The Emerging Market for Forest and Land-Use Carbon

A new asset class with early-stage investment opportunities that generate extensive environmental and social benefits

April 2013

4th Edition

Terra GLOBAL CAPITAL

Terra Global Capital, LLC was founded in 2006 with the objective of building the market for community-based forest and land-use carbon projects and programs that provide sustainable livelihoods to communities. As a group, Terra has more global experience in the land-use sector than any other entity and employs a collaborative and participatory approach with its local partners that builds capacity and supports local communities and governments to sustainably manage their land. Terra's work extends to the U.S. with development of protocols and methodologies to measure the GHG emissions from a full range agricultural activities.

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*The report has been prepared by Terra Global Investment Management, LLC, the investment manager of the **Terra Bella Fund.** The Fund is a globally diverse community-based forest and land-use carbon fund in a Luxembourg SIF-SICAV private equity investment vehicle, and currently in first-close capital raising.*

The Emerging Market for Forest and Land-Use Carbon

Importance of Forest and Land-use Carbon to Climate Change Mitigation

Human-induced climate change caused by greenhouse gas emissions is impacting the earth's ecosystem stability through effects such as ocean acidification, thawing of permafrost regions, shrinking sea ice, increased incidence of extreme weather, and shifting precipitation patterns[1]. These negative climate impacts are expected to cost the world between 5% and 20% in GDP annually[2].

Forest and land-use changes make a significant contribution to emissions through greenhouse gases (GHGs) released during deforestation and soil disturbance. Deforestation, after accounting for re-growth and afforestation/reforestation, accounts for 17.4% of global greenhouse emissions and the agriculture sector accounts for another 13.5%[3]. To put these volumes into context, the forestry sector alone generates more carbon dioxide emissions than the entire transport sector, a level comparable to the annual carbon dioxide (CO_2) emissions of the U.S. or China[4] (given that the current GHG emissions are almost equal). Furthermore, a 2011 study released by a large group of leading climate scientists[5] found that forest growth *sequesters* more carbon and deforestation *releases* more carbon than previously understood.

Given this dual impact, policy-makers are increasingly recognizing the need to address emissions levels from the land-use sector. And the forest and agricultural sectors are both core to effective sustainable development: economic benefits extend beyond emissions reductions to include stabilization of regional rainfall, improved soil stability, improved watersheds that reduce flood risk, maintenance of habitat, and improvements in livelihoods. The world's forests support the livelihoods of up to 1.6 billion people and provide habitat to 80% of the world's terrestrial biodiversity[6]. And such "co-benefits" that have a critical important economic value. The deep impact of forest and land-use change programs means that today the sector is increasingly a focus of the impact investment community. Market commentators expect continued emphasis in 2013 on carbon program's social and other "non-carbon" benefits along with continued standardization of approach and the development of frameworks assessing emissions reduction program opportunities across jurisdictions rather than on a project-by-project level[7].

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[1] UNFCCC (UN Framework Convention on Climate Change) (2011). *Fact Sheet: The need for strong global action on climate change.* Accessed 11 July 2011 at http://unfccc.int/press/fact_sheets/items/4976.php

[2] Stern, N. (2006). *Stern Review on The Economics of Climate Change*. HM Treasury, London. Accessed 11 July 2011 at http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/stern_review_report.htm

[3] UNFCCC Intergovernmental Panel on Climate Change (2007). *Climate Change 2007 Fourth Assessment Report: Synthesis Report – Summary for Policymakers.* Accessed 2 September 2011 at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

[4] UK Office of Climate Change / Johan Eliasch (2008). *Climate Change: Financing Global Forests, The Eliasch Review.* Accessed 11 July 2011 at http://www.official-documents.gov.uk/document/other/9780108507632/9780108507632.pdf

[5] Canadell, J. et al. (2011). *A Large and Persistent Sink in the World's Forests.* Accessed 3 August 2011 at http://www.globalcarbonproject.org/global/pdf/pep/Pan.etal.science.Forest_Sink.pdf

[6] UNEP (website, 2012). *Benefits of Forests, Forest Facts.* Website of the UNEP. Accessed 20 November 2012 at http://www.unep.org/wed/forestfacts/

[7] See for further explanation and latest framework developments both: http://v-c-s.org/JNRI and http://americancarbonregistry.org/carbon-accounting/acr-nested-redd-requirements

Without action, greenhouse gas emissions are expected to rise to 66 $GtCO_2e$[8] (gigatons of carbon dioxide equivalent) per annum by 2030 - a trajectory well in excess of the 50 $GtCO_2e$ per annum that is projected as the maximum possible emissions level for maintaining global temperature rise below 2°C above pre-industrial levels[9]. Beyond this level, the UNFCCC estimates that it will become too difficult to stabilize global temperature at a level that does not risk more severe climate impacts[10] with high global economic and social costs.

The UK government's Eliasch Review[11] identifies that these required reductions are only achievable through halving deforestation by 2020. The forestry sector alone, including the critical methodology for programs and activities that are Reducing Emissions from Deforestation and Forest Degradation (REDD[12]), can contribute up to 12.5 gigatons CO_2e of the 16.0 Gtons tCO_2e emission reductions required per year[13]:

Table 1. GHG Emission Reduction Potential Per Year by Sector, 2030 (Gigatons CO2e)

GHG Emission Reduction Potential Per Year, 2030 (Gigatons CO2e)			
Sector	Annex I[14]	Non-Annex I	Global
Power Generation	4.4	5.0	9.4
Forestry (Includes REDD+)	0.1	12.4	12.5
All Other	5.5	4.3	9.8
Total	10.0	21.7	31.7

Besides having the highest reduction potential of any sector to meet emissions reductions objectives, the cost of reducing emissions via forest carbon activities is one of the lowest options, estimated at

[8] CO2e is the concentration of carbon dioxide that would cause the same amount of radiative forcing as a given mixture of carbon dioxide and other greenhouse gases.

[9] McKinsey & Company (2010). *Impact of the Financial Crisis on Carbon Economics: Version 2.1 of the Global Greenhouse Gas Abatement Cost Curve.* Accessed 11 July 2011 at http://www.mckinsey.com/en/Client_Service/Sustainability/Latest_thinking/Costcurves.aspx

[10] IPCC (Intergovernmental Panel on Climate Change) (2007). *Fourth Assessment Report: Climate Change - Summary for Policy Makers.* Accessed 11 July 2011 at http://www.ipcc.ch/publications_and_data/ar4/syr/en/spms5.html

[11] UK Office of Climate Change / Johan Eliasch (2008). *Climate Change: Financing Global Forests, The Eliasch Review.* Accessed 11 July 2011 at http://www.official-documents.gov.uk/document/other/9780108507632/9780108507632.pdf

[12] The term REDD was introduced by the United Nations as the name for its proposed mechanism to "create an incentive for developing countries to protect, better manage and wisely use their forest resources, contributing to the global fight against climate change. REDD strategies aim to make forests more valuable standing than they would be cut down, by creating a financial value for the carbon stored in trees". Source: UN-REDD Programme. Accessed 11 July 2011 at http://www.un-redd.org/AboutUNREDDProgramme/FAQs/tabid/586/Default.aspx

[13] United Nations Framework Convention on Climate Change (2008). *Investment and financial flows to address climate change: an update.* Accessed 11 July 2011 at http://unfccc.int/resource/docs/2008/tp/07.pdf

[14] Annex I and Non-Annex I refers to the classification of countries that are party to the UN Framework Convention on Climate Change (UNFCCC): Annex I countries are industrialized countries that accepted emissions targets for the period 2008-12 as per Article 3 and Annex B of the Kyoto Protocol. They include the 24 original OECD members, the European Union, and 14 countries with economies in transition. (Croatia, Liechtenstein, Monaco, and Slovenia joined Annex 1 at COP-3, and the Czech Republic and Slovakia replaced Czechoslovakia). Non-Annex I countries have ratified or accepted the UNFCCC but are not included in Annex I, and are developing countries.

