Annex I Parties were then given the opportunity to reach their targets by the adoption of command-and-control regulations or by using the "flexibility mechanisms" in order to comply with their assigned emission levels.[12]

During the negotiation of the Kyoto Protocol, the United States was the main driving force for the inclusion of the so-called "flexibility mechanisms." The Kyoto Protocol includes three flexibility mechanisms: (i) the Joint Implementation provisions, set out under Article 6; (ii) the Clean Development Mechanism, in Article 12; and (iii) International Emissions Trading under Article 17.

The Joint Implementation provisions allow Annex I parties to transfer to, or acquire from, *another Annex I country*, emission

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[7] *Id*.

[8] *Id.* at art. 1-26.

[9] Kyoto Protocol, *supra* note 2, at Annex B. For background on the negotiation of the Kyoto Protocol and the design of the CDM, *see* RAUL ESTRADA-OYUELA, *A Commentary on the Kyoto Protocol*, *in* ENVIRONMENTAL MARKETS: EQUITY AND EFFICIENCY (Graciela Chichilnisky & Geoffrey Heal eds., Columbia University Press 2000); FARHANA YAMIN (ED.), CLIMATE CHANGE AND CARBON MARKETS: A HANDBOOK OF EMISSION REDUCTION MECHANISMS (Earthscan 2005); MICHAEL GRUBB, THE GREENHOUSE EFFECT: NEGOTIATING TARGETS (Royal Inst. of Int'l Affairs 1989); MICHAEL GRUBB ET AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT (Royal Inst. of Int'l Affairs 1999).

[10] *See* UNFCCC, Kyoto Protocol http://unfccc.int/kyoto_protocol/items/2830.php (last visited Nov. 12, 2007); see also ENERGY INFORMATION ADMINISTRATION [EIA], ANNUAL ENERGY OUTLOOK 2002: WITH PROJECTIONS THROUGH 2020 23 (2001), *available at* http://www.gcrio.org/OnLnDoc/pdf/aeo2002.pdf.

[11] Kyoto Protocol, *supra* note 2, at Annex B.

[12] *See generally* GRUBB, *supra* note 9.

reduction units (ERUs) generated by projects that reduce man-made GHGs or enhance the anthropogenic removal of such gases by sinks.[13]

The Clean Development Mechanism allows Annex I countries to finance projects that reduce emissions in developing countries that are Kyoto parties but have not made commitments to reduce their GHG emissions. In return, Annex I countries receive Certified Emission Reductions (CERs) from those projects.[14] These CERs then can be used for compliance in Annex I countries.[15] Thus, under the CDM emission credits generated from climate-friendly projects in the developing world can be used for compliance purposes in the developed world.

Finally, under the International Emissions Trading provisions, Annex I countries can trade Assigned Amount Units (AAUs) among themselves.[16] AAUs are allocated to Annex I parties at the beginning of each commitment period based on each party's targets set out in Annex B of the Protocol.

By the end of the first commitment period, in 2012, an Annex I country must be in compliance with its obligations under the Kyoto Protocol such that its emissions of GHGs are either less than or equal to its AAUs, which can be duly adjusted with any of the following assets:

(i) ERUs transferred through Joint Implementation (JI) projects,
(i) CERs resulting from the Clean Development Mechanism, and
(ii) AAUs themselves that may be traded by means of International Emissions Trading.[17]

Each one of the above mentioned assets (ERUs, CERs and AAUs) represents one metric ton of CO_2 equivalent.[18] One ton of a GHG reduction from a CDM or JI project anywhere in the world

[13] Kyoto Protocol, *supra* note 2, at art. 6, ¶ 1.
[14] *Id.* at art. 12, ¶ 3.
[15] *Id.*
[16] *Id.* at art. 17.
[17] *See id*. at art. 3, ¶¶ 10–14; *see also id.* at art. 4.
[18] UNFCCC, Emissions Trading, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php (last visited Nov. 12, 2007).

can be converted into a ton of carbon dioxide equivalent by multiplying it by a pre-determined global warming potential.[19] This conversion allows for a common "currency" whereby ERUs, CERs, and AAUs can be freely exchanged for compliance purposes, as each represents a ton of carbon dioxide equivalent.

A party to the Kyoto Protocol can also authorize a private entity to participate in these flexible mechanisms.[20] In this way, companies and other non-sovereigns can undertake climate-friendly projects and generate emission reduction credits. These credits can then be used for compliance purposes, or sold or traded in emissions markets to others who may need the emission credits for compliance purposes.

