



# 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*





Terra Global Capital, LLC was founded in 2006 with the objective of building a market for community-based forest and land-use carbon projects that provide sustainable livelihoods to communities. As a group, TGC has more global experience in the land-use sector than any other entity and employs a collaborative and participatory approach with its local developing country partners that builds capacity and empowers local people to sustainably manage their land. Terra Global Investment Management, LLC (TGIM) was formed in 2010 to provide private capital to community based land-use carbon projects. TGIM is a subsidiary of Terra Global Capital, LLC.

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## **The Emerging Market for Forest and Land-Use Carbon**

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## 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<sup>1</sup>. These negative climate change impacts are expected to cost the world between 5% and 20%<sup>2</sup> in GDP annually beginning in 2011 and thereafter.

Forest and land-use change contribute significantly 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%<sup>3</sup>. 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<sub>2</sub>) emissions of the U.S. or China<sup>4</sup> (given that the current GHG emissions are almost equal). A study recently released by a large group of leading climate scientists<sup>5</sup> 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 from the land-use sector. And the sector is core to effective sustainable development: economic benefits from forest and land-use carbon 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, all important "co-benefits".

Without action, greenhouse gas emissions are expected to rise to 66 GtCO<sub>2</sub>e<sup>6</sup> (gigatonnes of carbon dioxide equivalent) per annum by 2030 - a trajectory well in excess of the maximum 50 GtCO<sub>2</sub>e per annum possible to maintain global temperature rise of less than 2°C above pre-industrial levels<sup>7</sup>. Beyond

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<sup>1</sup> UNFCCC (UN Framework Convention on Climate Change). *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](http://unfccc.int/press/fact_sheets/items/4976.php)

<sup>2</sup> 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](http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/stern_review_report.htm)

<sup>3</sup> 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](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf)

<sup>4</sup> 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>

<sup>5</sup> 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](http://www.globalcarbonproject.org/global/pdf/pep/Pan.etal.science.Forest_Sink.pdf)

<sup>6</sup> CO<sub>2</sub>e 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

<sup>7</sup> 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](http://www.mckinsey.com/en/Client_Service/Sustainability/Latest_thinking/Costcurves.aspx)

this level, the UNFCCC projects that it will become too difficult to stabilize global temperature at a level that does not risk more severe climate impacts<sup>8</sup> with high global economic and social costs.

The UK government's Eliasch Review<sup>9</sup> identifies that these required reductions are only achievable through halving deforestation by 2020. The forestry sector alone, including projects that Reduce Emissions from Deforestation and Forest Degradation (REDD<sup>10</sup>), can contribute up to 12.5 GtCO<sub>2</sub>e in emission reductions per year<sup>11</sup>:

### **GHG Emissions Potential by Sector**

GHG Emission Reduction Potential Per Year, 2030 (GtCO <sub>2</sub> e)			
Sector	Annex I	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 projects is one of the lowest options at US\$2-7<sup>12</sup> per tonne. Thus, the policy driver for land-use change as a mitigation option exists, and the relative affordability of forest carbon activities make the sector an attractive investment opportunity.

### **Market-based Approaches Drive Required Investment Capital**

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<sup>13</sup> will require funding of \$17-\$28 billion per year, yet funding levels through public

<sup>8</sup> 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](http://www.ipcc.ch/publications_and_data/ar4/syr/en/spms5.html)

<sup>9</sup> 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>

<sup>10</sup> 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>

<sup>11</sup> 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>

<sup>12</sup> Stern N (2009). *A Blueprint for a Safer Planet* New York, NY, Random House

<sup>13</sup> 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>

finance agreements currently amount to only \$4.5 billion for 2010-12<sup>14</sup>. Public sources do not have the capacity to close this significant gap.

Private sector interest is increasing with growing business and consumer support for offsetting as a market-based mechanism that attributes value to forest preservation. A 2008 survey by the Economist magazine cited that 95% of corporations recognize the importance of addressing the public expectation that businesses act in a more socially-responsible way. It identifies climate change as the dominant driver of recent growth in the Corporate Social Responsibility (CSR) industry, whose growth has then driven demand for forest carbon offsetting.

