

WORKING PAPER

Demand for REDD Carbon Credits

A Primer on Buyers, Markets, and Factors Impacting Prices

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This paper was prepared for and in cooperation with Don Melnick, Jim Warfield, and Tatiana Alves of the Center for Environment, Economy, and Society (CEES) at Columbia University, in connection with CEES's development of a comprehensive forest carbon standard, and with the collaboration of PUMA (Fundación Protección y Uso Sostenible del Medio Ambiente or Foundation for the Protection and Sustainable Use of the Environment); Funbio (Fundo Brasileiro para a Biodiversidade or Brazilian Fund for Biodiversity); Fondo para la Acción Ambiental y la Niñez (or Fund for Environmental Action and Childhood); FAN (Fondo Ambiental Nacional or National Environmental Fund); and PROFONANPE (Fondo de Promoción para las Areas Naturales Protegidas del Perú or Peruvian Trust Fund for National Parks and Protected Areas); and funding from Cargill International SA.



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Table of Contents

1. Overview	3
2. Potential Buyers of REDD Carbon Credits and Their Objectives.....	3
2.1. Public sector demand for REDD	5
2.2. Meeting compliance obligations.....	7
2.3. Corporate social responsibility and brand enhancement	7
2.4. Market speculation	7
2.5. Philanthropy and personal responsibility.....	8
3. Meeting Buyer Objectives	8
3.1. Survey of forest carbon buyers	8
3.1.1. Motivations for purchasing forestry offsets.....	9
3.1.2. What buyers want in forest carbon offsets	9
4. Markets for REDD Credits	9
4.1. REDD in Kyoto and European Union compliance markets	13
4.2. REDD in U.S. national and regional compliance markets	13
4.3. Voluntary markets for REDD.....	14
5. Factors Influencing the Price of REDD Credits	15
5.1. Forestry under the CDM.....	17
5.2. Pricing of REDD credits.....	18
6. Conclusion.....	18

1. Overview

Demand for forest carbon, current and potential, comes from many parties and organizations, public and private, and these entities have both common and divergent interests. Their investments and purchases are driven in-part by international, national, and sub-national climate policies that continue to evolve. For parties and organizations interested in developing forest carbon projects, it may be difficult to identify all the potential buyers of forest carbon and the factors underlying their purchasing decisions. Moreover, forest carbon projects themselves vary considerably, particularly with their ability to provide social and environmental co-benefits, control for leakage, address any reversals in sequestered carbon, demonstrate additionality, and meet buyers' needs.¹

The development of any forest carbon project entails considerable time, expense, and risk, and involves many upfront decisions that will permanently affect both the project and the kinds of buyers that may be interested in purchasing any emissions credits² generated by the project. To ensure that forest carbon projects are designed in ways that maximize both their marketability to buyers and their ability to meet the needs of all stakeholders including local parties, project developers need a firm understanding of the markets, participants, and forces that comprise the demand for forest carbon.

This paper provides an overview of the demand for forest carbon, including potential buyers and their objectives, markets for forest carbon, and forces that affect the price of forest carbon. It is intended for parties and organizations who are considering developing forest carbon projects, as an aid to understanding the changing market and demand for forest carbon credits. While the primary focus of the paper is on markets and demand for REDD credits – credits arising from projects that reduce emissions from deforestation and degradation – much of the information is applicable to afforestation and reforestation projects, as well as improved forest management.

Section two discusses potential buyers of forest carbon credits and their objectives. Section three looks at ways to meet buyer objectives, and the important role that a project development standard plays in facilitating this goal. Section four provides an overview of existing and potential markets for forest carbon, and section five looks at forces that affect the price of forest carbon.

2. Potential Buyers of REDD Carbon Credits and Their Objectives

Forests provide a multitude of benefits, some of which may be captured in a forest carbon credit, and others that will fall outside the legal scope of what is bound, certified and transacted in any such credit. Concerns about climate change have sped development of carbon markets ahead of markets for other environmental services, with the result that carbon markets are currently the gathering point for buyers with a broad range of objectives, including, in the case of forest carbon, those buyers who value the non-carbon benefits of forests alongside any associated carbon benefits. This diversity of buyers in the marketplace presents project developers with opportunities as well as strategic choices regarding what kinds of projects will attract sufficient capital to drive the types of activities sought by buyers and sellers—both in the near-term and moving forward, as carbon markets continue to develop.

¹ In the context of carbon projects that seek to address global climate change, environmental and social co-benefits refer to outcomes such as biodiversity and poverty reduction that may result from project implementation; leakage is an increase in GHG emissions outside the project boundaries that occurs as a result of the project; reversals in sequestered carbon are re-emissions of stored carbon into the atmosphere that occur during the life of the project, possibly due to fire or clearing of forest; and additionality means that benefits attributed to the project would not have occurred in absence of the project.

² An emissions credit here refers to a legal instrument certifying that a reduction or sequestration of greenhouse gas emissions has occurred.

To better understand buyer objectives, we can first sort buyers of carbon credits into two groups: those facing a legal requirement to reduce their GHG emissions, and those for which the choice to reduce carbon emissions is made voluntarily, that is, outside of any legal requirement to do so. Among the latter group, motivations range from pure profit, to Corporate Social Responsibility (CSR) and brand enhancement, to philanthropy. Firms and governments facing a compliance obligation to reduce their GHG emissions may have accompanying objectives that overlap with participants who engage in carbon market transactions voluntarily, but to the extent that they decide to meet these obligations through the purchase of carbon offset credits, their need to satisfy emission reductions in a legally-permissible way will more narrowly define the kinds and amounts of offset credits they seek.

Although this paper largely focuses on demand and funding for REDD credits, note that few tropical countries currently have the technical tools and policy framework needed to participate in the kinds of REDD mechanisms being considered under the UNFCCC framework, or by the U.S, the European Union, Australia, Japan and others. These requirements would include clear and reliable tenure over land and carbon assets, effective forest law enforcement, removal of perverse incentives for forest conversion, and development of a system for accurate and timely monitoring of the forest estate. As many of these reforms and tools are public goods and clearly beyond the interest or capacity of private sector capital to pursue, interest in the development of REDD has to date been primarily financed by the public sector, through a number of bilateral and multilateral funds (see Section 2.1 below) that are focused on building REDD capacity and testing various approaches to implementing REDD projects. This public sector demand for REDD activities may extend into continued demand for verified emission reductions (credits) alongside private-sector demand, if and when compliance markets for REDD emerge.

Table 1 identifies potential buyers of forest carbon credits and their objectives, which are discussed below.