The CDM, on which this article focuses, began operation shortly after the adoption of the Marrakech Accords. The Marrakech Accords resulted from the 2001 meeting of all of the parties that are signatories to the UNFCCC (Conference of the Parties or COP). The Marrakech Accords supplemented the Kyoto Protocol by identifying in detail the modalities and procedures by which the flexible mechanisms would operate.[21]

The CDM directs the design and development of emission reduction offset projects located in the developing world under the Kyoto Protocol. For instance, the CDM provides the framework for the development of baselines and monitoring methodologies for measuring emission reductions from projects. It also develops procedures by which emission reductions could be verified by

[19] The Kyoto Protocol regulates six greenhouse gases, each of which is indexed, on a per-ton basis, based on global warming potential relative to carbon. Thus, one ton of carbon equals one tCO2e. Methane is 23 times more potent than carbon as a GHG, and thus reducing one ton of methane is equivalent to reducing 23 tons of carbon. The industrial gas HFC-23 is 12,000 times more potent than carbon as a GHG. Energy Information Administration [EIA], Comparison of Global Warming Potentials from the Second and Third Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC), http://www.eia.doe.gov/oiaf/1605/gwp.html (last visited Nov. 12, 2007); *see also* Kyoto Protocol, *supra* note 2, at art. 5, ¶ 3.

[20] *See, e.g.*, Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Nov. 28, 2005–Dec. 10, 2005, *Modalities and procedures for a clean development mechanism*, ¶ 7, U.N. Doc. FCCC/KP/CMP/2005/8/Add.1 (Mar. 30, 2006), *available at* http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf [hereinafter *Modalities and Procedures*].

[21] *See* UNFCCC, Kyoto Protocol, http://unfccc.int/kyoto_protocol/items/2830.php (last visited Nov. 12, 2007) (describing the effect of the Marrakech Accords on the Kyoto Protocol).

independent third parties.[22]

Although the Kyoto Protocol was negotiated in 1997, it did not enter into force until February 16, 2005, when the required number of countries finally ratified it.[23] When Kyoto became effective, the CDM was ready for a period of significant growth in the volume of GHG emission reductions that could be generated by environmentally-friendly projects.

II. THE CREATION OF CERTIFIED EMISSION REDUCTIONS

The main institutions involved in overseeing the CDM are the "Conference of the Parties serving as the meeting of the Parties" (referred to as the "COP/MOP")[24] and the Executive Board (EB). The COP/MOP provides overall authority and guidance to the CDM.[25] The EB is composed of ten members (two from Annex I and eight from non Annex I countries).[26] The EB manages the day-to-day supervision of the CDM.[27] The EB is assisted in its activities by panels of experts, working groups, and the CDM registration and issuance team.[28]

Every CDM project has a defined project cycle that derives from the Marrakech Accords and guidance provided by the COP/MOP and EB. The formal project cycle starts with the project design document (PDD). The PDD contains details about the proposed CDM project, including of a description of the project activity that will reduce GHG.[29]

The PDD substantiates each project's "additionality" by demonstrating that the project creates emission reductions that are

[22] *See* UNFCCC, Verify and Certify ERs of a CDM project activity, http://cdm.unfccc.int/Projects/pac/howto/CDMProjectActivity/VerifyCertify/index.html (last visited Nov. 20, 2007).

[23] UNFCCC, Status of Ratification, http://unfccc.int/Kyoto_protocol/background/status_of_ratification/items/2613.php (last visited Nov. 12, 2007); *see also* Kyoto Protocol, *supra* note 2, at art. 25, ¶ 1.

[24] The COP/MOP, a subset of parties to the UNFCCC, consists of those parties that have also ratified the Kyoto Protocol. Thus, the United States and Australia are not members of the COP/MOP. *See* Kyoto Protocol, *supra* note 2, at art. 13, ¶¶ 1–2.

[25] For a detailed review of law-making by COPs, *see* Jutta Brunnée, *COPing with Consent: Law-Making Under Multilateral Environmental Agreements*, 15 LEIDEN J. INT'L L. 1 (2002).

[26] *Modalities and Procedures*, *supra* note 20.

[27] *Id.* at ¶ 5.

[28] *Id.* at Decision 7/CMP.1, ¶ 12.

[29] *Id.* at ¶¶ 35–38.