The Ecoscurities Forest Carbon Offsetting Report 2010 (drawing on respondents that are predominantly end-users and intermediaries) presents strong data that points to the i) positive trends to source offsets from forestry, particularly in Europe, ii) increasing demand from the future global and U.S. regulatory programs and iii) strong interest in forestry offsets that is being driven by their social, biodiversity and other environmental benefits<sup>15</sup>. Capital flows to the sector in 2010 support these findings with \$76 million<sup>16</sup> in upfront investments being made through pre-paid forward sales and related contracts for future forest carbon investments estimated to be \$760 million.

Developing REDD as a market mechanism challenges the traditional development paradigm and requires a reversal of what in the past has been referred to as an “intractable antagonism”, characterized by misaligned interests, on the part of capitalists toward the natural world<sup>17</sup>. And it is not surprising that the conflicting dynamics of markets, being both the cause (demand for timber, increased agriculture, etc.) and yet the potential solution to deforestation, has caused profound policy debate. But today, momentum remains strongly in favor of market-based policies that are critical to cost-effective environmental protection and the recognition of the economic value of REDD<sup>18</sup>.

## Policy-driven Demand for Land-use Carbon Emerging from Multiple Sources

The dominant source of future demand for forest and land-use carbon offsets will come from national and international policy initiatives. This driver is already becoming evident, with 2010 survey data

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<sup>14</sup> Asian Development Bank (2010). *National REDD+ Strategies in Asia and the Pacific Progress and Challenges*. Accessed 12 July at <http://www.adb.org/documents/reports/national-redd-strategies/national-redd-strategies.pdf>

<sup>15</sup> Ecoscurities (2010). *The forest carbon offsetting report 2010*. Accessed 11 July 2011 at [http://www.ecoscurities.com/Standalone/Forest\\_carbon\\_offsetting\\_report\\_2010/default.aspx](http://www.ecoscurities.com/Standalone/Forest_carbon_offsetting_report_2010/default.aspx)

<sup>16</sup> Ecosystem Marketplace / Bloomberg New Energy Finance (2011). *State of the Voluntary Carbon Markets 2011*. Accessed 12 July 2011 at [http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page\\_id=8351&section=our\\_publications&eod=1](http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=8351&section=our_publications&eod=1)

<sup>17</sup> 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>

<sup>18</sup> 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>

identifying that i) 23% of total voluntary market transactions were driven by “pre-compliance” positioning in 2010<sup>19</sup>, with nearly half of this demand emanating from Europe and ii) in the North American California Climate Action Registry<sup>20</sup>, 74% of emissions reductions were transacted for “pre-compliance” purposes.

### International Policy under UNFCCC for Post-2012 Phase

At the UNFCCC’s most recent Conference of the Parties (COP) in Cancun 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. This announcement sent a strong signal to prospective investors and project developers that REDD will be central to future international efforts to combat climate change. The agreement also laid the foundation for future market mechanisms as it urges - but does not commit - developed countries to support “results-based” REDD host country programs and demonstration activities. In terms of next steps, the agreements specified that the establishment of one or more market mechanisms will be considered at the 17<sup>th</sup> COP in Durban in 2011.

In the World Bank’s Carbon Finance Unit 2011 survey of market participants<sup>21</sup>, respondents were not optimistic that a binding agreement would be reached in the short-term. But they believed that a binding agreement was possible in the medium-term and that the absence of international frameworks “should not impede countries from continuing to act”. The Ecosystems Forest Carbon Offsetting Report revealed similar attitudes: 2010 found that 83% of respondents found it “highly desirable” (64%) or “desirable” (19%) that forestry activities including REDD should be included in the major regulatory frameworks

### A Nexus of National and Regional Initiatives will Drive Land-use Demand

While conclusions of international UNFCCC negotiations for the phase post-2012 remain uncertain, the number of national and sub-national programs that are including REDD is increasing. The table below summarizes the most likely sources of demand for developing country offsets of which land-use will be a subset. The structure and data for this analysis is taken from the World Bank’s comprehensive *State and Trends of the Carbon Market 2011* Report<sup>22</sup>.