US$2-7[15] per ton. Thus, the policy driver for land-use change as a mitigation option exists, and the relative affordability of forest carbon activities makes the sector an attractive investment opportunity.

This report assesses the current status of market-driven and results-based finance mechanisms for REDD, the sustainable management of forests and enhancement of forest carbon stocks (together widely referred to as "REDD+") around the world, exploring potential demand from multilateral, bilateral, national and sub-national approaches.

Investment Capital Following Market Based Approaches

With the significant advancements made in forest and land-use carbon accounting standards in the last five years, the key barrier to implementation now is a lack of funding to this critical sector. Halving deforestation by 2030[16] will require funding of $17-$28 billion per year. Public sources increasingly do not have the capacity to close this significant gap, as discussed further below.

Private sector capital has already been responsive and started to develop REDD+ activities and generate REDD+ credits. In the corporate sector, there is growing recognition of climate change policy development and consumer awareness. The 2012 Carbon Disclosure Report surveys 500 of the world's largest companies[17] and highlights a near doubling over the last two years of respondents indicating that climate change issues are integrated into business strategy (increasing from 48% in 2010 to 78% in 2012). This is no doubt driven by perception of risk, where the percentage of companies that view physical risks as current nearly quadrupled from 10% in 2010 to 37% in 2012. In 2012 the number of respondents reporting board or senior executive oversight of corporate climate change programs hit 92%[18]. The State of the Voluntary and State of the Forest Carbon Markets 2012 Reports[19,20] provide further insight into growing interest in offsetting by the private sector. For example:

- In 2011, growth in the forest carbon market value reached a historic high ($237 million, a 33% increase over 2010). Forest carbon program activities are today affecting 18 million hectares and the sector in the top three sectors of voluntary market demand.
- The private sector continued to dominate (78% of the market), across a broad array of industries and interests. During 2011, however, there was strong growth in demand from the public sector (18% transactions).

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[15] Stern N (2009). *A Blueprint for a Safer Planet* New York, NY, Random House

[16] UK Office of Climate Change / Johan Eliasch (2008). *Climate Change: Financing Global Forests, The Eliasch Review.* Accessed 11 July 2011 at http://www.official-documents.gov.uk/document/other/9780108507632/9780108507632.pdf

[17] The survey covers the largest 500 companies by market capitalization included in the FTSE Global Equity Index Series

[18] Carbon Disclosure Project (2010, 2012). *CDP Global 500 Reports 2010 and 2012* Accessed 11 November at https://www.cdproject.net/en-US/Results/Pages/All-Investor-Reports.aspx

[19] Ecosystem Marketplace (2012). *State of the Forest Carbon Markets 2012*. Accessed 12 November at http://www.forest-trends.org/publication_details.php?publicationID=3242

[20] Ecosystem Marketplace and Bloomberg New Energy Finance (2012). *State of the Voluntary Carbon Markets 2012.* Accessed at http://www.forest-trends.org/publication_details.php?publicationID=3164

- Leading brands such as Chevrolet, Walt Disney, Unilever, BHP Billiton, BP and JW Marriott were notable offset buyers and investors in 2011.
- $62 million of upfront investments were made during 2011, through pre-paid forward sales. Related contracts for future forest carbon investments were estimated at $105 million.
- Continued strong interest in forestry offsets driven by their social, biodiversity and other environmental benefits. Certification standards attesting co-benefits achieved by projects and programs were much more widely adopted, though no resulting price trend was attributable.

Developing REDD+ as a market mechanism is a new approach to what has traditionally been a development-funded set of activities. However, funding REDD+ actions through a carbon price leads to carbon starting to compete with the revenues displaced from traditional commodities (timber, soy and palm oil, for example). The resulting conflict between the dynamics of development approaches and market-based approaches has caused profound policy debate. But today, momentum continues to recognize market-based policies as being critical to cost-effective environmental protection and the recognition of the economic value of REDD+[21].

This recognition is stimulating interest and demand for forest carbon offsets in three ways:

- Compliance demand driven by growth in carbon market legislation
    - International policy under UNFCCC for post-2012 phase
    - National and regional market programs
- Public funding stimulating quasi-market demand
- Established and growing voluntary market demand for land-use carbon

Compliance Demand Driven by Carbon Market Legislation

The dominant source of future demand for forest and land-use carbon offsets is expected to come from national and international legislation that initiates market-based regulation to address greenhouse gas emissions. A grey market is already developing with 23% of 2011 transactions (most recent data) being reported as for compliance or "pre-compliance" use, the latter referring to purchases in anticipation of forest carbon being an allowable offset in a future compliance regulation for that buyer[22]. This value is much higher in the California market launched in November 2012, where one third of transactions (valued at $85 million) were signaled as being driven by pre-compliance positioning. REDD is being assessed for acceptance into the California market following the analysis and recommendations of the

[21] See for further valuable commentary on this debate (1) Simon West (2010). *'Command Without Control': Are Market Mechanisms Capable of Delivering Ecological Integrity to REDD?* Law, Environment and Development Journal. Accessed 11 July 2011 at *http://www.lead-journal.org/content/10298.pdf* available at http://www.lead-journal.org/content/10298.pdf; and (2) Rudolf de Groot (lead author) (2010) Chapter 1, Appendix 3. *Integrating the Ecological and Economic Dimensions in Biodiversity and Ecosystem Service Valuation* in *The Economics of Ecosystems and Biodiversity: The Ecological and Economic Foundations.* Accessed 11 July 2011 at *http://www.teebweb.org/LinkClick.aspx?fileticket=0ZjhJGzdxxU%3D&tabid=1018&language=en-US*.

[22] Ecosystem Marketplace (2012). *State of the Forest Carbon Markets 2012*, p.47. Accessed 12 November at http://www.forest-trends.org/publication_details.php?publicationID=3242.

REDD Offset Working Group, released end-2012[23]. Due to be finalized mid-2013, the recommendations address the need to focus on a sector-wide jurisdictional scale and will constitute the feedback of experts from California and the states of Acre and Chiapas in Mexico.