Table 1. Potential buyers of REDD carbon credits and their objectives.

Potential buyers	Compliance obligation?	Objectives
Public sector: governments and multilateral funds	Possibly	Support for REDD capacity building and project development; meeting emissions reduction commitments under future international agreement(s) and domestic climate policy.
Emitters of GHGs	Possibly	Compliance with regulations and voluntary Corporate Social Responsibility/branding
Private companies who are not major GHG emitters	No	Corporate Social Responsibility/branding
Buyers of credits for trading purposes	No	Resale of credits at a profit
NGOs and individuals	No	Philanthropy and personal responsibility

2.1. Public sector demand for REDD

Public sector interest in, and funding for, REDD have been recently catalyzed by a number of decisions occurring under the UNFCCC climate negotiations. At the 11th COP in Montreal in 2005, Papua New Guinea and Costa Rica proposed the inclusion of incentives to reduce tropical deforestation and degradation (REDD)—a request that culminated in the Parties agreeing at COP 13 in Bali to include REDD in the context of a post-2012 agreement, as well as establishing a “roadmap” leading to an agreement in Copenhagen. Though negotiations at Copenhagen failed to produce the binding agreement that many had hoped for, further progress was made on the REDD agenda, including additional near-term (fast-start) funding commitments. Six countries—Australia, France, Japan, Norway, the United Kingdom and the United States—pledged \$3.5 billion of fast-start support for REDD+³ for the period 2010 to 2012. Since then, additional countries have joined, including the European Union, Germany, Slovenia, and Spain, bringing total fast-start pledges for REDD+ to over \$4.5 billion.⁴ Perhaps most significantly going forward, at the last COP 16 in Cancun, countries officially adopted REDD+ as a mechanism for reducing emissions from deforestation and forest degradation – a decision that is expected to further catalyze public funding for REDD+ readiness and development activities.⁵

In the wake of the Bali agreement, several multilateral and bilateral funds were established that currently play a dominant role in REDD financing, complementing some existing environmental funds whose programmatic scope includes REDD. Much of the fast-start funding pledged at Copenhagen and again at Cancun for reductions in forest sector emissions is being channeled through these facilities. Major funds include the UN-REDD programme, the Forest Investment Program, the Forest Carbon Partnership Facility (FCPF), the BioCarbon Fund, the Amazonian Fund, the Congo Basin Forest Fund, and bilateral initiatives from the governments of Norway, Australia, Japan, and Germany. The financial mechanisms used include grants, preferential rate debt, pre-payment of credits to be generated, or guaranteed funds to reduce the risk profile of projects. The majority of funded activities to date are for planning and capacity building, however some the funds are designed to finance the purchase of verified emissions reductions, and thus may be relevant sources of demand for developers of forest carbon credits.

Table 2 summarizes major multi- and bi-lateral funding initiatives for REDD.

³ REDD+ covers reduction of emissions from deforestation and forest degradation, the conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks in developing countries.

⁴ World Bank, 2010. *State and Trends of the Carbon Market 2010*, Washington, D.C.

⁵ UN-REDD Programme press release, December 11, 2010. *UN-REDD Programme Applauds the COP16 Agreement on REDD+ Reached in Cancun*. UN-REDD Programme, Geneva, Switzerland.

Table 2. Major multi- and bi-lateral funding initiatives supporting REDD capacity building and project implementation worldwide.

Fund and start date	Governing body	Resources & Scope
UN-REDD Programme, 2008	Partnership between UNEP, UNDP and FAO	\$113 million pledged to date. Supports country-driven REDD+ readiness activities and global efforts. Project implementation in 9 countries (Bolivia, DRC, Indonesia, Panama, Papua New Guinea, Paraguay, Tanzania, Viet Nam and Zambia), with an additional 13 country observers (Argentina, Ecuador, Cambodia, Costa Rica, Kenya, Mexico, Nepal, Nigeria, the Philippines, Republic of Congo, Solomon Islands, Sri Lanka and Sudan).
Forest Investment Program, 2008	World Bank	\$512 million pledged to date. Finances REDD capacity building investments and promotes sustainable forest management. Supports investments in institutional capacity, forest governance and information; investments in forest mitigation efforts and; investments outside the forest sector necessary to reduce pressure on forests. Eight countries selected to become pilots: Brazil, Burkina Faso, DRC, Ghana, Indonesia, Mexico, Laos, Peru.
Forest Carbon Partnership Facility, 2008	World Bank	\$221 million pledged to date. Supports REDD capacity building in 37 developing countries and tests REDD implementation strategy through pilot projects.
BioCarbon Fund, 2003	World Bank	\$90 million. Operates as a targeted investment fund in the LULUCF sector (including REDD), purchasing credits from forest projects and building capacity among project promoters while aiming to promote biodiversity conservation and poverty alleviation. Investors include several governments and private corporations (Japanese in particular). One of the few buyers of tCER forest credits.
Amazonian Fund, 2008	Brazil	\$1,027 million pledged to date. \$1 billion by the Norwegian government for the period 2009-2015, and \$28 million from Germany. \$21 billion target by 2021. Launched by Brazilian President Luis Silva with a mandate to prevent, monitor and combat Amazonian deforestation, as well as promote sustainable use of Amazonian forests. Funds are accepted from a variety of donors and managed by the Brazilian Development Bank.
The Congo Basin Forest Fund, 2008	Independent. Secretariat based at the African Development Bank	Initial funding of \$160 million (€118 million) from UK and Norway. Intended to support the development of private initiatives and projects targeting forest conservation and poverty reduction in the region.
Forests and Climate Initiative, 2007	Norway	In addition to major contributions to multilateral funds that finance and support REDD, Norway is supporting REDD through bilateral initiatives, including contributions to Brazil's Amazonian Fund (see above) and preparing Tanzania for REDD through a \$87 million (500 million NOK) contribution over 5 years. Stated programmatic goals include conservation of natural forests, taking early action to achieve cost-effective and verifiable reductions in GHG emissions, and working to include REDD in a new international climate regime.
International Forest Carbon Initiative, 2007	Australia	\$217 million (AUD 243) pledged to date. Includes contributions to the Forest Carbon Partnership Facility and the Forest Investment Program, and financing for bilateral programs in the Asia-Pacific region, including programs in Indonesia and Papua New Guinea.
The Hatoyama Initiative, 2008 (replaces the previous "Cool Earth Partnership Fund")	Japan	\$160 million allocated for REDD through 2012 out of \$15 billion public/private fund. Programmatic goals include assisting developing countries to conduct national inventories of forest resources, and develop forest management plans to promote sustainable use and management of forests.
International Climate Initiative, 2008	Germany	\$85 million disbursed for REDD projects to date out of \$550 million pledged to general fund. Financing for international projects addressing climate change, including REDD, and that leverage private sector funds.

