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The Voluntary Carbon Market and Business Innovation for Sustainable Development

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Comments
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Abstract

There is no need to choose between preventing climate change and promoting economic growth and development. In fact, many sources now agree that responding to climate change will create significant business opportunities. This paper examines the role that one of those opportunities—the voluntary carbon market—plays in helping business grow sustainably and in promoting innovation. Carbon markets and credits, which are an increasingly popular way of limiting the quantity of greenhouse gas emissions, are a great example of an effective climate change response with potential business implications. While the world of carbon markets is increasingly uncertain, the voluntary market remains a source of growth and innovation. The three cases examined here showcase different traits and capabilities of the voluntary carbon market (VCM). We learn that the VCM is capable of supporting small businesses with unique business models in Africa, of helping large businesses achieve corporate social responsibility (CSR) goals in the United States, and of promoting conservation and increasing the value of ecosystem services in Peru. The VCM is thus an important resource for promoting sustainable development across the globe and is a powerful complement to existing mandatory carbon markets.

Executive Summary

There is no need to choose between preventing climate change and promoting economic growth and development. In fact many sources, including *The Stern Review,* now agree that responding to climate change will create significant business opportunities. This paper examines the role that one of those opportunities—the voluntary carbon market—plays in helping business grow sustainably and in promoting innovation. Carbon markets and credits, which are an increasingly popular way of limiting the quantity of greenhouse gas emissions, are an important example of an effective climate change response with potential business implications. While the world of carbon markets is increasingly uncertain, the voluntary market remains a source of growth and innovation. In particular, this report will focus on the beneficial uses of the voluntary carbon market for business innovation.

The three cases examined here each showcase different traits and capabilities of the voluntary carbon market (VCM). We learn that the VCM is capable of supporting small businesses with unique business models in Africa, of helping large businesses achieve corporate social responsibility (CSR) goals in the United States, and of promoting conservation and increasing the value of ecosystem services in Peru. The VCM is thus an important resource for promoting sustainable development across the globe and is a powerful complement to existing mandatory carbon markets.

The VCM is capable of supporting these diverse businesses and services because it is a different marketplace than more traditional compliance carbon markets, such as the European Union Emissions Trading Scheme (EU ETS). The VCM is a product marketplace, where every transaction between a buyer and seller produces a unique carbon product. It

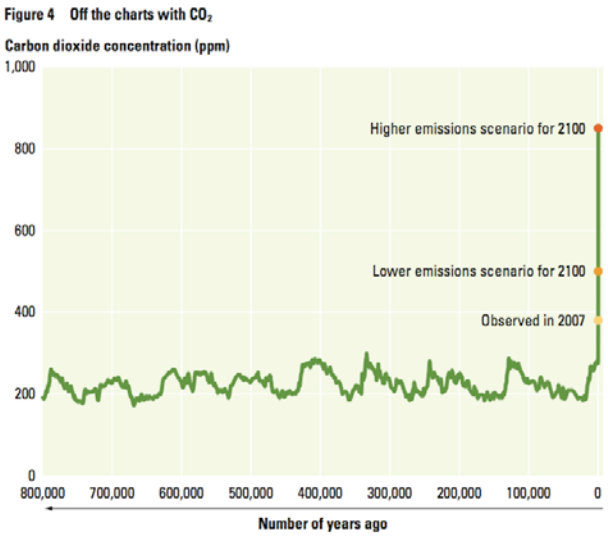
is also more flexible than a compliance market because it can be tailored to meet specific business needs through the use of different standards. This allows for more diversity among buyers and sellers, which in turn promotes a wider range of projects, such as those examined in this paper.

These three cases show that no matter the purpose, businesses can often benefit from pursuing voluntary emissions reductions through the voluntary market. In the case of Hestian Innovation Ltd, the VCM supported this small business and helped it achieve a price premium for its high-quality carbon. For CEMEX, the VCM helped the company make significant progress towards its CSR goal of using more alternative fuels. And in Peru, the VCM was instrumental in increasing the value of forest-based ecosystem services and promoting conservation. While there are many other unique projects in the world that have benefited from the VCM, these three are especially demonstrative of the market's utility for business and sustainability.

Climate Change

Global climate change is a serious threat to future prosperity. It is also an intricate, unique, and controversial global issue. Nevertheless, climate change requires an active response on behalf of humanity to lessen potential future damages and costs. If we do not act, it "will affect the basic elements of life for people around the world—access to water, food production, health, and the environment. Hundreds of millions of people could suffer hunger, water shortages and coastal flooding as the world warms."[1]

Anthropogenic climate change is fueled by the release of greenhouse gases (GHG) into the Earth's atmosphere. These gases cause the atmosphere to trap more heat, warming the planet over time. Human activities contribute to the emission of many GHGs, such as CO_2, CH_4, N_20, and halocarbons. When the release of these gases is greater than the natural removal process, atmospheric concentrations increase and result in global warming.[2] The nature of CO_2 and the atmosphere also means that both past and future emissions will likely continue to contribute to warming for more than a millennium.[3] The concentrations of these gases are measured in parts per million, or ppm. According to scientists, Earth's concentration of CO_2 ranged from 200-300ppm over the last 800,000 years.[4] But as we can see in this graph from the World



[1] Nicholas Stern. *Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press, 2007, xv.
[2] "Climate Change 2007: Synthesis Report". *Intergovernmental Panel on Climate Change*. 2007, 37
[3] Ibid., 47.
[4] *World Development Report 2010: Development and Climate Change*. Washington DC: World Bank, 2010.

Bank's 2010 World Development Report, current concentrations are far above historical levels. In fact, on May 4th 2013 the world officially reached 400ppm, the highest level ever recorded.[5] Interestingly, this means that current concentrations of CO_2 are higher than at any previous time since the dawn of *Homo sapiens* around 200,000 years ago.[6]

The Intergovernmental Panel on Climate Change (IPCC), the world authority on the topic, has made many significant findings. They conclude in their last assessment that "warming of the climate system is unequivocal" and that "most of the global average warming over the past 50 years is *very likely* due to anthropogenic GHG increases."[7] While they acknowledge many key uncertainties, they do believe that "climate sensitivity [the level of warming in response to increased levels of GHGs] is *likely* to be in the range of 2 to 4.5˚C with the best estimate of about 3˚C, and is *very unlikely* to be less than 1.5˚C."[8]

It should be noted, however, that there is some scientific uncertainty on the topic. Reporting conducted by *The Economist* (a rather business friendly publication) notes a "lack of new warming" despite recent levels of emissions.[9] While there are many possible explanations, one option is that the climate is not "responding to higher concentrations of carbon dioxide" as previously anticipated.[10] Ultimately, this is a matter of variable climate sensitivity, a topic that is not perfectly understood. According to their reporting, three recent studies have contradicted the IPCCs climate sensitivity assessment, predicting mean

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[5] "The measure of global warming." *The Economist.* May 11th 2013.
[6] "What does it mean to be human." *Smithsonian National Museum of Natural History*. Accessed April 29, 2013. http://humanorigins.si.edu/evidence/human-fossils/species/homo-sapiens
[7] "Climate Change 2007: Synthesis Report". *Intergovernmental Panel on Climate Change*. 2007, 72.
[8] Ibid., 38.
[9] "A Sensitive Matter." *The Economist*, March 30th 2013.
[10] Ibid.

warming of 1.9˚C, 2.3˚C, and 1.6˚C respectively.[11] These reports are inconclusive, and at any rate do not contradict the nature of climate change, but only confirm existing uncertainty.

Perhaps the simplest way to conceive of the climate problem is with a carbon budget. According to a recent report by the Carbon Tracker Initiative, the world can afford to emit a total of 886 $GtCO_2$ between 2000-2050 in order to "reduce the chance of exceeding 2˚C warming to 20%."[12] Unfortunately, the world burnt through over one third of this 50-year carbon budget in only the first decade of the 21st century. Fossil fuels contributed an estimated 282 $GtCO_2$ during this period while land use changes added another 39$GtCO_2$.[13] That means the world can only emit 565 $GtCO_2$ between now and 2050 to keep the chance of a 2˚C warming within sight. But the world's proven reserves of coal, oil, and gas equate to 2795 $GtCO_2$, or over 5 times our remaining budget.[14] In addition, "using just the reserves listed on the world's stock markets in the next 40 years would be enough to take us beyond 2˚C of global warming."[15] Thus the world must either figure out how to avoid the combustion of its remaining fossil fuels by pursing low-carbon development or agree to accept a higher degree of warming. If fossil fuel usage continues unabated, we will reach the end of our budget by 2027, 14 years from now.[16]

While a warming of 2˚C may not sound like a lot, it would have devastating consequences for society. The World Bank estimates that a warming of only 2˚C would put between 100 to 400 million more people at risk of hunger and cause between 1 to 2 billion

[11] Ibid.
[12] James Leaton. "Unburnable Carbon". *Carbon Tracker Initiative*. 2011, 6.
[13] Ibid.
[14] Ibid.
[15] Ibid., 8.
[16] Ibid., 9.

people to no longer have adequate water for their needs.[17] A warming closer to 5˚C would have even more dramatic consequences; in particular it would threaten "small islands, low-lying coastal areas and major world cities such as New York, London, and Tokyo" with sea level rise.[18] To put this in perspective, a 5°C change in global temperature is "equivalent to the change in average temperature from the last ice age to today."[19] The costs of inaction are equally as frightening. *The Stern Review* estimates the costs of inaction to be equivalent to losing between 5-20% of global GDP each year.[20] The costs of action, however, would only be about 1% of global GDP each year.[21] Any solution to this problem will entail costs, but "spending less on mitigation will mean spending more on adaptation and accepting greater damages."[22] In other words, "prompt and strong action is clearly warranted."[23]

Any solution will require limiting and reducing the amount of CO_2 and other greenhouse gases released into the atmosphere. Ultimately, stabilizing the amount of CO_2e in the atmosphere "requires that annual emissions be brought down to more than 80% below current levels."[24] This can be accomplished by limiting the amount of greenhouse gases (GHG) released into the atmosphere, by either putting a price on them (a carbon tax), or setting emissions caps (cap-and-trade), among other initiatives.

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[17] *World Development Report 2010: Development and Climate Change*. Washington DC: World Bank, 2010. 5
[18] Nicholas Stern. *Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press, 2007, 67.
[19] Ibid., xvi.
[20] Ibid., xv.
[21] Ibid.
[22] *World Development Report 2010: Development and Climate Change*. Washington DC: World Bank, 2010. 7
[23] Nicholas Stern. *Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press, 2007, xv
[24] Ibid., xvi.

Tax v Quantity: Two Emissions Control Approaches

Carbon taxes and carbon credits are two very different tools made for accomplishing the same task—controlling pollution—and both are subsets of larger pollution control approaches. Price-based control mechanisms, like a carbon tax, are the oldest. They were first conceived by Arthur Cecil Pigou in 1920 when he recommended "levying a tax to correct the negative 'externalities' of a market activity."[25] Environmental taxes can generate revenue that can be used to mitigate pollution. More importantly, they discourage the generation of pollution by making it costly. In the case of greenhouse gas emissions, a price on carbon dioxide would force polluters to pay for the cost of their pollution. Price-based mechanisms like a carbon tax are very uniform and predictable, though not necessarily more effective than their counterpart, namely quantity controls.

Just as a carbon tax is one example of a price-based pollution control mechanism, emissions caps are an example of quantity-based pollution control mechanisms. This approach is based on the work of John Dales, whose book *Pollution, Property, and Prices* developed the idea of emissions trading.[26] In a quantity scheme the government establishes a maximum total level of pollution for a specific pollutant, or "cap". This cap establishes scarcity, which is necessary for a market to operate. Polluters are then allocated "rights" to emit a certain amount of pollution under the cap. These "rights", often called allowances, can then be traded between firms to either avoid penalties for excess pollution or profit from reducing emissions. This trading activity, termed "emissions trading", often takes place in public markets where supply and demand determine the price of allowances. Over

[25] Simon Powell, Christine Loh, and Roger Raufer. *The emissions game: How markets can help save the planet.* CLSA Asia-Pacific Markets: Blue Books, 2007, 9.
[26] Roger Raufer, and Sudha Iyer. "Emissions Trading." In *Handbook of Climate Change Mitigation*, ed. Chen, W.-Y., J. Seiner, T. Suzuki, M. Lackner. Springer Science and Business Media. 2012, 4.

time, the government reduces the cap to achieve its environmental goal. What is not often understood about these markets is that they are artificially constructed, since the demand "arises from government coercion."[27]

Both of these solutions effectively solve what is commonly known as "the tragedy of the commons." The tragedy of the commons, a concept popularized in the environmental community by Garrett Hardin in his article *The Tragedy of the Commons* written in 1968, simply explains a scenario in which many people share a communal resource—the "commons"—but have no incentive to preserve it.[28] Because "individual agents do not take account of the effects of their own actions on the welfare of others," the commons are destroyed.[29] Putting a price on the commons, either with a tax or a quantity system, "leads agents to act *as if* they take the effects [of their own actions] into account."[30] In the case of climate change, the Earth's climate is the commons. Both a carbon tax and a carbon trading scheme can lead to the corrective behavior change necessary to decrease pollution and preserve this resource. In truth, both options are essentially the same, although as we will see one is more politically acceptable than the other.