"additional" to those that would have occurred under a "business as usual" scenario. In order for a CDM project to generate CERs, the project proponents must present a "counterfactual," that is, a description of the reductions that would have occurred in the absence of the investment.[30] Each PDD must describe the "baseline" scenario[31] from which this additionality is measured and must include a detailed monitoring plan.[32]

A written "letter of approval" (LOA) from the host developing country must also be obtained for the project.[33] The Kyoto Protocol is an international agreement between sovereign parties, but through this letter of approval a sovereign can devolve rights and obligations to private entities, allowing them to take advantage of the flexible mechanisms.

The PDD, together with the LOA, is submitted by the project sponsor to an independent entity for "validation."[34] This entity is known as the Designated Operation Entity (DOE).[35] The DOE reviews the PDD and submits it together with the LOA to the EB. The formal acceptance by the EB of the validated project as a CDM project activity is known as "registration." A request for registration is considered granted and the registration final within eight weeks of the EB's receipt of the request, unless prior to the expiry of that period three or more members of the EB (or a party involved in the CDM project itself) request review of the proposed CDM activity.[36]

In the implementation phase, the project is carried out and the monitoring plan submitted in the PDD takes effect. Based on the monitoring plan in the PDD, GHG reductions are calculated and submitted for verification as CERs.[37] A different DOE needs to be hired by the project sponsors (unless the project is small scale) to verify the GHG reductions and to generate a verification report that certifies in writing the amount of additional emission

[30] *Id.* at ¶ 43.
[31] *Id.* at ¶¶ 44–48.
[32] *Id.* at ¶ 53.
[33] *Id.* at ¶ 40(a).
[34] *Id.* at ¶ 35.
[35] *Id.* at ¶¶ 26–27.
[36] *Id.* at ¶ 41.
[37] UNFCCC, CDM Project Activity Cycle, http://cdm.unfccc.int/Projects/pac/index.html (last visited Nov. 20, 2007).

reductions attributable to the project.[38]

If everything goes as planned, the EB ultimately issues the CERs in the amount of one CER for each ton of carbon dioxide equivalent of emissions reduced.[39] A percentage of the CERs issued is transferred to a special account used to finance projects that help developing countries adapt to the adverse impacts of climate change. The remaining CERs are forwarded to the accounts of the participants in the CDM project.

III. GROWTH OF THE INTERNATIONAL CARBON MARKET

The international carbon market has grown tremendously over the past several years. Prior to February 2005, when Kyoto Protocol came into effect, the market was relatively inactive, particularly within the private sector. Early market activity was largely prototype buying by sovereigns and international financial institutions like the World Bank. Prototype buying showed, through "learning by doing," how CDM and JI transactions could be undertaken.

With the entry into force of the Kyoto Protocol, the international carbon market grew to US$30 billion in two years.[40] The volume of credits generated by projects that reduce greenhouse gases more than quadrupled from 2004 to 2006.[41]

The potential for market growth is much larger. For instance, the UNFCCC Executive Secretary, Yvo de Boer, has said that carbon finance could generate up to $100 billion annually in financial flows to developing countries.[42]

As mentioned in the introduction, the international carbon market has so far been dominated by two types of market-based mechanisms. The first is the trading of allowances that have been allocated to regulated entities under a "cap and trade" program.

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[38] The CDM allows for expedited procedures for small scale projects. *See* United Nations Framework Convention on Climate Change, Small scale CDM project activities, http://cdm.unfccc.int/Projects/pac/pac_ssc.html (last visited Nov. 20, 2007).

[39] UNFCCC, Verify and Certify ERs of a CDM project activity, *supra* note 22.

[40] CAPOOR & AMBROSI, *supra* note 1, at 3.

[41] *See id*. at 21.

[42] Interview by unknown with Yvo De Boer, Executive Secretary, UNFCCC, in Bonn, Fr. (October 30, 2006), *available at* http://www.ecologie.gouv.fr/IMG/pdf/interview_yvo_de_boer.pdf.