Sources: Online programmatic links from the UNFCCC, World Bank, GEF and Governments of Norway, Australia and Germany; UNEP, 2010. *Bringing forest carbon projects to the market*; Climate Funds Update, online at <http://www.climatefundsupdate.org/>.

2.2. Meeting compliance obligations

Under a growing number of national and sub-national jurisdictions, firms that are large-scale emitters of GHGs face legal requirements to reduce their emissions. These would include the more than 12,000 facilities in 27 European Union (EU) countries covered under the EU Emission Trading System, electricity retailers in Australia's New South Wales, certain large-scale emitters in the Canadian province of Alberta, and large fossil fuel power plants in the ten Northeastern U.S. states that make up the Regional Greenhouse Gas Initiative (see section 4 below). Where requirements to reduce emissions are facilitated through a cap-and-trade system, REDD credits may be one mitigation option, though it should be noted that none of the currently operational compliance markets accept REDD credits, though California will when their cap-and-trade program commences in 2012.⁶ In addition to defining the types of credits which may be used to meet compliance obligations, all existing and proposed compliance regimes place limits on the number of offsets allowed into the system, as well as rules governing the kinds of standards accepted for generating offset credits.

2.3. Corporate social responsibility and brand enhancement

By a wide margin, sellers of voluntary carbon offsets surveyed by Ecosystem Marketplace in 2007, 2008,⁷ and 2009⁸ ranked Corporate Social Responsibility (CSR) and brand enhancement as the primary purchasing motivations of their customers. Depending upon one's point of view, the distinction is somewhat arbitrary, but we can think of them both as the desire by companies to benefit from acting in ways that serve (or at least appear to serve) the greater good. Here we refer to them both as CSR.

Interest in CSR extends beyond early purchasers of voluntary carbon offsets. A 2008 survey by the *Economist* magazine found that 95% of corporations recognize the importance of addressing public expectations for businesses to act in a more socially responsible way.⁹ Moreover, that same report cites concern over climate change as the biggest single driver of recent growth in the CSR industry.

CSR manifests itself through a wide range of activities, from traditional corporate philanthropy and community volunteering, to investments and changes in business practices that strategically align with a company's products, brand and expertise. Often cited potential benefits of CSR are risk management (brand or regulatory risk), aiding in personnel recruitment and retention, and brand differentiation. A good example of the latter would be an outdoor company, such as REI, that advertises its environmental stewardship by offsetting the carbon emissions of the adventure travel trips it organizes. Likewise, we can envision many other ways in which the purchase of forest carbon credits would fit into a company's CSR strategy, highlighting the company's commitment to those environmental and social benefits realized through forest conservation.

2.4. Market speculation

Firms that purchase carbon credits for investment purposes, hoping to resell those credits for profit at a later date, comprised the second largest segment of the voluntary Over-the-Counter (OTC) carbon market in 2009 at 26% (down from 35% in 2008), behind purchases for retirement by final end users.¹⁰ Among this class of market participant, factors that would be expected to drive demand include real or anticipated changes in regulations governing the kinds and amounts of credits that may be used in meeting

⁶New Zealand's recently created Emission Trading Scheme (NZ ETS) allows for landowners to generate forestry credits under Article 3.3 of the Kyoto Protocol, including those from domestic avoided deforestation projects. These credits may then be converted into internationally tradable AAUs for use in Kyoto markets, marking the first instance where credits sourced to avoided deforestation are accepted into compliance markets. However, in so far as developing, non Annex-I countries are concerned, this option is not available under Kyoto rules.

⁷Ecosystem Marketplace 2009. *Fortifying the Foundation: State of the Voluntary Carbon Markets 2009*.

⁸Ecosystem Marketplace & Bloomberg New Energy Finance 2010. *State of the Voluntary Carbon Markets 2010*.

⁹The Economist, January 19, 2008. *Just Good Business: A special report on corporate social responsibility*.

¹⁰Ibid (8).

compliance obligations, along with overall macroeconomic factors affecting end-user demand for credits, such as changes in the demand for energy. Related concerns include the size and liquidity of the market for a particular carbon instrument. A more thinly-traded carbon instrument constitutes a higher risk investment for which market speculators will demand an appropriate discount before purchasing.

2.5. Philanthropy and personal responsibility

Purchases by NGOs and individuals comprised just 7% and 2.5% respectively of the voluntary market for carbon offsets in 2009 (up from 1% and 2% respectively in 2008),¹¹ however NGOs play an outsized role in the emerging market for REDD. Some of the earliest credit-generating REDD projects have been developed and financed in-part by NGOs, and these groups can be influential in guiding larger, private investment. A well-known example is the Noel Kempff Climate Action Project in Bolivia, the first REDD project to be verified by a third party, that was largely spearheaded by The Nature Conservancy, and whose backers include three U.S. energy companies.¹² Currently, most of the large international NGOs support REDD initiatives, either directly or indirectly, and many continue to play a significant role in developing best practices for REDD.¹³ Of note, this group may have stronger preferences for investing in projects that deliver environmental and social co-benefits.¹⁴

3. Meeting Buyer Objectives

Because of the frequently complex and unpredictable social and economic drivers of land-use and land-use conversion that operate in and around the project area, REDD projects can be risky investments. Along with anthropogenic threats, carbon stocks may be jeopardized by natural disturbances from fires, pests and disease. Compounding these project-specific risks are broader governance factors, including the strength and clarity of land tenure, the rules governing resource ownership (e.g., aboveground carbon), and the quality of a country's judicial system, which will all affect a project's risk profile.

It is the purpose of any forest carbon standard to control for these risks in a way that engenders sufficient trust in buyers that the environmental and social benefits represented by a carbon credit are real, and will be delivered as promised if purchased. Factors that can help ensure the environmental and social integrity of a REDD credit are:

- Use of rigorous and standardized methodologies for measuring and monitoring emissions reductions, coupled with independent verification by an accredited third party.
- A credible way to account for leakage and any non-permanence risks.
- Ability to demonstrate the additionality of emission reductions, ensuring that carbon credits are not issued for activities that would have occurred under business-as-usual conditions.
- Safeguards for environmental, social and governance concerns. Even where co-benefits are outside the scope of a REDD project, sustained success will depend to some degree on the extent of achieved co-benefits and stakeholder buy-in.