Compliance Demand Driven by International Policy under UNFCCC for Post-2012 Phase

The largest potential source of demand pre-2020 comes from an agreement under the United Nations Framework Agreement on Climate Change (UNFCCC). Important developments in international policy during Conference of the Parties (COP) meetings over the last three years have stimulated focus on prospects for REDD+ within the UNFCCC's compliance framework. Overall however, this framework for emissions reductions policy has been slow to progress to ambitious commitments.

At the UNFCCC Copenhagen COP in December 2010, agreements were reached that i) specified that REDD+ must be included in future frameworks and ii) developed the high-level framework that defined REDD+ host country participation at different speeds, as a function of each country's readiness.

The December 2011 COP in Durban furthered indications that REDD+[24] would be a meaningful component in Kyoto's successor mechanism, providing specificity on the mechanisms that will drive private sector capital inflows. The Working Group on Long-term Co-operative Action's draft decision explicitly recognized that appropriate market-based approaches could be developed to support results-based actions and that results-based finance may come from both public and private sources. The COP established the Green Climate Fund as a financial mechanism with a goal to raise $100 billion by 2020[25]. It is specified that REDD+ qualifies for adaptation and mitigation funding from the fund, and results-based financing is mentioned as an important criterion for allocating fund resources. In terms of implementing REDD+, the Subsidiary Body for Scientific and Technological Advice (SBSTA)[26] acknowledged that sub-national forest reference levels may be elaborated in the interim of transition to national reference levels, and that a country's reference levels may cover less than the entire national territory of forest area.

At the 18th COP in Doha concluding in December 2012, the "Doha Climate Gateway" included important amendments to the Kyoto Protocol to establish a second commitment period and preserve a legally-binding top-down and rule-based system. For REDD+, the objectives of a work program to improve the effectiveness of REDD+ results-based finance were rolled over to be concluded by the next COP end-2013. This review will be led within the SBSTA, with a mandate to scale up and improve the effectiveness of finance for REDD+ activities, to initiate work on methodological issues to incentivize

[23] See www.stateredd.org

[24] REDD+ refers to the VCS project types Reducing Emissions from Deforestation and Forest Degradation and Improved Forest Management.

[25] See www.gcfund.net/home.html

[26] The SBSTA is a permanent subsidiary convention to the United Nations Framework Convention on Climate Change, providing timely information and advice on scientific and technological matters as they relate to the Convention or its Kyoto Protocol (see for further information http://unfccc.int/bodies/body/6399.php.

non-carbon benefits (such as biodiversity, water filtration and the engagement of forest peoples) and to address transfer payments for results-based action. Important REDD+ talks on measuring reporting and verification (MRV) and finance were also not concluded and will resume in 2013. Five major REDD+ donor countries proposed to increase funds flowing to REDD+ as long as certain verification requirements were met (UK, US, Germany, Norway and Australia)[27]. Still open from this latest COP is the question of the future market mechanism as a framework supportive for REDD+, though references to private sector participation and project level activities are supportive.

Market participants naturally want the timeline for international agreement on future binding targets sooner. The outcomes summarized above are putting in place a framework for future international compliance acceptance and increased private sector funding that will support development of end-user demand. However, announcements as to new national and sub-national initiatives in 2012 have meant that domestic efforts and multilateral accords have now overtaken the moment of the Kyoto process for achieving real cuts in emissions reductions.

Summarized below are assumptions used to assess potential international offset demand scenarios:

Table 2. Compliance Demand Scenarios – International Policy Under UNFCCC Post-2012 Phase

Potential Compliance Source	Inclusion of Forest and Land-Use Carbon and Assumptions Used	2013-2020 International Offset Demand Scenarios (Millions tons CO2e)		
		LOW	MID	HIGH
UNFCCC	Terra uses the assumptions of USAID / FCMC report entitled "Emerging Compliance Markets for REDD+: An Assessment of Supply and Demand"[28], whose analysis assumes a UNFCCC deal in place for 5 years from 2016-20. High Case assumes conditional pledges are honored by participating nation states and Mid Case assumes unconditional pledges are agreed. In the Mid Case, there is a 25% assumed cap on international offsets and a 10% cap on forest carbon credits allowed. In the High Case, there is 49% cap on international offsets and a 25% cap on forest carbon credits allowed.	0	278	2,382
TOTAL		**0**	**278**	**2,382**

Compliance Demand Driven by National and Regional Market Programs

While conclusions of international UNFCCC negotiations for next phase of the Kyoto Protocol remain uncertain, the number of national and sub-national programs that are including REDD+ is steadily increasing. A total of 30 market or results-based mechanisms that may create demand for carbon credits

[27] Ecosystem Marketplace (2012) *Forest Carbon News Brief 12 December* Accessed 19 December 2012 at http://www.ecosystemmarketplace.com/pages/dynamic/newsletter.page.php?page_id=9483&section=newsletters&eod=1

[28] See http://www.fcmcglobal.org/resources.html

are referenced in the extensive USAID / FCMC study *Emerging Compliance Markets for REDD+: An Assessment of Supply and Demand*[29].

The major bloc sources of compliance demand for forest carbon offsets are:

EU ETS - Launched in 2005, the EU ETS excluded forest-related carbon in the first two phases given a political focus on industrial efficiency initiatives during the design phase. Given EU leadership in global sustainable development initiatives, only the most pessimistic forecaster would exclude this sector in perpetuity. The EU is still calling for a 50% reduction in deforestation by 2020, and supporting the use of REDD+ verified emission reductions through investments in multilateral funds. In addition to policy statements on reducing deforestation by the EU, both Switzerland and the EU have added to efforts (started in Cancun) to include agriculture in the advisory board that counsels the Conference of the Parties on matters of climate, the environment, technology, and methodologies[30]. This would promote a broader future market for agricultural offsets, beyond those in the CDM[31].

US and Canada - In both US and Canada, Federal initiatives to enact climate policy have been rejected while progressive state (US) and provincial (Canada) measures have proven successful and now lead North American climate policy.

In California, the program regulator, the Air Resources Board (ARB) has acknowledged that forest and land-use carbon activities have a "unique capacity to sequester, store, and emit carbon dioxide and to facilitate the positive role that forests can play to address climate change". Protocols supporting the creation of offsets in U.S. forests and urban environments have already been approved and domestic agricultural methodologies are expected to be approved during 2013. The regulation stipulates that International REDD is a potential international sector-based offset type; the ARB has now initiated the work of the REDD Offset Working Group to develop a framework for the inclusion of an international REDD offset program, including public outreach in the process. The Group released draft recommendations for the linking of the states of California, Acre and Chiapas to develop the world's first sector-based, jurisdictional REDD offset program within a cap-and-trade compliance system[32].