Indeed, based on the monetary value of trades, the dominant force in international trading has been the European Union Emission Trading System (EU ETS). The EU countries entered into a "burden sharing agreement" whereby they collectively agreed to reduce their emissions by 8% from 1990 levels in accordance with the Kyoto Protocol. Each individual EU country then agreed to cap its emissions at certain levels.[43] EU countries devolved compliance obligations down to individual regulated entities, allocating each a certain number of allowances.[44] The EU market topped US$20 billion in 2006.[45]

The other dominant type of transaction in the international carbon market has been emission offset projects, in particular those under the CDM.[46] The principal buyers of such credits have been EU countries and Japan.[47] The main reason for this is that, depending on the rules of various regulatory programs, entities regulated by the EU ETS can use CDM credits for compliance purposes.[48] Japanese private entities have also purchased CDM credits as part of voluntary targets set to help their country meet its Kyoto commitments.

Other regulatory regimes, including those in the United States, could also "link" to either the CDM, the EU ETS, or other regulatory regimes, depending on the specific provisions in each system and applicable law.[49] Through this linking, it could be possible for credits to be traded between the regulatory regimes of different countries.

A wide variety of projects have been launched under the CDM, including renewable energy projects such as wind and hydroelectric; energy efficiency projects; fuel switching; capping landfill gases; better management of methane from animal waste; the control of coal mine methane; and controlling emissions of

[43] Council Decision 2002/358, 2002 O.J. (L 130) 1, 1–3 (EC); *see also* Council Directive 2003/87, 2003 O.J. (L 275) 32, 32–35 (EC).

[44] Council Directive 2003/87, art. 11, 2003 O.J. (L 275) 32, 36 (EC).

[45] CAPOOR & AMBROSI, *supra* note 1, at 3.

[46] *See id*. at Table 1.

[47] *Id.* at 22 (Fig. 3).

[48] The use of credits from forestry projects and large hydroelectric projects is restricted. *See* Council Directive 2004/101, arts. 11(a)–(b), 2004 O.J. (L 338) 18, 20–21 (EC).

[49] *See e.g.*, Climate Stewardship and Innovation Act, S. 280, 110th Cong. §§ 144–145 (2007).

certain industrial gases including HFCs and N_2O.[50] CDM projects have taken place throughout the developing world, including in Asia, Africa, and Central and South America.[51]

However, certain countries have dominated the market. The World Bank estimates that from 2002 through 2006, China represented 60% of the cumulative CDM market in terms of credit volume.[52] Based on the number of projects (as opposed to credit volume), China still represents 50% of the market.[53] Other dominant sellers include India and Brazil.[54] These concentrations aside, CDM projects have been registered in over 45 countries.[55] In total, as of October 2007, over 80 million CERs have been issued from over 20 countries.[56]

Early purchases of carbon credits received a significant boost with the commencement of the Prototype Carbon Fund (PCF) of the World Bank, which began carbon purchases in the year 2000. The basic concept of the PCF is quite simple: the fund collects contributions from participating entities and uses those funds to facilitate projects that reduce GHG emissions. The emission reductions so generated are then distributed to the entities that contributed to the fund *pro rata* based on the amount of their respective contributions. The Prototype Carbon Fund helped to pioneer the development of the carbon market and demonstrate how CDM and JI transactions could work.[57] Notably, since the development of the PCF there has been a proliferation of carbon funds both in the World Bank and the private sector. The World Bank currently manages ten carbon funds with approximately US$2 billion in capital commitments.[58]

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[50] CAPOOR & AMBROSI, *supra* note 1, at 27–29.

[51] *Id.* at 24.

[52] *Id.*

[53] *Id.*, *citing to* Jorgen Fenhann, UNEP Risoe Centre, CDM projects by host region, http://cdmpipeline.org/cdm-projects-region.htm (last visited Nov. 20, 2007).

[54] CAPOOR & AMBROSI, *supra* note 1, at 24 (Fig. 4).

[55] UNFCCC, Registration, http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html (last visited Nov. 20, 2007).

[56] UNFCCC, CERs issued by host party, http://cdm.unfccc.int/Statistics/Issuance/CERsIssuedByHostPartyPieChart.html (last visited Nov. 20, 2007).

[57] *See* DAVID FREESTONE, *The World Bank's Prototype Carbon Fund: Mobilizing New Resources for Sustainable Development*, *in* LIBER AMICORUM IBRAHIM F.I. SHIHATA 265, 280 (Sabine Schlemmer-Schulte & Ko-Yung Tung eds., 2001).