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<sup>19</sup> Ecosystem Marketplace / Bloomberg New Energy Finance (2011). *State of the Voluntary Carbon Markets 2011*. Accessed 12 July 2011 at [http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page\\_id=8351&section=our\\_publications&eod=1](http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=8351&section=our_publications&eod=1)

<sup>20</sup> The California Climate Action Registry was created by the State of California in 2001 to address climate change through voluntary calculation and public reporting of emissions

<sup>21</sup> World Bank (2011). *State and Trends of the Carbon Market 2011*. Accessed 12 July 2011 at [http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend\\_LowRes.pdf](http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend_LowRes.pdf)

<sup>22</sup> World Bank (2011). *State and Trends of the Carbon Market 2011*. Accessed 12 July 2011 at [http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend\\_LowRes.pdf](http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend_LowRes.pdf)

**Projected Demand for Offsets from Non-Annex I Countries 2013 – 2020 (Source: World Bank<sup>23</sup>)**

Demand Source	Status of Program Development	Inclusion of Forest and Land-Use Carbon	Demand 2013 - 2020 (MtCO <sub>2</sub> e) <sup>24</sup>
<b>EU Emission Trading Scheme (ETS)</b>	Active market since 2005, though excludes forestry-related offsets. Proposed target is 20% emission reduction against 1990 levels by 2020, potentially increasing to 30% if an international agreement is achieved.	Currently excluded, though EU is expected to consider forest and land-use carbon in context of a post-Kyoto, global agreement.	1,750 – 2,550
<b>New Zealand Emission Trading Scheme</b>	Active market since launch in July 2010. Proposed target is 10-20% reduction against 1990 levels by 2020.	Currently only domestic offsets are allowed from afforestation, reforestation and REDD. These can be converted into permanent UN credits known as AAUs, creating a first link to the international market.	77 – 106
<b>Australia</b>	Recently passed law establishes cap-and-trade from July 2015. Proposed 2020 target is 5% reduction against 2000 levels. Design features signal intention to link with international markets.	International emissions units will be eligible for up to 50% of regulated entity compliance from 2015-2020. Between 2012-2015, domestic Carbon Farming Initiative offsets (agriculture and forestry) may be used for 5% of compliance.	516 – 637
<b>Japan</b>	Emissions reduction target to achieve a 25% cut against 1990 levels by 2020.	Japan now moving forward with bilateral agreements. Japan has earmarked ¥5.2 billion in its fiscal 2011 budget to promote the scheme through feasibility studies and pilot projects; four of the five offset pilot projects selected to receive government funding are international REDD projects <sup>25,26,27</sup> .	539
<b>U.S. &amp; Canada – California and Western Climate Initiative (WCI)</b>	Federal draft legislation would have driven significant demand for REDD, and while approved by House of Representatives, did not pass through the Senate. The California Cap-and-Trade program commences in 2012 and British Columbia and Quebec are also working to start programs in 2012.	California will become the second largest emissions market and has specified inclusion of REDD (rule-making to commence likely next year). WCI has indicated that it will allow offsets, but has not yet specified the level of forest inclusion. Taking the most recent bill, a Federal program would stimulate significant demand not included in the offset volume estimate presented here. See below for further comments on each program.	12 – 24
<b>TOTAL PROJECTED OFFSET DEMAND (MtCO<sub>2</sub>e) WORLD BANK SCENARIO RANGES 1 and 2 (2013 – 2020)</b>			<b>2,922 – 3,911</b>

<sup>23</sup> World Bank (2011). *State and Trends of the Carbon Market 2011.1* Accessed 12 July 2011 at [http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend\\_LowRes.pdf](http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend_LowRes.pdf)

<sup>24</sup> Metric tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e)

<sup>25</sup> Point Carbon (2011). Japan favours REDD in latest offset funding awards. Accessed 16 July 2011 at <http://www.pointcarbon.com/news/1.1567447>

<sup>26</sup> Climate Connect (5 June 2011). *Supply of post-2012 emission reduction instruments twice as much in 2008-12: World Bank Report*. Accessed 11 July 2011 at <http://www.climate-connect.co.uk/Home/?a=node/721>

<sup>27</sup> Point Carbon (21 June 2011). *Japan solicits 'REDD+' projects under bilateral scheme*. Accessed 11 July 2011 at <http://www.pointcarbon.com/news/1.1551722>

The demand ranges presented in the right-hand column above represent low- and high-end potential offset demand (cumulative) from 2013 to 2020 resulting from World Bank scenarios: Scenario 1 reflects implementation of enacted and proposed initiatives in line with unconditional pledges made under the Copenhagen Accord and Scenario 2 reflects this, plus the incremental demand that would arise from higher pledges made by developed countries in the event of international agreement.