Of the two control mechanisms, the quantity-based approach has become the most acceptable. It was first used successfully in the United States to control acid rain. Acid rain posed a challenge to the United States because it defied the existing pollution control infrastructure, namely the EPA's Emissions Trading Program (ETP) that dealt in Emissions Reduction Credits (ERCs), which focused on local air quality.

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[27] Simon Powell, Christine Loh, and Roger Raufer. *The emissions game: How markets can help save the planet*. CLSA Asia-Pacific Markets: Blue Books, 2007. 9.
[28] Garrett Hardin. "The Tragedy of the Commons." *Science* 162, (1968).
[29] *New Sources of Development Finance*. Edited by A. B. Atkinson. New York: Oxford University Press, 2005. 35
[30] Ibid.

When controlling pollution, "the economic approach must take into account the physical characteristics of the pollutant."[31] Because acid rain is a total loading problem, not a local problem, a new policy approach was needed that went beyond the scope of ETP. In fact, "economic modeling conducted for the EPA showed that the ERC approach was not likely to work" for acid rain.[32] To solve the problem, an economist named Dan Dudek proposed a quantity-based control using allowance trading. He "developed a control program in which the 'licenses' were called 'emission allowances', and one emission allowance would represent the right to emit one ton of sulfur dioxide in a given year."[33]

Eventually, his proposal became the basis for Title IV of the Clean Air Act Amendments of 1990.[34] The allowance market for sulfur dioxide was a success; "by 2004, with 3,391 operating units covered, total SO_2 emissions were 10.3 million tons—a drop of nearly 7 million tons, or 40 percent, from 1980 levels."[35] The program was reproduced in various ways for nitrogen oxide, ozone, and mercury in the United States.[36] Most importantly, the allowance-trading scheme went on to gain acceptance (thanks to its success in the US) into the Kyoto Protocol and globally as an effective pollution control policy.[37]

Despite the prevalence of carbon markets in the world, the debate over whether to use carbon taxes or carbon markets is still ongoing. Many experts believe that a carbon tax would be a better solution. The Brookings Institution, for example, favors a carbon tax in

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[31] Roger Raufer. *Pollution Markets in a Green Country Town: Urban Environmental Management in Transition* (Connecticut: Praeger Publishers, 1998)143.
[32] Ibid., 144
[33] Ibid., 143.
[34] Ibid.
[35] Kathy McCauley, Bruce Barron, and Morton Coleman. *Crossing the Aisle to Cleaner Air: How the Bipartisan "Project 88" Transformed Environmental Policy* (University of Pittsburg, 2008), 34.
[36] Ibid.
[37] Ibid., 37. For more on the Kyoto Protocol, see the discussion in the next section.

the United States. Brookings researcher William Gale writes that a carbon tax would "bring about benefits on economic and environmental grounds" and could "help address the fiscal problem in the United States.[38] Gale believes that a carbon tax would generate substantial revenue, would be economically efficient, and could have the potential to benefit a large number of citizens. In addition, Agnar Sandmo writes in *New Sources of Development Finance* that a tax "has a number of advantages from an efficiency point of view" and that it could "achieve the desired reduction of the activity in question at minimal sacrifice to society as a whole."[39]

Many popular critics are also in favor of a carbon tax rather than a trading scheme. Annie Leonard, a popular environmental critic, believes that cap-and-trade is a "huge problem" because it creates a "false sense of progress."[40] Rather, she prefers changing fossil fuel subsidies and enforcing "strong laws."[41] Other pundits, such as Thomas Friedman, offer better explanations as to why a carbon tax is preferable. Friedman writes that a carbon tax would "be the least painful and have the best long-term impact" for the United States.[42] He reports that a carbon tax of $25 would reduce the US federal deficit by $1.25 trillion over ten years, but would only appear to consumers as an extra 21¢/gallon of gasoline and 1.2¢/kwh of electricity.[43] Most recently, *The Guardian* also reported on critics

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[38] William Gale. "Carbon Taxes as Part of the Fiscal Solution." *Brookings*. Accessed April 29, 2013. http://www.brookings.edu/research/papers/2013/03/12-carbon-tax-gale
[39] *New Sources of Development Finance*. Edited by A. B. Atkinson. New York: Oxford University Press, 2005.
[40] Annie Leonard. "The Story of Cap & Trade." *The Story of Stuff Project.* Accessed April 29, 2013. http://www.storyofstuff.org/movies-all/story-of-cap-trade/
[41] Ibid.
[42] Thomas Friedman. "It's lose-lose vs. win-win-win-win-win." *The New York Times*. March 16, 2013.http://www.nytimes.com/2013/03/17/opinion/sunday/friedman-its-lose-lose-vs-win-win-win-win-win.html
[43] Ibid.

who believe "cap-and-trade systems are inefficient and create incentives for polluting industries to continue with business as usual."[44]

Others such as Bjorn Lomborg, Director of the Copenhagen Consensus Centre, would not vote for either solution. Lomborg writes that the Kyoto approach is not working because cutting emissions is expensive, because the treaty is insufficient to solve climate change, and because green energy is not ready to take over from fossil fuels.[45] He also believes that a carbon tax would not be effective because it would curb economic growth and would not have a large enough impact on emissions. Instead, Lomborg favors investing in research and development, which he claims would be "500 times more effective" and much cheaper than the "old-fashioned, failed policy of the past twenty years."[46]

Finally, there are still a number of individuals who simply do not believe in anthropogenic climate change and thus favor a course of inaction. Chief among these opponents is the Heartland Institute. According to their website, the group is devoted to "sound science and market-based, rather than government-based, solutions to environmental problems."[47] But the group opposes both cap-and-trade programs and carbon taxes. Instead, they believe that "carbon taxes are job killers" and that "global warming fears are overstated."[48] The group also states that climate change is

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[44] Carey Biron. "International cap-and-trade markets expanding—but still contentious." *The Guardian*. Accessed April 29, 2013. http://www.guardian.co.uk/environment/2013/apr/11/international-carbon-markets-expanding#start-of-comments

[45] Bjorn Lomborg. "Policy Relevant Climate Issues in Context." Testimony before the United States Subcommittee on Environment of the Committee on Science, Space, and Technology. March 6, 2013.

[46] Ibid.

[47] "Center on Climate and Environmental Policy." *The Heartland Institute*. Accessed April 29, 2013. http://heartland.org/issues/environment

[48] "Carbon Tax." *The Heartland Institute*. Accessed April 29, 2013. http://heartland.org/ideas/carbon-tax

predominantly driven by natural causes, and that human induced emissions are "not playing a substantial role."[49] The international community generally disagrees.

There are actually many good reasons to pursue a carbon trading system. Market mechanisms like emissions trading are generally believed to be very business-friendly because they allow for flexibility in achieving compliance. This is a useful change from older "command-control" pollution control methods, which could be unnecessarily restrictive. In general, "a well-functioning trading regime will level the marginal reduction costs across all sectors of industry, by allowing sources with high marginal reduction costs to invest in reductions in sources with lower marginal reduction costs through buying allowances freed up by these sources."[50] By allowing companies to use whatever emissions abatement approach works best, emissions trading lowers the cost of compliance and eases the achievement of environmental targets.[51]

There are also many specific reasons why emissions trading is better than a tax. First, emissions trading is more desirable because it allows the quantity of abatement to be known.[52] Abatement quantities are not always known under a tax because we cannot perfectly predict how price changes will influence consumption. But the largest practical advantages are political. Taxes are notoriously unpopular with voters, especially in the United States, because they involve a largely uncontrolled wealth transfer to government. Thus tax schemes face considerable political opposition. Quantity approaches, however, give politicians considerable flexibility: "if governments require funds, they can auction off

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[49] Craig Idso, Robert Carter, Fred Singer. "Climate Change Reconsidered: 2011 Interim Report." *The Heartland Institute*. 2011.
[50] *Climate Change and Carbon Markets: A Handbook of Emission Reduction Mechanisms*. Edited by Farhana Yamin. London: Earthscan, 2005. 83
[51] Ibid.
[52] Worldwatch Institute. *2009 State of the World: Into a Warming World*. New York: W.W. Norton & Company, 2009. 105

emissions allowances to generate revenue. If they prefer to minimize political resistance, they can instead give all of the allowances away."[53] Emissions trading also allows "politicians to separate environmental effectiveness from politics" by supporting political bargaining; politicians can give away special deals (like the 30 special deals struck during the United States' acid rain program) but tighten the cap in other areas to ensure that the environmental goal is met.[54] Finally, emissions trading favors the private sector by creating opportunities for brokers, traders, and exchanges, and by encouraging high-tech development and new start-up companies.[55] Ultimately, both a tax and a cap will lead individuals to modify their behavior in a way that causes "the market system to function efficiently."[56]

But the debate between carbon taxes and cap-and-trade is not necessarily an "either-or" scenario. It is possible to have both, such as in Australia. In 2011 Australia's Parliament passed the Clean Energy Future Package, a comprehensive law aimed at helping the country meet its reduction target under the Kyoto Protocol's second commitment of 5% below 2000 levels by 2020. This legislation included the Carbon Price Mechanism (CPM), a national cap-and-trade program that is expected to cover around 500 businesses representing 60% of the country's GHG emissions.[57] Since it began in 2012, the CPM has acted like a carbon tax; during this initial phase, the Australian government has set a fixed price of A$23/ton.[58] Although the fixed price carbon credits (in this case termed Carbon Units, or CUs) is essentially a carbon tax, businesses will still be required to acquire and

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[53] Roger Raufer. "Carbon Taxes vs. Emissions Trading in China." *Energy Intelligence* 1, no.5 (2012): 1.
[54] Ibid.
[55] Ibid.
[56] *New Sources of Development Finance*. Edited by A. B. Atkinson. New York: Oxford University Press, 2005. 38
[57] Alexandre Kossoy, and Pierre Guigon. *State and Trends of the Carbon Market 2012*. Washington DC: World Bank, 2012, 75.
[58] Ibid., 74.

surrender permits in order to prepare them for the transition to a trading scheme.[59] Starting in 2015, the Australian government will allow the price of CUs to float under a price ceiling, and then to float freely starting in 2018. According to the Brookings Institution's report "Carbon Pricing in Australia," Australia's example may hold valuable lesions for other countries, especially the United States.[60]

International Carbon Markets

The international response to climate change dates back to 1979 with the first ever World Climate Conference. In 1988, the World Meteorological Organization and the United Nations Environment Programme jointly created the Intergovernmental Panel on Climate Change (IPCC).[61] The IPCC issued its first report in 1990, which greatly influenced the famous "Rio Earth Summit" of 1992. The United Nations Framework Convention on Climate Change (UNFCCC) was then created at Rio. The UNFCCC was ratified by 189 countries, including all developed countries.[62] These countries agreed, through the UNFCCC, to "return greenhouse has emissions to 1990 levels by 2000."[63] To accomplish this, the UNFCCC gave all countries some commitment to reduce GHG emissions, but was careful to stipulate "common but differentiated responsibilities." These commitments were voluntary.

The Kyoto Protocol came five years later in 1997 as an amendment to the original UNFCCC document. Its purpose was to "set out an approach for binding international action

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[59] Ibid.
[60] Joshua Meltzer. "Carbon Pricing in Australia: Lessons for the United States." *Brookings*. July 2, 2012. http://www.brookings.edu/research/opinions/2012/07/02-carbon-australia-meltzer
[61] Nicholas Stern. *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press, 2006, 514.
[62] Ibid.
[63] Ibid.

and agreed specific commitments."[64] The treaty became active in 2005, and the first commitment period ran from 2008-2012. While Kyoto originally only had 84 signatures, it now has 191.[65]

The Kyoto Protocol is the only credible attempt to create a framework for international action on climate change. Most importantly, the treaty is the first international pollution control approach featuring emissions trading. Kyoto interprets the UNFCCC's "common but differentiated responsibilities" clause by distinguishing between developed (called Annex I) and developing (non-Annex I) countries. Countries that have agreed to legally binding commitments are referred to as Annex B.

These Annex B countries were required to reduce their emissions of six greenhouse gases in the first commitment period: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. A seventh gas, nitrogen trifluoride, has been added for the second commitment period which runs from 2013-2020. These gases "originate principally from the generation and use of energy, industrial processes, municipal wastes, and land-use activities."[66] Since CO_2 is the main global warming gas, the other gases are generally converted to a carbon dioxide equivalent, or CO_2e. In addition, their global warming potential (GWP) is also calculated in relation to CO_2 for purposes of tracking and reporting.[67]

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[64] Ibid., 515.
[65] "Status of Ratification of the Kyoto Protocol." *United Nations Framework Convention on Climate Change*. Accessed February 19, 2013. http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php
[66] Simon Powell, Christine Loh, and Roger Raufer. *The emissions game: How markets can help save the planet*. CLSA Asia-Pacific Markets: Blue Books, 2007, 23
[67] Ibid.