In addition to creating demand for offsets from approximately ten mid-sized REDD carbon projects or programs, the California market is likely to lead the development of REDD compliance rules and give the first compliance market price signal for REDD. Thompson Reuters research estimates a significant

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[29] USAID / Forest Carbon, Markets and Communities (FCMC) (March 2013). *Emerging Compliance Markets for REDD+: An Assessment of Supply and Demand*. Accessed 18 April 2013 at http://www.fcmcglobal.org/resources.html

[30] The UNFCCC's Subsidiary Body for Scientific and Technological Advice (SBSTA).

[31] UN Environment Programme (May 2011). *REDDy, Set, Grow – Part 1: A Briefing for Financial Institutions.* Accessed 11 July 2011 at http://www.unepfi.org/fileadmin/documents/reddysetgrow_01.pdf.

[32] REDD Offset Working Group (January 2013). *Draft Recommendations to Conserve Tropical Rainforests, Protect Local Communities and Reduce State-Wide Greenhouse Gas Emissions* Accessed 24 January 2013 at www.stateredd.org.

shortage of supply of offsets by the third compliance period (2018-20)[33,34] and American Carbon Registry in conjunction with Winrock also forecast a 67% shortage of compliance offsets by the third compliance period (2018 - 2020)[35]. During the year, the REDD Offset Working Group will present its findings and the ARB is expected to announce approvals of additional offset protocols, including agricultural protocols, in the program.

Beyond California, the Western Climate Initiative (WCI) comprises four Canadian provinces in addition to California in the U.S. Each of these five regions has signed an agreement to use a market-based approach to reduce GHG emissions to 15% below 2005 levels by 2020. Quebec has confirmed adoption of a cap-and-trade regulation that would link with California, with obligations coming into force on 1 January 2013 and linkage approvals expected mid-2013[36]. British Columbia and Ontario and Manitoba are anticipated to join after the California and Quebec program launches. The World Bank estimates that a full WCI operation would lead to total potential offset demand of 94 million tCO_2e. The ceiling for international offsets coming into the system has not yet been announced.

The last position of U.S. Federal negotiations on climate change legislation drew significant political debate between the 2008 and 2009 Congresses. The House of Representatives approved the American Clean Energy and Security Act (Waxman-Markey Bill) in June 2009, but this was later rejected in the Senate. In November 2009, the Senate Environment and Public Works Committee approved the Clean Energy Jobs and American Power Act (Kerry-Boxer Bill) before Republican boycott led to its abandonment.

Both pieces of legislation were based on market-based cap-and-trade systems that would reduce greenhouse gas emissions against 2005 levels by 20% by 2020, and 83% by 2050. Should this kind of legislation be passed in the U.S., the value of the resulting markets has been estimated at $65-130 billion by 2015, and forest and land-use carbon was expected to play a significant role. The Kerry-Boxer bill targeted 720 million tons of annual emission reductions from deforestation in developing countries by 2020.

The U.S. EPA has taken a position that greenhouse gas emissions pose a health threat and under the 2009 Clean Air Act, it has powers to set standards for large sources and suppliers in the United States. EPA regulation can be seen as a "plan B" to U.S. Federal legislation and may directly or indirectly lead to

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[33] Point Carbon Thompson Reuters (2012). *Carbon Market Analyst: WCI Price Forecast – Show Me the Offsets (26 March).* Received in copy by Terra Global Capital. See www.pointcarbon.com for contact details.

[34] Point Carbon Thompson Reuters (2012). *California cap-and-trade: still a work-in-progress (3 October).* Received in copy by Terra Global Capital. See www.pointcarbon.com for contact details.

[35] Winrock International and American Carbon Registry (2012). *Compliance Offset Supply Forecast For California's Cap-and-Trade Program 2013-20.* Accessed 12 November 2012 at http://americancarbonregistry.org/acr-compliance-offset-supply-forecast-for-the-ca-cap-and-trade-program.

[36] Government of Quebec (December 2011). *Cap and Trade System for Greenhouse Gas Emissions Allowances* Accessed 16 April 2012 at http://www.mddep.gouv.qc.ca/changements/carbone/Systeme-plafonnement-droits-GES-en.htm

demand for offsets in the future. While President Obama increasingly avoided leading climate change debate during his first term, his second term January 2013 Inauguration Address signaled the issue as a more prominent aspect of his second term.

New Zealand Emissions Trading Scheme - The New Zealand Emissions Trading Scheme has included domestic forestry in its program since its inception in 2008[37]. Through it, certain forest landowners have incurred compliance obligations for emissions associated with deforestation, and others have generated carbon credits from afforestation activities. However, following the announced exit of New Zealand from the second commitment period of the Kyoto Protocol, New Zealand's position with respect to future international forest carbon demand is unclear. Given the Doha CMP 8 decision preventing Parties not engaged in the second commitment period from transferring or acquiring Kyoto units from 1st January 2013, it is not clear how the New Zealand ETS will engage in the international carbon market from 2013 onward[38].

Australian Emissions Trading Scheme - the Australian government has passed legislation in the Senate that establishes a carbon tax from July 2012. This carbon tax will then convert to an emissions trading program beginning in 2015, becoming the second largest program behind the EU. From 1 July 2015, allowance prices will float, subject to an initial ceiling of $20 per ton above an international benchmark (with ceiling set to increase). A link to international carbon markets is provided for from 2015[39] with the definition of eligible international emissions units including Kyoto Protocol units. A link to the EU ETS has been approved for implementation by July 2018. Under these international links, businesses will be able to use carbon units from the Australian emissions trading scheme or the EU ETS for compliance under either system. REDD+ credits issued under the UNFCCC or other foreign schemes approved will become "prescribed international units". Within the program, emitters are also allowed to meet up to 5% of compliance credits from a subsidiary domestic offset system designed specifically for the agriculture and forestry sectors[40]. In December 2011, an offset methodology was approved for credit generation from establishment and management of permanent native forests[41]. While still informal, the Australian government has been actively exploring the possibility of international offsets, specifically REDD, becoming part of their program in the future. Following the struggle to pass this legislation, it was interesting to observe the 2012 Carbon Disclosure Project's findings that Australian companies are

[37] Carbon Positive (August 2011). *New Zealand declares early ETS success.* Accessed 7 September 2011 at http://www.carbonpositive.net/viewarticle.aspx?articleID=2363

[38] CMP 8 Decision *Amendment to the Kyoto Protocol pursuant to its Article 3, paragraph 9*, paragraphs 13 and 15 (Decision number not assigned at the date of publication).

[39] Australian Government (September 2011). *Securing a Clean Energy Future (Chapter 3): Putting a Price on Carbon Pollution.* Accessed 7 September 2011 at http://www.cleanenergyfuture.gov.au/clean-energy-future/securing-a-clean-energy-future/#content04.

[40] Press Office of the Prime Minister of Australia (July 2011) *Putting a Price on Carbon Pollution* Accessed 15 August at http://www.pm.gov.au/press-office/putting-price-carbon-pollution.

