

# The Demand for Carbon Offsets in the United States:

*A Snapshot of US Buyers on the  
Global Voluntary and California Compliance Markets*

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## About the Project

This report was completed as part of a Master's Project, the capstone requirement for students at the University of Michigan's School of Natural Resources and Environment. The research was conducted between January 2012 and April 2013. The students involved are Hannah Erickson, MS in Environmental Policy and Planning '13; Nancy Gephart, MS in Sustainable Systems and MBA '14; Allie Goldstein, MS in Environmental Justice and Policy '13; and Sam Stevenson, MS in Sustainable Systems and MBA '14.

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Finally, we would like to thank the dozens of individuals, including company representatives, carbon brokers, regulators, and other experts who took the time to speak with us about the fascinating world of carbon markets. A full list of these individuals can be found in Appendix A. Without them this project would not have been possible.

## Abstract

While the supply-side of carbon markets is relatively well documented, understanding of demand is more elusive. This report aims to shed light on the demand for carbon offsets in the United States, both among companies purchasing offsets voluntarily and California entities purchasing offsets as part of their compliance obligations under the new greenhouse gas regulation in the state. Our research focuses on three key areas of inquiry:

- (1) *Motivations*: Why are firms choosing to purchase carbon offsets?
- (2) *Processes*: How are firms navigating the carbon markets? What decision-making processes are firms using when purchasing offsets? What barriers and challenges are firms facing?
- (3) *Preferences*: What preferences do buyers exhibit when purchasing offsets? What factors do firms consider when investing in an offset project or portfolio of projects?

To answer these questions, we surveyed compliance companies in California, did case studies of five major companies purchasing offsets on the voluntary market, and interviewed dozens of buyers and other market participants.

On the voluntary side, we found that companies were motivated largely by corporate social responsibility and public relations. Although each company had different goals for their offsetting program, they all reaped benefits in terms of both environmental sustainability and improved branding. The case studies of Ford, Macmillan, Interface, General Motors, and British Petroleum illustrate several different approaches toward offsetting. In terms of process, we found that most voluntary buyers purchase offsets as part of larger sustainability efforts and spend considerable time and effort quantifying their emissions and defining program goals. They then work with NGOs, consultants, and other advisors to build their offset strategies accordingly. Lastly, in terms of preferences, we found that companies in the voluntary market prefer offsets that are highly visible, have an immediate impact, and pose a low public relations risk. They tend to buy a diverse portfolio of offsets, some of which are “charismatic” and others that are cheaper and/or available in bulk.

In the California compliance market, companies are motivated entirely by the AB32 regulation, which requires them to meet an emissions cap. To do so, they have the option to reduce their emissions, purchase allowances, purchase offsets, or do a combination of the three to comply with the law. Since offsets are cheaper than allowances, many compliant entities plan to purchase offsets as a way to reduce costs; however, there may be hidden transaction costs in figuring out how to navigate the offset marketplace. We found that overall, compliance entities are very price-sensitive, with recommendations from partners being a secondary consideration. The projected supply of offsets and differentiated risk across project types may also influence demand for offsets on the California market.

## Table of Contents

About the Project.....	3
Acknowledgements .....	3
Abstract .....	4
Glossary of Key Acronyms and Other Terms.....	7
Introduction.....	1
Research Goals and Methodology .....	4
<b>PART 1: US FIRMS BUYING OFFSETS THROUGH VOLUNTARY CARBON MARKETS.....</b>	<b>6</b>
Influence Beyond its Size: The voluntary carbon market in context.....	6
Motivation: Why (voluntarily) offset? .....	7
<i>Corporate social responsibility meets public relations.....</i>	<i>7</i>
<i>Winning customers: the business case for offsetting? .....</i>	<i>8</i>
<i>Just one aspect of sustainability.....</i>	<i>8</i>
<i>Anticipating regulation .....</i>	<i>8</i>
<i>A strong commitment is driven from the top .....</i>	<i>9</i>
Process: Connecting boardrooms with carbon.....	9
<i>When to offset? .....</i>	<i>9</i>
<i>Partnering up.....</i>	<i>9</i>
<i>Brokering carbon .....</i>	<i>10</i>
Preferences: Many kinds of tonnes .....	10
<b>Case Studies.....</b>	<b>12</b>
Ford: The Hybrid Escape Guinea Pig.....	14
Macmillan: Low-Carbon Courage.....	16
Interface: Making Carpets Cool.....	18
General Motors: All-American Carbon .....	20
British Petroleum: The Olympic Bid.....	22

**PART 2: DEMAND FOR OFFSETS ON CALIFORNIA’S COMPLIANCE CARBON MARKET ... 24**

Orchestrated demand: compliance carbon markets in context..... 24

*Other compliance markets, in the US and abroad* ..... 25

*Demand from the bottom up*..... 26

Motivation: Low-carbon at the lowest cost..... 26

*Meeting regulation through allowances*..... 27

*Meeting regulation through offsets*..... 27

*Resource shuffling: Moving to an unregulated atmosphere*..... 28

Process: Navigating the marketplace..... 28

Preferences: Price check, or make it Golden..... 29

*The most tonnes for their buck*..... 30

*A tonne is a tonne*..... 31

*Risk of invalidation*..... 33

*Projected offset shortages* ..... 34

**CONCLUSION ..... 38**

**APPENDIX A: Interviews and Panels That Informed This Report ..... 42**

Interviews ..... 42

Panels ..... 43

**APPENDIX B: Survey Questions ..... 44**

**APPENDIX C: International Compliance Carbon Markets ..... 49**

## Glossary of Key Acronyms and Other Terms

**AB32:** California's Global Warming Solutions Act, passed in 2006, which created a cap-and-trade regime that went into effect in January 2013.

**Allowance:** A permit to emit under cap-and-trade or other carbon regulation. The number of allowances is set equal to the cap. Depending on the regulatory regime, allowances are either given away for free or auctioned off to entities required to reduce emissions under the law.

**Broker:** An intermediary that connects sellers of carbon credits (usually project developers) with buyers (companies or sometimes countries).

**Cap-and-trade:** A market-based approach to pollution emissions reductions. The regulating body sets a cap and allows compliant entities to trade among themselves in order to meet the cap at the lowest overall cost to the economy.

**CARB:** The California Air Resources Board, the regulator responsible for administering cap-and-trade in California.

**Carbon leakage:** The unintended increase of emissions beyond the boundaries of the emission reduction project. For examples, manufacturers in California may choose to relocate outside of the state to avoid cap-and-trade regulation. In effect, actual GHG emissions are not being reduced by the regulation but are shifted geographically.

**Carbon standard:** A recognized methodology for measuring carbon emissions reductions. For instance, carbon offsets on the voluntary market may be verified by the Gold Standard, the Verified Carbon Standard, or others.

**CDM:** The Clean Development Mechanism, a market based mechanism administered through the UNFCCC. The program allows developed countries purchase certified emissions reductions from developing countries.

**Compliance carbon market:** A market through which offset transactions occur to meet regulatory requirements such as cap-and-trade.

**Compliance period:** A time period over which a certain number of emissions reductions are required.

**COP18:** The 18th Conference of the Parties to the UNFCCC. These international climate negotiations occurred in Doha, Qatar in December 2012.

**CSR:** Corporate Social Responsibility, or operating a business in a manner that takes into account its social and environmental impact.

**EU ETS:** The European Union Emissions Trading System, a cap-and-trade regime that covers 11,000 entities in Europe.

**GHG:** Greenhouse gas, a gas that contributes to the greenhouse effect by absorbing infrared radiation. The six most common greenhouse gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF<sub>6</sub>).

**Golden Offsets:** Offsets under California cap-and-trade for which the liability for invalidation lies with the broker rather than the buyer.

**GWP:** Global Warming Potential, or how much heat a greenhouse gas traps in the atmosphere by mass. The GWP of carbon dioxide is 1 and the GWP all other GHGs are standardized against CO<sub>2</sub>.

**MRV:** Monitoring, Reporting, and Verification, the process by which emissions reductions are certified by an auditor.

**MtCO<sub>2</sub>e:** Metric tonnes carbon dioxide equivalent, the unit of exchange for transactions on carbon markets. MMtCO<sub>2</sub>e refers to a *million* metric tonnes. *CO<sub>2</sub> equivalent* refers to the fact that other emissions reductions may be sold on carbon markets, but they are converted to the common unit of CO<sub>2</sub>e based on their global warming potential. Also keep in mind that 1 metric tonne equals 1.10231 short tons and that carbon dioxide is not the same as carbon, though “carbon” is often used as shorthand for CO<sub>2</sub>e.

**Offset:** An emissions reduction made somewhere in the world that can be sold on carbon markets.

**Offset project:** A project that creates offsets by verifying reduction of greenhouse gas emissions, such as reducing natural gas leaks while extracting oil (reduction of methane emissions), flaring refrigerants (reduction of HFC emissions), or reducing the rate of deforestation (reduction of carbon dioxide)

**Offset protocol:** Under California cap-and-trade, a methodology by which certain offset project types can be developed. CARB has approved four offset protocols so far.

**OPR:** Offset Project Registry, or entities that list verified offsets available for purchase. In California, the two OPRs are the Climate Action Reserve and the American Carbon Registry.

**Project developer:** A group that designs and creates an offset project and then usually sells the offsets generated by that project.



**Project type:** A classification of an offset project developed under a certain protocol or methodology and representing a certain kind of emission reduction. For instance, REDD+, livestock methane, and clean cookstoves are all project types.

**REDD+:** Reduction of Emissions from Deforestation and Degradation of Forests, a flexibility mechanism being developed under the UNFCCC to allow developing countries with threatened forests to sell carbon offsets for avoided deforestation. The + refers to added social and biodiversity benefits beyond carbon.

**RGGI:** The Regional Greenhouse Gas Initiative, a group of nine states in the Northeast United States that aim to cap carbon dioxide emissions from power generators.

**UNFCCC:** The United Nations Framework Convention on Climate Change, an international environmental treaty created in 1992. Its objective is to avoid “dangerous” climate change and limit global temperature rise to 2 degrees Celsius through an international agreement to reduce greenhouse gas emissions.

**Voluntary carbon market:** A market through which offset transactions occur *outside* of regulation. For instance, a company not required to reduce emissions might choose to purchase offsets voluntarily as a part of an environmental sustainability initiative.

## Introduction

Greenhouse gases (GHGs) are global pollutants. From the perspective of mitigating climate change, it does not matter whether reductions in GHG emissions occur in California or Timbuktu. GHG reductions may occur across various gases<sup>a</sup> and project activities by accounting for respective global warming potential (GWP)<sup>b</sup> of each GHG. Such project activities can include reducing natural gas leaks while extracting oil (reduction of methane emissions), flaring refrigerants (reduction of HFC emissions), or reducing the rate of deforestation (reduction of CO<sub>2</sub>). These characteristics of GHGs—the fact that the effects of their reduction are the same regardless of where they occur in the world and the fact that different gases can be standardized to a common unit of carbon dioxide equivalence (CO<sub>2</sub>e)—allows carbon credits to be traded globally as a commodity. Carbon offsets, or verified GHG emission reductions, are sold to a company, country, or other entity to “offset” their emissions.<sup>c</sup>

Numerous carbon markets exist globally. The largest source of carbon offsets is the Clean Development Mechanism (CDM), which is administered by the United Nations Framework Convention on Climate Change (UNFCCC). The CDM allows developed countries seeking to meet their GHG emissions reduction goals under the Kyoto Protocol to purchase offsets from emissions reductions projects in developing countries.<sup>d</sup> The majority of offset generated by the CDM are purchased by the 11,000 entities covered under the European Emissions Trading Scheme (EU ETS).