Annex B countries were required to reduce emissions of these gases to levels at least 5% below 1990 in the period from 2008-2012.[68] This established a de facto quantity ceiling for each signatory country. The countries were free to come up with the required reductions however they pleased. Non-Annex I countries were not given quantifiable emissions reduction targets, but were instead allowed to address climate change as part of a larger approach to sustainable development.[69]

But to make reductions easier and cheaper, Kyoto also established three "flexibility mechanisms" that involve carbon trading. These mechanisms are designed to do three things: "stimulate sustainable development through technology transfer"; "help countries with Kyoto commitments to meet their targets"; and "encourage the private sector and developing countries to contribute to emissions reduction efforts."[70]

The first mechanism is called International Emissions Trading (IET). It allows for international trading of national emission allowances, allocated to all Annex B countries. Countries are allowed to trade their emission allowances, called "Assigned Amount Units" (AAU's), with each other.[71] AAUs are not subject to a baseline, but are issued against a total quantity cap. The AAU market decreased by 49% in size between 2010 and 2011.[72]

The second and third flexibility mechanisms involve trading credits from emission reducing projects, rather than national allowances like AAUs. Both of these project-based

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[68] Nicholas Stern. *The Economics of Climate Change: The Stern Review*. Cambridge: Cambridge University Press, 2006, 539.
[69] Ibid., 542.
[70] "Mechanisms under the Kyotot Protocol." *United Nations Framework Convention on Climate Change*. Accessed February 19, 2013. http://unfccc.int/kyoto_protocol/mechanisms/items/1673.php
[71] Dr. M. A Hashmi. *A Complete Guide to the Global Carbon Market: Profiting in a Low-Carbon World.* Minnesota: MaxEnergy Inc., 2008, 24-25
[72] Alexandre Kossy, and Pierre Guigon. *State and Trends of the Carbon Market 2012*.. Washington DC: The World Bank Group, 2012.

mechanisms can be used by Annex B countries to meet their commitments.[73] But they must contribute "additional" reductions relative to business-as-usual. This is often called "additionality." To confirm this, each project must first establish a baseline emissions case, and then prove that the project will reduce emissions relative to that case. Baselines can be project, industry, or country-specific.[74] Essentially, the baseline has to assure "the regulator that the credits are real."[75]

The second flexibility mechanism, called Joint Implementation (JI), allows for projects hosted in *developed* countries to sell emission reduction credits to other Parties. JI projects operate in accordance with Article 6 of the Kyoto Protocol, and sell only Emission Reduction Units (ERUs), a special form of carbon credit. The ERU market is fairly small, and decreased in size by 32% from 2010 to 2011.[76]

The third mechanism, called the Clean Development Mechanism (CDM), allows projects hosted in *developing* countries to sell similar credits called Certified Emissions Reductions (CERs). CDM projects must be certified and approved by a national authority, an accredited private organization, and by the CDM executive board before they can begin selling CERs.[77] Recently, the primary CER market value fell by 32%.[78] Both governments and private companies can purchase credits from JI and CDM to meet reduction goals. The project-based mechanisms, despite recent challenges, are still believed to "have the

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[73] Simon Powell, Christine Loh, and Roger Raufer. *The emissions game: How markets can help save the planet*. CLSA Asia-Pacific Markets: Blue Books, 2007, 24
[74] Dr. M. A Hashmi. *A Complete Guide to the Global Carbon Market: Profiting in a Low-Carbon World.* Minnesota: MaxEnergy Inc., 2008, 15
[75] Simon Powell, Christine Loh, and Roger Raufer. *The emissions game: How markets can help save the planet*. CLSA Asia-Pacific Markets: Blue Books, 2007, 11
[76] Alexandre Kossy, and Pierre Guigon. *State and Trends of the Carbon Market 2012*.. Washington DC: The World Bank Group, 2012.
[77] Dr. M. A Hashmi. *A Complete Guide to the Global Carbon Market: Profiting in a Low-Carbon World.* Minnesota: MaxEnergy Inc., 2008, 23.
[78] Alexandre Kossy, and Pierre Guigon. *State and Trends of the Carbon Market 2012*.. Washington DC: The World Bank Group, 2012.

capacity to mobilize capital efficiently toward cost-effective low-carbon investments."[79] Unfortunately, CDM projects have not been evenly distributed; 75 percent of the sales revenue from CDM offsets comes from Brazil, India, and China; in other words, "the CDM has pretty much bypass[ed] low-income countries, which have received only 3 percent of carbon revenues."[80]

But the CDM has helped "lower carbon emissions by about 1 billion tonnes while spurring $215 billion of green spending."[81] Much of this success is due to the inclusion of CERs in the EU ETS, which made the credits more accessible to European buyers. But that has also caused problems. In 2012 it was reported that CDM market prices had "essentially collapsed", despite the issuance of the one-billionth CER the same year.[82] The price has remained well below €1 per CER since the start of 2013.

The value of the CDM market has dropped from €17.8bn to just €6.1bn, despite an increase in volumes.[83] As for the JI market, the price of ERUs had fallen but the overall market value has increased 26% to €906m.[84] At these prices, the markets provide little or no incentive for companies to cut emissions or invest in clean technology.[85] A group of 30 large companies is now calling for market reform, but it remains to be seen what actions the UN will take.

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[79] Ibid.
[80] *World Development Report 2010: Development and Climate Change*. Washington DC: World Bank, 2010. 265
[81] Pilita Clark. "UN-led carbon market 'close to collapse'." *Financial Times*. October 2, 2012. http://www.ft.com/cms/s/0/ee81799c-0c84-11e2-a776-00144feabdc0.html#axzz2LMLr5PSc
[82] Ibid.
[83] James Murray. "European carbon price 'inching ever closer to zero'." *The Guardian*. February 7, 2013. http://www.guardian.co.uk/environment/2013/feb/07/european-carbon-price-zero
[84] Ibid.
[85] Fiona Harvey. "EU urged to revive flagging emissions trading scheme." *The Guardian*. February 15, 2013. http://www.guardian.co.uk/environment/2013/feb/15/eu-urged-revive-emissions-traing

Compliance Carbon Markets

In addition to the Kyoto markets, there are also many other regional carbon markets based on emissions trading. The most significant of these markets is the EU Emissions Trading System (ETS). The EU ETS is an international greenhouse gas trading program established in the European Union to help meet Kyoto Protocol emissions reduction targets. However, the EU ETS was "specifically designed to be independent of the Kyoto Protocol in case the latter was not ratified."[86]

The EU ETS is a cap-and-trade program that works by putting a limit on overall emissions from high-emitting industry sectors and then reducing the limit. The market trades European Union Allowances, or EUAs. It is now the world's largest market in greenhouse gas emissions and is the central feature of the EU's climate response and climate policy. Currently all 27 EU member countries participate in the EU ETS, as well as several non-EU members such as Norway, Iceland, Croatia, and Lichtenstein.[87]

The EU ETS covers more than 11,000 power stations and manufacturing plants in these countries, which, in addition to aviation, now covers around 45% of all EU emissions.[88] The target of the market is to reduce emissions to 20% below 1990 levels by 2020 and 80-95% below 1990 levels by 2050.[89] In 2011, 7,853 $MtCO_2e$ were traded for a total value of over $147billion.[90] The EU ETS is far larger than all other existing allowance markets, as the following chart from the World Bank's *State and Trends of the Carbon*

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[86] Simon Powell, Christine Loh, and Roger Raufer. *The emissions game: How markets can help save the planet.* CLSA Asia-Pacific Markets: Blue Books, 2007, 28.
[87] "The EU Emissions Trading System (EU ETS)." *European Commission*. Accessed March 6, 2013. http://ec.europa.eu/clima/policies/ets/index_en.htm
[88] "The EU Emissions Trading System (EU ETS) Factsheet." European Commission. Accessed March 6, 2013. Available: ec.europa.eu/clima/publications/docs/factsheet_ets_2013_en.pdf
[89] Ibid.
[90] Alexandre Kossy, and Pierre Guigon. *State and Trends of the Carbon Market 2012*.. Washington DC: The World Bank Group, 2012, 10.

Market 2012 report demonstrates. In 2011, the EU ETS accounted for 97% of all allowance volumes in the world, and 99% of global allowance value.[91] But this may not be the case for long. On April 16th 2013, the European Parliament rejected an attempt to fix the EU ETS (plagued by over-supply of allowances in recent years) through a proposal known as "backloading". The proposal would have delayed the issuance of 900 million allowances in the market, which could have bolstered current prices. The rejection of this proposal saw the price of carbon in the market plummet to €2.75 a ton on April 17th.[92] This is a stark example of how vulnerable compliance carbon markets can be to government legislation.

	2010		2011	
	Volume ($MtCO_2e$)	Value (US$ million)	Volume ($MtCO_2e$)	Value (US$ million)
	Allowances market			
EUA	6,789	133,598	7,853	147,848
AAU	62	626	47	318
RMU	-	-	4	12
NZU	7	101	27	351
RGGI	210	458	120	249
CCA	-	-	4	63
Others	94	151	26	40
Subtotal	**7,162**	**134,935**	**8,081**	**148,881**

Source: Alexandre Kossy and Pierre Guigon. *State and Trends of the Carbon Market 2012*. Washington DC: The World Bank Group, 2012.

The EU ETS has also been linked with the CDM and JI markets. This allows participating countries to meet their assigned reductions by purchasing project-based credits from other countries. These tend to be much cheaper than EUAs. In addition, "the system will foster technology transfers to developing countries, which have signed up to the Kyoto Protocol, via CDM or other signed industrialized nations via JI."[93] Phase III of the EU ETS includes a provision that requires all newly registered CDM projects after 2012 to be located in "least developed countries" as listed by the UN in order to sell CERs in the

[91] Ibid.
[92] "ETS, RIP?" *The Economist*. April 20 2013.
[93] Simon Powell, Christine Loh, and Roger Raufer. *The emissions game: How markets can help save the planet.* CLSA Asia-Pacific Markets: Blue Books, 2007, 29

market.[94] This means that more CERs will be coming from Africa and south Asia, rather than China.

In addition, the EU ETS has inspired the development of other regional cap-and-trade programs. Some of the most prominent include Australia, California and Quebec, New Zealand, and South Korea. Others include Mexico, Japan, and the Regional Greenhouse Gas Initiative (RGGI) in the United States. Some of these programs are strictly national cap-and-trade schemes, whereas others, such as the Western Climate Initiative (which to date only includes California and Quebec) and RGGI are regional programs that include multiple states or countries. Finally, there is an effort to link the existing programs to create and international market, such as between Australia and the EU. The prevalence of these programs, and their rapid evolution over the past decade, clearly indicates an international preference for cap-and-trade programs over taxes in response to climate change.

The Voluntary Carbon Market (VCM)

In addition to all of these diverse compliance markets, carbon credits can also be purchased in the voluntary market. The voluntary carbon market is different than compliance markets because it exists independent of government action; participants are not forced to buy credits as they would be under "mandatory" cap-and-trade schemes. In the voluntary market, corporations are motivated to reduce emissions mostly because they have corporate sustainability goals or because they fear future legislation. This market is very different from the typical compliance market, and it exists independently of international climate policies such as the Kyoto Protocol.

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[94] Roger Raufer, and Sudha Iyer. "Emissions Trading." In *Handbook of Climate Change Mitigation*, ed. Chen, W.-Y., J. Seiner, T. Suzuki, M. Lackner. Springer Science and Business Media. 2012.

There are in fact many different voluntary carbon markets (plural) that make up the global voluntary market (singular). These markets can be identified by the use of voluntary standards. For instance, there are national domestic-only voluntary markets created by domestic standards such as the Panda Standard in China, the UK's Forestry Commission's Woodland Carbon Code, Japan's J-VER program, Korea's K-VER program, and Australia's Carbon Farming Initiative. It is also important to understand that the VCM is not controlled by any regulating body and that credits in this market sell mainly through bilateral agreements, not on international exchanges. The VCM is a fragmented marketplace, which makes it more difficult to understand than a single compliance market. But since transactions in this marketplace are all voluntary no matter what the standard, they all fall into the category of the voluntary carbon market. As we will see, the VCM sells many different credits, has many different projects, exists in many different countries, and attracts many different buyers for different reasons. In other words, it is a very unique market. For the sake of continuity, this report will refer to the singular global voluntary market.

As it stands, the voluntary carbon market (VCM) is much smaller than existing compliance markets. In fact, in 2011 the entire global VCM only accounted for 95 $MtCO_2e$ of carbon transactions compared to the 10,094 $MtCO_2e$ of global compliance markets.[95] In other words the VCM is less than 1% as large as the compliance market in terms of volume. In terms of value, the VCM was worth only $576 million in 2011 compared to the $175.5

[95] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012. Iv.