The table below presents projected REDD offset demand in the above scenarios (again 2013-2020 cumulative)<sup>28</sup> under three assumptions on the percent limits that REDD offsets may be of the total international offsets<sup>29</sup>.

**Projections of Forest Offset Compliance Demand based on the World Bank Projections<sup>30</sup>**

		Scenario 1 Low mtCO2e	Scenario 2 High mtCO2e
<b>Assumptions of % Limit for REDD Offsets</b>	<b>15%</b>	438	587
	<b>25%</b>	731	978
	<b>50%</b>	1461	1956

The summaries below provide further insight into the demand for the EU, New Zealand, Australia, California, U.S. & Canadian Western Climate Initiative, and the U.S. Federal position.

**EU ETS:** Launched in 2005, the EU ETS excluded forest-related carbon in its first two phases (to end in 2012) 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 supports 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<sup>31</sup>. This would promote a broader future market for agricultural offsets, beyond those in the CDM<sup>32</sup>.

<sup>28</sup> The California Cap-and-Trade program draft rules have indicated a potential allowance of 2% from REDD projects between 2015-17 and 4% from 2018-20. Note however that this level of detail has been excluded from the “back-of-envelope” demand cover for the Terra Bella Fund table presented above. The resulting effect is negligible given the total projected offset demand.

<sup>29</sup> Cap-and-Trade programs typically define a ceiling on forest and land-use offsets from non-Annex I countries. The draft rules for the California program set this at 25% in 2015, rising to 50% in 2017, for example.

<sup>30</sup> World Bank (2011). *State and Trends of the Carbon Market 201.1* Accessed 12 July 2011 at [http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend\\_LowRes.pdf](http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/StateAndTrend_LowRes.pdf)

<sup>31</sup> The UNFCCC’s Subsidiary Body for Scientific and Technological Advice (SBSTA)

<sup>32</sup> 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](http://www.unepfi.org/fileadmin/documents/reddysetgrow_01.pdf)

The EU Directive on Aviation plans to cover emissions from all domestic and international flights that arrive or depart from an EU airport from 2012, potentially adding marginal demand for emissions reductions from international airlines that are not covered by the EU ETS but that are covered by the new Directive. There is no indication as to potential for use of offsets from forest and land-use carbon, though the cost-effectiveness of the sector may mean forest and land-use carbon is offered as a bargaining chip for countries resisting the legislation on cost grounds (for example the U.S., China and Russia)<sup>33</sup>.

**California Cap-and-Trade:** Draft rule-making was released December 2010 ahead of a 2012 launch. The estimated demand for REDD offsets, given that the 25% limits that applies to REDD offsets, is estimated to be 3.6 million tCO<sub>2</sub>e per year in the first compliance period, increasing to 15.6 million tCO<sub>2</sub>e per year in 2018. In addition to creating demand for offsets from approximately ten mid-sized REDD carbon projects, the California market is likely to lead the development of REDD compliance rules and give the first compliance market price signal for REDD. In a December 2010 analysis of the California market structure, New Forests commented that it “expects the market to rely extensively on forest carbon offset supply”<sup>34</sup>. In July 2011, the California Governor stated his support for the cap-and-trade approach and expressed doubt regarding claims contesting the environmental impact of the market by certain environmental groups<sup>35</sup>. August 2011 saw the launch of California Carbon Allowance futures contracts on the GreenX exchange “in response to strong customer demand and increasing over-the-counter activity”<sup>36</sup>. On October 20 2011 the final approval by the California Air Resources Board on the regulations for the economy wide carbon market under AB 32 was granted.