3.1. Survey of forest carbon buyers

A 2010 EcoSecurities survey¹⁵ of corporate participants in the forest carbon market (the first one appeared in 2009) provides some of the best public information on the motivations and preferences of

¹¹ Ibid (8).

¹² Project documentation available at <http://www.nature.org/initiatives/climatechange/work/art4253.html>.

¹³ For a good overview of REDD projects around the world and the groups involved see *An Overview of Readiness for REDD: A compilation of readiness activities prepared on behalf of the Forum on Readiness for REDD*. Woods Hole Research Center publication, December 2009.

¹⁴ CIFOR 2008. *Moving Ahead with REDD: Issues, Options and Implications*, CIFOR, Bogor, Indonesia.

¹⁵ EcoSecurities 2010. *The forest carbon offsetting report 2010*. Online at http://www.ecosecurities.com/Standalone/Forest_carbon_offsetting_report_2010/default.aspx.

early movers in the forest carbon marketplace. Survey respondents were end users of forest carbon offsets, comprising both large and small companies, and are said to represent as much as half the global demand for voluntary forest carbon offsets in 2009. Here we summarize the most relevant findings.

3.1.1. Motivations for purchasing forestry offsets

When asked what factors associated with forestry offsets motivated their purchasing decisions, respondents overwhelmingly cited social and local community benefits, and biodiversity and other environmental benefits as the prime motivation for their purchases (90% and 89%, respectively). Interestingly, price was not cited as a motivation in 2009 (and was ranked last among concerns in 2008) for preferring forest carbon offsets over other offsets. Survey authors suggest that this may be because voluntary buyers in the current market are not strongly sensitive to price, and are willing to pay a price premium for forestry offsets that are believed to provide co-benefits.

3.1.2. What buyers want in forest carbon offsets

The carbon standard used to certify a forest carbon offset was of primary concern for the vast majority of survey respondents, with 89% and 91% ranking it highly important or important in 2009 and 2008 respectively. Other factors considered highly important or important to buyers' purchasing decisions include the experience and credibility of the project developer (72% in 2009, 87% in 2008), the project's location (84% in 2009, 70% in 2008), the type of project (80% in 2009, 74% in 2008) and the project's ability to generate additional community benefits (83% in 2009, 69% in 2008) and biodiversity benefits (77% in 2009, 74% in 2009). Regarding standards, the Voluntary Carbon Standard (VCS) and Climate, Community and Biodiversity Standard (CCB) in conjunction with another carbon accounting standard¹⁶ were the two most popular project standards in 2009 (73% and 64% rated these as highly desirable or desirable). The next most popular standard was the Clean Development Mechanism standard (CDM). Also significant, proprietary certification standards were rated as least desirable by a large percentage of respondents (43% in 2009, up from 22% the previous year).

4. Markets for REDD Credits

Despite widespread acknowledgement of REDD's potential as an immediate and cost-effective means for reducing global GHG emissions,¹⁷ demand has thus far been limited to voluntary markets and public sector bi- and multi-lateral funding mechanisms. In this section we provide a brief overview of where the Kyoto and European Union markets stand with respect to allowing in REDD credits for use in meeting compliance obligations. We also discuss REDD provisions in proposed U.S. federal and regional climate legislation and look at some relevant trends in the voluntary markets. presents a summary of the major existing and proposed carbon markets, including market rules for offsets.

¹⁶ The CCB standard does not generate tradable offset credits. It is used for evaluating the community and biodiversity co-benefits of land-based carbon mitigation projects, and is therefore frequently applied in conjunction with a carbon accounting standard like the VCS or CDM.

¹⁷ Stern, N., 2006. *The economics of climate change: the Stern Review*, Cambridge, Cambridge University Press; Kinderman et al., 2008. *Global cost estimates of reducing carbon emissions through avoided deforestation*. Proceedings of the National Academy of Sciences, 105, 10302-10307.

Table 3. Existing, potential, and proposed markets for REDD.

Market	Market overview	Start date	Participants	2009		Rules regarding use of offsets (including REDD)
				volume (MtCO ₂ e)	avg. price (\$/ton CO ₂ e)	
Voluntary OTC	Wide range of voluntary transactions not driven by any current emissions cap. Operates largely outside of exchanges. Historical deals have been mostly bi-lateral, but the number of intermediaries facilitating transactions has increased with market maturity.	1988	“Pure voluntary” and “pre-compliance” buyers, including private business, NGOs, governments, public institutions and individuals.	46	\$7.35	None, however note the increasing use of standards overall, with at least 96% of OTC credits verified in 2008.
Kyoto Primary CDM Market	Driven by Annex-I country commitments under Kyoto Protocol, with an average reductions target of 5.4% below 1990 levels over the period 2008-2012.	2008	All 187 countries that have thus far ratified the Kyoto Protocol. CDM projects originate in non Annex-I countries party to the Kyoto Protocol.	211	\$12.69	Forestry-related offsets under CDM currently limited to afforestation and reforestation (A/R) projects. REDD standards under development. Advisory group to COP recommends REDD baselines be established based on historical emissions and adjusted for national circumstances. Need for local engagement and representation is recognized.
European Union Emissions Trading System (EU ETS)	Created by EU member states to meet a portion of their commitments under the Kyoto Protocol, participants are EU GHG emitters to which a share of national GHG reduction responsibilities have been passed on. Currently the largest emissions market in the world.	1 st phase, 2005–2007; 2 nd phase, 2008–2012; 3 rd phase, 2013–2020	Some 12,000 facilities in 27 EU countries, encompassing electric power plants and major GHG emitting industries, including pulp & paper, metals, refining and cement. Covers around 45% of EU CO ₂ emissions. Air transportation will be included starting in 2012.	6,326	\$18.73	All LULUCF credits (such as A/R) are currently excluded. This decision applies to the upcoming Phase three period as well, although EU has left the door open to REDD pending establishment of a post-Kyoto, global climate agreement.
New Zealand Emissions Trading Scheme (NZ ETS)	Created by New Zealand to meet a portion of their commitments under the Kyoto Protocol, the system is in a transition phase with no fixed cap on emissions for 2010-2012, and no cap yet announced for 2013 and thereafter. For the period 2010-2012, covered entities can opt to either purchase allowances (NZUs) in the market (i.e., from the forestry sector), or purchase government issued NZUs at a fixed price of NZ\$25 (US\$18). Stationary energy, industrial process and liquid fossil fuel installations will need to surrender just one NZU per two tons of CO ₂ e over 2010-2012. Government-issued NZUs can only be surrendered; they cannot be banked or sold.	2008	Forestry sector - a carbon sink representing some 32% of GHG emissions – entered in 2008. Energy, transport, fishing and industry (43% of GHG emissions) entered in July 2010, and agriculture (48% of GHG emissions) will enter in 2015.	.6 (all forestry)	\$14	Landowners generating domestic credits from A/R/REDD can convert them into internationally tradable AAUs, making NZ the only place where forest carbon can be turned into permanent UN carbon credits. As with the EU ETS, international forestry-based CERs are excluded.