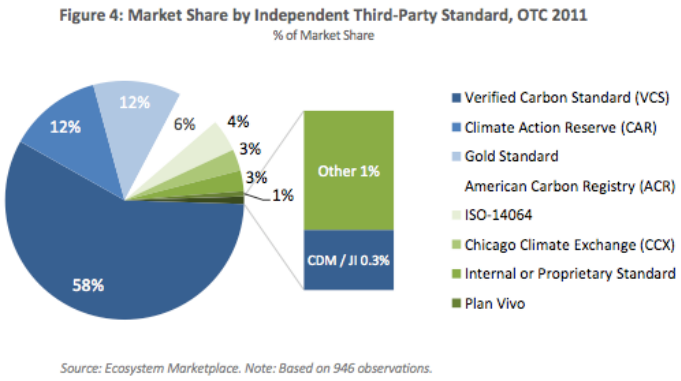
billion of the compliance markets.[96] This is just over 0.3% of the value of compliance markets.

	Volume (MtCO2e)		Value (US$ million)	
Markets	**2010**	**2011**	**2010**	**2011**
Voluntary OTC	128	93	422	572
CCX	2	0	0.2	0
Other exchanges	2	2	11	4
Total Voluntary markets	133	95	433	576
Total Regulated Markets	8,702	10,094	158,777	175,451
Total Global Markets	8,835	10,189	159,210	176,027

Source Data: Stanley-Peters, Molly and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012.

But what it lacks in size, it makes up for in flexibility. The VCM is home to many different standards of carbon credits, as previously mentioned. These standards, developed by independent organizations, lend significant market infrastructure and variety to the VCM. In addition, the motivations for buyers and sellers in the VCM are much more diverse than in compliance markets. There is also significant geographic variety not found in compliance markets; a total 61 countries participated in projects for the VCM in 2011, and buyers came from 38 countries.[97] Finally, there are many different project types—ranging from methane capture in the US to clean cook stoves in Africa—that make up the global supply of voluntary credits.

[96] Ibid.
[97] Ibid., v, viii.



Source: Stanley-Peters, Molly and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012.

Credits in the voluntary carbon market come in many different varieties. In general, a voluntary carbon credit is called a Voluntary Emissions Reduction, or VER. This is the generic term for a credit bought in the VCM. But independent carbon registries and accounting firms often issue their own brand of credit; for example, the Verified Carbon Standard issues "Verified Carbon Units" or VCUs; the American Carbon Registry issues "Emission Reduction Tons" or ERTs; and the Climate Action Reserve issues "Climate Reserve Tons" or CRTs. These credits, while all variations of a VER, are all somewhat different. The Gold Standard's VERs, for example, are more rigorous because they take social and sustainability concerns into account when assessing a project, unlike the VCS's VCUs, which only account for emissions reductions. Most importantly, these credits all sell for different prices. Of these credits, VCUs from the Verified Carbon Standard are the most popular, accounting for 58% of the market in 2011.[98] The Climate Action Reserve and the

[98] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012. Vii.

Gold Standard each account for another 12% of the market.[99] Just four standards (VCS, CAR, the Gold Standard, and ACR) made up 82% of all transacted credits.[100]

These different carbon registries provide extremely important market infrastructure. In fact, "suppliers that reported using a standard said that almost all (98%) credits they transacted adhered to a third-party standard, as opposed to using an internal standard." In addition, these voluntary carbon registries have begun to influence new compliance markets, showing that the VCM is home to significant carbon expertise. For example, governments such as California, British Columbia, Germany, Costa Rica, Thailand, and Australia have worked with and supported voluntary standards.[101]

The voluntary market is widely known to be more innovative, flexible, and cheaper than compliance markets. These three attributes are its greatest advantage. "Numerous suppliers say they benefit from this flexibility and the lower transaction costs associated with it."[102] In addition, many VCM participants enjoy that the market is not subject to government legislation (which makes it less vulnerable to price crashes like those seen recently in the EU ETS).

In terms of project types, renewable energy projects accounted for 45% of all transactions in 2011, by far the largest share of the market.[103] More specifically, wind energy projects had the largest share of any project type, accounting for 23.5 $MtCO_2e$ or about 30% of the 2011 market.[104] Afforestation/reforestation projects accounted for another 10% of the market at 7.6$MtCO_2e$, and REDD projects took another 9% of the

[99] Ibid., vi.
[100] Ibid., 28.
[101] Ibid., 27.
[102] Ricardo Bayon, Amanda Hawn, and Katherine Hamilton. *Voluntary Carbon Markets: An International Business Guide to What They Are and How They Work, 2nd ed.* London: Earthscan, 2009. 14
[103] Ibid., iv.
[104] Ibid.

market at 7.3 $MtCO_2e$.[105] This is surprising given that in 2010 wind only accounted for 11% of the market's volume. REDD projects, at 29% of the market's volume, were instead the most popular project type in 2010.[106] This rapid upset in project market share shows that the VCM is not yet a mature marketplace. Furthermore, it shows that only a handful of large projects can significantly change the project breakdown of the market; for example, in 2010 REDD projects had the largest market share mostly because of one very large deal.[107]

Prices in the voluntary market remained resilient in 2011. "The average price for VERs increased slightly in 2011, from \$6/tCO_2e in 2010 to \$6.2/tCO_2e in 2011."[108] This resilience was surprising given the lack of political certainty in the United States surrounding carbon markets and the financial troubles in Europe. But buyers in Europe actually "upped their offset purchases even in the face of financial troubles", and buyers in the US purchased more credits than any other single country in attempts to "sustain climate action in the absence of a federal cap-and-trade scheme."[109]

In general, the VCM is actually a "product market where preferences, prices, and projects vary greatly by region."[110] The details of each project, credit, and transaction vary greatly across the market. But one trend that drives the market is corporate demand for credits that also contribute to social, sustainable, and local development. While 92% of all credits in the VCM were transacted by corporate buyers, 54% of these buyers "voluntarily

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[105] Ibid.
[106] Molly Stanley-Peters, Katherine Hamilton, Thomas Marcello, and Milo Sjardin. *Back to the Future: State of the Voluntary Carbon Markets 2011.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2011. V.
[107] Ibid., 15
[108] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012. Iii.
[109] Ibid.
[110] Ibid., 45.

purchased offsets for CSR or public relations and branding purposes."[111] These are called "purely voluntary" buyers, since their motivations are driven by voluntary goals. Credits that can satisfy CSR needs, such as those sold with Gold Standard certification, fetch a consistently higher price in the marketplace; Gold Standard credits typically sell in the above average price range (>$8/$tCO_2e$), as compared to the Verified Carbon Standard's VCUs which sell in the $4-$6/tCO_2e range.

This represents a growing divide in the voluntary marketplace between two distinct types of carbon: commoditized and "boutique." This is the same divide that separates carbon products in the voluntary market from those in compliance schemes. When carbon is commoditized, prices are driven down; but when it comes in boutique form, prices are sustainably higher. Within the voluntary marketplace, there is a growing tension between buyers who "want a fungible commodity" and buyers "whose main interest is the overall feel of the projects they are funding".[112] The cases presented below give examples of each side of this argument. In general, providing carbon with additional attributes—boutique carbon (also called gourmet carbon)—is what the voluntary marketplace does best. There are many standards devoted specifically to supplying this type of carbon; for example, the Gold Standard, Social Carbon, and the CCB Standards (discussed below). It is very likely that the voluntary market will continue to supply this type of boutique carbon in the future as corporate buyers continue to care about the social responsibility and public relations

[111] Ibid., viii.
[112] Ricardo Bayon, Amanda Hawn, and Katherine Hamilton. *Voluntary Carbon Markets: An International Business Guide to What They Are and How They Work, 2nd ed.* London: Earthscan, 2009. 107

benefits of their purchases. In fact, 2011 suppliers forecasted a 70% growth rate for the 2012 market.[113]

Buyers are also interested in voluntary carbon credits for reasons other than corporate sustainability/public relations, as shown in this chart from the *State of the Voluntary Markets 2012* report. Other motivations include resale (22%), anticipation of future regulations (19%), and greening the supply chain (7%).[114] This flexibility is possible because voluntary credits do not "retire" upon purchase. Firms can purchase credits for resale or investments in addition to emissions offsetting. In order to count as an emissions offset, however, a firm must purchase a credit and retire it so that it can no longer serve another purpose.

Table 7: Top Five Business Motivations for Offsetting, 2011

Rank	Motivation	Share
1	Corporate Social Responsibility	32%
2	Public Relations/Branding	22%
3	Resale	22%
4	Anticipation of Regulation or Commodity Investment	19%
5	Greening a supply chain	7%

The use of voluntary offsets by business has been the source of some controversy. Many environmentalists claim that voluntary offsets are "a game of smoke and mirrors rather than an engine of actual environmental progress."[115] Other critics "believe that offsets should not count in company claims of emissions reductions."[116] While these claims are popular they are generally misguided, since they come from a deeper misunderstanding of the nature of carbon offsets. In fact, offsets *are* emissions reductions—they have just occurred elsewhere. Furthermore, since offsets have to meet very strict standards they are often "considerably more rigorous than reported internal

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[113] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012. viii.
[114] Ibid., 38.
[115] Ricardo Bayon, Amanda Hawn, and Katherine Hamilton. *Voluntary Carbon Markets: An International Business Guide to What They Are and How They Work, 2nd ed.* London: Earthscan, 2009. 13
[116] Ibid., 83

emissions reductions."[117] This is true for all three cases examined below. In fact, there are five general criteria that offsets must always meet; offsets must be real, permanent, additional, verifiable, and enforceable in order to generate carbon credits.[118] Finally, there is a common belief that if a company is purchasing emissions offsets it is making "no other efforts to reduce its climate impact."[119] The truth is that a company purchasing offsets is likely doing more internal reductions than a company that is not. As we will see, large companies like CEMEX and Disney are driven to participate in offsetting through the VCM because of existing commitments to sustainability—they are not simply purchasing offsets to appease stakeholders. Ultimately, corporate use of the voluntary market should be encouraged because it finances emissions reductions and sustainable projects worldwide. Additionally, this market is uniquely positioned to fulfill the needs of businesses, buyer and seller alike.

The following section will look at three carefully selected examples of the voluntary carbon market in action. These examples demonstrate the significant and diverse role the voluntary carbon market plays in promoting different kinds of businesses.

Case 1: Gold Standard Cook Stoves in Malawi: Hestian Innovation Ltd.

In many parts of the world, especially Africa and South America, families still use dirty fuel for indoor cooking. In fact, every day almost 3 billion people use stoves fueled by coal or biomass for cooking.[120] But reliance on polluting cookstoves and fuels leads to a

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[117] Ibid. 84
[118] Jenna Goodward and Alexia Kelly. "The Bottom Line on Offsets." *World Resources Institute*. August 2010.
[119] Ricardo Bayon, Amanda Hawn, and Katherine Hamilton. *Voluntary Carbon Markets: An International Business Guide to What They Are and How They Work, 2nd ed.* London: Earthscan, 2009, 85.
[120] "Environment." *Global Alliance for Clean Cookstoves."* Accessed April 12, 2013. http://www.cleancookstoves.org/our-work/the-issues/environment.html

wide variety of problems; these stoves have serious repercussions for health, the environment, and people's livelihoods.

When it comes to the environment, polluting cookstoves and fuels cause local, regional, and global problems. Burning solid biomass releases methane and black carbon, two potent greenhouse gases. Some sources even believe that the emission of black carbon contributes to between 25-50% of carbon dioxide influenced global warming.[121] Collecting wood to burn for fuel or to produce charcoal also contributes heavily to deforestation in many countries, which can cause mud-slides, loss of watersheds, and desertification, in addition to contributing further to climate change.[122] The loss of forests for fuel can also have negative impacts on local biodiversity.

Exposure to the emissions from burning biomass or coal is also an extremely potent health hazard. In fact, "chronic exposure to smoke from traditional cooking practices is one of the world's biggest—but least well-known—killers."[123] In fact, nearly two million people die every year from illnesses related to indoor air pollution caused by solid fuel use.[124] In addition to mortality, exposure to this smoke can cause child pneumonia, lung cancer, chronic obstructive pulmonary disease, heart disease, and low birth-weight in children born to chronically exposed mothers.[125] Exposure to the pollution that causes these deaths and diseases is greatest among women and children; women are more likely to stand near

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[121] Ibid.
[122] Ibid.
[123] "Health." *Global Alliance for Clean Cookstoves."* Accessed April 30, 2013. http://www.cleancookstoves.org/our-work/the-issues/health-impacts.html
[124] "Indoor Air Pollution." *World Health Organization.* September 2011. http://www.who.int/mediacentre/factsheets/fs292/en/
[125] "Health." *Global Alliance for Clean Cookstoves."* Accessed April 30, 2013. http://www.cleancookstoves.org/our-work/the-issues/health-impacts.html

polluting stoves when preparing food and children often study by the light of the fire.[126] In addition to carbon monoxide and many other pollutants, fine particulate pollution can penetrate deep into the lungs. Exposures often occur at levels greater than 100 times the World Health Organization's recommendations.[127]

The inequity in exposure means that rudimentary polluting cookstoves affect women and children disproportionately. This is also the case because women and children are often the ones responsible for collecting fuel for household stoves. This takes considerable amounts of time and energy, which limits other productive activities that could contribute to development, such as studying for or attending school in the case of children.[128] Finally, women and children may be at risk of injury or violence in unsafe parts of the world while gathering fuel.