**Western Climate Initiative:** WCI comprises seven U.S. states and four Canadian provinces that have signed agreements to use a market-based approach to reduce GHG emissions to 15% below 2005 levels by 2020. California, British Columbia and Quebec are working towards 2012 start dates, and Ontario and Manitoba will join after the program starts. The World Bank estimates that a full WCI operation incorporating California would lead to total potential offset demand of 24 million tCO<sub>2</sub>e. The ceiling for international offsets coming into the system has not yet been announced.

**U.S. Federal:** The last position of U.S. Federal negotiations on climate change legislation drew significant political debate between the 2008-2009 Congress. The House of Representatives approved the American Clean Energy and Security Act (Waxman-Markey Bill) in June 2009, but this was later rejected

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<sup>33</sup> Carbon Finance (14 July 2011). *US, China, Russia try to fly free of EU aviation emissions cap*. Accessed at <http://www.carbon-financeonline.com/index.cfm?section=lead&id=13817&action=view&return=home>

<sup>34</sup> New Forests (December 2010). *The California Carbon Market: Implications for Forest Carbon Offset Management*. Available from New Forests.

<sup>35</sup> Point Carbon (29 July 2011). *Carbon Market North America* (Weekly Newsletter). Accessed 29 July 2011 at [http://www.pointcarbon.com/polopoly\\_fs/1.1564098!CMNA20110729.pdf](http://www.pointcarbon.com/polopoly_fs/1.1564098!CMNA20110729.pdf)

<sup>36</sup> GreenEx (August 2011). *GreenX Advances Launch of California Carbon Allowance Futures Contract*. Accessed 17 August at <http://www.thegreenx.com/news/articles/08-17-2011.html>

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<sup>37</sup>, and forest and land-use carbon was expected to play a significant role. The Kerry-Boxer bill targeted 720 million tonnes of annual emission reductions from deforestation in developing countries by 2020<sup>38</sup>.

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<sup>39</sup>. EPA regulation can be seen as a "plan B" to U.S. Federal legislation and may in the future, directly or indirectly, lead to demand for offsets.

**New Zealand Emissions Trading Scheme:** The New Zealand Emissions Trading Scheme has included domestic forestry in its programme since 2008 and early results have demonstrated a reversal of deforestation as a result<sup>40</sup>. Participants can purchase and surrender Kyoto Protocol emission reduction units, so including Afforestation and Reforestation projects registered under the Clean Development Mechanism (though REDD and other approaches are excluded). Early results demonstrate the impact of including forestry: deforestation has been reversed and of permits surrendered permits for the second half of 2010, 64 percent were New Zealand units (NZUs) allocated to forest-owners for reforestation or forest management projects<sup>41</sup>.

**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 scheme beginning in 2015, becoming the second largest programme behind the EU. A link to international carbon markets is provided for from 2015<sup>42</sup> and emitters will be allowed to meet up to 5%

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<sup>37</sup> 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>

<sup>38</sup> The full Bill can be accessed at Govtrack: <http://www.govtrack.us/congress/bill.xpd?bill=s111-1733>

<sup>39</sup> EPA (2011). Accessed 18 July 2011 at <http://www.epa.gov/climatechange/emissions/ghgrulemaking.html>

<sup>40</sup> Carbon Positive (Aug 2011). *New Zealand declares early ETS success*. Accessed 7 Sept 2011 at <http://www.carbonpositive.net/viewarticle.aspx?articleID=2363>

<sup>41</sup> Point Carbon (August 2011). *NZ ETS Review Due Within Weeks: Minister* Accessed 7 September 2011 at <http://www.pointcarbon.com/news/1.1564260>

<sup>42</sup> 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>

of compliance credits from a subsidiary domestic offset system designed specifically for the agriculture and forestry sectors<sup>43</sup>.

**Bilateral Agreements:** Japan and South Korea have given early indications that a bilateral offsetting scheme will be their preferred method of carbon offset sourcing in absence of binding international commitments. As governments bilateral schemes develop, they may look more like public payments that are structured as payment for performance or they may evolve to be more market based systems like the emerging California system.

**Latin American Domestic Emissions Trading Schemes:** Countries within Latin American, specifically Colombia and Brazil, have 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<sup>44</sup>. At the same time, a law recently passed in Brazil listed a domestic emissions trading scheme as a viable option for the country to reduce their emissions<sup>45</sup>. The emergence of domestic programs could drive offset demand in select countries and provide a foundation for the linking of these local programs to future international programs.