[58] *See* WORLD BANK, CARBON FINANCE FOR SUSTAINABLE DEVELOPMENT 19

At the time of this writing, over 700 projects have made it through the rigorous CDM process and been both validated by a Designated Operational Entity and registered by the CDM Executive Board.[59] This has also led to the approval of over sixty-five methodologies for measuring emission reductions from different types of projects.[60] The projects in the current CDM pipeline are expected to generate approximately two billion CERs through 2012 (the end of the first Kyoto commitment period).[61]

IV. PURCHASING CARBON CREDITS THROUGH ERPAS[62]

An Emission Reduction Purchase Agreement (ERPA) is a specialized form of a purchase and sale agreement, involving what can be considered a relatively new type of commodity—an emission reduction.[63]

CDM transactions can take many different forms. In simplest terms, there is a seller and buyer of emission reductions. The seller typically has some ownership or control of the project which is generating the emission reductions. At a minimum, the seller needs to have legal rights to the emission reductions being sold. However, in some transactions the buyer may take other roles as well, including providing funding to the project activity, preparing the relevant Kyoto documentation, contributing technology or expertise, taking an equity position in the project, or any other number of approaches.

Given the wide variety of possible approaches to carbon finance transactions, ERPAs can also take widely varying forms. Several different template ERPA contracts are publicly available. For instance, the International Emissions Trading Association (IETA) has developed a model form of ERPA.[64]

(2006), *available at* http://carbonfinance.org/docs/CFU_AR_2006.pdf.

[59] UNFCCC, CDM Statistics, http://cdm.unfccc.int/Statistics/index.html (last visited Nov. 20, 2007).

[60] UNFCCC, Methodologies for CDM Project Activities, http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html (last visited Nov. 20, 2007).

[61] UNFCCC, CDM Statistics, *supra* note 59.

[62] This section draws heavily on the Authors' prior work, available at Christopher Carr & Flavia Rosembuj, *World Bank Experiences in Contracting for Emission Reductions*, 15 ENVTL. LIAB. 114, 116 (Mar.–Apr. 2007).

[63] *See id*.

[64] Int'l Emissions Trading Ass'n [IETA], *Buyer Limited and Seller Co., Ltd.: Emissions Reduction Purchase Agreement* (Dec. 3, 2005) (draft for discussion

In its pioneering role in the carbon finance market, the World Bank developed a form of ERPA that became a prototype for many transactions. In line with the World Bank's approach, most ERPAs principally make payment on the future delivery of emission reductions.[65] Contracts may involve varying degrees of up-front financing.[66] However, most ERPAs—both those of the World Bank and others—remain forward contracts, in that the contracts are typically entered into well before the delivery of the CERs.

A. *Contracting for a Regulatory Asset Amidst Regulatory Uncertainty*

Two broad categories of risk exist in ERPAs. Project risk arises out of the physical activity occurring that reduces or sequesters emissions. "Kyoto risk" arises out of uncertainty surrounding the regulatory status of emissions reductions generated by the project.[67]

The value in a CDM transaction derives from a regulatory regime—the Kyoto Protocol. Accordingly, CDM transactions involve a variety of regulatory risk. For example, the project may not be approved by the CDM executive board; the CDM may be discontinued post-2012; or CDM standards may change, reducing or eliminating the value of the carbon finance revenue stream.

Understanding the allocation of regulatory risk in ERPAs is important. Two approaches to this regulatory risk can be seen in VER (Verified Emission Reduction) and CER contracts.

For example, the World Bank's Prototype Carbon Fund (PCF) began purchasing emission reductions roughly five years before the entry into force of the Kyoto Protocol in 2005. These initial PCF ERPAs were designed to stimulate the generation of emission reductions that would eventually be convertible into CERs under

purposes), *available at* http://www.ieta.org/ieta/www/pages/download.php?docID=1318; *see also* Certified Emission Reductions Sale and Purchase Agreement [CERSPA], http://www.cerspa.com/downloads/CERSPA_Template_Eng_v1_4-2007.doc (last visited Nov. 7, 2007) (an open-source contract template for buying and selling CERs).

[65] *See* CAPOOR & AMBROSI, *supra* note 1, at 34.

[66] *Id.*

[67] Carr & Rosembuj, *supra* note 62, at 118. While transactions may involve a variety of other risks, focusing on these two types of risks helps to understand the fundamentals of CDM transactions.