[41] Point Carbon (December 2011) *Australia to award carbon credits for planting trees* Accessed 19 December 2011 at http://www.pointcarbon.com/news/1.1703103?&ref=searchlist.

"increasingly comfortable with carbon pricing" and 25% indicated that carbon pricing could create new opportunities[42].

Japan - Japan has since 2011 pursued a "third way" through its commitment to a bilateral offsetting scheme in absence of a binding international commitment. Such a program may look more like payment-for-performance, or evolve to resemble market-based systems like the California program. Announcements at the end of 2012 gave fresh indications as to the latter. Japan will in April 2013 launch a bilateral offset market that will allow Japanese firms to claim carbon emission reductions achieved in Indonesia[43] and announced common carbon offset markets with Mongolia and Vietnam[44].

Other National Programs In Development – South Korea is the latest nation to legislate a national emissions trading scheme having overcome strong industry opposition with bipartisan support across lawmakers. The program will start January 2015, driven by the pledge in the *Framework Act on Low Carbon and Green Growth* to reduce GHG emissions by 30% below business-as-usual levels by 2020. Countries within Latin America, specifically Colombia and Brazil[45], have also recently shown movements towards domestic cap-and-trade schemes. A consortium of governments, multilateral organizations, and the Colombian Mercantile Exchange is establishing a voluntary market platform for trading emissions reductions[46]. A law recently passed in Brazil listed a domestic emissions trading scheme as a viable option for the country to reduce their emissions[47] and the States of Rio de Janeiro and Sao Paolo are assessing the potential for regional emissions trading markets. In Asia, China has included the aspiration for comprehensive climate change legislation in the 12th Five-Year Plan, with carbon trading programs being piloted in seven cities and provinces. A draft bill allows for emissions trading as well as a carbon tax but is not expected to become law for at least three years[48].

To aggregate the potential demand from national and regional carbon market programs, summarized on the following page are scenarios projecting potential compliance demand for REDD+ offsets drawing on

[42] Carbon Disclosure Project (2012). *CDP Australia and New Zealand Climate Change Report 2012.* Accessed 12 November 2012 at https://www.cdproject.net/CDPResults/CDP-Australia-NZ-Climate-Change-Report-2012.pdf

[43] Advanced Global Trading (2012) *Japan eyes April start for Indonesia offset market.* Accessed 14 November at http://advancedglobaltrading.com/japan-eyes-april-start-for-indonesia-offset-market/#.UKQfboc8B8E.

[44] Point Carbon (11 December 2012). *Japan, Mongolia agree common carbon offset market.* Accessed 11 December 2012 at http://www.pointcarbon.com/news/1.2096265 and News VietNamNet (7 December 2012) *VN aims to join global carbon market.* Accessed 7 December 2012 at http://english.vietnamnet.vn/fms/environment/53158/vn-aims-to-join-global-carbon-market.html

[45] "Environment: Climate Change" within Brazilian government website (2012). Accessed May 8, 2012 at http://www.brasil.gov.br/sobre/environment/climate-change/climate-change/br_template_completo?set_language=en

[46] Point Carbon (September 2011). *Colombia eyes CO2 markets to tackle sectoral emissions.* Accessed 22 November 2011 at http://www.pointcarbon.com/news/1.1574608

[47] Point Carbon (May 2010). *Brazil considers a domestic market.* Accessed 21 November 2011 at http://www.pointcarbon.com/news/1.1442709

[48] Stockholm Environment Institute and FORES (2012). *China's Carbon Emissions Trading: An Overview of Current Development*. Accessed 20 January 2013 at http://www.sei-international.org/mediamanager/documents/Publications/china-cluster/SEI-FORES-2012-China-Carbon-Emissions.pdf

assumptions used in the World Bank's comprehensive *State and Trends of the Carbon Market 2012* report[49], and USAID's *Emerging Compliance Markets for REDD+*[50] report prepared by Terra for FCMC:

Table 3. Compliance Demand Scenarios – National and Regional Emissions Trading Programs

Potential Compliance Source	Inclusion of Forest and Land-Use Carbon And Potential Demand Assumptions Used	2013-2020 Forest Carbon - Demand Scenarios[51] (million tons CO2e)		
		LOW	MID	HIGH
European Union (EU)[52]	Currently excluded, though EU is expected to consider forest and land-use carbon in context of a post-Kyoto, global agreement. Terra excludes EU in the mid-case, but includes in the high case with a probability discount of 50% applied to the 30% conditional EU emission reduction target. Terra uses assumptions of the World Bank (2012) who estimate 3,500 MtCO2e of international offset demand assuming a global agreement and 30% emissions reduction target. In the high case, we assume a 25% cap on forest carbon allowance within international offsets.	0	0	875
US	Following request from a prospective investor to understand a golden scenario, we include conservative annual demand for 0.5 billion tons annually for 2015 – 2020[53]. For this to occur, the US political landscape would have to return to consider federal cap-and-trade on the same terms as the failed 2010 American Power Act (APA). The Mid Case is the latest World Bank projection of US state-level demand. The High Case is Terra's calculation based on the APA and volume analysis from the US EPA[54], both applying a 25% allowance cap for forest carbon.	0	24	1,563
Australia	Prospective international offsets rules may allow use of REDD+ credits (with a ceiling) if a UNFCCC REDD+ mechanism is successful. Terra uses assumptions of USAID / FCMC (see footnote 29) applying limit adjustments to the government's demand estimate for international credits (348 million) from 2015-2020 driven by international and domestic approval assumptions. The mid-case assumes REDD+ absorbs up to 10% of international demand and high case assumes REDD+ credits absorb 50% of international demand.	0	35	174
New Zealand	In the event of a global agreement, New Zealand is likely a net buyer of international credits the potential demand for which will be partly determined by alternative sources of international offsets and quantitative limits on the inclusion of REDD+ credits. Mid-case assumes credits are allowed with a 10% cap on REDD and high case assumes REDD+ credits absorbs 50% of high-end of forecast supply shortfall. Given the link to a UNFCCC deal, only years 2016-20 are included.	0	75	105
Japan	Terra references the assumptions of the World Bank (2012) which estimates up to 539 MtCO2e demand for international offsets, including through its bilateral mechanism. Applying the assumptions used in USAID / FCMC (2013) as referenced in footnote 29, the low case estimate assumes Japan sources international credits from other sectors and the mid case assumes the World Bank (2012) volume with an assumed forest carbon ceiling of 10%. The high case assumes a 25% forest carbon ceiling.	0	54	135
TOTAL		**0**	**188**	**2,852**

[49] World Bank (2012). *State and Trends of the Carbon Market 2012* Table 12, p.16 and Annex 8, p.122. Accessed 12 November at http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/State_and_Trends_2012_Web_Optimized_19035_Cvr&Txt_LR.pdf

[50] USAID study *Emerging Compliance Markets for REDD+: An Assessment of Supply and Demand* (not yet publicly released, though will be available on request from Terra)

[51] Or shorter timespan within this horizon as specified.