## Public Funding Creating Quasi-Market Demand for Land-use Carbon

Prior to the Cancun Agreement, 2009-2010 also saw significant commitment to the REDD sector at an international level by nine developed countries and the EU collectively pledged \$4.5 billion for the sector's development. There are currently ten major multilateral and bilateral funding initiatives supporting REDD capacity-building and project implementation worldwide<sup>46</sup>.

Some donor programs are also beginning to generate demand for forest and land-use carbon by applying a "payment for GHG reduction performance" structure. Norway has led this type of engagement through the Overseas Development Assistance (ODA) community in the sector, by including elements of performance-linked structures (funds tied to verified emissions reductions) that disburse \$1 billion funds to Indonesia as emissions reductions targets are met<sup>47</sup>. When structures distribute donor funds to either governments or projects within REDD host countries based on verified emission reductions, they provide a price for a verified emission reduction that may be earned by investors.

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<sup>43</sup> 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>

<sup>44</sup> Point Carbon (September 2011). *Colombia eyes CO2 markets to tackle sectoral emissions*. Accessed 22 November 2011 at <http://www.pointcarbon.com/news/1.1574608>

<sup>45</sup> Point Carbon (May 2010). *Brazil considers a domestic market*. Accessed 21 November 2011 at <http://www.pointcarbon.com/news/1.1442709>

<sup>46</sup> 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>

<sup>47</sup> 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/](http://www.norway.or.id/Norway_in_Indonesia/Environment/-FAQ-Norway-Indonesia-REDD-Partnership/)

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 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 projects (no further information available on structures). Norway, Switzerland and Denmark are reported to be considering similar vehicles<sup>48</sup>.

### Established and Growing Voluntary Demand for Land-use Carbon

Forest carbon offset projects were first conceived prior to the prospect of regulatory frameworks and were spurred by the initiatives of NGOs and corporations. The "voluntary" market is small when compared to the compliance markets (discussed above), but transacted 131 MtCO<sub>2</sub>e in 2010 with a 31% growth rate over 2009 volume and had an estimated transaction value of \$424 million<sup>49</sup>.

This voluntary market has been the foundation of forest carbon demand in recent years, gaining recognition as measurement and monitoring capabilities have improved, and additionality, permanence and leakage risks have been addressed through the adoption of robust standards<sup>50,51</sup>. In 2010, forest and land-use carbon projects dominated this market supplying 46% of the voluntary over-the-counter market during the year. This was the same year that the leading land-use accounting standard, the Verified Carbon Standard<sup>52</sup> (VCS), approved its first methodologies for developing REDD projects. The reputation of the VCS combined with the CCB for social and biodiversity standards provides buyers with a creditable measurement standard. The 2010 Ecoscurities survey reported that 89% of respondents rated carbon standards as the most important factor when purchasing forest carbon credits.

The 2011 State of the Voluntary Carbon Market report and the State of the Forest Carbon Market provide data as to voluntary carbon market demand and specifics on forest carbon demand. The latest

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<sup>48</sup> 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>

<sup>49</sup> Ecosystem Marketplace / Bloomberg New Energy Finance (2011). *State of the Voluntary Carbon Markets 2011*. Accessed 12 July 2011 at [http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page\\_id=8351&section=our\\_publications&eod=1](http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=8351&section=our_publications&eod=1)

<sup>50</sup> Ecoscurities (2010). *The forest carbon offsetting report 2010*. Accessed 11 July 2011 at [http://www.ecosecurities.com/Standalone/Forest\\_carbon\\_offsetting\\_report\\_2010/default.aspx](http://www.ecosecurities.com/Standalone/Forest_carbon_offsetting_report_2010/default.aspx)

<sup>51</sup> 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.

<sup>52</sup> See <http://www.v-c-s.org/>. The Ecoscurities Forest Carbon Offsetting Report 2010 (citation 37) cites that the Verified Carbon Standard (VCS) and Community, Climate and Biodiversity standards were by far the two most popular standards.

annual State of the Voluntary Market report showed that forest carbon offsets represented 40% of the volume transacted in 2010<sup>53</sup> and the total market volume grew 90% from 2009 to 2010<sup>54</sup>.