Kyoto.[68]

Because the Kyoto system was still in flux, the PCF structured its purchases around VERs. An emission reduction in these early PCF contracts was defined as all existing and future legal and beneficial rights arising from one GHG reduction. This included the right to any CERs arising from that GHG reduction.[69]

Under a VER contract, the buyer and seller agree to a monitoring protocol, which was used to verify the emissions reductions generated. If a VER project is subsequently registered by the CDM Executive Board this monitoring protocol is adjusted to maximize the delivery of CERs from the project.[70]

Currently, the Kyoto Protocol is the primary driver of value in carbon transactions. However, VER-type contracts allow the parties to create, transfer, and pay for emission reductions despite regulatory uncertainty.[71]

When Kyoto entered into force, many market players focused on CER contracts, under which the buyer would only pay for a "compliance grade" asset—CERs issued by the CDM Executive Board.[72] Under these contracts, the seller bears the risk of a project's failure to generate CERs. This includes the risk that the project will not receive the approval of the CDM Executive Board.[73]

The World Bank has continued to use VER contracts after the entry into force of the Kyoto Protocol in order to allow maximum

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[68] *Id.* at 116–17.

[69] *Id.* at 117. *See* Int'l Bank for Reconstruction and Dev. [IBRD], *General Conditions Applicable to Verified Emission Reductions Purchase Agreement: Clean Development Mechanism Projects*, at 3, (Feb. 1, 2006), *available at* http://carbonfinance.org/docs/VERGeneralConditions.pdf [hereinafter *VER General Conditions*] (providing a definition of Emission Reductions).

[70] Carr & Rosembuj, *supra* note 62, at 118; Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Nov. 28, 2005–Dec. 10, 2005, *Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its first session*, ¶ 8, U.N. Doc. FCCC/KP/CMP/20005/8/Add.1 (Mar. 30, 2006), *available at* http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=31. The CDM Executive Board supervises the CDM, under the authority and guidance of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

[71] Carr & Rosembuj, *supra* note 62, at 117.

[72] *Id.* at 117; *see, e.g.*, Int'l Emissions Trading Ass'n [IETA], *Code of CDM Terms: Version 1.0*, *available at* http://www.ieta.org/ieta/www/pages/getfile.php?docID=1794 (Sept. 11, 2006).

[73] *Id.* at 117.

flexibility to sellers interested in contracting with the Bank. The VER mechanism also helps sellers develop difficult projects and innovative methodologies.[74]

VER contracts also provide a bridge to the post-2012 carbon market. Because the first Kyoto commitment period ends in 2012, projects that plan to generate emission reductions post-2012 involved the risk that no Kyoto compliance exists, or that the current regime will be replaced by a different one. Either outcome could reduce the value of credits.

However, the World Bank has realized that post-2012 purchases can contribute to market stability, during the transition from the first commitment period to the regime that follows.[75] This can be particularly true where projects need revenue for more than the approximately five years remaining in the first commitment period. The approach the World Bank has usually followed is entering into hybrid contracts that include the purchase of CERs for emission reductions delivered up to 2012 and purchase of VERs thereafter.[76] To accomplish the goal of post-2012 purchases, the approach the Bank has usually followed is hybrid purchases, including the purchase of CERs for emission reductions delivered until 2012, and purchases of VERs thereafter.[77] Thus, as VER contracts facilitated the development of the carbon markets before the Kyoto rules were fully developed, they also provide a mechanism for contracting forward into the post-2012 world.[78]

Experiences in the VER market also have ramifications for the so-called "voluntary" market for GHG emission reductions. In the voluntary market, parties can buy and sell emission reductions based on contractually agreed-upon verification protocols, outside of a regulatory regime such as the Kyoto Protocol.[79]

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[74] *Id.* at 117.

[75] WORLD BANK CARBON FINANCE UNIT, THE ROLE OF THE WORLD BANK IN CARBON FINANCE: AN APPROACH FOR FURTHER ENGAGEMENT 13 (2006), *available at* http://carbonfinance.org/docs/Role_of_the_WorkBank.pdf.

[76] Carr and Rosembuj, *supra* note 62, at 117.

[77] *Id.*

[78] *Id.* at 117.

[79] For instance, in the United States, companies have voluntarily bought and sold emission reductions in the absence of a federal greenhouse gas regulatory program.

B. *Standardization, Risk, and Price*

Standardized conditions for ERPAs have been developed by the World Bank and other third-party buyers in an effort to build market capacity through increased uniformity in terms. However, wide variation in contract terms exists due to variation in project risk and buyer and seller preferences.