[52] The EU Emission Trading System (ETS) operates in the 27 EU member states plus Iceland, Liechtenstein and Norway. Given its geography, Switzerland has been included in this bloc as a ratified signatory to the UNFCCC and given its objective to link with the EU ETS in 2013.

[53] See for further detail US Environmental Protection Agency (14 June 2010). *EPA Analysis of the American Power Act. Accessed online (25 January 2013) at* http://www.epa.gov/climatechange/Downloads/EPAactivities/EPA_APA_Analysis_6-14-10.pdf

[54] http://www.epa.gov/climatechange/Downloads/EPAactivities/EPA_APA_Analysis_6-14-10.pdf

Public Funding Stimulating Quasi-Market Demand

Between 2008 and 2012, public sector REDD+ financing has been estimated to reach approximately $7 billion, sustaining at $1.3-1.5 billion per annum during the 2010-2012 period.[55] There are currently ten major multilateral and bilateral funding initiatives supporting REDD+ readiness and capacity-building and mitigation implementation worldwide[56]. Of these, two sources of demand are already active in the market: the World Bank's Forest Carbon Partnership Fund ("FCPF") and Germany's REDD Early Movers Fund ("REM"). Such funds often adopt a payment-for-performance approach to financing, with funding allocations being contingent on achievement of a certain amount of verified emissions reductions. This quasi-market may only develop in the context of bilateral agreements at government and multilateral fund level, but still offers an implied value on a ton of verified emission reduction from land-use change.

The FCPF is a two-part facility - combining a Readiness Fund and a Carbon Fund for emission reduction purchases - to build developing country capacity for REDD+ readiness and to pilot a program of payments for reduced emissions. As of June 2012, donors have collectively pledged approximately $239 million to the Readiness Fund, and $390 million to the Carbon Fund. The REM was mandated by the Ministry for Economic Cooperation and Development who commissioned KfW and the Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) to implement a fund supporting pioneers in the REDD+ sector i.e. countries that are taking risks and acting independently towards mitigating climate change through preserving their forests. Norway, Switzerland and Denmark are reported to be considering similar vehicles[57].

USAID / FCMC's extensive *Emerging Compliance Markets for REDD+: An Assessment of Supply and Demand* (as referenced in footnote 29) includes estimates of demand generated by both of these active funds:

[55] Simula, M (2010) *Analysis of REDD+ Financing Gaps and Overlaps REDD+*. December 2010, accessed October 31, 2011 at http://reddpluspartnership.org/25159-09eb378a8444ec149e8ab32e2f5671b11.pdf

[56] Overseas Development Institute (November 2011). *Climate Finance Fundamentals – REDD-plus Finance Brief. 5* Accessed 24 December 2012 at http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/7472.pdf and Nicholas Institute for Environmental Policy Solutions (February 2011). *Demand for REDD Carbon Credits: A Primer on Buyers, Markets, and Factors Impacting Prices* Accessed 12 July 2011 at http://nicholasinstitute.duke.edu/economics/naturalresources/demand-for-redd-carbon-credits

[57] Terra Global Capital discussion with Carbon Market Investors Association and ClimateFundsUpdate.org. Accessed 11 July 2011 at http://www.climatefundsupdate.org/listing/international-climate-fund

Table 4. Demand Scenarios - Public Funding Stimulating Quasi-Market Demand

Potential Multilateral Fund Source	Potential Demand Assumption Used	2013-2020 International Offset Demand Scenarios (Millions tons CO2e)		
		LOW	MID	HIGH
World Bank FCPF	USAID / FCMC as referenced in footnote 29 estimates 10-41 million tons of potential demand as a function of funds allocated to Emissions Reductions Purchase Agreements and price paid per ton, using a wide range of price assumptions: $5 (low), $10 (mid) and $20 (high).	10	20	41
REDD Early Movers Fund	REM Fund has a performance-based mandate to direct payments to emissions reductions accounted using a proven methodology and verified by an independent auditor. USAID / FCMC as referenced in footnote 29 takes the approach of divided total contributions committed to the REM Fund by price, using the same assumptions as FCPF above: $5 (low), $10 (mid) and $20 (high).	2	4	8
TOTAL		**12**	**24**	**49**

The Green Climate Fund may be a further source of demand. As introduced in the first part of this paper, the COP established the Green Climate Fund as a financial mechanism with a goal to raise $100 billion by 2020[58]. It is specified that REDD+ qualifies for adaptation and mitigation funding from the fund, and results-based financing is mentioned as an important criterion for allocating fund resources. REDD is allowed for in this Fund's investment strategy though capital that will be potentially deployed to REDD+ has yet to be determined, and so this vehicle is excluded from demand scenarios.

Outside of such active market development fund initiatives, many donor programs are supporting the concept of a forest carbon market and beginning to generate demand through applying a "payment for GHG reduction performance" structure. Norway has led this type of engagement through its Overseas Development Assistance (ODA) community in the sector, linking the disbursement of $1 billion funding to verified emissions reductions[59]. The Norwegian International Climate and Forest Initiative funds several bilateral and multilateral efforts aimed at reducing deforestation and testing results-based payment. When structures distribute donor funds to either governments or projects within REDD+ host countries based on verified emission reductions, they provide a signal as to the verified emission reduction that may be earned by investors.

Other countries participating in development funding-led initiatives include the United States, Germany, and the United Kingdom. USAID, for example, has issued RFPs for more than 15 major forest carbon programs since the beginning of 2009. These solicitations focus upon the preparation of national public and private sector capacities for private finance and market-based systems, as specified in the U.S. government's "Strategic Choices for United States Fast Start Financing for REDD+", issued in October

[58] See www.gcfund.net/home.html

[59] Site of Royal Norwegian Embassy, Jakarta. Accessed 12 July 2011 at http://www.norway.or.id/Norway_in_Indonesia/Environment/-FAQ-Norway-Indonesia-REDD-Partnership-/

2010. The UK's "International Climate Fund" was established in 2010 by three government departments and has reportedly ear-marked £600 million for results-based investment into REDD+ programs (no further information available on structures).

Established and Growing Voluntary Demand for Land-use Carbon

Forest carbon offset project and program activities were first conceived prior to the prospect of regulatory frameworks and were spurred by the initiatives of NGOs and corporations. This "voluntary" market is extremely small against current volumes in compliance markets, but has experienced rapid growth during the last decade with no significant decline during the 2008-9 financial crisis. The 2012 State of the Voluntary Carbon Market and the State of the Forest Carbon Market[60] reports provide extensive data as to voluntary carbon market demand and the specifics of forest carbon demand; both are recommended reading in providing very detailed profiles of these markets[61].