Though the United States is not a signatory of the Kyoto Protocol and efforts to implement a federal cap-and-trade system have so far been unsuccessful, US firms nonetheless purchase carbon offsets through California’s compliance cap-and-trade system and on the voluntary carbon markets. California, representing 7% of US GHG emissions,<sup>1</sup> is expected to generate 200 million metric tonnes carbon dioxide equivalent (MMTCO<sub>2</sub>e) of carbon offset demand by 2020, representing a \$2,000M market size at today’s carbon prices. In addition, US firms lead globally in purchases of carbon offsets

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<sup>a</sup> Greenhouse gas emissions reported under the Kyoto Protocol include: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulphur hexafluoride (SF<sub>6</sub>).

<sup>b</sup> The GWP of GHGs vary significantly across gases and timeframes. GWP refers to how much heat a GHG traps in the atmosphere by mass. The GWP of CO<sub>2</sub> is 1, and the other GHGs are standardized against this reference point. With a 100-year time horizon, methane is 21x more potent than CO<sub>2</sub>, nitrous oxide 310x, HFCs range from 140-11700x, sulphur hexafluoride 16300x, and PFCs from 6500-8700x. For more information see UNFCCC, “Global Warming Potentials.” Available at: [http://unfccc.int/ghg\\_data/items/3825.php](http://unfccc.int/ghg_data/items/3825.php)

<sup>c</sup> “Carbon credit” is sometimes used interchangeably with “carbon offset”. This paper will use offset throughout this report.

<sup>d</sup> Under the UNFCCC, non-Annex I countries can originate offset projects under the Kyoto Protocol. For a list of the non-Annex I countries, see:

[http://unfccc.int/parties\\_and\\_observers/parties/non\\_annex\\_i/items/2833.php](http://unfccc.int/parties_and_observers/parties/non_annex_i/items/2833.php)

through the voluntary carbon market. Though much smaller, \$576M in 2011, the voluntary market allow companies to offset their emissions for Corporate Social Responsibility (CSR) and public relations purposes.

In both the compliance and voluntary markets, the supply-side is relatively well understood.<sup>e</sup> Over the last decade, hundreds of offset protocols have been developed to provide guidance on how to account for, forecast, monitor, and verify GHG emission reductions. Offset projects are registered on public databases and thus information on the supply of carbon credits in the various global markets is readily available.<sup>f</sup> Research groups such as Forest Trends' Ecosystem Marketplace have provided in-depth analyses of carbon transactions globally.

Yet, the demand side of the equation remains elusive. The EU ETS experienced a crash in offset prices in 2012 due to "surging supply and stagnant demand," causing some project developers to look towards the voluntary market to offload their credits.<sup>2</sup> On both compliance and voluntary carbon markets, there is a lack of analysis of the motivations, processes, and preferences of offset buyers. This is no surprise given that buyers are often more guarded about their preferences and intentions for competitive reasons. However, uncertainty about demand has important implications for the viability of existing and emerging carbon markets. This study seeks to research the demand side of carbon markets, with a focus on US buyers.

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<sup>e</sup> See Winrock 2011, Point Carbon 2011, and Ecosystem Marketplace 2012 for supply analysis.

<sup>f</sup> Information on the supply of verified carbon offsets is available on the APX VCS Registry ([www.vcsregistry.com/](http://www.vcsregistry.com/)), the Markit Registry ([www.markit.com/en/products/environmental/markit-environmental-registry.page](http://www.markit.com/en/products/environmental/markit-environmental-registry.page)), Ecosystem Marketplace's Forest Carbon Portal ([www.forestcarbonportal.com/](http://www.forestcarbonportal.com/)), the Climate Action Reserve Registry ([www.climateactionreserve.org](http://www.climateactionreserve.org)), the CDM pipeline ([www.cdm-pipeline.com](http://www.cdm-pipeline.com)), and more.

## INTRODUCTION SOURCES

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<sup>1</sup> World Resources Institute (WRI), Climate Analysis Indicators Tools (CAIT), last updated January 29, 2013. Available at: [www.wri.org/tools/cait/?guest=1](http://www.wri.org/tools/cait/?guest=1)

<sup>2</sup> Point Carbon, "EU ETS increasingly irrelevant and investors exit CDM market en masse, says carbon survey," published March 25, 2013. Available at: [www.pointcarbon.com/aboutus/pressroom/pressreleases/1.2236741](http://www.pointcarbon.com/aboutus/pressroom/pressreleases/1.2236741)

## Research Goals and Methodology

The goal of this report is to shed light on the demand for offsets in the United States both on the compliance and voluntary markets. The scope does not include a forecast of offset demand, rather, the report focuses on three key qualitative questions:

- (4) **Motivations:** Why are firms choosing to purchase carbon offsets?
- (5) **Processes:** How are firms navigating the carbon markets? What decision-making processes are firms using when purchasing offsets? What barriers and challenges are firms facing?
- (6) **Preferences:** What preferences do buyers exhibit when purchasing offsets? What factors do firms consider when investing in an offset project or portfolio of projects?

Due to the structural differences between compliance and voluntary markets, the report is divided into two parts: Part 1 focuses on voluntary demand for carbon offsets among US firms. Part 2 focuses on offset demand generated through California's compliance regime. Each section offers an overview of the market followed by an analysis of buyers' motivations, processes, and preferences.

The methodology for each section is as follows: literature review, analysis of corporate websites, and structured interviews with key market stakeholders and specialists. The literature review began with Ecosystem Marketplace's annual *State of the Voluntary Carbon Markets* and *State of the Forest Carbon Markets* reports, and information from the California Air Resources Board. A comprehensive study of relevant news articles and market analyses were incorporated during the period of February 2012 – April 2013. The team reviewed carbon registries including Markit and APX VCS for quantitative information on retired offsets, and analyzed several companies' offset activities and CSR strategies through publicly available sources.

The bulk of the research for this report, however, was done through interviews with carbon brokers, regulators, climate negotiators, NGOs, and offset buyers. In addition, the team was an active participant at the 18th Conference of the Parties (COP18) to the United Nations Framework Convention on Climate Change (UNFCCC) in Doha, Qatar in December 2012. The team conducted research through a day-long side event by the International Emissions Trading Association (IETA), presented initial findings at Forest Day, attended dozens of side events, and conducted discussions with the majority of carbon market actors. (A list of all of the interviews we conducted and the relevant events we attended is available in Appendix A.)

In addition to the methodologies described above, we also adopted slightly different tactics to dig into the voluntary and California compliance market demand in Parts 1 and 2, respectively. For Part 1, our analysis of motivation, processes, and preferences among buyers is supported by case studies of five offset-purchasing companies: Ford, Macmillan, Interface, General Motors (GM), and British Petroleum (BP). These firms

represent the three largest carbon-buying sectors on the voluntary market—energy, retail, and manufacturing—and they all purchase offsets for corporate social responsibility (CSR) or public relations/branding purposes (as opposed to buying offsets for resale or anticipation of compliance regulation). They all purchase or have purchased carbon offsets in relatively large volumes and consider offsetting in the context of overarching sustainability goals. With the exception of BP, all five companies are headquartered in the United States; BP was included because Americans made up the largest proportion of participants in the specific offsetting program we looked at. Beyond these criteria, these five companies were selected for their willingness to speak with us at length about their offsetting story, resulting in case studies that represent a range of nuanced opinions and experiences.

For Part 2, we conducted a survey of current and prospective offset buyers in the California compliance market to determine how each is preparing for cap-and-trade, and learn about their plans for purchasing offsets. (See Appendix B for the survey questions.) The survey, which was designed on Qualtrics and open from November 13, 2012 to February 12, 2013, consisted of 29 questions and was sent to relevant contacts in cement, refinery, mining, stationary combustion, electricity generation, and other compliant industries. Of the 367 compliance entities in California (as of January 2013), 42 (11.4%) responded. These survey results are included throughout Part 2 to elucidate our investigation of the motivations, processes, and preferences of (potentially) offset-buying California companies.

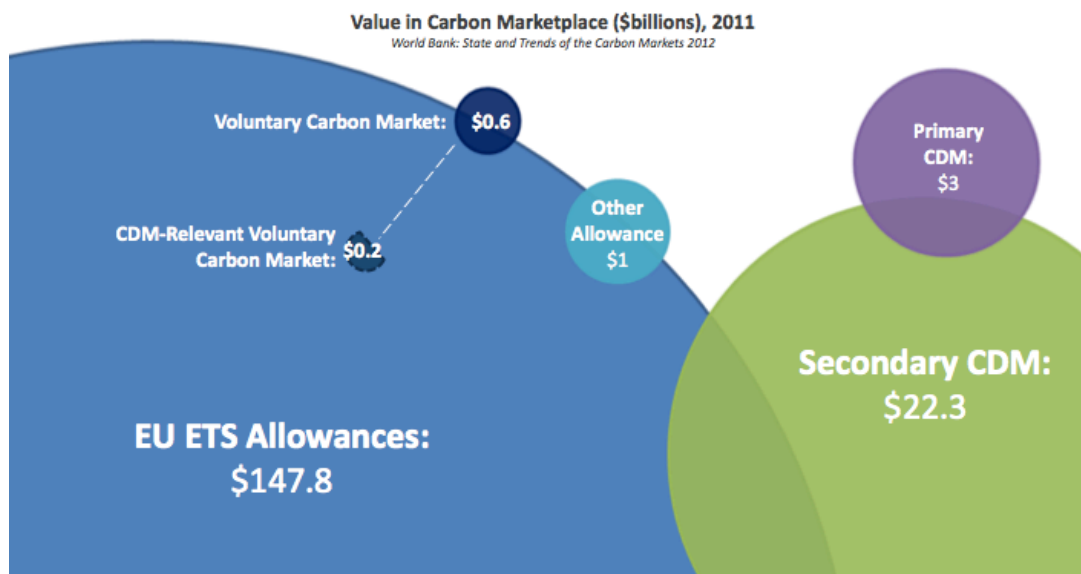
## PART 1: US FIRMS BUYING OFFSETS THROUGH VOLUNTARY CARBON MARKETS

This part offers a glimpse into the decision-making process of US companies that are purchasing carbon offsets as a part of wider sustainability initiatives. It begins with a brief overview of the voluntary carbon market. Next, we turn to the *why* and the *how* of carbon offsetting: why do companies choose to invest in carbon offsets? Once they make the decision to invest, how do they go about doing it? What are their preferences across project types, and what drives these preferences? These questions are addressed from a high level first, and then specifically in the form of five case studies of companies that have varying levels of experience in the voluntary carbon market. These companies include Ford, Macmillan, Interface, General Motors, and British Petroleum.

### Influence Beyond its Size: The voluntary carbon market in context

The voluntary carbon market refers to the buying and selling of carbon offsets outside of carbon regulation such as the Kyoto Protocol or cap-and-trade. In terms of dollar value and the total transactions, the voluntary carbon market is less than 0.01% of the total global carbon marketplace, and tiny in comparison to most compliance schemes (discussed in more detail in Part 2).

Figure 1: Size of the Voluntary versus Compliance Carbon Markets



Ecosystem Marketplace 2012. Though numbers are accurate, the diagram is conceptual and circles are not drawn to scale. CDM stands for Clean Development Mechanism and EU ETS is the European Union Emissions Trading Scheme.