For all these reasons, it is important to introduce safer and more reliable cooking methods to families that still rely on rudimentary polluting stoves. While there are many types of clean cookstoves, any successful alternative will require a technology that is "affordable, socially acceptable, easy to use, widely available, durable" and desirable.[129] Globally, there are many groups working to develop and distribute "clean cookstoves" to families in need. The United Nations Foundation has also developed the Global Alliance for Clean Cookstoves, which works to develop knowledge and capacity in support of this effort.

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[126] Ibid.
[127] Ibid.
[128] "Indoor Air Pollution." *World Health Organization.* September 2011. http://www.who.int/mediacentre/factsheets/fs292/en/
[129] "What is a clean cookstove." *Global Alliance for Clean Cookstoves.* Accessed April 30, 2013. http://www.cleancookstoves.org/our-work/the-solutions/what-is-a-clean-cookstove.html

Their goal is to "foster the adoption of clean cookstoves and fuels in 100 million households by 2020."[130]

Malawi, one country that suffers greatly from the use of polluting household stoves, has recently announced the goal of adopting 2 million "clean and efficient cook-stoves throughout the country" by 2020.[131] Currently, a staggering 91% of rural Malawians "use 3-stone stoves for domestic cooking and heating" and only 2% of Malawians have access to electricity for cooking.[132] Unfortunately, the widespread use of rudimentary stoves leads to 13,000 deaths a year in the country.[133] The effort to adopt 2 million stoves will be a joint project between the governments of Malawi, the United States and Ireland, local non-profit organizations, and the Global Alliance for Clean Cookstoves.

A company called Hestian Innovation Ltd has already had success building and distributing clean cookstoves in Malawi. Since 2008, the company has distributed almost 20,000 cleaner solutions to households (over 18,000 clean cookstoves and more than 1,000 "Rocket Barns," a solution for drying tobacco).[134] In addition, their activities have contributed to the employment of over 1,000 people in the production, construction, monitoring, and marketing of the project.[135] This is made possible by their innovative business model, which includes decentralized production using local materials. Hestian establishes local distribution centers and then allows local people to sell the stoves for a

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[130] "Alliance Mission and Goals." *Global Alliance for Clean Cookstoves.* Accessed April 30, 2013. http://www.cleancookstoves.org/the-alliance/

[131] "U.S. and Ireland Partner with President Joyce Banda to reach 2 million Clean Cook-stoves in Malawi by 2020." *Embassy of the United States Lilongwe Malawi*. Accessed April 12, 2013. http://lilongwe.usembassy.gov/pressreleases5/clean-cook-stoves.html

[132] "Project Design Document for Gold Standard Voluntary Offset Projects: Integrated Biomass Energy Conservation Project – Malawi." ECOFYS. November 19, 2010, 14.

[133] "U.S. and Ireland Partner with President Joyce Banda to reach 2 million Clean Cook-stoves in Malawi by 2020." *Embassy of the United States Lilongwe Malawi*. Accessed April 12, 2013. http://lilongwe.usembassy.gov/pressreleases5/clean-cook-stoves.html

[134] "About." *Hestian*. Accessed April 30, 2013. http://hestian.com/about/

[135] Ibid.

commission. In addition, they employ women whenever possible. The company works in all parts of Malawi, targeting its product range at different consumer groups, such as rural households or small tobacco farmers. They have developed three categories of clean cookstoves: household stoves, institutional cook stoves, and Rocket Barns. They also partner with mico-finance institutions to distribute some of the most expensive products.[136]

Hestian's household stoves focus on being "affordable, appropriate, and locally made."[137] They offer three different types of household stove. The first type, called a "Chitetezo Ceramic Stove," is the cheapest of the three. This ceramic stove is small, portable, easy to use, and has a lifespan of about 3 years. Their second household stove is called the "Esperanza Fixed Stove" and is more expensive than the ceramic model but lasts forever. The Esperanza stove is also more efficient than the ceramic, meaning its payback period can be as low as four months.[138] Their last stove is called the "Mthandizi Urban Stove" and it is designed specifically for city dwellers who would otherwise use rudimentary biomass stoves. This stove is affordable, efficient, and aesthetically pleasing (being made out of metal instead of clay or cement). This stove has also been designed to be compatible with local cuisine, which adds to its popularity. All of these household stoves are significantly cleaner than rudimentary alternatives, are locally made with local materials, are culturally appropriate, and are easy to use. They all also reduce fuel wood

[136] "Project Design Document for Gold Standard Voluntary Offset Projects: Integrated Biomass Energy Conservation Project – Malawi." ECOFYS. November 19, 2010, 5.
[137] "Household Stoves." *Hestian*. Accessed April 12, 2013. http://hestian.com/projects/household-stoves/
[138] Ibid.

consumption by up to 80%. If these clean cookstoves were adopted on a large scale, they could drastically decrease rates of deforestation.[139]

The institutional cookstoves are simply larger, specialized versions of their "Esperanza" household model. These institutional models are made custom for places such as schools where the stove is responsible for larger volumes of cooking. These custom institutional clean cookstoves are also made with local materials, come with a two-year warranty, and can save over 70% of firewood compared to a baseline scenario.[140] The significantly increased fuel efficiency means that these stoves also deliver "very impressive cost savings" for their buyers.[141]

Hestian's final product is the "Rocket Barn", which is a cleaner and more efficient solution to traditional tobacco processing. Many farmers in Malawi rely on tobacco for their income. In fact, tobacco is actually Malawi's "largest export and the country's primary source of hard currency."[142] Because many small tobacco farmers in Malawi will also use fuel wood to dry their tobacco leaves, Hestian also developed The Rocket Barn. This product is a clean cookstove alternative for drying tobacco that is constructed with local materials. This technology can reduce wood consumption by up to 75% while increasing the amount of tobacco that can be processed.[143]

Together, these clean cookstove technologies have significant benefits. For example, they reduce dangerous indoor air pollution and associated health problems, they reduce time spent collecting fuel, they reduce the amount of fuel used and therefore the amount of

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[139] "Carbon Financed Cookstoves in Africa." *Hestian*. Accessed April 30, 2013. http://hestian.com/
[140] "Institutional Cook Stoves." *Hestian*. Accessed April 30, 2013. http://hestian.com/projects/institutional-cook-stoves/
[141] Ibid.
[142] "Rocket Barns." *Hestian.* Accessed April 12, 2013. http://hestian.com/projects/rocket-barns/
[143] Ibid.

money spent on fuel, and they reduce pressure on the environment from unsustainable fuel collection and polluting emissions.[144]

Because of the environmental benefits, especially reduced greenhouse gas emissions and avoided deforestation, Hestian Innovation is able to sell carbon credits from the construction and distribution of these clean cookstoves. In fact, Hestian planned to access the carbon market to "overcome various constraints so that sales could be increased dramatically through training specialized building teams and production groups, marketing and promotion, technical development and improved after sales services."[145] With the money gained from the carbon market, Hestian was able to finance its business expansion, improve operational capacity, devise quality assurance, develop user manuals, improve the design of its products, and most importantly incorporate itself as a business.[146]

It is safe to say that without the revenues generated from the voluntary carbon market, Hestian's clean cookstove business model would not have succeeded. According to the company, the revenue generated from selling clean cookstoves and rocket barns at affordable market prices in Malawi would have been "inadequate to address the barriers faced."[147] Thus the project would not be "economically viable nor attainable" without carbon finance.[148] Hestian was able to show that disseminating clean cookstoves and low carbon solutions in developing countries can be commercially viable when supported with revenues from the voluntary carbon market.[149]

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[144] "Project Design Document for Gold Standard Voluntary Offset Projects: Integrated Biomass Energy Conservation Project – Malawi." ECOFYS. November 19, 2010, 5.
[145] Ibid., 5.
[146] Ibid.
[147] Ibid., 14.
[148] Ibid.
[149] "Project Profile: Hestian Innovation, technology solution for VER tracking, Malawi." July 2012. http://businessinnovationfacility.org/page/project-profile-hestian-innovation-technology-ver-tr

But the voluntary carbon market does more than simply overcome financial barriers for projects like Hestian's; it also provides an incentive to succeed. Carbon finance "creates a strong incentive for quality assurance and customer service to ensure user awareness, proper use and continuity of emissions reduction" because Hestian must prove that its project is effective at reducing greenhouse gas emissions in order to obtain carbon financing.[150] The rigorous enforcement provided by the VCMs market infrastructure also helps assure buyers of the quality of the carbon credits by reducing investment risk and guaranteeing real emissions reductions. Thus businesses that buy these credits can be assured that their offsets will hold up to public scrutiny, which decreases reputational risks.

But recently Hestian has taken its participation in the voluntary carbon market to a new level. The company is now working with an IT company called Revel Innovation on a smartphone-based emissions tracking system "that will facilitate the generation of verified emission reductions," or VERs, from its clean cookstoves.[151] This smartphone-based tracking system is intended to digitize the auditing process required in the VER certification. Currently, Hestian relies on a paper-based reporting system that "demands significant human involvement and presents high costs and constraints."[152] A mobile technology solution to the VER reporting process will allow Hestian to "implement more improved cookstoves and generate greater revenues from VERs" which will allow the

[150] Ibid.
[151] Ibid.
[152] Ibid.

company to scale its activities in Malawi and potentially expand to other countries in Africa.[153]

In order to access carbon finance, Hestian partnered with the Gold Standard Foundation, a nonprofit group that certifies carbon credits. The Gold Standard was developed under the leadership of the World Wildlife Fund (WWF), HELIO International and SouthSouthNorth, with "a focus on offset projects that provide lasting social, economic, and environmental benefits."[154] Hestian's project was the first to be registered under the Gold Standard in Malawi, and has gained attention because of its unique model, "with the cook stoves all manufactured in country by production groups of women using local materials."[155] Over its seven-year crediting period, this project hopes to achieve emission reductions of 1,375,737 tCO_2e.[156] In absence of this project activity, households in Malawi would continue to collect and burn biomass in an unsustainable and hazardous manner, proving that this project achieves additional emissions reductions.

The Gold Standard is strictly a certification body—it does not sell carbon credits. But when Gold Standard credits are sold, they consistently fetch a high average price in the marketplace (above $8/tCO2e). Buyers are willing to pay more because the Gold Standard takes into account the sustainable co-benefits of its credits. This is thus considered boutique carbon because the credits also come with valuable storytelling appeal that represents additional value to buyers. In 2011, suppliers sold a record 8.5 MtCO2e Gold

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[153] Ibid.
[154] Anja Kollmuss, Michael Lazarus, Carrie Lee, Maurice LeFranc, and Clifford Polycarp. *Handbook of Carbon Offset Programs: Trading Systems, Funds, Protocols, and Standards*. London: Earthscan, 2012.
[155] Hestian Press Release: "Hestian's project in Malawi issues first gold standard cookstove VERs using suppressed demand." 2013. Available: hestian.com/wordpress/wp-content/uploads/Hestian-Press-Release_070213_final.doc
[156] "Project Design Document for Gold Standard Voluntary Offset Projects: Integrated Biomass Energy Conservation Project – Malawi." ECOFYS. November 19, 2010, 18.

Standard certified VERs, which accounted for about 12% of the entire voluntary marketplace.[157]

Clean cookstoves are actually a well-know voluntary market project category. In 2011, clean cookstoves accounted for 4% of the market or 3.2 $MtCO_2e$.[158] Most of these projects utilize the Gold Standard because it has developed a clean cookstove project methodology. While many clean cookstove projects have been around for some time, supply of clean cookstove carbon credits is just now catching up with demand. Suppliers expect demand for clean cookstove based carbon credits to continue increasing. As stated they are popular with corporate offsetters because they "unite humanitarian, environmental, and in some cases investment opportunities under one offset purchase"—in other words they fulfill many corporate CSR needs and are thus generally considered the ultimate form boutique carbon credits.[159]

Because of this, credits from clean cookstove projects sell for the highest average price ($13.2/tCO2e) of any project type in the VCM.[160] This represents a significant premium over average VCM prices—in fact the minimum transacted price for a clean cookstove credit in 2011 was "more than $3/$tCO_2e$ higher than the market average."[161]

On February 7th, 2013, Hestian's clean cookstove project issued the first ever Gold Standard certified VERs that use a "suppressed demand" approach.[162] Very simply, suppressed demand addresses "demand for an energy source that is currently suppressed

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[157] Stanley-Peters, Molly and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012. 29.
[158] Ibid., 19
[159] Ibid., 21
[160] Ibid., 23
[161] Ibid.
[162] Hestian Press Release: "Hestian's project in Malawi issues first gold standard cookstove VERs using suppressed demand." 2013. Available: hestian.com/wordpress/wp-content/uploads/Hestian-Press-Release_070213_final.doc

by underdevelopment."[163] In other words, it allows for project developers to "leapfrog" a dirty technology rather than wait for underdeveloped populations to adopt a dirty technology so they can then be eligible for carbon credits by making the switch to cleaner ones. Because of this approach, Hestian is able to earn more VERs for its activities than actual emissions reductions achieved. This achievement has set a precedent that will "allow million of people from [LDCs] to realize sustainable development benefits through finance from verified emissions reductions."[164]

Thus it seems that the voluntary carbon market was instrumental in financing Hestian Innovation's clean cookstove business. Without the revenues from the sale of VERs, Hestian would not have been able to develop its technologies, develop its business, or achieve success in reducing emissions or providing ancillary benefits to Malawian households. But in this case, the VCM was more than a source of finance. It provided the impetus necessary to develop quality control, monitoring, and customer support, without which stove users would not have achieved the same benefits. Additionally, the flexibility of the VCM's infrastructure allowed Hestian to partner with a certification body—the Gold Standard—that specialized in African and cookstove projects. This partnership allows Hestian to sell carbon credits at higher prices than otherwise possible and achieve extra emissions reductions by providing a leapfrog technology solution. Finally, Hestian is using innovation of its own to improve upon the VCM experience by developing an electronic

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[163] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, 20.
[164] Hestian Press Release: "Hestian's project in Malawi issues first gold standard cookstove VERs using suppressed demand." 2013. Available: hestian.com/wordpress/wp-content/uploads/Hestian-Press-Release_070213_final.doc

auditing system for smartphones. The VCM is a great fit for Hestian's business model; it very clearly enabled a new, low-carbon business to succeed.