The most recent data shows a 36% growth rate leading to the value of voluntary market carbon transactions reaching $576 million in 2011[62]. Through this growth, the voluntary market has gained recognition as measurement and monitoring capabilities have improved, and the adoption of robust standards addressing additionality, permanence and leakage risks[63,64]. In 2011, forest and land-use carbon activities accounted for 23% of the volume of voluntary over-the-counter market during the year, with Afforestation/Reforestation (10%) and REDD (9%) dominating over Improved Forest Management (4%)[65]. Total transacted volumes fell across the voluntary market as a whole, following highs in 2008 and 2010, though price gains supported achieving a new high in market value[66]. The forest carbon market followed the same trends, with a 33% increase in value (to $237 million) driven by new price levels masking a fall in volumes as issuance from new activities slowed.

The annual growth rate of the voluntary forest carbon market since 2002 has been 64%, over double the growth rate of the total voluntary market which has grown at 27% per annum. In estimating future voluntary market size, Terra has assumed three growth scenarios from 2011 forest carbon market transaction volume of 26 million tCO_2e as a base:

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[60] Ecosystem Marketplace (2012). State of the Forest Carbon Markets 2012 Accessed 12 November 2012 at http://www.forestcarbonportal.com/content/leveraging-landscape-state-forest-carbon-market-2012

[61] Ecosystem Marketplace (2011) *State of the Forest Carbon Markets 2011*. Accessed 11 November 2011 at http://www.forest-trends.org/documents/files/doc_2963.pdf

[62] Ecosystem Marketplace and Bloomberg New Energy Finance (2012) *State of the Voluntary Carbon Markets 2012*, p.13. Accessed at http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=9405&section=our_publications&eod=1 and Ecosystem Marketplace (2012).

[63] Ecosecurities (2010*). The forest carbon offsetting report 2010.* Accessed 11 July 2011 at http://www.ecosecurities.com/Standalone/Forest_carbon_offsetting_report_2010/default.aspx

[64] Additionality is the concept that emissions reductions can be directly attributed to the carbon offset project and would not otherwise occur. Permanence refers to protection or insurance against offsets already generated becoming invalid due to forest damage, and non-leakage refers to the avoidance of a project's actions leading to the increase of emissions in other areas or activities.

[65] Ecosystem Marketplace and Bloomberg New Energy Finance (2012) *State of the Voluntary Carbon Markets 2012*, p.17. Accessed at http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=9405&section=our_publications&eod=1

[66] Ibid, p.3

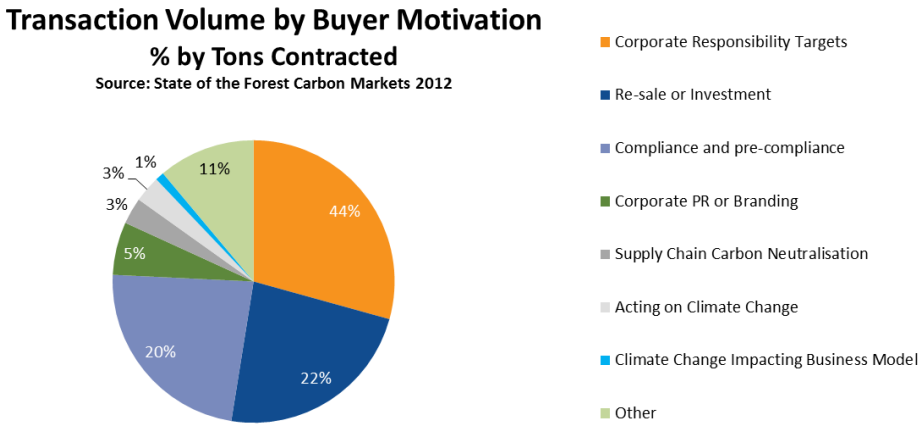
Table 5. Projection of Voluntary and Pre-compliance Forest Carbon Demand and Market Value Under Three Growth Rates

Demand Source	Inclusion of Forest and Land-Use Carbon And Potential Demand Assumptions Used	2013-2020 International Offset Demand Scenarios (Millions tons CO2e)		
		LOW	MID	HIGH
Voluntary and Pre-Compliance Markets	Slow, intermediate and high growth rate assumptions are applied to a 2011 voluntary forest carbon market base (actual). Slow and intermediate assumptions of 5% and 20% growth are notional and conservative, against historic growth rates. The high growth rate assumption is based on historic growth rate of the voluntary forest carbon market.	283	730	1,805
TOTAL		**283**	**730**	**1,805**

The profile of voluntary market buyers reported in the annual *State of the Voluntary Carbon Markets* reports has changed over the last three years in favor of "pre-compliance" motivated purchases: corporates and intermediary speculators taking positions to build experience in carbon offsets, to acquire at prices discounted for uncertainty.

Within forest carbon markets, the buyer survey for *State of the Forest Carbon Markets 2012* reported than 23% of demand was motivated by compliance needs or "pre-compliance" positioning. Speculative buying for investment or re-sale accounted for the same level. Both were surpassed only by purchasing to meet corporate CSR targets (44%)[67] as presented below. Note that extensive buyer composition data is presented in the *State of the Forest Carbon Markets 2012* and readers are encouraged to access this document in developing an understanding of demand.

Figure 1. Transaction Volume by Buyer Motivation



[67] Ecosystem Marketplace (2012), p. 46. *Leveraging the Landscape: State of the Forest Carbon Markets 2012.* Accessed 24 December 2012 at http://www.forest-trends.org/documents/files/doc_3242.pdf

In addition, government buying with a voluntary motivation is a small but very important new indicator in the market. Voluntary actions by governments signal the laying of groundwork for domestic GHG regulation as seen through the effective national programs such as the Verified Emissions Reduction programs of South Korea and Japan, and regional programs including the Government of British Columbia's Carbon Neutrality program and the California Cap and Trade Program and Oregon Carbon Dioxide Standard.

Ecosystem Marketplace has released an important report profiling such government programs that directly or indirectly drive demand in the voluntary markets[68]. The report identifies more than 20 national or sub-national governmental agencies that have incorporated voluntary climate-change solutions into their formal strategies and are leveraging voluntary carbon market mechanisms to "supplement or underpin future regulations".

By geography, European buyers were the largest source of demand for voluntary carbon credits, and the most active as voluntary actions were viewed as complementary to regulatory obligations. European buyers transacted 51% of forest carbon volume (where reported)[69].

Total Market Demand Projections for Land-use Carbon

Compliance and voluntary market growth assumptions must be aggregated to derive a complete view of market demand for forest carbon offsets over the 2013-2020 timeframe. However, to simply sum these values would ignore that there is a relationship between the two markets: some of the observed growth in the "voluntary market" is pre-compliance demand. This pre-compliance demand will shift to compliance demand as regulatory programs become operational. And so, defining pure voluntary demand growth (buyers motivated by social and environmental responsibility rather than regulation) requires discounting assumed growth in pre-compliance buyers.

Voluntary market estimates introduced above are therefore adjusted to discount growth in pre-compliance demand. As such, the 2011 base volume of 26 $MtCO_2e$ is reduced to 20.8 $MtCO_2e$, based on an estimated 20% pre-compliance demand in the current market. This leads to lower predicted voluntary demand in the *intermediate* (20% growth) and *historic* (35% growth) scenarios. This adjustment was not applied to the slow growth scenario (5%) which already represents weak compliance market activity as a source of demand.