However, the voluntary carbon market's influence outpaces its size in terms of the number and total dollar value of offsets transacted. Voluntary markets have historically

served as the leading edge of methodology development, financing, and monitoring techniques. Compliance markets often use voluntary standards as models for their own.<sup>1</sup> For example, California’s cap-and-trade system is now using four protocols based largely on the work of the Climate Action Reserve (CAR), which serves the voluntary market. “The influence of the voluntary market is disproportionate—in a positive way—to its size,” according to Tanya Peterson of the Gold Standard.<sup>2</sup>

In the absence of national-scale compliance markets in most countries, the voluntary carbon market is the *only* opportunity for companies to participate in the carbon markets.<sup>3</sup> US buyers are a major force on the voluntary carbon markets, holding about 40% of market share in 2011. According to Ecosystem Marketplace’s *State of the Voluntary Carbon Markets 2012*, “Buyers in the US purchased more credits than companies in any other country, supporting domestic projects to sustain climate action in the absence of a federal cap-and-trade scheme.” Much of this demand is attributed to large buyers such as GM, which committed \$40 million to purchase 8MMtCO<sub>2</sub>e in offsets, and Norfolk Southern Railway, which invested \$5.6 million in a 1MMtCO<sub>2</sub>e offset project that will restore 10,000 acres of forest in the Mississippi Alluvial Valley, along its rail route.<sup>3</sup> Other major US buyers include Google, Dell, JetBlue, Staples, Ebay,<sup>4</sup> as well as the companies we profile the in case studies below.

## Motivation: Why (voluntarily) offset?

### *Corporate social responsibility meets public relations*

Companies purchase carbon offsets for various reasons. In many cases, the investment is part of a corporate social responsibility (CSR) initiative. CSR itself is a broad term, but it is typically conceived of as “operating a business in a manner that takes into account its social and environmental impact.”<sup>5</sup> In the case of buying offsets, firms seek to reduce their environmental footprint by reducing their GHG emissions. However, since many companies actually calculate their carbon footprint and then choose to offset all or part of their emissions, carbon offsetting may in fact be seen as retributive: it is an attempt to internalize an environmental externality of doing business. Within CSR, there is a wide spectrum of motivations, ranging from a sense of moral obligation to reduce a company’s impact on the environment (regardless of customer responsiveness to any sustainability initiatives) to pure self-interest through branding. Companies using offsets merely as a branding effort have faced retaliation from customers that perceive the initiative as mere ‘green washing.’<sup>b</sup>

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<sup>a</sup> California is the only state with a functioning compliance carbon market. The Regional Greenhouse Gas Initiative (RGGI) in the Northeast includes provisions for purchasing offsets and protocols for developing projects, but because entities have fulfilled their obligations through allowances instead, no offsets have actually been transacted in this market to date.

<sup>b</sup> See [www.greenwashingindex.com](http://www.greenwashingindex.com)



### *Winning customers: the business case for offsetting?*

Both motivations outlined above are hypothetical in the context of carbon offsets. Most companies fit somewhere along the spectrum. The caricatured PR-centric company is non-existent in the real world for the simple reason that the business case for carbon offsetting often remains elusive. As our Ford and BP case studies show, customer-offset schemes that set up an easy way for individuals to purchase offsets (or in BP's case, a way for people to simply sign up for offsets that BP would then buy) have shown low adoption, even when customers claim interest in sustainability initiatives. Similarly, companies that invest in carbon with the hope of gaining a sales advantage over their competitors or getting lots of press coverage are often disappointed.

The "angel" company is similarly elusive. Though there are certainly companies that are legitimately concerned about climate change and would invest in carbon offsets regardless of customer response, there is little reason *not* to communicate environmental initiatives to the public. As the offset buyer for Interface communicated, talking about carbon reduction gives their salespeople another reason to get in front of their customers, even if many of those customers couldn't care less.

### *Just one aspect of sustainability*

Of course, purchasing carbon offsets is just one option of many for companies looking to become more environmentally responsible or simply "green" their image. Other options include investing in energy efficiency, tightening water use, fuel-switching, changing material use, sourcing more locally to reduce transportation emissions, reducing packaging, replacing car fleets with hybrids, and so on. In 2010, Ecosystem Marketplace noted a shift from "carbon solutions to climate solutions" as more companies began to think of carbon reduction in the context of all of their other environmental footprints.<sup>6</sup> Many companies take a "portfolio" approach to environmental responsibility, and offsetting greenhouse gas emissions may be just one of many initiatives. In making the initial decision to offset, companies may be influenced by the decisions of peer companies—or they may seek "first-mover" recognition as the first in their industry to engage in an offsetting scheme.

### *Anticipating regulation*

When Waxman-Markey, a federal cap-and-trade bill passed the House in 2009, many companies purchased pre-compliance credits on the voluntary market in anticipation of federal regulation.<sup>7</sup> Though federal cap-and-trade legislation is no longer imminent, many firms now consider some form of carbon regulation to be an eventual inevitability.<sup>8,9</sup> Indeed, some are even pushing for it, either as a way to "level the playing field" in their favor or because regulatory uncertainty makes it difficult to plan ahead. For these companies, investing in carbon offsetting projects now and building relationships with brokers and project developers may create a competitive advantage if carbon regulation does come on line. However, it is important to note that offsets

currently bought in voluntary markets are considered “beyond compliance.” For example, in Europe’s Emissions Trading Scheme (EU ETS), companies that claim carbon leadership must reduce or offset their emissions *beyond* the law and their peers in order to be taken seriously. A similar phenomenon would occur if economy-wide carbon regulation became a reality in the United States.

### *A strong commitment is driven from the top*

Our case studies reveal that the players within a company that are involved in the offsetting decisions are generally few, and a single personality is sometimes the driving force behind a firm’s sustainability vision. For Macmillan and Interface, this driving force was the CEO and the Chairman, respectively. Both companies completely transformed their business models at the direction of leaders who were morally motivated toward environmental responsibility and decided to do what they could to lessen their company’s contribution to climate change. While Macmillan is privately owned, Interface is a publicly traded company, indicating that even companies that have to answer to shareholders may be able to take a strong stance on carbon—but perhaps only if the executives are pushing for it.

### **Process: Connecting boardrooms with carbon**

The typical process for purchasing voluntary credits involves deciding how many offsets to buy, which channel to go through, which projects to buy from or what criteria (e.g. price or standard) to use, negotiating a price, and finally retiring the offsets.

### *When to offset?*

After deciding to purchase offsets, companies must first think about how offsets fit into their overall sustainability strategy. Do they take a “kitchen sink” approach and try offsetting along with other sustainability initiatives? Or do they offset only when they have exhausted all reasonable internal mitigation measures? Among the five companies we profiled in case studies, we found that order mattered. Companies that used offsetting as a last resort, were more satisfied with the experience overall. General Motors is an example of a company that perhaps experimented with offsetting too early in their sustainability process. After spending \$40 million on offsetting the driving emissions from 2011 Chevrolets, GM is going back to the drawing board and focusing more heavily on reducing internal emissions. Conversely, for companies such as Ford, offsetting is a self-proclaimed experiment, and they may dip in and out of the market fairly quickly simply to gain experience in the carbon markets. Other companies may deepen and expand their investments over time as they work towards carbon neutrality.

### *Partnering up*

Once they have decided to take the plunge, there are essentially two channels to go through to purchase carbon offsets on the voluntary market: through a private

exchange with a project developer or “over-the-counter” from an intermediary. Companies that work directly with a project developer are often looking to invest a substantial sum of money in offsets and want to have some control over the project; they usually provide upfront financing to develop a carbon reduction project and may then purchase the offsets from that project. Often, the developing partner also has substantial control in shaping the demand of the company. An example of this is the Walt Disney Company, which worked with Conservation International to develop \$7 million-worth of REDD+ projects in Peru and the Democratic Republic of Congo.<sup>10</sup> In this case, Conservation International was able to steer Disney’s interests toward certain conservation priorities, and ensure that projects met the interests of all parties involved.

### **Brokering carbon**

The second and more common option is to purchase offsets from a private intermediary: a carbon broker or retailer. Intermediaries may either be non-profit organizations, such as Atmosfair and Carbonfund.org, or for-profit companies, such as The Carbon Neutral Company or Native Energy. Unlike developing partners, the intermediary’s role is to connect buyers and sellers and to provide information to clients that cannot navigate the carbon markets on their own. Companies often rely on intermediaries—and sometimes non-profit environmental organizations advisors as well—to explain different offset types, vet projects, negotiate price, and help them communicate the impact of their investments. Many brokers and retailers offer portfolios of carbon projects, and many companies invest in more than one offset project. On some level, the process is all about communication and trust, both between the broker and the project developer and between the broker and the buyer. In this way, the brokers are also able to facilitate purchases and shape the demand for offsets.

### **Preferences: Many kinds of tonnes**

Once a company makes the decision to purchase carbon offsets, they face the not-so-straightforward question of which offsets to buy. Though all offsets represent a single metric tonne of carbon dioxide equivalent (MtCO<sub>2</sub>e), the similarities end there. Carbon offsets originate from various project types all over the world, are certified by a handful of different standards, come in different vintages (the year in which the carbon reduction took place), and are sold at different prices. Depending on their motivation for buying offsets, companies may have preferences in each of these categories. The table below gives an overview of the most common offset project types on the voluntary market and how their carbon reductions are accounted for. It is important to note that since the “currency” of carbon offsets is MtCO<sub>2</sub>e, projects can either represent reductions in carbon dioxide itself, or reductions in other greenhouse gases, including methane, for which one molecule is equal to 25 MtCO<sub>2</sub>e, or HFC-23, for which one molecule is equal to 14,800 MtCO<sub>2</sub>e.<sup>11</sup>

*Table 1: Most Popular Carbon Offset Project Types on the Voluntary Market*

PROJECT TYPE	MARKET SHARE (2011)	HOW CARBON EMISSIONS ARE REDUCED OR AVOIDED:
Wind	30%	Wind projects offset energy that would otherwise be produced by fossil fuels.
Afforestation/ reforestation	10%	Tree-planting initiatives on un-forested or previously forested land. Trees sequester carbon as they grow.
REDD/ avoided conversion	9%	REDD credits account for avoided land conversion calculated against an established baseline level of deforestation.
Landfill methane	7%	Rather than leaving biomass and organic matter to decay, releasing methane, landfills are covered and methane is captured. The captured methane may either be oxidized and destroyed or burned to generate electricity.
Biomass/ biochar	7%	Biomass/biochar projects burn organic waste to generate energy that would otherwise be produced by burning fossil fuels.
Hydro	7%	Hydro projects offset energy that would otherwise be produced by fossil fuels.
Clean cookstoves	4%	Improved cookstove models that require less fuelwood are distributed in the developing world.
Improved forest management	4%	Improved forest management projects increase the carbon stock of a managed forest by, for instance, extending the rotation age of a forest before harvesting. IFM often replaces clear-cutting or patch-cutting practices.
Ozone-depleting substances	3%	Ozone-depleting substances are gases—such as CFCs and HFCs—that leak from old refrigerators and air conditioners and harm the stratosphere. Burning them converts them to CO <sub>2</sub> , a gas with a much lower global warming effect.
Fuel-switching	3%	Fuel-switching refers to a power plant or industrial facility switching to a lower-carbon form of fuel. For instance, the facility would switch from oil or coal to natural gas.
Livestock methane	2%	Rather than allowing manure to decay and release methane into the atmosphere, the methane is captured and either oxidized and destroyed or burned to generate electricity.
Wastewater methane	2%	Recovering methane from organic matter from wastewater treatment plants. The methane is then either oxidized and destroyed or burned to generate electricity.
Coal Mine methane	2%	Instead of being vented into the atmosphere, methane from coal mines is either oxidized and destroyed or used for power production.
Solar	1%	Solar projects offset energy that would otherwise be produced by fossil fuels.
Energy efficiency	1%	Improving industrial processes for greater energy efficiency reduces greenhouse gas emissions if the facility relies on fossil-fuel based energy.

Market share numbers from Ecosystem Marketplace, *State of the Voluntary Carbon Market 2012*. Large and run-of-river hydro were combined. Methodology descriptions compiled by Allie Goldstein, using some concepts from the *CDM Methodology Booklet*.