Market	Market overview	Start date	Participants	2009		Rules regarding use of offsets (including REDD)
				volume (MtCO ₂ e)	avg. price (\$/ton CO ₂ e)	
New South Wales Greenhouse Gas Abatement Scheme (NSW GGAS)	Australian state-level cap-and-trade program aimed at reducing GHG emissions in the production and use of electricity. Will be absorbed into national emissions trading scheme if and when one is established.	2003	Electricity retailers and certain other parties who buy or sell electricity in New South Wales.	34	\$3.44	No credits from CDM or JI projects accepted. Forestry-related offsets currently limited to domestic A/R projects.
U.S. National (proposed)	Proposed compliance market under House-passed ACES bill (aka Waxman-Markey bill) would cover some 87% of U.S. GHG emissions when fully phased in (2016), potentially creating the largest demand for international forest carbon in the medium term. Current proposals being considered in the Senate would have smaller coverage, tighter restrictions on the use of international offsets, and require national or state/provincial-level baseline accounting.	2012	Under ACES, covered sectors are electric power plants and major GHG emitting industries, including pulp & paper, metals, refining and cement. Covers some 85% of U.S. GHG emissions. Agriculture and transportation sectors are outside the cap.	-	-	Under ACES, forestry-based offsets established under existing U.S. programs RGGI and CAR are eligible for 3 or more years of early-action crediting (2009-3 years after bill is enacted). Other programs of equal stringency may apply to EPA Administrator for eligibility in early action crediting.
The Regional Greenhouse Gas Initiative (RGGI)	Regional U.S. initiative by ten Northeastern states to reduce GHG emissions from the electricity sector through a cap-and-trade system. RGGI is the only active U.S. compliance market. Cap is two-phase: stabilization at initial level for 2009-2014, and 2.5% reduction per year 2015-2018 for total 10% reduction. The program currently suffers from an excess of allowances – a condition that may persist throughout current reduction schedule. Speculation of credit eligibility in a future federal cap-and-trade program continues to provide the only support for prices above the auction floor price.	2008	Fossil fuel power plants with 25 MW or greater capacity in member states/provinces are covered. Participating US states: ME, NH, VT, CT, NY, NJ, DE, MA, MD, RI.	805	\$2.71	Level and type of offsets admitted dependent upon allowance price: if allowance price is below \$10/ton CO ₂ e, domestic offsets may account for up to 5% of GHG emissions. If allowance price rises above \$10/ton CO ₂ e, offsets may account for 10% of GHG emissions, and include international CDM credits. Forestry-related offsets currently limited to domestic afforestation, and A/R from CDM projects if price trigger is reached.

Market	Market overview	Start date	Participants	2009		Rules regarding use of offsets (including REDD)
				volume (MtCO ₂ e)	avg. price (\$/ton CO ₂ e)	
The Western Climate Initiative (WCI)	Regional U.S. and Canadian initiative of six US states and four Canadian provinces to reduce GHG emissions. WCI has a regional GHG target of 15% below 2005 levels by 2020, to be met in part by a market-based multi-sectoral program. 2012 start of trading will likely include CA, and the Canadian Provinces of British Columbia, Quebec and Ontario (E&E News).	2012	Participating U.S. states: CA, MT, NM, OR, UT, WA (NM may withdraw following election of Gov. Susan Martinez (E&E News); participating Canadian provinces: British Columbia, Manitoba, Ontario, Quebec. Some 90% of GHG emissions will be covered by 2015. Covered industries will include electricity generators, and industry with annual emissions > 25,000 tCO ₂ e.	-	-	Offset rules are under development. Under California's AB32 trading program, international offsets, including REDD, will be accepted using sectoral accounting. International offsets can account for up to 8 percent of a regulated entity's emissions. In total, 74.3 million tons of CO ₂ reductions from REDD are possible through 2020. California has signed agreements with Chiapas, Mexico and Acre, Brazil to establish offset programs, and other agreements may follow.
The Midwest Greenhouse Gas Reduction Accord (MGGRA)	A regional US and Canadian initiative of six states and one Canadian province with 16% emissions reduction target below 2005 levels by 2020. Will incorporate a cap-and-trade system.	2012	Participating U.S. states: IL, IA, KS, MI, MN, WI; Canadian province of Manitoba; three US states are observers. Most sectors of the economy will be covered.	-	-	-

Sources: World Bank, *State and Trends of the Carbon Market 2010*; Ecosystem Marketplace & Bloomberg New Energy Finance, *State of the Voluntary Carbon Markets 2010*; Ecosystem Marketplace, *State of the Forest Carbon Markets 2009*. E&E News, 1/12/2011 "N.M. unlikely to join Western carbon-trading program"

4.1. REDD in Kyoto and European Union compliance markets

At the COP 7 negotiations in Marrakesh, deforestation was dropped from the Kyoto Clean Development Mechanism (CDM), largely due to European Union concerns over how to set baselines, accurately monitor, report and verify (MRV) emission reductions, control for leakage, and adjust for potential non-permanence.¹⁸ Those same concerns, along with fears that low-cost forest credits would flood the market, undermine carbon prices, and thereby reduce incentives to cut industrial emissions, underlined the European Commission's 2004 decision to exclude all forest carbon offsets from the European Union's Emissions Trading Scheme (EU ETS).¹⁹—by far the world's largest carbon marketplace.

While opening the EU ETS to REDD credits was considered for the upcoming third trading phase (2013-2020), the European Parliament voted on December 2008 to continue the ban on all forest carbon credits until at least 2020. Member states agreed to allocate 50% of revenue from allowance auctions to a package of international climate priorities, including REDD.²⁰ At the same time, the European Parliament's decision allows for a reconsideration of REDD credits in the EU ETS pending approval of a future international climate agreement.