In aggregate, demand scenarios for forest and land-use carbon between 2013-20 are collated below:

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[68] Forest Trends Ecosystem Marketplace (2012) *Bringing It Home: Taking Stock of Government Engagement with The Voluntary Carbon Market.* Accessed 1 April 2012 at http://www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=8922&section=news_articles&eod=1

[69] Ecosystem Marketplace (2012), p. 47. *Leveraging the Landscape: State of the Forest Carbon Markets 2012.* Accessed 24 December 2012 at http://www.forest-trends.org/documents/files/doc_3242.pdf

Table 6. Compliance Demand Scenarios – International Policy Under UNFCCC Post-2012 Phase

Demand Source	2013-2020 International Offset Demand Scenarios (million tons CO2e)		
	LOW	MID	HIGH
Compliance - UNFCCC	0	278	2,382
Compliance – National and Regional	0	188	2,852
Multilateral Funds	12	24	49
Voluntary / Pre-Compliance (discounted)	283	584	1,444
TOTAL	**295**	**1,074**	**6,727**

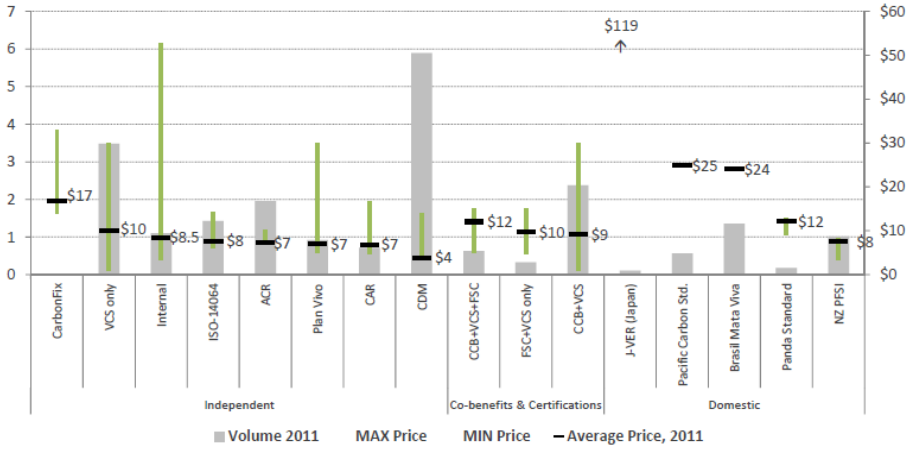
Forest and Land-Use Carbon Price Data

The State of the Forest Carbon Market Report 2012 and market brokerage data provide a range of sources for transacted and anticipated forest and land-use carbon prices.

The State of the Forest Carbon Market Report 2012 collates primary and secondary transaction information including price data[70]. As may be expected for a global emerging sector, prices vary widely as a function of differentiating project or program characteristics, buyer motivations and transaction structures. The report summarizes price data in a distribution chart that is copied below. A note to the chart comments on the early and illiquid state of the market in reminding that "no project variable by itself - from project location to type to size – has a statistically significant impact on the forest carbon credit price", and this is found with respect to use of co-benefits standards also (contrary to common belief of a price premium). Comparing 2011 with 2010 average prices reveals a 156% increase for the bellwether VCS standard offsets, owing to higher prices across all VCS activity types and a series of British Columbia government purchases at $25 per ton.

[70] Primary market transactions refer to credits acquired directly from a project while the secondary market refers to credits acquired from another buyer rather than directly from the project.

Figure 2. Price and Volume Distribution by Certification Standard (MtCO2e and Million $US) in 2011



The detail to the left focuses on the leading Verified Carbon Standard, which accounted 45% of total forest carbon volume contracted in 2011. VCS only average price is $10 per ton (horizontal line) within a <$1 to $25 per ton range. Note that the grey bars represent volume (left axis) in $MtCO_2e$. The center and right bars represent offsets that are dual- or triple-validated in combination with the Climate Community and Biodiversity standard and the Forest Stewardship Council (FSC) certification.

Sector Participants and Industry Development

The number of financial, legal and consulting companies engaged in the land-use sector has grown rapidly in recent years: this is an indication of the expected depth of the future forest and land-use carbon industry.

In the financial community, three global investment banks have been actively involved in land-use carbon activities for investment (and believed to be outsourcing project and program development and services, rather than using an in-house development and management model). Merrill Lynch agreed a structured investment deal with the Government of Aceh, Indonesia to acquire credits from an Indonesian project. The World Bank has two public-private funds mobilizing resources into pilot projects and programs. Investment Banks with trading desks include Barclays Capital, Deutsche Bank and Société Générale and a small community of specialist brokerages, including market leaders such as Evolution Markets, TFS (TFS Green), MF Global and BGC Partners. The possibility of increasing private sector capital flows to the sector through packaging future payment streams into bonds is being assessed by a number of banks.

Leading global law firms including Hunton & Williams, Norton Rose, Dentons, and Baker & McKenzie have climate and carbon market-focused practices that include experienced advisers in legal issues relating to forest and land-use carbon. Of the "Big Four" auditors, Ernst & Young, PWC, Deloitte and KPMG, all now have climate change practices and offer differing levels of tax / audit / fund service provider advisory services.

Insurance products are also in development, led by OPIC and Terra Global Capital's recent announcement of what is believed to be the first political risk insurance contract on a REDD+ project or program, but including also UK-based Forest Re.

Outlook for Early-Stage Land-use Carbon Investment Opportunities

Forest and land-use carbon is an early-stage sector with increasing economic, policy and scientific fundamentals that will work in favor of its future growth. This is particularly evident in the number of national emissions trading programs announced in the last year. The opportunities and challenges for investors in the sector are not unique. Comparison with the clean technology sector is valid in that both sectors require upfront project finance in return with long-term repayment profiles linked to payments for assets whose value is driven by low carbon policies and sustainability trends in consumer demand. Leadership in the development of the market continues to shift between the international and regional arenas. Continued fragmented growth over the next 1-2 years should inevitably lead to an overreaching international framework on a 2-5 year time scale. But the absence of a global framework will offer opportunities to investors with the ability to navigate the multiple emerging markets and manage the technical complexity associated with developing and verifying land-use carbon offsets.

Governments around the world have already engaged in forest carbon initiatives through i) implementation of laws and regulations that define rights and ownership, ii) fiscal mechanisms like taxes or payments that reduce incentives to deforest and iii) public management and investment in activities that promote markets that value REDD+ offsets iv) early initiatives to develop market-friendly frameworks. The private sector has grown with these advancements and is now poised to harness the existing momentum in order to establish itself as an integral part of the climate change solution from forest carbon activities.

This growth will not arrive in a "big bang" but its elements will develop slowly over time to build on the recent momentum in this new market, and will offer early investors the opportunity to capture attractive returns.

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