Preferences for offset types have shifted over time, and many companies opt for a “portfolio” approach, investing in several different types of offsets. Some firms are driven primarily by price and simply go for the lowest-cost offsets, while others look for

certifications that go above and beyond carbon reduction and make assurances about biodiversity or livelihoods improvements. Many companies lie somewhere along the spectrum of quantity versus quality: they adopt a carbon portfolio that includes a lot of low-priced offsets, such as wind or landfill methane, and a smaller number of “boutique” offsets, such as clean cookstoves or forestry. Companies tend to highlight these charismatic “boutique” offsets even if, percentage-wise, they make up a fairly small portion of their portfolio. In terms of project location, some US companies are interested in “local” projects that are somehow related to their supply chain—such as a book publishing company investing in forest carbon offsets. Others prefer offsets from developing countries so that they can emphasize health and livelihood benefits to communities in Asia, Africa, or South America.

## Case Studies

The following case studies offer a glimpse into the decision-making process of a few firms that are either currently purchasing offsets on the voluntary market or purchased offsets in the past. As mentioned in the methodology, we selected these firms because they all purchase or have purchased relatively large volumes of offsets for CSR and/or PR purposes, they are all thinking about larger sustainability goals, and they were all willing to be fairly candid with us in telling their offsetting story. These firms represent a range of motivations, processes, and preferences in terms of carbon offsetting, and are illustrative of many of our findings about voluntary US demand.

## PART 1 SOURCES

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## Case Study

### Ford: The Hybrid Escape Guinea Pig

Program: Greener Miles, offsetting manufacturing and driving of the Hybrid Escape

Timeframe: launched 2006, discontinued 2008

Motivations: customer engagement, first-mover status, branding

Process: worked with TerraPass and environmental advisors to identify credit-generating projects

Offset project types: wind, livestock methane

Cost: \$29.95 to \$79.95 annual fee for customers to offset driving emissions

Volume: data not available

Ford was an early-mover in the carbon marketplace. Their offset-purchasing pilot project, called “Greener Miles,” launched in 2006 and included two intertwined initiatives: (1) offsetting the emissions generated from manufacturing the Hybrid Escape and (2) giving customers the option to offset their emissions from driving. Ford’s goal was to be a first-mover on carbon offsetting while at the same time raising their customers’ awareness about carbon dioxide emissions. For both of these initiatives, Ford partnered with TerraPass, essentially a carbon offset aggregator that customized a website for Ford, allowing customers to calculate their annual carbon dioxide emissions from driving through a simple mileage equation and then buy credits from projects pre-selected by Ford. Annual costs ranged from \$29.95 to \$79.95 depending on the type of vehicle and miles travelled. The Hybrid Escapes were decorated with decals advertising the offset emissions from both aspects of the program.



Decals for the Ford Hybrid Escape highlight the two aspects of the program: (left) Ford’s direct offsetting of manufacturing emissions and (right) encouraging customers to offset their own driving emissions.

## Case Study

Larry Merritt, Ford's Global Environmental Policy Manager, described the internal decision-making process to purchase carbon offsets as "a grassroots idea" within the auto company. The decision to buy carbon offsets was a joint one, made by both the management and marketing teams at Ford. At the time, Ford was unique in their focus on carbon, and the Greener Miles program made them the first auto company—and one of the first companies in general—to create a carbon offset purchase program work. When deciding which types of offsets to buy, they consulted separately with a handful of environmental groups they had worked with previously. These trusted advisors steered them towards offsets from wind power and agricultural methane projects. Ford limited credit purchases to those derived from US-based projects, surmising that customers would respond more positively to offset purchases closer to home.

Always conceived of as a pilot program with a shelf life, the Greener Miles program was discontinued after two years. The results were somewhat mixed. Although they were proud to have blazed the carbon trail for other companies. However, in the end, an underwhelming number of Hybrid Escape buyers went to the TerraPass website to offset their emissions. According to Merritt, the program may have been a bit too far ahead of the public's understanding of the role of carbon credits in addressing climate change.

"Part of the problem is that if you're too early on something, you don't get a lot of traction," he said. "Feedback we received from the customers indicated that [Ford's offsetting effort] wasn't a significant factor in their purchasing decision." Merritt also mentioned that there is still the lingering perception in the US that buying credits constitutes "buying your way out of the problem."

Ford has therefore refocused its efforts on doing everything possible to reduce emissions within its facilities, with a long-term carbon management strategy that aims to reduce CO<sub>2</sub> emissions in their manufacturing operations by 30% between 2010 and 2030. Merritt says Ford may consider buying offsets in the future, but only for "that last bit you can't eliminate out of the manufacturing process itself." The auto company is also working actively to improve corporate involvement in carbon markets in general, and to facilitate more successful offsetting programs in the future. Ford was a founding member of the UK Voluntary Emissions Trading Program and the (now defunct) Chicago Climate Exchange. In the end, one of the biggest takeaways from Ford's foray into the US voluntary carbon market was perhaps a push along the learning curve of the carbon marketplace.

"It was a good experience for us in that we learned a lot about how the process worked," Merritt said. "We appreciated that there is a lot of detail that goes into establishing a program like this."



## Case Study

### Macmillan: Low-Carbon Courage

Program: Macmillan Sustainability

Timeframe: 2009-present (ongoing)

Motivation: “sustainability is as important as profits”

Process: hired a sustainability consultant who works closely with the CEO, project sourcing partners include Atmosfair, CarbonFund.org, and Carbon Neutral

Offset project types: various, including cookstoves, reforestation, renewable energy (wind and geothermal), ozone-depleting substances, and landfill gas

Cost: \$200,000 spent in 2012 (\$2.25 - \$28.00 per metric tonne CO<sub>2</sub>e)

Volume: 39,500 MtCO<sub>2</sub>e in 2012, up from 32,000 MtCO<sub>2</sub>e in 2011

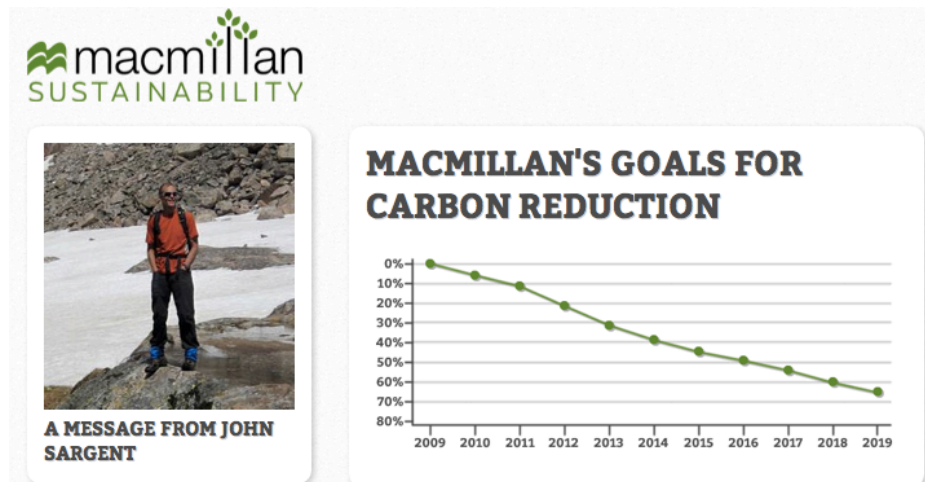
In 2009, Macmillan’s CEO, John Sargent, had an environmental awakening. Positioned at the helm of the privately owned publishing company, he explained to employees his concern about climate change and announced that sustainability was now just as important to the company as profits. When the marketing team asked whether they could begin communicating Macmillan’s greening to customers, Sargent said *wait*. Though he believes in the possibility of “doing well by doing good,” the latter is not a means to the former but rather a stand-alone commitment of environmental stewardship and responsibility to future generations. Sargent did not want to risk greenwashing by publicizing Macmillan’s sustainability initiatives prematurely.

With the help of sustainability consultant Bill Barry, Sargent decided to tackle Macmillan’s scope 1, 2, *and* 3 emissions, dealing with the carbon dioxide exhaled from the company’s paper mills and car fleets, indirect emissions associated with their supply chain, such as those from the milling process, and everything in between. When they were first starting out, Sargent asked Barry how much progress he thought they could make by 2019, then a decade away. Initially, Barry said that “a 50% reduction in emissions would be a real stretch, but [possible] if you want to dig in and really go after it” However, Sargent wanted to push even further, and as CEO “came up with the goal of a 65% reduction by 2019.”

Since then, the company has shifted to sourcing their paper from mills with a significantly higher renewable energy component, reducing scope 3 emissions by 40% on an intensity basis and reducing 16,000 MtCO<sub>2</sub>e annually. They also changed almost all vehicles in their 150-car fleet to hybrids, installed efficient lighting and motion sensors in their warehouses, and even drilled an exploratory well to see if a facility in

## Case Study

Virginia could be heated and cooled by geothermal energy (turned out it couldn't). This all-out sustainability strategy meant that, for Macmillan, carbon offsetting was a last-resort measure—one they take only when the company has maxed out on reducing its own carbon footprint.



John Sargent, the CEO of Macmillan, has declared that sustainability is just as important to him as profits. He is positioning the company for a 65% reduction in carbon dioxide emissions by 2019. (Screenshot from [sustainability.macmillan.com](http://sustainability.macmillan.com))

“John and I are both a little dubious about offsets,” Barry said. “It’s an easy way to assuage guilt, show quick progress, or go for a PR boost. The real challenge for industry is to radically change how they perceive the environment and climate change and then to take courageous action to correct what they can about their processes that improves their situation.”

The company therefore dipped into carbon offsetting cautiously. In 2010, the first year they chose to buy carbon offsets, Macmillan invested \$25,000 in a single project: Atmosfair’s clean cookstove project in Nigeria, which distributes stoves that are 80% more efficient than the ones traditionally used in the region. Since 2010, Macmillan has expanded their offsetting efforts each year, adding non-profit Carbonfund.org and for-profit The Carbon Neutral Company as partners. The company has purchased offsets from a wind project in China, a geothermal project in Indonesia, a landfill gas project in New York, a destruction of ozone-depleting substances project in Arkansas, and forest projects in Panama, Canada, Louisiana, Georgia, and Texas. Macmillan’s carbon reductions are, as Sargent promised, decoupled from economic indicators: though the company did worse profit-wise in 2012 than in 2011, their sustainability efforts intensified over this time period.

“Sargent’s not one for publicity and press releases. And I just don’t think enough of our customers care about a lot of this stuff, unfortunately,” Barry said. “So I can’t say we’re seeing a traditional financial return on the money we invest in our sustainability efforts. Sargent is the driver behind all this, and for him, it’s really about doing the right thing.”

## Interface: Making Carpets Cool

Program: Cool Carpets and Cool Fuel

Timeframe: 2002-present (ongoing)

Motivations: sustainability vision, first-mover status, customer engagement, branding

Process: purchase offsets from about eight different brokers, sometimes buying all of the offsets from a single project

Offset project types: various

Cost: about \$2 million per year, with offset prices ranging from \$2 to \$12 per metric ton

Volume: approximately 400,000 MtCO<sub>2</sub>e per year

Interface is one of the largest voluntary purchasers of carbon offsets in the United States, and they have been at it for quite a while. We spoke with Buddy Hay, who is in charge of making all of the offset decisions for the company, which he has been doing since 2002. He's seen the voluntary market transform from a do-it-yourself experiment a decade ago to an established marketplace with differentiated products, third-party certifiers, and plenty of broker 'storefronts' that facilitate transactions. With manufacturing on four continents and sales in more than 110 countries, Interface is the largest producer of modular carpet in the world, and Hay estimates that the company spends about \$2 million on offsets a year.