Case 2: Manufacturing: CEMEX, CSR, and the VCM

Cement is a ubiquitous substance in modern life. It plays an irreplaceable role in meeting the world's needs for housing and infrastructure; "there is currently no other material that can replace cement or concrete in terms of effectiveness, price, and performance."[165] Some people would even say that cement is one of the most useful materials developed by man.[166] In addition, society's reliance on cement is increasing as rural populations become more urbanized and as more infrastructure is built in less developed nations. It is no surprise then that cement production is expected to increase dramatically for the better part of the century. In 2008, the world produced 2.8 billion tones of cement to meet its needs.[167] Today, over half of all cement produced globally is made in China.

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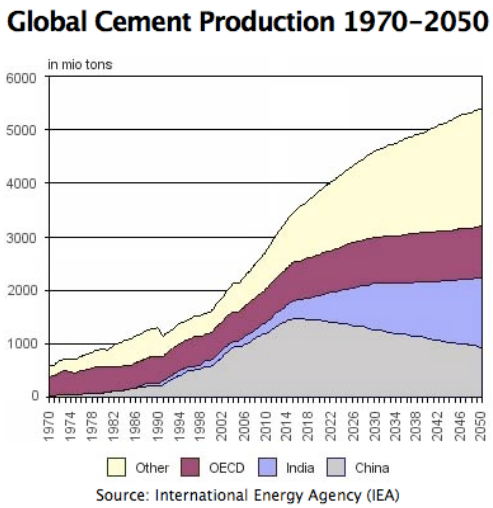
[165] "About the Cement Industry." *World Business Council for Sustainable Development Cement Sustainability Initiative.* Accessed April 30, 2013. http://www.wbcsdcement.org/index.php/about-cement
[166] "Cement Production." *World Business Council for Sustainable Development Cement Sustainability Initiative*. Accessed April 12, 2013. http://www.wbcsdcement.org/index.php/about-cement/cement-production
[167] "About the Cement Industry." *World Business Council for Sustainable Development Cement Sustainability Initiative.* Accessed April 30, 2013. http://www.wbcsdcement.org/index.php/about-cement



Source: "About the Cement Industry." *World Business Council for Sustainable Development Cement Sustainability Initiative.* Accessed April 30, 2013. http://www.wbcsdcement.org/index.php/about-cement

But what is cement? Cement is simply a manmade mineral structure that has many attractive properties. It usually contains a mixture of lime (CaO), Silica (SiO_2) and oxides of aluminum and iron (AL_2O_3 and Fe_2O_3).[168] These are combined into a powder that reacts with water to "produce strength-bearing lattices."[169] In order to produce cement, rocks (usually limestone) must be quarried. Then the large rocks undergo preliminary crushing and are proportioned so that the "rawmeal" has the correct chemical balance. Once the rawmeal is produced, it is "preheated" at high temperatures before it enters the kiln for further cooking. When the rock is cooked, the calcium carbonate ($CaCO_3$) decomposes into CaO and releases CO_2. This decomposition accounts for up to 60% of all GHG emissions from cement production, the rest comes from fuel consumption and transportation.[170] The extreme temperatures in the kiln cause chemical reactions that create calcium silicates,

[168] "Cement Production." *World Business Council for Sustainable Development Cement Sustainability Initiative*. Accessed April 12, 2013. http://www.wbcsdcement.org/index.php/about-cement/cement-production
[169] Ibid.
[170] Ibid.

cement's main ingredient. Once the raw material, now called clinker, is cooled it is ground with other materials into the powder we know as cement. The cement is then bagged and sold to the consumer, where it is used to build the many structures we know today.

In order to be useful, cement must be mixed with water and aggregates to form concrete. Concrete is then used to build hospitals, schools, apartment buildings, roads, bridges, dams, and much more. It should come as no surprise then that concrete is the most used man-made product in the world; each person "uses" three tons of it every year.[171] Concrete is a very attractive substance. It is strong and durable, it is infinitely versatile, very low maintenance, highly affordable, fire-resistant, has excellent thermal mass, and can be produced locally.[172]

But our reliance on cement contributes greatly to climate change. Global cement production accounts for about 5% of all anthropocentric emissions of CO_2.[173] Most of these emissions come from the production process, but a sizable amount also comes from fuel consumption in production and energy used in transporting the final product. In addition to CO_2 emissions, cement production also releases nitrous oxides, sulfur oxides, volatile organic compounds, particulates, heavy metals, and persistent bioaccumulative toxins such as dioxins and furans.[174] There are also other important environmental impacts, such as noise pollution, landscape and watershed disturbance, and impacts on biodiversity (mainly

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[171] "Sustainability Benefits of Concrete." *World Business Council for Sustainable Development Cement Sustainability Initiative*. Accessed April 30, 2013. http://www.wbcsdcement.org/index.php/about-cement/benefits-of-concrete

[172] Ibid.

[173] "About the Cement Industry." *World Business Council for Sustainable Development Cement Sustainability Initiative.* Accessed April 30, 2013. http://www.wbcsdcement.org/index.php/about-cement

[174] "The Cement Sustainability Initiative: 10 years of progress—moving on to the next decade." *World Business Council for Sustainable Development Cement Sustainability Initiative*. 2012, 18

from limestone quarries). Because the chemistry of cement production is unavoidable, the industry is greatly limited in their ability to achieve emissions reductions.

In response to all of these impacts, the World Business Council on Sustainable Development helped create the Cement Sustainability Initiative (CSI). CSI is a joint effort between 24 major cement producers, such as SCG Cement, Titan, CIMPOR, China Resources Cement Holdings Ltd, CEMEX, and many others. Collectively these companies represent 30% of global cement production, with operations in over 100 countries.[175] They have joined together to explore the possibility of promoting sustainable development through cement. CSI's purpose is to explore what sustainable development means to the cement industry, to identify actions to promote sustainable development, to provide a framework for other cement companies, and to further stakeholder engagement.[176] CSI is still one of the largest global sustainability programs ever undertaken by a single industry sector.[177]

But in addition to joining CSI, many cement companies have also developed their own sustainability programs and goals. CEMEX, for example, has developed a sustainable development framework made up of seven priorities. Their company has also adopted strong language, such as: "Sustainability is central to CEMEX. It is core to our business strategy, as well as key to our growth…the only future CEMEX can possible aim for is a sustainable one."[178] As part of the company's response to climate change, CEMEX aims to increase energy efficiency, use alternative raw materials, use alternative fuels and renewable energy, disclose CO_2 emissions, explore new technologies, and use sustainable

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[175] "About CSI." *World Business Council for Sustainable Development Cement Sustainability Initiative.* Accessed April 30, 2013. http://www.wbcsdcement.org/index.php/about-csi
[176] Ibid.
[177] Ibid.
[178] "Building a Better Future: 2011 Sustainable Development Report." *CEMEX*. 2011.

transportation.[179] In addition, the company has registered eight projects with the CDM and has 12 more in development. They strongly believe in the use of cap-and-trade policies, especially instead of a carbon tax.[180] It remains to be seen how their CDM project will develop, however, since the price of CERs has all but collapsed.

The company is committed to increasing the use of alternative fuels in its cement manufacturing process. In 2009, the company had a 16.4% alternative fuel substitution rate in its kilns.[181] That number increased to 24.7% in 2011, with the current goal being 35% by 2015.[182] This means that in 2011 90% of CEMEX's plants burned some kind of alternative fuel, which saved around 2 million tons of coal. Since 2005, the company has invested $175 million increasing its alternative fuel usage rate.[183] Alternative fuel usage is highest among the company's European operations, in part because the company participates in the EU ETS which incentivizes emissions reductions.[184] The company admits that both the EU ETS and the CDM allow them "to pursue a variety of carbon-reduction projects more economically."[185] But the recent price collapses in both of these markets has undoubtedly changed this outlook.

In the United States, the company is pursuing alternative fuels usage with help from the voluntary carbon market. It has two projects registered with the Verified Carbon Standard. Their project in Louisville is attempting to phase out the usage of coal in cement production by using more low-carbon fuels such as natural gas and biomass. The Louisville

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[179] "Sustainable Development: Our 7 Priorities." *CEMEX*. Accessed April 30, 2013. http://www.cemex.com/SustainableDevelopment/KeyPriorities.aspx
[180] "Market Mechanisms for Mitigating Climate Change: CEMEX's POSITION." *CEMEX*. July 20, 2012.
[181] "Building a Better Future: 2011 Sustainable Development Report." *CEMEX*. 2011, 7.
[182] Ibid.
[183] Ibid., 21
[184] Ibid., 20
[185] Ibid., 23

project is looking to substitute up to 78% of its fuel requirements with alternative fuels such as tires, municipal solid wastes, plastics, textiles, wood residues, paper, cardboard, and agricultural and other biomass residues.[186]

To generate the carbon credits necessary to finance the project, CEMEX partnered with the Verified Carbon Standard (VCS) (formerly the Voluntary Carbon Standard). The VCS is the leading carbon registry in the VCM; it accounted for 58% of 2011's market share.[187] The VCS has in fact been leading the VCM in market share for 5 consecutive years. In 2011, they transacted 41 $MtCO_2e$. Of this, 78% was generated from "energy-based" projects, 60% strictly from renewable energy projects.[188] Unfortunately for CEMEX, VCS credit prices were somewhat depressed in 2011, averaging only $\$5/tCO_2e$ instead of CEMEX's anticipated $\$12/tCO_2e$, although the prices admittedly ranged significantly according to project.[189] In this case, the voluntary credits are more of a commodity rather than a boutique variety since they have no storytelling appeal and serve only a financial purpose. The VCS actually specializes in these types of commodity carbon, since its standard focuses only on emissions reductions. But they do allow the use of other standards, as we will see, to account for missing co-benefits.

CEMEX has applied for a 10-year crediting period with VCS. They estimate that over this period, the project activity will help reduce over 2.9 million tones of CO_2e. In absence of the project activity, the Louisville plant would continue to burn fossil fuels, thus the reductions in this scenario are unquestionably additional.

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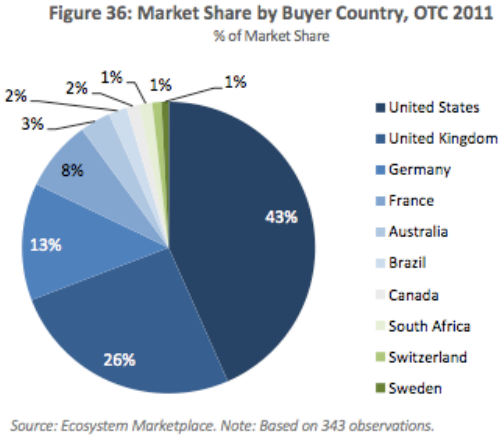
[186] "CEMEX USA: Alternative Fuels and Biomass Project at Louisville Cement Plant." CO2 Solutions USA, LLC. September 3, 2012, 3.
[187] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012*. Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, 29.
[188] Ibid., 28.
[189] Ibid., 31, and "CEMEX USA: Alternative Fuels and Biomass Project at Louisville Cement Plant." CO2 Solutions USA, LLC. September 3, 2012, 35.