Building upon progress made on the REDD agenda at COP 15 in Copenhagen, an agreement to formally recognize REDD+ as a mechanism for reducing emissions from deforestation and forest degradation was reached at COP 16 in Cancun. The agreement calls for a three-phased approach to implementing REDD+, consisting of (1) the development of national strategies or action plans and capacity building, (2) the implementation of national strategies or action plans that could involve REDD+ pilot projects, and (3) the mobilization of funds from developing countries to support scaled-up efforts.²¹ Of note, the question of how to finance REDD+, either through a market mechanism, a non-market (i.e., fund-based) approach, or both, was left on the table for subsequent negotiations. Other important features of the agreement are its calls for national-level forest monitoring and reporting, with sub-national monitoring and reporting being acceptable as an interim measure, and the establishment of social and environmental safeguards to accompany REDD+ activities. Those safeguards should include “the full and effective participation of relevant stakeholders, in particular, indigenous peoples and local communities,” and ensuring that REDD+ programmatic activities are “consistent with the conservation of natural forests and biological diversity.”²²

4.2. REDD in U.S. national and regional compliance markets

By many accounts, a national-level U.S. carbon market offers the greatest potential demand for international forest carbon in the near term, with proposed U.S. legislation creating a market roughly three times the volume of the current EU ETS.²³ The House-passed American Clean Energy and Security Act of 2009 (ACES), also known as the Waxman-Markey bill, seeks to reduce U.S. emissions by 17 percent below 2005 levels by 2020 through a cap and trade scheme, and allows for extensive use of international offsets, including REDD, though it fails to specify eligible project-based REDD protocols. Other issues

¹⁸ Fry, I., 2008. *Reducing Emissions from Deforestation and Forest Degradation: Opportunities and Pitfalls in Developing a New Legal Regime*. Review of European Community & International Environmental Law, 17, 166-182.

¹⁹ Bozmoski, A. and Hepburn, C., 2009. *The interminable politics of forest carbon: an EU outlook*. Smith School of Enterprise and the Environment paper for the Harvard Program on International Financial Systems, Forest Carbon Finance Summit 2009, 6-8 March 2009.

²⁰ COM 2008/645/3. *Addressing the challenges of deforestation and forest degradation to tackle climate change and biodiversity loss*. Impact assessment, Commission staff working document accompanying the communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels.

²¹ COP16 Cancun Agreements, Outcome of the work of the Ad Hoc Working Group on long-term Cooperative Action under the Convention, Section C, Articles 68-79. Available at: http://unfccc.int/meetings/cop_16/items/5571.php.

²² Annex 1 of COP16 Cancun Agreements.

²³ Murray, B., Lubowski, R., Sohngen, B. 2009. *Including International Forest Carbon Incentives in Climate Policy: Understanding the Economics*. Nicholas Institute Report, Duke University; EIA 2009. *Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009*. EIA analysis, Washington, D.C.

not yet resolved in the legislation include how leakage should be accounted for and how liability for reversals will be handled. There are also substantial regulatory requirements that must be satisfied before international REDD credits can be used, including agreements on national baselines, on the technical capacity to monitor, report, and verify forest carbon fluxes, and the establishment of institutional capacity to reduce deforestation through effective governance of the forest estate. Major emitters, including Brazil, would be excluded from project-based REDD.

A Senate counterpart bill to the House climate bill, the American Power Act, was introduced by Senators Kerry and Lieberman in May of 2010, however the bill failed to attract enough support to defeat a threatened filibuster, and it was never brought up for a vote. Following the results of the 2010 mid-term elections, during which Republicans took majority control of the House and increased their numbers in the Senate, prospects for the passage of comprehensive federal climate legislation over the next two years are slim.²⁴

In the absence of federal climate legislation, several U.S. states and regional state consortiums have put in place, or are developing, market-based climate policies. Of these, the largest market in the U.S. is currently the Regional Greenhouse Gas Initiative (RGGI), encompassing emissions from the electric power sector in ten Northeastern states and with a 2009 volume of 805 MtCO₂e (value: \$2,179 million).²⁵ RGGI permits the limited use of international CDM credits, but does not currently allow avoided deforestation/REDD for compliance.

California's Global Warming Solutions Act (AB 32) is a state economy-wide cap-and-trade system set to start in 2012, with an estimated size of 365 MtCO₂e in 2020.²⁶ The program would be part of a wider regional trading program, the Western Climate Initiative, involving five other U.S. states and four Canadian provinces. A limited number of international REDD credits will be accepted for use in California's trading program—up to 8 percent of a regulated entities emissions—for a maximum total of 74.3 million tons of CO₂ reductions through RED by 2020.²⁷ California's REDD crediting system will operate under state-level accounting agreements with several states and provinces in Brazil, Indonesia, Mexico, and Nigeria. Any project-level REDD activity will need to reconcile with state-wide accounting in so-called nested projects.

4.3. Voluntary markets for REDD

The only place where credits for avoided deforestation are yet traded is on the voluntary over-the counter markets, which consist largely of bilateral trades executed outside of exchanges. The volume of REDD credits transacted increased dramatically in 2009 to 2.8 MtCO₂ – a little less than the volume from all previous years combined (3.1 MtCO₂), and a jump of 289% from the year before.²⁸ While still comprising only a fraction of REDD's potential contribution to world carbon markets,²⁹ the growth could reflect the continued progress of REDD in international UNFCCC negotiations, as well as the increased availability of forest carbon project standards that enjoy wider recognition and support.³⁰

²⁴ Remarks by President Obama at Nov 3, 2010 White House press conference.

²⁵ Ibid (4).

²⁶ Ibid (23).

²⁷ California's AB 32 trading program may start by allowing credits from reduced deforestation (RED) before accepting credits that include emissions reductions from reduced forest degradation (REDD). Mongabay.com, December 7, 2010. *Can RED Hot California Heat Up A Sedated Cancun?* Commentary by John Niles, Director of the Tropical Forest Group.

²⁸ Ibid (8).

²⁹ Ibid (17).

³⁰ Ibid (8).

5. Factors Influencing the Price of REDD Credits

For insight into how compliance markets may value REDD credits, we turn first to the world's largest offset market, the Kyoto Clean Development Mechanism (CDM) market. Volume on the CDM market in 2008 was 1,461 MtCO₂e, valued at \$32.8 billion—nearly twelve times the size and more than forty-six times the value of all voluntary carbon market transactions for the same year.³¹ The CDM is one of three “flexibility mechanisms” established under the Kyoto protocol to assist Annex I countries in meeting their GHG reduction commitments. The CDM is also the only mechanism that involves developing countries, and carries the additional objective of promoting sustainable development in host (non-Annex I) countries.