Though the company was an early-mover in the carbon marketplace, their sustainability journey began almost a decade before with a single man—Interface's founder and Chairman, Ray Anderson. Because of Anderson's vision and commitment, Interface has since become a leader in industrial ecology. Their 'Mission Zero' aims for zero emissions, waste, and oil by 2020. The company has set up infrastructure for recycling carpet (theirs *and* carpet produced by other companies) where none existed before and are on their way towards a "closed loop" manufacturing process that uses *no* virgin material.



An image from Interface's Cool Carpets brochure indicates a key principle of the company's sustainability goals: balance, as depicted with the scale here. The company provides every customer a certificate that indicates how many offsets Interface purchased to balance out the lifetime emissions of their carpet.

Interface came to offsetting when they began to see diminishing returns on their efforts to reduce emissions. “We decided to purchase offsets to make our product climate neutral for a couple reasons. Number one is because that’s just who we are; we understand that the biggest contributor to our product footprint is carbon,” Hay said.

The company considers the horizontal sustainability of their products, looking at carpets from cradle to grave. In doing this, they found that the *use* phase is actually where most of the lifecycle carbon is emitted: seven years of vacuuming and cleaning a carpet leads to about three times the carbon emissions as were produced during its manufacturing. Though Interface has not stopped tightening the efficiency of its operations and looking to close carbon loopholes, by 2002 they realized that offsets would be a necessary part of a zero-emissions strategy.

With no established carbon market at the time, Interface convened their own panel of advisors to help them navigate what was then a Wild West of offsets. They purchased their first tons from a Blue Source carbon capture and storage project and went from there. Today, Interface is one of the largest voluntary buyers of offsets in the world, investing in projects from the US to Guatemala to Kenya to Brazil to India to Thailand. They work with several different companies, including First Climate, Carbon Neutral Company, Native Energy, South Pole Carbon, and Social Carbon, to negotiate two- to four-year contracts with project developers all over the world. Interface’s good reputation in the marketplace and the fact that they are often purchasing *all* the offsets generated by a particular project over the contract period often gets the company a good price, Hay said.

Interface essentially buys two categories of offsets: the less expensive, higher volume ‘commodity’ offsets and the pricier ‘boutique’ offsets for projects with benefits beyond carbon. Their strategy is necessarily a hybrid one: given the volume of offsets they buy, Interface cannot afford to spend \$10 per ton across the board, and yet Hay likes to support ‘boutique’ projects like forestry. Interface has invested in offsets from a REDD project in Kenya and from reforestation projects in Guatemala and Tanzania. Hay does not differentiate risk across project types since, from his perspective, the major potential downfall is the failure of projects to deliver the offsets, and Interface’s contracts mitigate against this risk.

Though Interface’s sustainability goals are guided by an internal compass rather than consumer pressure, the company makes a point of letting its customers know that they are purchasing not just carpet, but carbon. Though the company absorbs the cost of the offsets without ‘re-billing’ customers, Interface’s salespeople present all carpet-buyers with a certificate with the number of offsets that were retired on their behalf. Hay admits that only a subset of customers initially care about carbon neutrality, but he also believes that doing right by the climate gives Interface a market advantage. Even if buyers remain unmoved by the idea, the offset certificates “give our salespeople a new reason to get in front of their customer.”

## General Motors: All-American Carbon

Program: Chevrolet Carbon Reduction Initiative

Timeframe: 2010-2015

Motivations: pilot project, reaching new consumers, shaping the carbon market, branding

Process: worked with Bonneville Environmental Fund and other environmental advisors to identify projects

Offset project types: various carbon credits, including wind, methane capture, biomass, weatherization, waste-heat recovery, and avoided agricultural conversion

Cost: estimated \$40 million

Volume: 6.97 MMtCO<sub>2</sub>e purchased (1.2 MMtCO<sub>2</sub>e retired)

General Motors (GM) has worked hard to shed its image as a company with a poor environmental record. As the manufacturer of the gas-guzzling Hummer—a vehicle that for many symbolizes a high-carbon lifestyle—this was no easy task. Vehicles such as the Cruze Eco, which gets 42 highway miles per gallon, and the Chevy Volt, a hybrid, have helped to remake the brand. The Chevrolet Carbon Reduction Initiative, through which GM plans to invest \$40 million in carbon reducing projects, is another part of this wider sustainability makeover. According to David Tulauskas, the Director of Sustainability at GM, lots of people avoid the company's cars in the United States, and of these a subset are very passionate about the environment. Among environmental-conscious consumers, GM's market research found that a smaller subset understood carbon markets—and it is these people they're trying to reach.

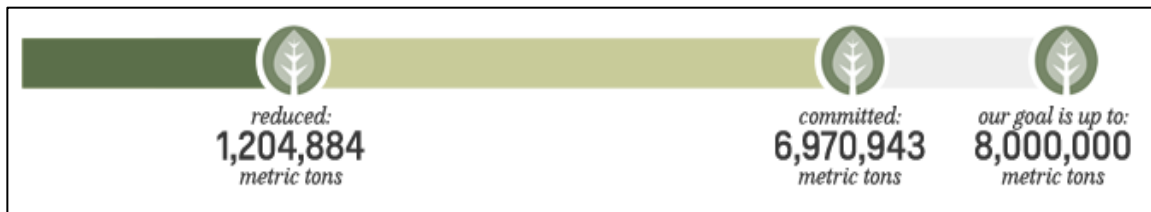
Our participation in the voluntary carbon market is focused on an opportunity to see how we can change customers' perspective on Chevrolet," Tulauskas said.

Another goal of GM's offsetting pilot program was to have a significant impact on the growth of the voluntary market; indeed, few other companies are investing at their scale. It is notable that the \$40 million budget for the Carbon Reduction Initiative comes out of GM's advertising budget, rather than from other areas of the company that were augmented with government bailout money. GM wanted to assure customers that they were committed to paying for sustainability initiatives out of their own pocket.

The Chevrolet Carbon Reduction Initiative launched in November of 2010 with a goal of reducing 8 MMtCO<sub>2</sub>e, GM's estimated equivalent to the emissions caused by driving the 1.9 million new Chevrolets sold in the United States in 2011. However, finding

information on carbon-reducing projects proved to be a challenge. Some reductions—such as wind credits—are easy to navigate, but finding unique projects—methane reduction in a former coal town, for instance—can be more difficult. GM decided to work with Bonneville Environmental Fund and a team of about a dozen external advisors.

Given their branding motivation and American customer base, GM decided to invest exclusively in US-based projects. They also attempted to target projects in densely populated areas, since most of their consumers live and drive in cities, but carbon projects in these areas are hard to come by. In selecting projects, GM looked for projects that would provide immediate carbon reductions as well as benefits such as job creation or lower energy bills. So far, landfill methane capture projects have dominated, accounting for seven of the 16 projects GM supports. The others are three wind farms, three biomass-heating projects for greenhouses, one waste heat recovery project, one weatherization project, and one avoided conversion to agriculture. According to Tulauskas, though GM has invested in reforestation and improved forest management projects over the years, these investments are a challenge for offset projects because the carbon is generated far into the future.



General Motors’ “carbon stories” webpage announces their offsetting goal and encourages visitors to calculate their personal emissions through Bonneville Environmental Fund’s calculator.

As of early 2013, GM had purchased 6.97 MMtCO<sub>2</sub>e —just a million metric tonnes short of their goal for the duration of the program. Tulauskas says the Carbon Reductions Initiative has been successful in reaching its target market and in growing the voluntary market. However, though GM’s offsetting program will continue for another year, after that the company is moving away from carbon offsets and focusing instead on reducing emissions within their operations. Their new sustainability report calls for reducing the carbon intensity of their facilities by 20% within the next decade. Offsetting was always conceived of as a pilot program, and at the moment, Tulauskas does not see continued offset purchases as the *best* way to be “environmentally friendly.” The company’s hope, though, is that their sizeable investment in the voluntary carbon market has opened up channels for more Americans to get involved, lowering the barriers to entry for entities such as homeowners and colleges.

“In order for the voluntary market to grow and become more accessible to Americans, we need to give them an opportunity to participate and incentivize their participation through monetizing carbon,” Tulauskas said.

## British Petroleum: The Olympic Bid

Program: Target Neutral

Timeframe: 2006-present (ongoing), with special event project for the 2012 Olympics

Motivations: customer engagement, branding

Process: BP accepts bids for projects and then narrows down based on an NGO review panel and visits to project sites

Offset project types: various, including biomass, wind, methane capture, landfill gas, and reforestation projects, all certified by ICROA

Cost: \$6.71 per tonne CO<sub>2</sub>e (€4.88)

Volume: 98,948 MMtCO<sub>2</sub>e (representing more than 500,000 journeys)

During the 2012 London Olympics, British Petroleum's (BP) Target Neutral campaign set the record for most number of people offsetting travel emissions to a sporting event. The company offered to foot the bill to offset the transportation emissions of all nine million ticketholders for the Games, and over 500,000 people took them up on it, investing in almost 100,000 MtCO<sub>2</sub>e. Americans offset more than 29,000 MtCO<sub>2</sub>e through BP, making them volume-wise the top offsetter for the Games. BP, an official partner of the Olympics, also offset emissions for 5,000 Games vehicles.

The Olympics campaign was focused on engaging and empowering customers to participate in the carbon market and to understand the environmental impact of their travel. Ticketholders received a flier about BP's offer to offset their emissions, and those who chose to do so went to the customized Target Neutral website and entered a tag code. There, they could view some of the other "offsetters" through social media profiles, compete with other countries for the "gold" in most tonnes offset, and view profiles of the six carbon projects—one from each continent—producing the offsets. These included a tree-planting project in Kenya, a landfill gas project in Turkey, a wind power project in New Caledonia, a methane capture project in the United States, and biomass projects in China and Brazil.

The London Olympics campaign, however, was just one aspect of BP's carbon offsetting initiative. BP began working with Target Neutral, an independent non-profit organization, in 2006 and tried a couple of different models before settling on a broad consumer offset scheme in 2010. Apart from the Olympics campaign, the program is currently available in six countries, supporting 10 projects around the globe. An offset costs \$6.51 (€4.88) per MtCO<sub>2</sub>e, with the price undifferentiated across project types.



Screenshot of the Target Neutral website for the 2012 London Olympics, which allows participants to offset their travel emissions to the Games, courtesy of British Petroleum.

According to Texas-based Mark Proegler, Director of BP’s Climate and Energy Policy, the goal of Target Neutral is to educate customers about their transport carbon footprint, and to offer a framework to reduce it. BP does the vetting work for its consumers. Rather than work through a broker, BP works bilaterally with their contracts, soliciting bids from credit-generating projects every two years. The Target Neutral directors play a large role in choosing which projects to shortlist, and that list is further scrutinized by an NGO panel, which assesses the local socio-economic and environmental benefits of the selected projects. Once the final projects are chosen, the review process culminates with visits to each project site.

All of this due diligence is followed for the purpose of making it easy for BP customers to offset their driving emissions and be able to visualize their money going to a real project and person somewhere in the world. BP’s efforts paid off, but perhaps not as much as they had hoped. When the company initially estimated how many tonnes of offsets to buy, they sent a survey out to a sample of customers, 20% of whom responded that they would be interested in participating in Target Neutral. When the program rolled out, however, only about 1% of consumers ended up offsetting. For the 2012 London Olympics campaign, only about 5% of customers engaged, even though this time the offsets were completely free to them.

Aside from customer engagement, another aim of Target Neutral was to gain further experience in carbon markets. BP prefers a market-based approach such as cap-and-trade to reduce GHG emissions. The company is already subject to compliance carbon regulation in the EU, New Zealand, Australia, and California, and has gained considerable offsetting knowledge through the Target Neutral campaign. They plan to make further carbon offset purchases in the future—either voluntarily or required by law—and it doesn’t hurt to have a few notches under the belt. For now, BP is looking to expand the Target Neutral brand and program in Europe and the United States.