The annual growth rate of the voluntary forest carbon market since 2002 has been 78%, nearly double the growth rate of the total voluntary market at 36% per annum. In estimating future voluntary market size, Terra has assumed three growth scenarios over the 2010 transaction volume of 30.1 million tCO<sub>2</sub>e. The three scenarios below provide the predicted annual tons transacted in the voluntary market under a slow growth, intermediate growth and historic growth set of assumptions.

**Projections of Voluntary and Pre-compliance Forest Carbon Demand 2013-2020**

		2013	2014	2015	2016	2017	2018	2019	2020	TOTAL
<b>Slow Growth</b>	<b>5%</b>	35	37	38	40	42	44	47	49	<b>333</b>
<b>Intermediate Growth</b>	<b>20%</b>	52	62	75	90	108	129	155	186	<b>858</b>
<b>Historic Growth</b>	<b>35%</b>	74	100	135	182	246	332	448	605	<b>2123</b>

The profile of buyers reported in the *State of the Voluntary Carbon Markets* has changed over the last two years. This year’s report shows strong growth expectations driven by “a network of compliance-based” or “semi-compliant” regional markets that “draw on the rapidly maturing voluntary carbon markets”<sup>55</sup>. The demand for voluntary credits reported under the *State of the Voluntary Carbon Market* which includes all voluntary market transactions, not solely forest carbon transactions, came from buyers with the following motives:

- **44% - Corporate social responsibility buyers** where transaction volume grew 119% over 2009 demand as economic growth resumed
- **22% - Intermediaries** looking to resell to voluntary offsetters
- **20% - Corporations with pre-compliance motives** who to position themselves in the emerging compliance markets

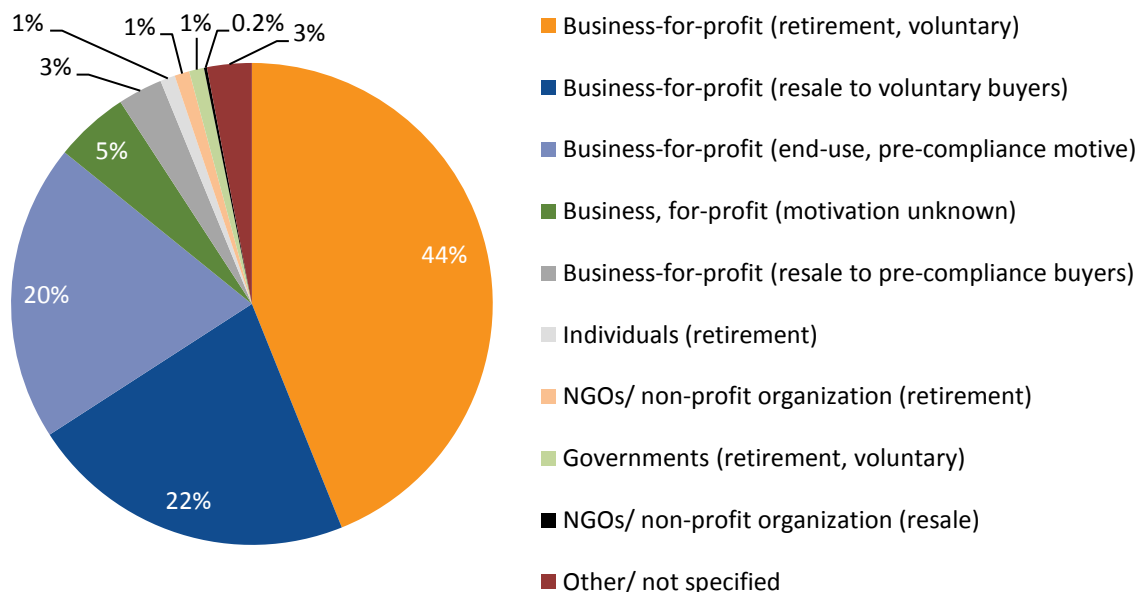
<sup>53</sup> Ecosystem Marketplace / Bloomberg New Energy Finance (2011). *State of the Voluntary Carbon Markets 2011*. Accessed 12 July 2011 at [http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page\\_id=8351&section=our\\_publications&eod=1](http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=8351&section=our_publications&eod=1)