The project will reduce CO_2 emissions from fuel consumption as well as methane emissions from biomass that would otherwise decompose. Unfortunately, utilizing these fuels has many drawbacks since the current infrastructure was designed to burn fuels of "high and constant quality" such as coal and petcoke.[190] Many of these fuels, especially municipal solid waste and biomass, do not have stable chemical compositions or physical properties. For example, the fuel mix will have an inconsistent composition, some fuels have extreme viscosity, low heating values, fluctuating levels of moisture, and a high potential for contamination.[191] In order to most effectively develop the usage of these fuels, CEMEX must develop complete systems for receiving, processing, storing, and feeding alternative fuels onsite.[192] Specifically, they will need to build a tire feeding system, a suspension burner, a multichannel burner, and a mechanical feeding system (pictured below).[193]

Source: "CEMEX USA: Alternative Fuels and Biomass Project at Louisville Cement Plant." CO2 Solutions USA, LLC. September 3, 2012,

[190] "CEMEX USA: Alternative Fuels and Biomass Project at Louisville Cement Plant." CO2 Solutions USA, LLC. September 3, 2012, 9.
[191] Ibid. 6
[192] Ibid., 3
[193] Ibid., 7

What is essential to understand about this case is that CEMEX would be unable to accomplish this project (and hence one of their main CSR goals) without the support of the voluntary carbon market. In Germany, where the company also operates, waste related legislation has supported the use of alternative fuels by substantially increasing waste tipping fees thus making fuel substitution more attractive for the company.[194] In the United States, the VCM provides the necessary financial incentives in absence of such laws or a national cap-and-trade program or carbon tax.



As we can see in this graph from *Ecosystem Marketplace*'s report "The State of the Voluntary Markets 2012", buyers in the United States are extremely fond of the voluntary market. In fact, thanks to the United States, North America was actually the region with the most purchases of and suppliers of voluntary carbon credits in 2011. Projects in North America supplied 37% of all credits in the market place.[195] And the region purchased more VERs than any other, with purchases in the United States totaling $151 million of the region's $159 million, or 28 $MtCO_2e$.[196]

Without the sale of VCUs from the project activity, CEMEX calculated an IRR of negative 100% on this investment. With the sale of VCUs however, the IRR improves to 18.10%. This is well over their acceptable margin of a 9.5% return on investment.[197] Thus

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[194] Ibid., 27
[195] Stanley-Peters, Molly and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, 24.
[196] Ibid., 43
[197] "CEMEX USA: Alternative Fuels and Biomass Project at Louisville Cement Plant." CO2 Solutions USA, LLC. September 3, 2012, 33.

the registration of the project with VCS alleviates any investment barriers that would otherwise prevent this low-carbon development. The extraordinary swing in return on investment is unusual. It suggests that CEMEX is not putting a lot of money into this investment and is instead relying heavily on carbon revenues. In addition, the revenues generated from the sale of voluntary carbon credits serve as "insurance against the considerable risks that the project activity involves."[198] Finally, the VCM also provides extra motivation to operators to "overcome all the major and minor problems that the introduction of such an aggressive fuels program will bring" because the project will fail financially if it cannot justify the issuance of carbon credits.[199]

In this case, CEMEX is motivated to make carbon reductions by their larger CSR goals. In fact, the majority of buyers who participate (32%) in the VCM are motivated primarily by CSR goals.[200] But in this case, CEMEX is not a buyer, it is a project developer. Thus the VCM also has the important function of supporting CSR based project development in addition to CSR based offset purchases. In addition, the voluntary carbon market is important to the CEMEX Louisville plant because there is no cap-and-trade or other legislative based incentive. Thus CEMEX, like many other US companies, turned to the voluntary carbon market.

In this case, the VCM's main role was financial. The extra financial incentive provided by the VCM allowed the project to attain an acceptable internal rate of return on investment over a 20-year timeframe. This is a very simple example of how the VCM can

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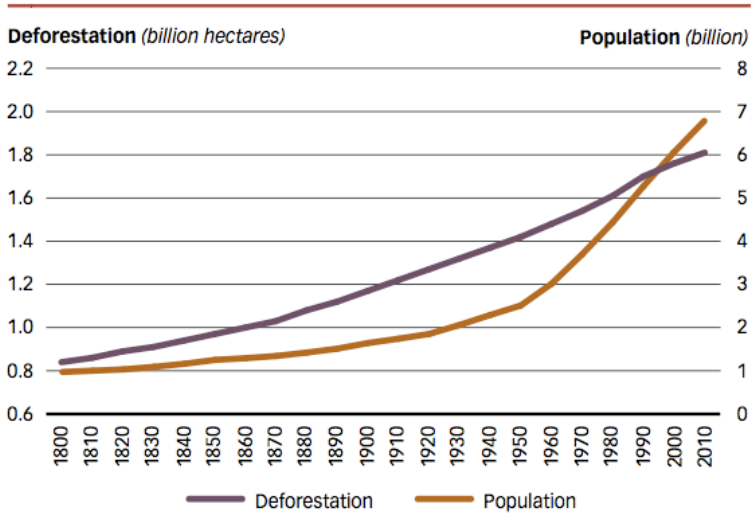
[198] Ibid., 35
[199] Ibid.
[200] Stanley-Peters, Molly and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, 38.

enable corporations—even large ones like CEMEX—to meet CSR goals. But the VCM also provided extra motivations for the success of this project.

Case 3: The VCM for Ecosystem Services and Land Conservation

Forests currently cover around 4 billion hectares or about 31% of the Earth's land surface.[201] But they are currently threatened by human induced land changes, such as deforestation and land degradation. In fact, there is a strong link between economic development and forest use. In addition, the "trajectory of deforestation has more or less followed the global growth rate of the human population," which indicates a strong link between development and forest degradation, as shown in the following graph.[202]

Figure 1: World population and cumulative deforestation, 1800 to 2010



Source: *State of the World's Forests*. Rome: Food and Agriculture Organization of the United Nations, 2012.

This graph also shows that deforestation rates have become increasingly severe:

[201] *State of the World's Forests*. Rome: Food and Agriculture Organization of the United Nations, 2012, 9.
[202] Ibid.

> "Over a period of 5,000 years, the cumulative loss of forest land worldwide is estimated at 1.8 billion hectares—an average net loss of 360,000 hectares per year. Population growth and the burgeoning demand for food, fiber, and fuel have accelerated the pace of forest clearance, and the average annual net loss of forest has reached about 5.2 million hectares in the past ten years."[203]

As such, it should come as no surprise that deforestation is believed to be one of the most "widespread and important changes" humans have ever made to the surface of the Earth.[204] In fact, "the global area of forest systems has been reduced by one half over the past three centuries."[205] Furthermore, forests have "effectively disappeared in 25 countries, and another 29 have lost more than 90% of their forest cover."[206] Deforestation is especially severe in the tropics, with rates exceeding 12 million hectares per year in certain areas.[207] "In Latin America, there was a net loss of 88 million hectares of forest (9 percent of the total forest area) during the 20 years from 1990 to 2010."[208] Ultimately, deforestation is a "deliberate decision to convert land to a use that is perceived as having a higher value," such as building cities or farms.[209]

If one were to take all the services that forests provide to people into account, then the loss and degradation of forest lands would cost the global economy between $2-$4.5 trillion per year.[210] But the essential services that forests provide are not monetized, a

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[203] Ibid.
[204] Ibid.
[205] Millennium Ecosystem Assessment (MEA). *Ecosystems and Human Well-Being: Synthesis*. Washington: Island Press. 2005, 29.
[206] Ibid., 29.
[207] Ibid.
[208] *State of the World's Forests*. Rome: Food and Agriculture Organization of the United Nations, 2012, 16-17.
[209] Ibid., 15
[210] Ibid., 25

mistake that leads to poor decision-making. Carbon markets can correct these poor incentives by helping society monetize essential forest functions.

Forests are responsible for providing many valuable services, especially air quality regulation, climate regulation, erosion control, and protection from natural hazards; but they also provide spiritual and aesthetic enjoyment to a significant degree. These "ecosystem services" (the benefits that nature provides to people) are very significant. Globally, "forest systems are associated with the regulation of 57% of total water runoff" and about "4.6 billion people depend for all or some of their water on supplies from forest systems."[211] In addition, forests provide habitat for about 70% of terrestrial animals and plants.[212] Because these attributes are not valued, "rational" economic thinking favors the destruction of forests for the cultivation of faster growing species or development.

In addition, the continued loss of global forestland has significant effects on the global climate. Net global deforestation from 2000-2005 contributed about 5.0 gigatons of CO_2 per year to the atmosphere.[213] Since the net greenhouse gas contributions from improper forest management are so severe, it should come as no surprise that sustainable forest management can generate carbon credits.

There are many different types of carbon credits available to sustainable land management practitioners. The categories include projects such as afforestation, reforestation, avoided deforestation and degradation (REDD), and sustainable management (REDD+). These projects can each generate different types of carbon credits.

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[211] Millennium Ecosystem Assessment (MEA). *Ecosystems and Human Well-Being: Synthesis*. Washington: Island Press. 2005, 29.
[212] "Facts & Figures." Forest Stewardship Council. Accessed March 13, 2013. https://us.fsc.org/facts-figures.219.htm
[213] *World Development Report 2010: Development and Climate Change*. Washington DC: World Bank, 2010, 25.

For example, when located in Annex I countries afforestation and reforestation projects can generate Removal Unites (RMUs), which can be used under the Kyoto Protocol to meet reduction obligations. Other credits, such as those from avoided deforestation projects, are not allowed under Kyoto and have to find other avenues. One of the most common alternatives for these projects is the voluntary carbon market, as was the case for one recent project in Peru.

As part of their work, Conservation International, a global nonprofit focused on preserving biodiversity, is actively involved in preserving the Peruvian Amazon. One piece of the Amazon in particular, named the Alto Mayo Protected Forest (AMPF) is especially valuable. In addition to the many endemic species, this forest provides many important ecosystem services to the local population and the world. It forest provides carbon sequestration, clean and abundant water, prevents soil erosion, protects downstream areas from flooding, and offers value through scenic beauty.[214] These valuable services are partly responsible for the AMPF's designation as a Nationally Protected Area (NPA), which makes certain land uses illegal under Peruvian law in an attempt to preserve the forest.

[214] "Alto Mayo Conservation Initiative: Project Description." Conservation International-Peru. June 15, 2012, 6.

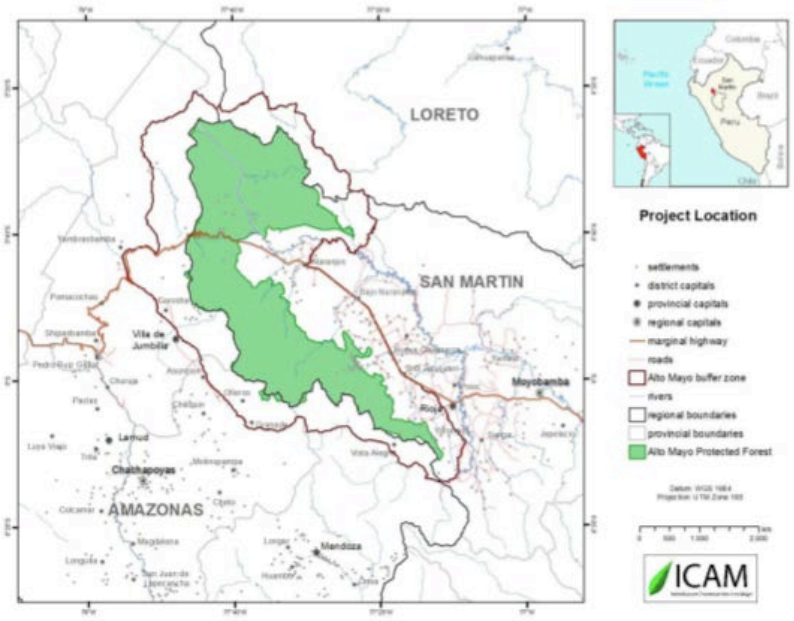

Figure 2. Location of the Alto Mayo Protected Forest

Source: "Alto Mayo Conservation Initiative: Project Description." Conservation International-Peru. June 15, 2012.

In general, ecosystem services can be broken down into four categories: "*provisioning services* such as food, water, timber, and fiber; *regulating services* that affect climate, floods, disease, wastes, and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and *supporting services* such as soil formation, photosynthesis, and nutrient cycling."[215] According to these categories, the AMPF is especially valuable for its regulating, cultural, and supporting ecosystem services. The emphasis on these services makes this case especially unique.

Conservation International's primary focus on ecosystem services is a great example of a new paradigm in land conservation. In addition, since this case also focuses heavily on the voluntary carbon market, it shows that the VCM can be successfully employed to support conservation by monetizing value gained from ecosystem services. In this case, the

[215] Millennium Ecosystem Assessment (MEA). *Ecosystems and Human Well-Being: Synthesis*. Washington: Island Press. 2005, V.

AMPF's regulatory service of climate regulation was able to generate revenue through the sale of voluntary carbon credits.