## PART 2: DEMAND FOR OFFSETS ON CALIFORNIA'S COMPLIANCE

### CARBON MARKET

Part 2 looks at the demand for carbon offsets among the 350 California firms that are subject to greenhouse gas regulation under the state's cap-and-trade law, which went into effect in January 2013. We begin with an overview of California's compliance market, providing context in terms of the role of offsets in California's and other cap-and-trade schemes. Next, we consider the motivations behind offset purchases in a compliance market; the process taken by firms to actively participate in offset purchases; and their preferences across project types. This final section takes a closer look at differentiated risks across project types and expected shortages in offset supply, both of which will affect the demand for offsets. As discussed in the methodology, our research for Part 2 is based on interviews with regulators and companies in California, the results from our survey of compliance entities, and an updated supply model developed by one of our group members while working for the American Carbon Registry in summer 2012.

#### Orchestrated demand: compliance carbon markets in context

In 2006, the California State Legislature passed Assembly Bill 32 (AB32), the Global Warming Solutions Act of 2006. The bill, signed into law by then Governor Arnold Schwarzenegger, mandated California to reduce greenhouse gases emissions to 1990 levels by 2020, an estimated 25% reduction from the state's emissions in 2006. The cap covers 85% of the state's GHG emissions with a total cap of 427 MMTCO<sub>2</sub>e.<sup>1</sup> The bill was controversial for many reasons, chief among them its impact on local industry and the potential increase in the cost of electricity in the state. AB32's implementation was delayed due to several efforts to thwart the new legislation including a lawsuit from the Chamber of Commerce and Proposition 23, which sought to suspend the new law.<sup>2</sup> However, AB32 prevailed and was implemented in January 2013. The regulation is in effect until December 31, 2019 and is split into three distinct compliance periods. Allowances, which are set equal to the "cap," are issued in each compliance period and ramped down over time by California Air Resources Board.

*Table 2: Emissions Caps over the Three Compliance Periods in AB32*

COMPLIANCE PERIOD	YEARS	ALLOWANCES/EMISSIONS CAP (MMTCO <sub>2</sub> E)
1	2013	162.8
	2014	159.7
2	2015	394.5
	2016	382.4
	2017	370.4
3	2018	358.3
	2019	346.3
	2020	334.2

Source: Compiled from Evolution Markets, May 2012 presentation for the Electric Power Industry CAR Workshop.

Regulated entities are able to use carbon offsets for up to 8% of their total compliance obligation and it is forecasted that California's covered entities will demand approximately 200MMtCO<sub>2</sub>e of offsets by 2020, representing approximately 40% of the total GHG emission reductions required under AB32's cap-and-trade policy.<sup>3</sup> Even before the first compliance period began in 2013, demand for offsets was already ramping up in California. Anticipating regulation, numerous companies purchased pre-compliance offsets to secure low-cost reductions. Ecosystem Marketplace tracked 10 MMtCO<sub>2</sub>e purchased in anticipation of AB32, and with offsets sold at an average price of \$8 per tonne, this equaled a total \$85 million in value. By comparison, US companies buying offsets purely for voluntary purposes purchased \$151 million worth of offsets in 2011.<sup>4</sup> This is the first sign that the offset demand created by California may soon dwarf the voluntary market.

### *Other compliance markets, in the US and abroad*

AB32 was not the first attempt to create a compliance market for carbon in the United States. The 2009 Waxman-Markey bill, which passed in the House but was thrown out in the Senate, would have created a federal emissions trading scheme whereby compliance entities could collectively purchase up to 2,000 MMtCO<sub>2</sub>e of offsets to meet their cap-and-trade obligations.<sup>5</sup> Similarly, the Regional Greenhouse Gas Initiative (RGGI)—which now includes nine states and aims to cap carbon dioxide emissions from power generators at 10% below 2009 levels by 2018<sup>6</sup>—developed protocols for offset projects. Yet, due to a combination of low natural gas prices, reduced economic growth and an over-allocation of allowances, regulated entities actually came in well under the cap in the first compliance period (2009-2012) negating the need for companies to purchase offsets to meet the regulation.

Internationally, the 2001 Kyoto Protocol has spurred the creation of numerous compliance regimes for GHGs. One of the earliest markets created was the Clean Development Mechanism (CDM), which allows signatories of the Kyoto Protocol to purchase Certified Emissions Reductions (CERs) from projects in developing countries. As of February 2013, 2095 CDM projects have issued more than 1,200MMtCO<sub>2</sub>e of credits. However, supply has far outpaced demand. In 2012, prices crashed precipitously,<sup>7</sup> calling into question the long-term viability of the CDM.

In addition, the uncertainty over whether Kyoto will continue has driven down demand. The European Union Emissions Trading Scheme (EU ETS) is currently the largest CO<sub>2</sub> emissions trading program with 27 nations signed on and over 11,000 entities regulated. In 2011, the EU ETS alone was responsible for the trade of 9,700MMtCO<sub>2</sub>e allowances, secondary Certified Emission Reductions (sCERs), and Emission Reduction Units (ERUs).<sup>8</sup> Australia and New Zealand also have compliance carbon markets, and South Korea and China's are under development. (See Appendix C for a full snapshot of compliance

carbon markets around the world.) The California Air Resources Board has modified its compliance approach learning from earlier regimes. Largely, the over allocation of allowances on the EU-ETS led to an allowance price crash. California has taken measures to ensure that over allocation is prevented by implementing an allowance auction and requiring that all GHG emissions data is verified by a third party.

### *Demand from the bottom up*

Though internationally demand for carbon offsets on these compliance markets has at times far outstripped supply, compliance (as opposed to voluntary) buyers still make up more than 99.9% offset purchases globally. Even without a legally binding international climate agreement, regional and even sub-national cap-and-trade has created a multi-billion-dollar market for carbon. “There’s a lot of attention paid to these smaller systems that are sprouting up around the world in a bottom-up fashion,” said Derik Broekhoff of CAR. “Some expect that these systems may be able to sustain an international emissions trading system in the absence of a top-down system.”

The following section studies the newest of these regional compliance regimes, with a focus on the motivations, preferences, and processes of those entities that may purchase carbon offsets to meet their compliance obligation under AB 32. Our findings are based on interviews with regulators and utilities as well as the results from a Web-based survey of compliance entities that we conducted between November 2012 and February 2013. Of the 367 compliance entities in California (as of January 2013), 42 (11.4) responded to the survey. The majority of respondents were either stationary combustion (13) or electricity generators (12), and others included cement, refineries, mining, food manufacturers, aircraft maintenance, and waste-to-energy plants.

### **Motivation: Low-carbon at the lowest cost**

According to our survey results, California compliance entities generally seek to meet the requirements of carbon regulation at the lowest cost possible. More than two-thirds of our survey respondents indicated that their company has a carbon management

#### **Allowances versus offsets explained**

Allowances, or permits, are not to be confused with carbon offsets, or credits. Although the terms are sometimes used synonymously and each equate to 1 metric tonne of CO<sub>2</sub>e, a carbon offset ensures that emissions reductions are achieved somewhere, whereas an allowance does not. Allowances are simply permits to emit; the regulator controls the number of allowances available to covered entities in order to monitor, cap, and decrease overall emissions over time. Under any cap-and-trade scheme, allowances may either be given away for free or sold at an auction. California is using a combination of these two options. Similar to allowances, carbon offsets also allow companies to emit over their cap, but require companies to purchase emissions reductions achieved by registered offset project developers.

strategy, either in place (43%) or under development (29%). In preparation for the regulation, the majority of respondents developed an internal strategy (60%) and hired consultants (53%). The California Air Resources Board

(CARB) has created several cost-containment mechanisms to try to minimize impact on industry and give companies flexibility as to how to meet the requirement. These options are: (1) reducing emissions internally, (2) purchasing or using allocated allowances, and (3) purchasing offsets. A fourth option is moving operations outside of California to avoid greenhouse gas regulation altogether. However, despite these options, respondents indicated that they expect the regulation to be either “very costly” (45%) or “costly” (33%), with a handful (20%) anticipating “neutral” financial impact.

#### California’s first allowance auction

In November of 2012, the California Air Resources Board (CARB) held its first online auction of allowances. Over 600 auction participants submitted bids on an electronic auction platform and after the three-hour bidding window, all 29+ million allowances were purchased. It was a good sign for California’s cap and trade program, the second largest in the world after the EU ETS, in terms of quantity of compliance entities included, potential carbon emissions reductions, and revenue. In total, the State predicts that it will receive approximately \$1 Billion in revenue from the allowances auction.

Out of the entities that responded to our survey, 59% plan to purchase allowances and 35% plan to purchase offsets. Surprisingly, only 46% of respondents plan to make changes in their business that would reduce internal emissions. These results indicate that companies will be shopping around for lowest-cost options—and many are planning to use allowances or offsets to meet the regulation before changing their operations.

#### *Meeting regulation through allowances*

Many California compliance entities may be able to meet their obligations simply through purchasing allowances. California’s first auction sold roughly 23M allowances at a market-clearing price of \$10.09, raising \$290M for the state, while the second auction, held in February of 2013, sold over 22M allowances at a market-clearing price of \$13.62.<sup>9</sup>

Companies can bid on and purchase up to 10% of the total number of allowances offered at an auction. However since allowances are generally more expensive than offsets, this strategy is often not the most cost-effective. California has set up their allowance auctions so that permits increase in value, with a mandate to increase the initial \$10/tonne price floor of allowances by 5% plus the rate of inflation annually.<sup>10</sup> Carbon offsets, on the other hand, do not have a price floor. Therefore, as CARB reduces the total number of allowances (the cap) and the price continues to rise, we expect that companies will look increasingly toward offsets.

#### *Meeting regulation through offsets*

To avoid the relatively high cost of allowances, companies may choose to purchase carbon offsets to cover up to 8% of their total emissions, approximately 40% of their

total reduction mandate.<sup>a</sup> Whether they will do so largely depends on the price of offsets compared to the price of allowances or the cost of reducing emissions. Because California's offset protocols only accept emission reductions originating in the United States California's offsets could prove to be more expensive than those sold in the EU ETS and other markets, which can be sourced from developing countries. Beyond the cost of the offsets themselves, compliance entities may also incur transaction costs—in time and effort as well as dollars—to identify projects to invest in and to assess risk. Still, offsets will likely play a role for most compliance entities in California.<sup>11</sup> ARB has imposed no price floor for carbon offsets, and pre-compliance offsets sold at an average of \$8/tonne, indicating that offsets may be cheaper than allowances.

### *Resource shuffling: Moving to an unregulated atmosphere*

Of course, the “none-of-the-above” option for companies facing regulation is simply to avoid it by moving operations outside of California. Such a scenario would be called “carbon leakage” under climate policy, since emissions would simply shift to other states. But for a handful of compliance entities, relocating may be a real possibility. Many California companies are already operating on a relatively small profit margin due to California's higher wage requirements, real estate, and existing regulations.<sup>12</sup> As Joel Levin of CAR pointed out, the impacts of the regulation may be uneven across sectors. “Utilities, especially the public-owned utilities, aren't as concerned about price increases since they can pass off the cost to ratepayers. A cement company can't do that since they're competing with the prices of their competitors outside of the state and country,” he said.