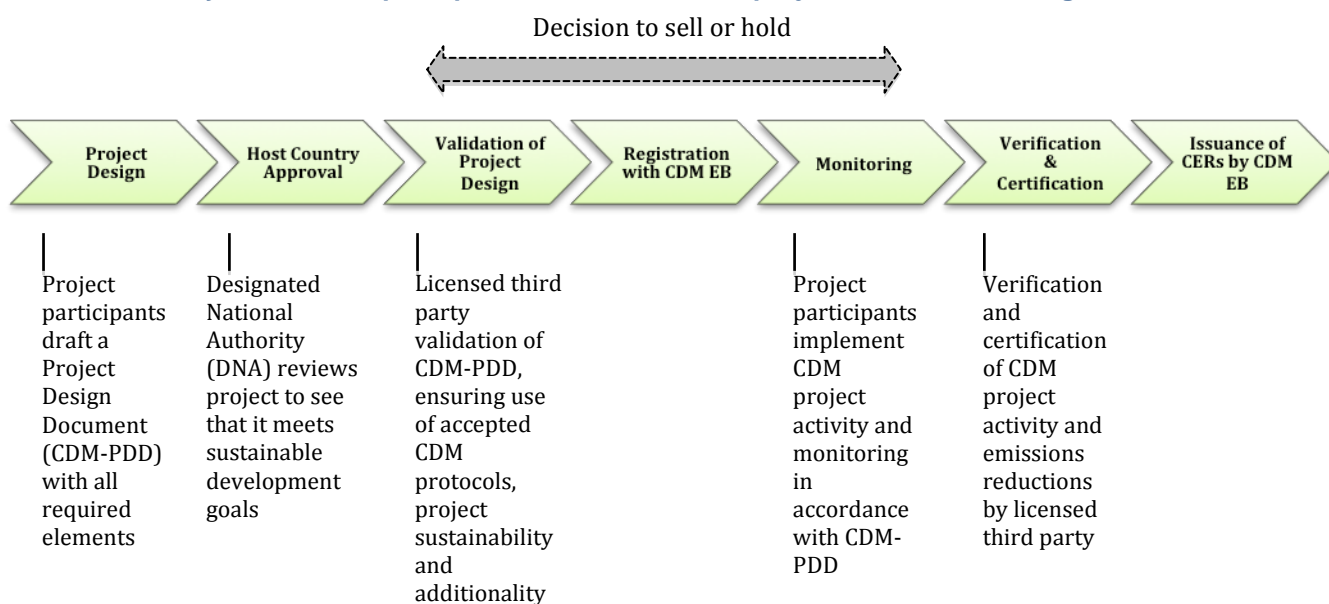
Carbon offsets originating from registered and approved CDM projects following accepted CDM protocols will be transferable to the investor in the form of certified emissions reductions, or CERs, upon certification by a licensed third party. The EU ETS, through its “Linking Directive,” allows covered entities to use a limited number of CERs to meet their compliance obligations (~10% of each entity's emissions), making these credits fungible with EU ETS credits, which are called European Union Allowances (EUAs). CERs can also be used by Annex I governments to meet a portion of their commitments under Kyoto. Additional demand for CERs comes from voluntary markets, and potentially from firms covered under RGGI.

The process by which a CDM project is first proposed, to the point at which it may generate CERs is called the CDM project cycle (see Figure 1). At any point along the CDM project cycle buyers and sellers have the option of establishing legally-binding contracts, or emission reduction purchase agreements (ERPAs), dictating the price, delivery date, and terms under which CERs will be exchanged. A project contracted at an earlier stage will carry additional risk for which a buyer will demand an appropriate discount. For the seller, this discount may be offset by the advantage of securing upfront financing to assist with project costs, or technology and implementation assistance from an investor. In practice, most ERPAs are contracted well ahead of the project's development or implementation, generally before the project is validated by a standard, thus providing project promoters with an additional source of financing or collateral for bank loans.³²

³¹ World Bank, 2009. *State and Trends of the Carbon Market 2009*. Washington, D.C.

³² UNEP, 2010. *Bringing forest carbon projects to the market*, New York, NY.

Figure 1. Steps in the CDM project cycle. At any point, buyers and sellers of CERs may establish forward contracts, or Emission Reduction Purchase Agreements, dictating the terms under which CERs will be exchanged. Projects farther along the project cycle are considered less risky, and will likely command a price premium over identical projects at an earlier stage.



CER prices are derived from the evaluation by both buyer and seller of the various risk factors involved in a project and the prevailing market forces. Those factors include:³³

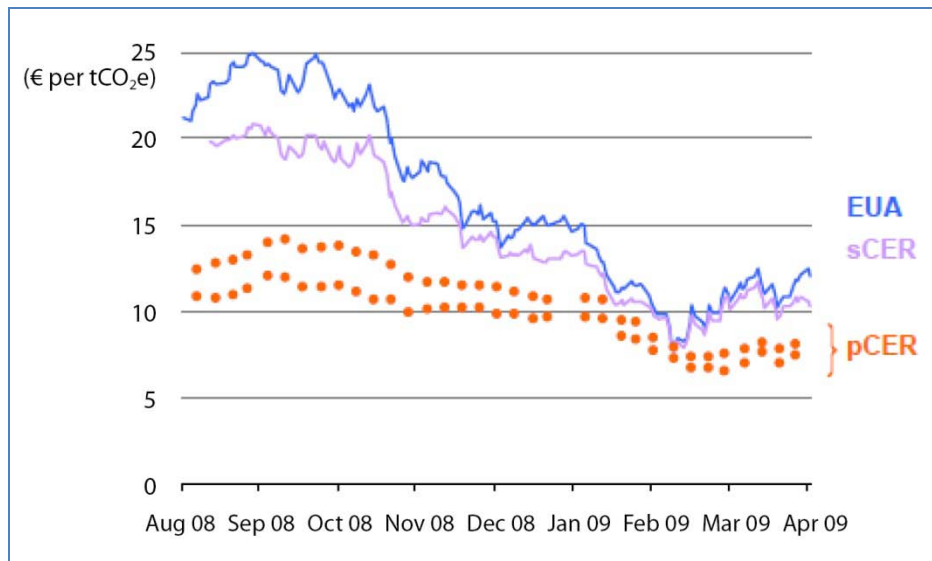
- *EUA market price* – the value of a CER is typically benchmarked to the EUA price, because CERs are fungible with EU ETS credits, and because the EU ETS is the largest and most established market for emissions. Volatility in EUA prices is typically mirrored in the CER market.
- *Counterparty risk* – risk that the buyer or seller will fail to meet their contractual obligations, both financial and project implementation obligations.
- *Performance risk* – risk that the project will fail to deliver the expected volumes of CERs at the agreed upon delivery date.
- *Project risk* – risk that the project will fail to successfully navigate the CDM approval process, which includes host country approval, validation of project documents, verification with the CDM executive board (CDM EB), verification by an accredited third party and issuance of CERs by the CDM EB.
- *Country risk* – related to the strength of a host country’s political and legal infrastructure, strength and clarity of property rights, currency volatility, risk of war, etc.
- *Terms and conditions of the sale* – any delivery guarantees offered by the seller, the volumes of CERs likely to be generated, the use of an established methodology, the extent to which co-benefits are generated and valued, etc., will affect the CER price.