<sup>54</sup> Ecosystem Marketplace / Bloomberg New Energy Finance (2010) *State of the Voluntary Carbon Markets 2010*. Accessed 12 July 2011 at [http://www.forest-trends.org/documents/files/doc\\_2434.pdf](http://www.forest-trends.org/documents/files/doc_2434.pdf)

<sup>55</sup> Ecosystem Marketplace / Bloomberg New Energy Finance (2011). *State of the Voluntary Carbon Markets 2011*. Accessed 12 July 2011 at [http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page\\_id=8351&section=our\\_publications&eod=1](http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=8351&section=our_publications&eod=1)

A full break-down of demand sources is copied from the *State of Voluntary Carbon Markets* report below:

**Transaction Volume by Buyer Type, % of Market Share (Source: Ecosystem Marketplace/Bloomberg New Energy Finance<sup>56</sup>)**



By geography, European buyers were the most active as they viewed voluntary actions as complementary to their regulatory obligations and transacted 41% of the volume. U.S. buyers accounted for 37% of the total demand.

The voluntary markets also signal value attributed to the “co-benefits” of forest and land-use carbon projects. The Ecoscurities Forest Carbon Offsetting Report 2010 reports that (i) social and local community benefits and (ii) biodiversity and other environmental benefits drive interest in forest carbon for most respondents (90% and 89% respectively), and that nearly half of respondents (44%) would pay a \$1-3 premium for an offset certified under the CCB standards. The willingness to pay such a premium is higher among European buyers compared to those in North America and Australasia.

<sup>56</sup> Ecosystem Marketplace / Bloomberg New Energy Finance (2011). *State of the Voluntary Carbon Markets 2011*. Accessed 12 July 2011 at [http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page\\_id=8351&section=our\\_publications&eod=1](http://www.ecosystemmarketplace.com/pages/dynamic/resources.library.page.php?page_id=8351&section=our_publications&eod=1)

## Total Market Demand Projections for Land-use Carbon

In order to derive a complete view of market demand for forest carbon offsets over the 2013-2020 timeframe the compliance and voluntary market growth assumptions must be aggregated. However, to simply sum these values would ignore that there is a relationship between the two markets as some of the growth that has been observed in the “voluntary market” actually represents pre-compliance demand. This pre-compliance demand will shift to compliance demand as compliance programs become operational. Thus, to define pure voluntary demand growth—that is, buyers motivated by social and environmental responsibility—requires removing pre-compliance motivated buyers from the equation.

To remove any double counting in creating the voluntary demand forecasts, the above estimates are adjusted to remove the pre-compliance tons. Thus, the base (2010) volume of 30.1 MtCO<sub>2</sub>e is reduced to 24 MtCO<sub>2</sub>e, 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.

Adding those numbers to the compliance projections provides a total market volume from 2013-2020 of 771 MtCO<sub>2</sub>e in the low scenario, and 3654 MtCO<sub>2</sub>e in the high scenario.

### **Projections of Total Market Demand - Voluntary and Compliance Forest Carbon Demand 2013-2020**

		Low Scenario - Volume MtCO <sub>2</sub> e	High Scenario - Volume MtCO <sub>2</sub> e
<b>Assumptions of % Limit for REDD Offsets</b>	<b>15%</b>	771	919
	<b>25%</b>	1417	1664
	<b>50%</b>	3159	3654

## 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 land-use industry.

In the financial community, three global investment banks have been actively involved in land-use carbon projects for investment (and believed to be outsourcing project 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. 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, SNR Denton, 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, 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 significant economic, policy and scientific fundamentals that will work in favor of its future growth. The opportunities and challenges for investors in the sector are not unique, and can be compared with the clean technology sector. Both sectors require upfront project finance in return with long-term repayment profiles linked to payments for assets that have value driven by low carbon policies and new sustainability factors in consumer demand. Leadership in the development of the market continues to shift between the international and regional arenas resulting in fragmented growth in the near future that should inevitably lead to an overarching 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. 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 projects.

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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