Despite the AMPF's designation as an NPA, its forest and critical ecosystem services are under threat. The area is plagued by insufficient funds for management, but also threatened by the development of a highway in 1975 and increasing rates of migration from the Andes to the Amazon.[216] More recently, the increasing price of coffee has made coffee farming more attractive to local settlers. This has caused an increase in unsustainable land conversion for coffee plantations. In addition, the highway in the area has been linked with other "mega-development" as part of the Initiative for the Integration of the Regional Infrastructure of South America (IIRSA).[217] These threats and trends are likely to continue, "unless new mechanisms are designed to add value to the standing forests so that it can compete economically with other land uses."[218]

To accomplish this task, Conservation International set up the Alto Mayo Conservation Initiative (AMCI), "whose main goal is to promote the sustainable management of the AMPF and its ecosystem services for the benefit of the local populations and the global climate."[219] Fundamental to the program, the AMCI recognizes that the key to preserving the area's many valuable services is in "designing a new mechanism to give the forest an economic value that competes with alternative uses of the land."[220]

This new mechanism is a combination of targeted activities that simultaneously raise revenues and promote sustainable practices. First, settlers in the AMPF will be asked

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[216] "Alto Mayo Conservation Initiative: Project Description." Conservation International-Peru. June 15, 2012, 6.
[217] Ibid.
[218] Ibid.
[219] Ibid.
[220] Ibid.

to sign conservation agreements in exchange for access to knowledge about sustainable coffee cultivation. Settlers will be instructed on the production of "organic, shade-grown coffee, thereby replacing the current traditional coffee plantations with sustainable, low-impact agro-forestry systems with the goal of reforesting degraded areas."[221] Sustainable coffee plantations allow settlers to both increase productivity and earn more money, thereby reducing the pressure to deforest new land. Second, the AMCI is "investing in strengthening the governance and enforcement capabilities of the AMPF Head Office."[222] Third, the AMCI will be carrying out extensive outreach to settlers to build awareness and "increase their involvement in conservation activities."[223] Finally, the AMCI will be participating in the voluntary carbon market to raise funding for these programs. This four-pronged approach is focused on creating sustainable opportunities for local populations in order to preserve the valuable forest.

This case also utilizes the Verified Carbon Standard (VCS) to certify its carbon credits. The project falls under VCS's Reducing Emissions from Deforestation and Forest Degradation (REDD) project category. Technically, since this project also includes sustainable landscape management it would qualify as REDD+**,** but it is simply categorized as REDD in the VCM. The VCS's first approved REDD methodology was released in 2010, which has helped REDD projects in the VCM overcome investment and reputational risks.[224] But since this project is heavily involved in additional social and environmental

[221] Ibid., 7
[222] Ibid.
[223] Ibid.
[224] Molly Stanley-Peters, Katherine Hamilton, Thomas Marcello, and Milo Sjardin. *Back to the Future: State of the Voluntary Carbon Markets 2011.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2011, 16.

benefits, CI decided to monetize these benefits by pursuing an additional certification, as will be discussed.

Now REDD projects are extremely common in the VCM. In 2010, REDD projects accounted for 29% of the global voluntary market, but only 9% in 2011.[225] So between 2010 and 2011, REDD project volumes in the VCM actually fell from 17.8 to 7.3 $MtCO_2e$ respectively.[226] Despite this decrease, REDD maintained its share of the market's value due to price increases (going from an average of $5 to $12 a credit).[227] In both 2010 and 2011, REDD projects accounted for $87 million, the largest sum of any project type in the VCM.[228] In 2010, Latin American forests accounted for "81% of all REDD credits and half of all forestry credits transacted" with Peru capturing the largest share of any country.[229] In general for REDD projects, buyers prefer to contract credits from projects in later stages of development, such as those that are undergoing validation or those that have already been issued credits (rather than buy riskier, earlier stage credits that may not materialize).[230] Luckily for the Alto Mayo, Conservation International was able to find a wiling buyer.

In addition to the VCS, this project is also certified under the Climate, Community, and Biodiversity Standard (CCB). This additional standard is important because the VCS does not take environmental and social co-benefits into account when assessing projects (unlike other standards such as the Gold Standard, Plan Vivo, or CarbonFix). However, the VCS does allow projects to pursue additional standards that account for a project's co-

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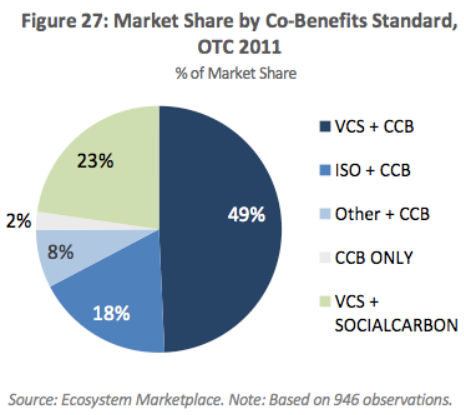
[225] Ibid., 15
[226] Ibid., and Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, iv
[227] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, 22.
[228] Ibid., 22
[229] Ibid., 23
[230] Ibid.

benefits, such as the CCB. Additional certification is "tagged" on to the VCS so that both standards sell with the credit.

The CCB standards, which are developed by the Climate, Community & Biodiversity Alliance, are actually project design standards that offer rules and guidance—they do not verify offsets or provide a registry. Instead, they are meant to be applied early on in a projects lifetime to help develop co-benefits. CCB Standards focus "exclusively on land-based biosequestration and mitigation projects" and require "social and environmental benefits from such projects."[231] These standards can be applied to any land-based carbon project, including REDD, REDD+, agricultural land management, or projects preserving non-forest ecosystems.[232] Achieving a CCB standard requires successful verification of a project's multiple benefits. Verification provides a "CCB label" for other brands of VERs, turning otherwise ordinary carbon into boutique credits.

The VCS+CCB combination is very popular in the VCM, as demonstrated by this graph from the *State of the Voluntary Carbon Markets 2012*. In 2011, the VCS+CCB combination accounted for 2.8 $MtCO_2e$.[233] In addition, almost half (47%) of VCS forestry credits transacted in 2011 had a CCB



[231] Anja Kollmuss, Michael Lazarus, Carrie Lee, Maurice LeFranc, and Clifford Polycarp. *Handbook of Carbon Offset Programs: Trading Systems, Funds, Protocols, and Standards*. London: Earthscan, 2012. 174
[232] "CCB Standards." *The Climate, Community & Biodiversity Alliance.* Accessed April 30, 2013. http://www.climate-standards.org/ccb-standards/
[233] Stanley-Peters, Molly and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, 30.

standard.[234] The use of the VCS with the CCB increases both the value and credibility of this project. CCB is especially useful for attracting buyers interested in boutique voluntary credits with co-benefits and storytelling appeal. More importantly, the use of these two standards in combination with Conservation International's globally recognized brand makes the credits from this project extremely valuable to buyers.

In this case, one of the main buyers is the Walt Disney Company. Disney's CSR goals were first announced in 2009. They include achieving "net zero direct greenhouse gas emissions," reducing indirect GHG emissions, sending zero waste to landfills, minimizing water usage and product footprint, and having a net positive impact on ecosystem.[235] These ambitious CSR goals take many forms, for example partnering with renowned nonprofit organizations in conservation such as Conservation International.

Disney recently purchased 437,000 VCUs from the AMCI for a total of $3.5 million.[236] This purchase was made as part of the company's Climate Solutions Fund, which invests in projects and purchases "high quality" carbon to help the company achieve its goal of becoming carbon neutral.[237] The VCUs purchased in this deal sold for $8 each, which is in the high average price range for the VCM, but was the average price for VCS+CCB credits in 2011.[238] This price, which is higher than average for VERs, reflects the unique value that credits from this project command. For Disney, credits from the AMCI have a powerful story that has significant value for marketing purposes. For instance, Disney can

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[234] Ibid.
[235] "Environmental Stewardship." *The Walt Disney Company*. Accessed April 30, 2013. http://thewaltdisneycompany.com/citizenship/environmental-stewardship
[236] Marcelo Tiexeira. "Disney, Latam Airlines buy 444,000 Peruvian forest carbon credits." Thomson Reuters Foundation. March 18, 2013. http://www.trust.org/alertnet/news/disney-latam-airlines-buy-444000-peruvian-forest-carbon-credits/
[237] Ibid.
[238] Molly Stanley-Peters and Katherine Hamilton. *Developing Dimension: State of the Voluntary Carbon Markets 2012.* Ecosystem Marketplace and Bloomberg New Energy Finance. 2012, 31.

now claim that the "protection of these forests will not only reduce carbon emissions but secure vital watersheds and habitat" for creatures such as "the Andean spectacled bear and yellow-tail woolly monkey in Peru."[239] In addition to protecting the area's charismatic mega fauna, Disney can also claim that its investments will "support local communities" by providing "a source of income to local villagers" and improving livelihoods.[240] The fact that the VCUs from this project are attractive to Disney for these reasons is another good example of the diverse motivations and products in this marketplace.

Thus the Alto Mayo Conservation Initiative case brings together many elements of the voluntary carbon market. It involves a REDD project type for the VCS, includes an additional co-benefit standard, involves a reputable nonprofit, provides for local communities, and of course attracts large corporate buyers interested in the story behind the carbon credit. Most importantly, this case successfully uses the voluntary carbon market to increase the value of forest ecosystem services. Without carbon financing in this case, alternative land uses in the AMPF would still be more attractive to locals. Such a complex project would not be possible without the expertise and flexibility of the VCM.

[239] "Disney Conservation Report." *The Walt Disney Company*. Date unknown. 12
[240] Ibid., 13.

Discussion

In conclusion, the voluntary carbon market is very different from traditional compliance carbon markets. These differences are generally advantages, especially where businesses are concerned. All three cases examined above would not have succeeded without financing from the voluntary market. Providing financing is clearly the most important function of the VCM, especially to projects in areas without supportive policies or economic environments. But in addition to providing funding, the VCM also provided the necessary oversight to help these projects succeed. For example, its market infrastructure gave projects an extra incentive to achieve real, verifiable emissions reductions. It also incentivized investments in quality control, customer support, and business development, especially in the case of Hestian Innovation Ltd.

The VCM's market infrastructure also benefits projects that produce extra co-benefits, helping them achieve a price premium for their innovative and valuable work. This also benefits voluntary credit buyers, who often look for projects with extra appeal. The diversity of the marketplace also means that project developers can benefit from the expertise of standard providers. This diversity also helps differentiate each project's unique carbon credits in the marketplace. The VCM also allows for project developers to be innovative in achieving reductions. The flexibility of the VCM is a great asset to businesses seeking to promote sustainable development, green their operations, or green their public image.

This research has also unearthed many questions that would be worthy of continued study. For example, the voluntary market would benefit from an in-depth examination of the role of voluntary carbon credits is project finance, the role of the

voluntary market in business development, barriers to entry in the voluntary market, and an examination of existing gaps in the voluntary market's applicability. Businesses might also benefit from additional guidance on participation, especially on overcoming barriers to entry and effectively utilizing the resources of the VCM for development. Most importantly, additional research is needed to better understand the VCM's level of contribution to global climate change mitigation and if the VCM has the potential to become involved in climate change adaptation projects.

But these three cases are helpful in understanding the market. In the case of Hestian, the VCM supported their small business and helped them achieve a price premium. For CEMEX, the VCM helped the company make significant progress towards its CSR goal of using more alternative fuels. And in Peru, the VCM was instrumental in increasing the value of forest-based ecosystem services and promoting conservation. While there are many other unique projects in the world that have benefited from the VCM, these three are especially demonstrative of the VCMs utility for business and sustainability.

Based on these findings, more businesses should be encouraged to participate in the VCM where possible. The success of Hestian suggests that there is more potential for small-scale projects in need of finance to enter the market, especially in developing countries. Their experience also suggests that the VCM can be a useful tool for small business development. Conversely, the success of CEMEX's alternative fuels project in Louisville suggests that more large companies should also consider involvement in the voluntary market as a source of finance, especially where access to other carbon markets is not available. This is increasingly the case as the world's compliance markets face price crashes, structural reforms, and growing uncertainty. Finally, the case of the AMPF suggests

that nonprofits should get more involved in the voluntary market, especially where it concerns conservation and ecosystem services. Nonprofits can play an important role in generating voluntary credits because they are not motivated by profit and can thus tolerate a lower rate of return on investment. They are also better able to form unique partnerships with governments or other groups and enter revenue-sharing models to recoup expenses rather than focus on repaying debt or earning back large capital expenditures. Instead, carbon revenues can go to other areas, such as teaching sustainable agriculture or improving forest conservation as in the case of the AMPF. In addition, the finding that the voluntary market can monetize some of the hidden value gained from ecosystem services is significant. This suggests considerable potential for new conservation projects to participate in this market by adopting an ecosystem services framework.

We have also seen that large companies like CEMEX and Disney are driven to participate in the VCM because of existing commitments to sustainability—they are not simply purchasing offsets to appease stakeholders. Ultimately, corporate use of the voluntary market should be encouraged because it finances emissions reductions and sustainable projects worldwide. These examples strongly refute claims that corporate involvement in offsetting is purely shortsighted or misguided.

The voluntary market demonstrates that responding to climate change will create significant business opportunities, as was predicted in *The Stern Report*. The VCM is a climate response instrument that is uniquely tailored to the needs of businesses, large or small. The three cases presented here demonstrate that responding to climate change, rather than ignoring it, can provide new and innovative opportunities. In addition, they give evidence in favor of the use of market mechanisms as a climate mitigation tool.

Markets like the VCM provide the flexibility necessary to allow businesses to adapt, grow, and succeed while also meeting environmental goals.

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