The added costs of calculating and offsetting their GHG emissions will undoubtedly increase the cost of companies' operations, and many covered entities are unsure if they'll be able to stay in business in the state—a sentiment that was expressed by many respondents to our survey. “We are trying to figure out how to survive it. We might make it, might not,” said one compliance entity. Two out of 37 responding said they had plans to move, and three more indicated that while they won't actually pull out of California, they will look to expand their operations elsewhere—to states “more business-friendly,” as one respondent put it. Others are adopting a ‘wait-and-see’ approach: “We will continue to operate the plant until our Power Purchase Agreement is over in 2018,” one respondent said. “If it becomes uneconomical to continue operations, we will shut down.”

### **Process: Navigating the marketplace**

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<sup>a</sup> To be clear, covered entities can use offsets for up to 8% of their total 20% reduction mandate by 2020 which means that 40% of their required reductions can come from the purchase of offsets rather than internal mitigation or purchases of allowances from other entities.

Compliance entities have many of the same options and dilemmas as companies voluntarily buying credits when it comes to actually navigating the carbon market. Of the respondents to our survey who plan to buy offsets as a part of meeting their greenhouse gas regulation, most plan to go through a broker (14 companies) or an exchange (7 companies), while a few plan to either work directly with a project developer (2 companies) or originate their own project (1 company). Since compliance entities are, by definition, participating in the carbon market for the purpose of complying with the law, they may have even less experience than many voluntary firms in thinking about carbon reduction and will rely on advisors to guide their decision-making. More than half of respondents to our survey indicated that their company had hired a consultant as a result of AB32.

However, in some ways, compliance firms' offsetting processes may be more straightforward than those of companies operating on the voluntary market. For one, regulated California entities are already required by law to report their emissions, so they do not need to assess their carbon footprint for the first time—a task that can sometimes take voluntary companies years to complete. They are also restricted to specific projects and purchasing processes, which may simplify many companies' purchasing strategies. Companies may only purchase offsets of a single standard (California's) and originating in a single country (the United States), while utilities have even more specific limitations regarding what offsets to purchase and how to bid within each compliance period.

To find projects, compliance entities look to the official Offset Project Registries (OPRs) in the state, either the Climate Action Reserve or the American Carbon Registry. Offset Project Registries are not exchanges, but rather serve to initially certify projects before they are transferred to ARB's compliance registry. Registries also serialize and track the GHG reductions generated by those projects to verify them over time.<sup>13</sup> Registries are particularly important in that they play a large part in reducing risk of offset invalidation, which is discussed in more detail below.

### **Preferences: Price check, or make it Golden**

Though compliance entities have considerably fewer choices to make in terms of offsets than voluntary buyers, they still have a myriad of project types to choose from, many of which are valued at differentiated prices and come with varying risk. Between 2007 and 2010, the CARB adopted four protocols, or project types, developed by the Climate Action Reserve (CAR): US Forests (including Reforestation, Improved Forest Management, and Avoided Conversion projects), Livestock, Urban Forests, and Ozone Depleting Substances.<sup>14</sup> Several more project types—Coal Mine Methane, Low-bleed Pneumatic Valves, and REDD—have been reviewed by ARB for potential adoption. To give a sense of the role each of these project types may play in compliance entities' offsetting choices, the following table provides a brief description of each project type

as well as the American Carbon Registry’s projection of potential cumulative supply over all three compliance periods (2013-2020).<sup>b</sup>

*Table 3: CARB Offset Project Types (Current and Under Review)*

ADOPTED PROJECT TYPES		
Project Type	Description of CARB protocol	Projected potential supply over the course of the regulation, 2013-2020 (in MMtCO <sub>2</sub> e)
Reforestation	Tree-planting in areas that have had less than 10% tree canopy cover for at least 10 years, or where at least 20% of live tree biomass has been removed.	n/a*
Improved Forest Management	Projects manage land with greater than 10% tree canopy cover in a specific manner.	36
Avoided Conversion	Projects require that at-risk forestlands be dedicated to a Qualified Conservation Easement or public entity, not including the Federal Government.	8
Livestock	Facilitating adoption of manure digesters among US dairy and swine operators, reducing methane emissions.	4.05
Urban Forests	Tree-planting in urban areas undertaken by municipalities, on educational campuses, and by utilities (not applicable to forest tracts over 100 acres).	n/a*
Ozone Depleting Substances	Destruction of CFCs and HFCs in refrigerators, air conditioners, and foam insulation.	8
PROJECT TYPES UNDER CONSIDERATION		
Coal Mine Methane	Various project types for destruction of methane, including Abandoned, Drainage, Ventilation Air Methane, and Surface, are under consideration.	34
Low-Bleed Pneumatic Valves	Replacing high-bleed pneumatic valves in the oil and gas sector with low-bleed devices (for each replaced valve, emissions are reduced from an average of 56 MtCO <sub>2</sub> e to 3 MtCO <sub>2</sub> e).	5 - 26
REDD	Reduction of emissions from deforestation; California is considering linkages with the states of Chiapas, Mexico, and Acre, Brazil to source REDD credits.	100

Sources: Winrock International, Compliance Offset Supply Forecast; CEPA Air Resources Board, Compliance Offset Protocol US Forest Projects.

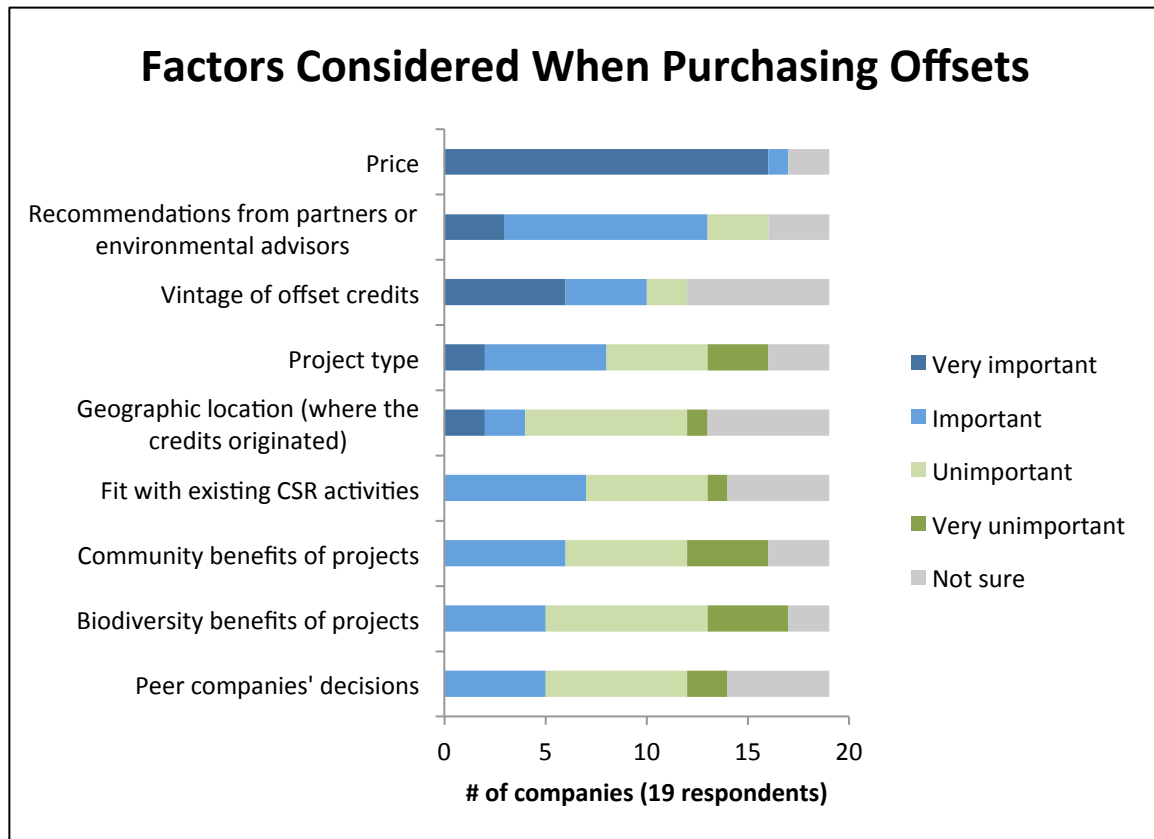
\* N/a because carbon prices are not expected to be high enough to make these projects financially viable.

### *The most tonnes for their buck*

Our survey of compliance entities asked both about factors companies consider when purchasing offsets and desirability of different offset project types. Not surprisingly under a compliance regime, most respondents indicated offset price as the most important factor. Here is the breakdown:

<sup>b</sup> One of the authors of this report, Sam Stevenson, was the lead author on the study for American Carbon Registry, conducted by Winrock International.

Figure 2: Factors Considered When Purchasing Offsets



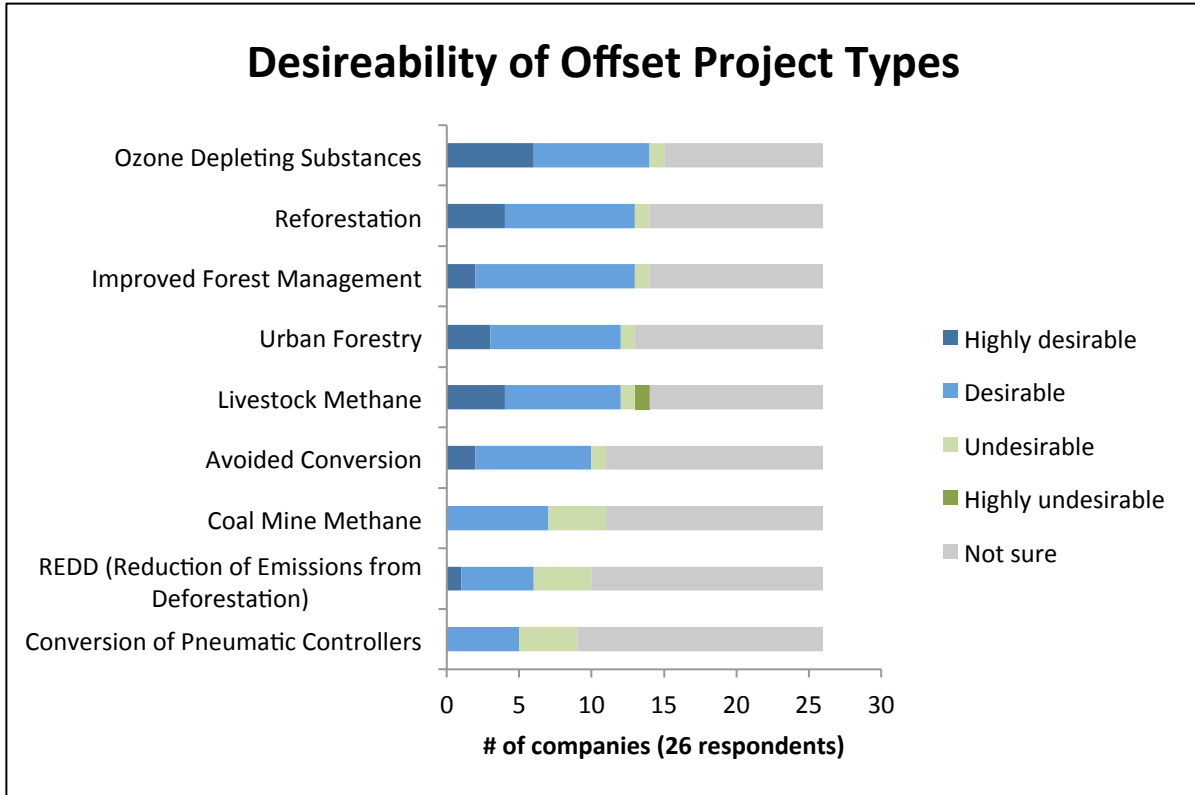
Thirteen respondents said that the recommendations of partners or environmental advisors were “very important” or “important” in informing their offset purchases, and 10 paid attention to vintage. Though a handful of companies do consider the other factors we mentioned—project type, geographic location, community benefits, biodiversity benefits, and peer companies’ decisions—more companies rated these factors as “unimportant” or “very unimportant.”