In 2005, the World Bank developed standardized sets of "General Conditions" that apply to its agreements. These General Conditions are incorporated by reference into World Bank ERPAs. The use of General Conditions increases the transparency of transactions, increases fairness by offering comparable terms to all sellers, and reduces transaction costs and negotiation time.[80] The ERPA contains negotiated terms covering price, volume, and other project-specific conditions.[81]

One constant in both World Bank CER and VER contracts is that the seller bears the risk that the agreed upon project activity, such as capping a landfill or improving energy efficiency, will not take place.[82] The assumption underlying this allocation is that the seller is best-positioned to assess and bear project risk.

However, significant differences in "Kyoto risk" allocation can be seen between the World Bank VER and CER contracts. Under the VER General Conditions, the buyer (the World Bank acting as trustee of a carbon fund) bears the risk that the project may not be registered and commits to make a payment based on the agreed-upon monitoring protocol if that registration does not occur within a specific time period. Furthermore, under the VER General Conditions, the Bank bears the risk that the agreed-upon methodology will not be not approved by the CDM Executive Board, and a less favorable methodology will be applied to the project.[83] By comparison, in a CER contract, the seller bears these

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[80] Carr and Rosembuj, *supra* note 62, at 117.

[81] *See, e.g.*, PROJECT ENTITY & INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT (AS TRUSTEE OF FUND), CLEAN DEVELOPMENT MECHANISM CERTIFIED EMISSION REDUCTIONS PURCHASE AGREEMENT (2006), http://carbonfinance.org/docs/CER_ERPA_07_07_06_model.doc.

[82] *Id*. at 118. *See, e.g.*, *VER General Conditions*, *supra* note 69; *see also* IBRD, *General Conditions Applicable to Certified Emission Reductions Purchase Agreement* (2006), http://carbonfinance.org/docs/CERGeneralConditions.pdf [hereinafter *CER General Conditions*].

[83] *See, e.g.*, *VER General Conditions*, *supra* note 69.

risks.[84]

Another crucial issue in ERPA contracting regards the remedies that are available if a seller breaches its obligations under an ERPA. Both the World Bank VER and CER General Conditions provide for three remedies in the event of a seller's unintentional failure to deliver the contracted-for emission reductions: (i) allow delivery in subsequent years, (ii) convert the amount of emission reductions subject to a delivery failure to a call option, or (iii) if, and only, if, the delivery failure persists for three consecutive years or in any of the last three years of the contract, terminate the ERPA and recover the World Bank's costs.[85] Notably, the World Bank forgoes the right to terminate for just one or two years' delivery failure, as long as the breach is not an intentional breach. Rather, there must be a continuing delivery failure in order for the World Bank to have the right to terminate. The intent behind this approach is to enhance the income flow stability to the seller, to allow it to obtain financing for the project. Both the CER and VER General Conditions provide for more stringent remedies in the event of an intentional breach.[86]

By comparison, some CER contracts by other buyers require the seller to guarantee delivery. Under such contracts, if the seller fails to deliver emission reductions from a project, it must deliver CERs from a different source to the buyer. Guarantee provisions have the potential of converting an ERPA from an asset to a liability for the seller. This occurs if a project fails to deliver emission reductions and the seller incurs higher costs for obtaining those emission reductions from a different source. However, sellers that offer guaranteed delivery can obtain higher prices.[87]

Other provisions unique to ERPAs as compared with other purchase and sale agreements can be seen in the World Bank General Conditions. For instance, ERPAs allocate the responsibility between buyer and seller for paying for the share of proceeds required to fund certain CDM administrative expenses

[84] *See, e.g.*, *CER General Conditions*, *supra* note 82; Carr & Rosembuj, *supra* note 62, at 118.

[85] *VER General Conditions*, *supra* note 69, at § 13.03(a)(i); *CER General* Conditions, *supra* note 82, at § 13.03(a)(i); Carr & Rosembuj, *supra* note 62, at 118.

[86] Carr & Rosembuj, *supra* note 62, at 118.

[87] *Id.*; CAPOOR & AMBROSI, *supra* note 1, at 32.

and adaptation measures.[88] Under the VER General Conditions the buyer pays the share of proceeds, while under the CER General Conditions the seller pays the share of proceeds.[89] This allocation mirrors the allocation of risk in Kyoto-compliant projects.