³³ Information taken from TFS Green, emissions broker. Online at <http://www.tfsgreen.com/global-markets/clean-development-mechanism>.

- *Stage of project development* – as mentioned above, the more developed a project is in terms of approvals and documentation and implementation, the more faith buyers will have in the project’s ultimate success in generating CERs.
- *Taxes and fees* – 2% of issued CERs are taken to fund global adaptation, along with a share of proceeds to cover administrative expenses incurred by the CDM EB.

To see how these various factors translate into market prices, Figure 2 shows recent prices for EUAs and what are known as secondary and primary CERs. Each EUA affords its holder the risk-free right to emit one ton of CO₂e emissions into the atmosphere under EU ETS rules. Secondary CERs are issued CERs, typically sold by intermediaries, and while fungible with EUAs, they trade at a slight discount, historically ranging from €1 to €5 (\$1.37-\$6.85), due in part to limits on CER usage and transaction costs. Shown at the bottom of the figure are prices for primary CERs. These are CERs contracted through forward purchase agreements (ERPAs), and whose delivery at time of contracting was uncertain. Buyer and seller share in the risk of these contracts, shown here for two common project types, and as indicated, these typically trade at a significant discount to EUAs.

Figure 2. Price movement and spread between EUAs (blue), secondary CERs (purple) and primary CERs (orange). Primary CERs are contracted through forward emissions reduction purchasing agreements (the dots represent two common CDM project types), are not guaranteed of delivery and frequently trade at a deep discount to EUAs.



Source: World Bank 2009.

5.1. Forestry under the CDM

Concerns about impermanence, accuracy of monitoring, and market flooding have led to restrictive and onerous rules for forestry under the CDM, along with a system for temporary crediting of these projects. The only forestry activities eligible under the CDM are afforestation and reforestation (A/R), and project methodologies were not available until 2003—two years after the general CDM rules were adopted. At the same time, buyer demand for forestry-based CDM credits has been limited, primarily due to the fact that such credits are excluded from the EU ETS (i.e., not fungible with EUAs), and the temporary crediting system.

CDM regulations define the credits from forestry projects as either short-term credits (tCERs – temporary Certified Emission Reductions) valid for 5 years or long-term credits (lCERs – long-term Certified Emission Reductions) valid for a maximum of 60 years. Both tCERs and lCERs have to be replaced upon

expiry if they are used for compliance. With tCERs, credits are reissued after each verification event, and if part of the carbon stock has been lost in the meantime, the next verification will simply yield less tCERs than before. Liability for issued credits in this system is not an issue since only existing stocks are given credit.³⁴

Conversely, credits for a project generating ICERs are valid until the end of the projects crediting period, which can be as long as 60 years. Unlike tCERs, if at any time the underlying project can no longer demonstrate that the credited carbon sequestration is ongoing, these credit units must be replaced prematurely.

Given these constraints, it's not surprising that few CDM A/R projects have been developed, nor that CDM A/R ERPA have traded at a deep discount to non-forestry CDM projects. At the time of this writing, only 19 A/R projects were registered under the CDM³⁵—less than 1% of the overall CDM market—with the majority of project developers choosing to enter into contracts to sell tCERs rather than ICERs.³⁶ Average prices for tCERs transacted through ERPA were \$4.76/tCO₂—well below comparable primary CDM prices, which averaged \$15.28/tCO₂ in 2008, and below the average price of \$851/tCO₂ for forest carbon on the voluntary OTC market in 2008.³⁷ A general rule of thumb regarding tCERs is that they're worth about one third the price of an equivalent permanent credit.³⁸

5.2. Pricing of REDD credits

Survey results by EcoSecurities of buyers purchasing forest offsets in 2009³⁹ show a willingness among a large percentage of buyers to pay significant price premiums for projects that also provide co-benefits. In their survey, which asked buyers what premiums they would attach to a forest carbon project also verified to the CCB standard -

- 67% stated they would pay a premium of at least \$1 for an offset certified under the CCB standard, with 34% willing to pay at least a \$2-4 premium per offset.
- 83% of carbon wholesalers and retailers surveyed stated they would pay a premium of at least \$1 per ton, but few would pay premiums more than \$5 per ton.

The average price in 2009 for REDD credits was \$2.9/tCO₂e, with a wide range of variation – credits traded for less than \$1/tCO₂e and as high as \$13/tCO₂e.⁴⁰

6. Conclusion

The market and policy environments surrounding forest carbon projects continue to evolve. While demand and opportunities to transact forest carbon including REDD credits are likely to grow, the ultimate rules governing the kinds of REDD credits accepted into international compliance markets—if and when they become open to REDD—remains uncertain. This paper presents an overview of the existing and proposed markets for REDD credits, highlighting the diversity of buyers and public organizations in the marketplace, and the factors that can be expected to drive their purchasing and investment decisions. We also include survey results showing the importance of environmental and social co-benefits for purchasers of forest carbon offsets, and the key role that a forest carbon project standard plays in meeting

³⁴ This is not to say that tCERs are without risk. Temporary CERs that are contracted on a forward basis and that fail to deliver expected emission reductions will need to be replaced, either by buyer or seller, depending upon the terms set out in the ERPA.

³⁵ Listing of registered CDM projects available online at <http://cdm.unfccc.int/Statistics/Registration/RegisteredProjByScopePieChart.html>.

³⁶ Ibid (28).

³⁷ Ibid (28).

³⁸ Ibid (32).

³⁹ Ibid (11).

⁴⁰ Ibid (8).

buyer objectives. Finally, the elements that comprise a project's risk profile and the impact this—along with the timing of a forest carbon transaction—has on the price of a forest carbon credit is detailed. To ensure that REDD projects meet the needs of buyers, sellers, and other stakeholders, project proposals should be assessed on their ability to access revenue streams from existing and proposed markets, on the presence of any unique project attributes, including a project's ability to provide environmental and social co-benefits, the project's risk profile and cost, and the financing needs of developers and stakeholders.