In 2006, CER prices averaged above US$10.00. One study has shown a significant range in CER prices from around US$6.00 to over US$24.00.[90] Thus, CER prices exist along a wide band, indicative of the significant variety in risk between projects, be it project risk, the choice of remedies, the existence of a delivery guarantee, or some other allocation of risk. This price variation is indicative of significant differences in risk between projects, and demonstrates the impact of the allocation of risk and responsibilities in ERPAs on carbon prices. Average CER prices in 2006 were demonstrably higher than VER prices, further reflecting the importance of risk in emission reductions pricing.[91]

The future is likely to continue to see some convergence in contracting terms, although varying project activities and approaches to risk make cookie-cutter contracts unlikely to emerge soon in the wider market.

V. LESSONS LEARNED

Several lessons can be learned from the growth of the carbon market. First, both the EU ETS and CDM were successful in bringing substantial amounts of capital into the carbon market in a short amount of time. In the two years following the entry into force of the Kyoto Protocol in 2005, the carbon market experienced tremendous growth from a prototype market to one measured in the tens of billions of dollars. The market expanded to include a wide variety of project types and market participants.

Second, the CDM was instrumental in developing a regulatory

[88] Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, Annex ¶ 66, U.N. Doc. FCCC/KP/CMP/2005/8/Add.1 (March 30, 2006). The adaptation fee includes a two per cent deduction from CERs issued for projects (except those located in Least Developed Countries). The administrative fee US$0.10 per CER issued for the first 15,000 CERs for which issuance is requested in a given calendar year and US$0.20 per CER issued for any amount in excess of 15,000 CERs for which issuance is requested in that calendar year. *Id.* at Decision 7/CMP.1, ¶ 37.

[89] *VER General Conditions*, *supra* note 69, at § 5.05; *CER General Conditions*, *supra* note 82, at § 5.05.

[90] Carr & Rosembuj, *supra* note 62, at 119.

[91] *Id.*; *see* CAPOOR & AMBROSI, *supra* note 1, at 31.

infrastructure capable of generating significant amounts of offset credits. This regulatory infrastructure includes a process for validating projects, creating and revising emission reduction methodologies, and issuing credits subject to third-party verification.

This CDM regulatory infrastructure can serve as a model for other national and international programs. Few regulatory programs satisfy every goal of every stakeholder, and the CDM is no exception. One significant challenge for the CDM will be to evolve to scale. Increased scale, if properly implemented, can allow more capital, development and technology benefits to flow to the developing world, while also scaling up increased greenhouse gas emission reductions in a cost-effective manner.

Third, the international carbon market is just that—a market. Markets respond to incentives. Early CDM projects involved credits that could be generated both quickly and relatively inexpensively. This is not surprising since markets seek the most efficient mechanism for creating economic value. The question of what incentives are provided by the international carbon market is driven in significant part by political decisions that shape the regulatory structure.

Risk in the carbon market has had a significant impact on the pace of projects and the price of carbon credits. Even though the framework of the Kyoto Protocol was agreed to in 1997, the volume of projects did not increase significantly until the entry into force of the Kyoto Protocol nearly seven years later. In the interim period, a number of buyers took innovative approaches to assessing risks, including the purchase of carbon credits under VER structures before the entry into force of the Kyoto Protocol. The World Bank played a significant role in spearheading the "learning by doing" of how transactions could take place in the international carbon market. However, the allocation of "Kyoto risk" continues to have an impact on projects and carbon pricing. Various approaches to allocating rights and responsibilities have allowed parties to tailor risks and benefits to their particular needs.

Market continuity is also a significant issue. CDM projects involve upfront costs, including the regulatory costs of getting a project and its methodology approved by the CDM Executive Board, as well as capital costs in implementing the project itself. These upfront costs can be a particularly significant issue for renewable energy projects, which require a certain length of time

to recover costs through carbon payments. If these projects cannot recover payments for carbon credits beyond 2012, the end of the first Kyoto commitment period, many worthwhile projects may not be feasible. At the time of this writing, much remains to be done to ensure a viable and vibrant post-2012 international carbon market.

In sum, carbon finance has shown that a market-based mechanism can draw significant amounts of capital, both public and private, to the problem of climate change, as well as spur economic activity in, and transfer climate-friendly technology to, developing countries. The international carbon market has learned significant lessons, and has developed a regulatory infrastructure for offset credits through the CDM. These lessons learned can provide a roadmap not only for improving the CDM, but also for expanding the carbon market to include new market participants and regulatory regimes.