### A tonne is a tonne

Twenty-six companies responded to our survey question about the desirability of different offset project types, though about half indicated that they were “not sure” or had no preference among them. While our sample of *non*-apathetic respondents is small (between 9 and 14 people indicated some preference for each project type), our results indicate the destruction of Ozone-Depleting Substances (ODS) as the most popular project type, followed by three out of the four forest protocols: Reforestation, Improved Forest Management, and Urban Forestry. Though REDD, Coal Mine Methane, and Conversion of Pneumatic Controllers each received a few “undesirable” votes, there was no project type that the majority of companies viewed as undesirable. Only 21% of companies stated that they would be willing to pay a premium for any particular project type over another, with the remainder prioritizing price over project.



Figure 3: Desirability of Offset Project Types



Interestingly, a couple of the more “charismatic” offset types that many respondents rated as desirable—namely reforestation and urban forestry—will likely be in short supply.<sup>15</sup> Predictably, respondents seemed to have less of an opinion about the three project types not yet accepted by CAR: Coal Mine Methane, REDD, and Conversion of Pneumatic Controllers.<sup>c</sup> The most recent aggregated price data for CAR-approved project types is from 2011, which makes those transactions pre-compliance. In that year, Livestock Methane projects averaged \$8.3/tonne, Ozone-Depleting Substances \$8.2/tonne, and Forestry (lumping together Reforestation, IFM, and Avoided Conversion) \$7.1/tonne.<sup>16</sup> Though these averages may very well shift over the compliance periods depending on supply and demand, they at least indicate that prices will likely be differentiated across project types, and compliance entities will likely chase the cheapest tonne.

<sup>c</sup> It is expected that Coal Mine Methane and Rice will soon be added as two additional protocols, with Pneumatics, REDD, and other offset types on a longer waiting list.

## *Risk of invalidation*

### **California offset buyer-liability explained**

One potential factor that may alter compliance entities' preferences in terms of project type is the risk that their offsets may be invalidated. Invalidation of offsets can be caused if the amount of credits achieved is overstated (by more than 5%), if more than one program issues the same offsets for the same period, or if the project is not in accordance with all local, state, or national regulations related to the environment, health, and safety. CARB can find offsets invalid within eight years after they have been initially verified; the invalidation window narrows to three years if the offsets have been re-verified by a second verifier.

Who bears the risk of invalidation is a key difference across project types. For most, project liability, or the responsibility if an offset is invalidated, is placed on buyers as opposed to project developers, landowners, or the State. California will be the first compliance market to structure their program this way, and the decision has been very controversial, since most buyers do not have control over offset projects or understand how to appraise invalidation risk. Forest offsets are the exception. Due to the required 100-year lifespan for forest carbon offsets and the higher risk of offset invalidation in that time, forest projects within the US Forest and Urban Forest Protocols are the only non-buyer liability projects currently approved in California. This shift in responsibility to the project developer is meant to protect buyers against the heightened risk of reversals. However, the increased liability for the project developer, along with the increased cost of developing forest projects, means a premium price for forest offsets.

Due to California's strict standards for protocols, including rigorous monitoring, reporting, and verification (MRV) of offsets conducted by independent, accredited bodies at least once every six years, the risk of invalidation is quite low, especially for projects that retire offsets immediately. Furthermore, brokerages that bundle offsets and/or agree to take on liability themselves sell higher-priced "Golden Offsets," lowering risk further for covered entities. And though no insurance groups have yet begun offering insurance for offsets in the state due to the difficulty of monetizing the risks associated with invalidated offsets, many are considering entering the market soon.

Many buyers are concerned about the risk of invalidation and perceive different risks across project types—though those perceptions are not always fully informed. According to Derik Broekhoff of CAR, the fact that forest projects are the only ones that leave the liability with the project developer may be "little known" by companies.<sup>17</sup> Many respondents to our survey indicated that the risk of offsets being invalidated is a major concern, but only one mentioned that they planned to buy "Golden" offsets to eliminate that risk. As on the voluntary market, some compliance entities perceive certain project types to be 'safer' than others simply because they are the most straightforward or on the shortest time horizon. One respondent said that ODS is "probably the least risky because it is fairly easy to measure and record." Another questioned the long-term reliability of forestry offsets, which have to persist for 100 years in order to be considered "permanent." Overall, though, most companies don't perceive differentiated risks across project types: "We are more concerned about poorly run offset generation projects than certain project types," said one respondent.

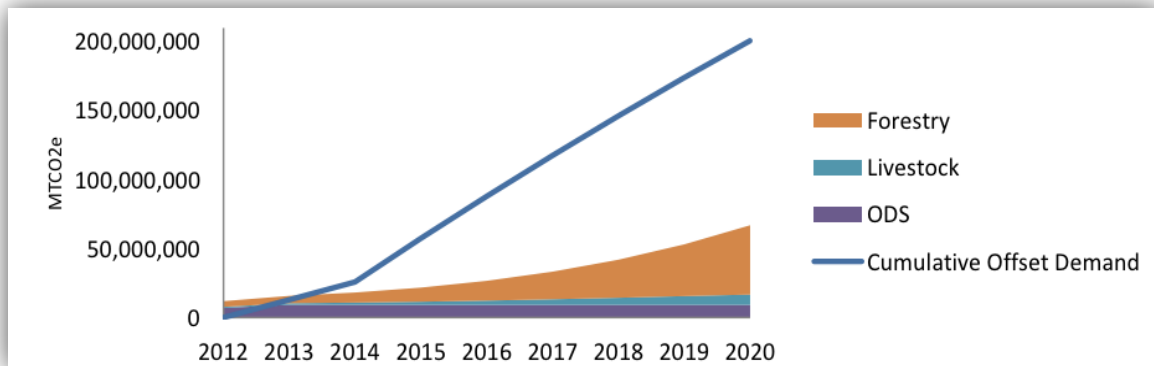
The California Public Utilities Commission (CPUC), however, is very aware of the liability differentiation. To avoid legal battles and heightened financial risk for Investor-Owned

Utilities (IOUs), the CPUC dictates that IOUs can only purchase “non-buyer-liability” carbon credits from the approved ARB offset protocols. “Our agenda is set by regulators,” Adam Smith of Southern California Edison explained. “The CPUC tells us that we can’t use buyer-liability offsets, and it monitors our rate increases for our customers.”<sup>18</sup> Though limiting IOU’s choices among offset types is intended to limit utilities’ financial risk, it also restricts them to purchasing only forest offsets, which could prove very expensive.

**Projected offset shortages**

Compliance entities’ preferences among project types may ultimately be limited by offset supply. The American Carbon Registry developed an offset supply forecast to determine whether a shortfall can be expected for the California cap-and-trade program from between 2012 and 2020.<sup>d</sup> The report concluded that with the current offset protocols, there will be a significant shortage of offsets to meet expected demand from covered entities, even when accounting for the early action offsets available.<sup>19</sup> Under baseline conditions, ACR concludes that a 29% shortage (7.6 MMtCO<sub>2</sub>e) in compliance period 1 is expected. Additional shortages are forecast given that covered entities and financial players can bank their credits in the early years to sell into future compliance periods. By compliance period 3, there will be a 67% (134 MMtCO<sub>2</sub>e) shortage. Forestry and Ozone-Depleting Substances offsets provide the significant majority of tonnes in compliance period 1 (8.1 MMtCO<sub>2</sub>e and 7.7 MMtCO<sub>2</sub>e respectively).<sup>20</sup>

*Figure 4: Projected US Offset Supply Under AB32 (2012-2020)*



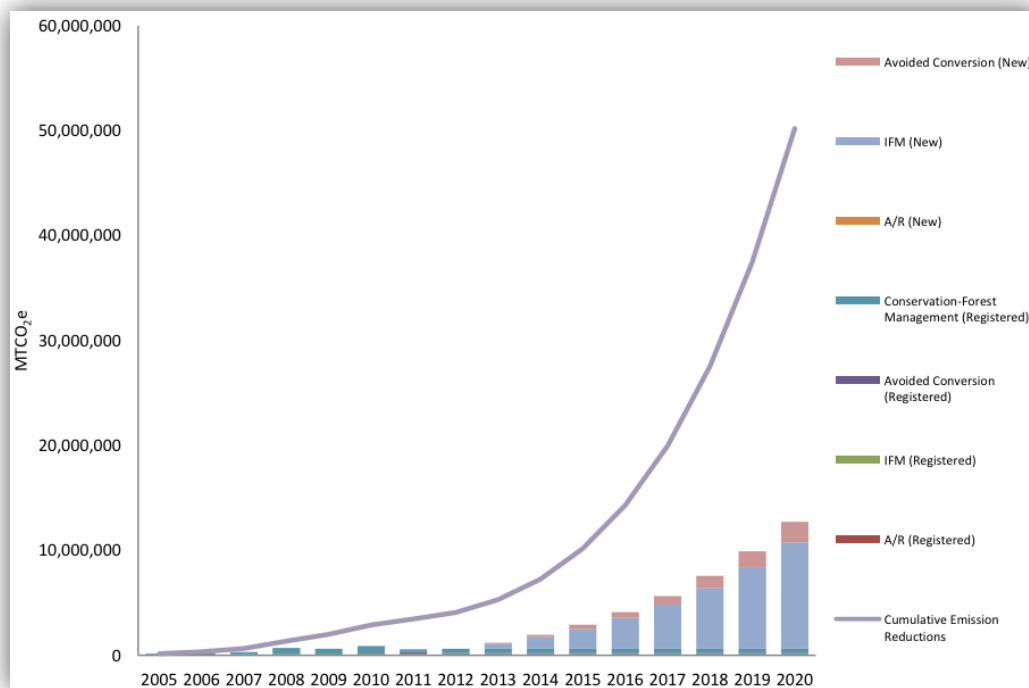
Source: Stevenson S., Morris B., 2012

The ACR report finds that US forest projects will largely dominate offset supply by 2020. Numerous studies estimate the technical potential of GHG emission reductions from forestry projects to be 500-750 MMtCO<sub>2</sub>e, which would easily satisfy the forecasted

<sup>d</sup> This report and offset supply model was developed by Sam Stevenson while working for the American Carbon Registry. The full report can be accessed at: <http://americancarbonregistry.org/acr-compliance-offset-supply-forecast-for-the-ca-cap-and-trade-program>

offset demand under AB32.<sup>21</sup> Yet long lead times, the 100-year permanence standard, and the fact that offset liability falls on the project developer create significant challenges to supplying forestry tonnes. Due to these barriers, ACR forecasts only 50 MMtCO<sub>2</sub>e from US forest projects by 2020. Of the five forest project types,<sup>e</sup> ACR found that Improved Forest Management and Avoided Conversion projects will dominate the offset supply due to the relative low cost and ease of project development. By 2020, Improved Forest Management projects will account for 61% (36 MMtCO<sub>2</sub>e) of the forest supply.<sup>22</sup>

Figure 5: Projected US Forest Offset Supply under AB32 (2012-2020)



Source: Stevenson S., Morris B., 2012  
 IFM is Improved Forest Management and A/R is Afforestation/Reforestation.

<sup>e</sup> The project types include Improved Forest Management (IFM), Conservation-based Forest Management, Avoided Conversion, Reforestation, and Urban Forestry.

## **Closing the supply gap: REDD+**

The only protocol that really has the potential to fill the projected supply gap on its own is Reduction of Emissions from Deforestation and Degradation (REDD+). California has been the leading participant in the Governors' Climate and Forests Task Force (GCF), a consortium of states and provinces across the globe that are working together to support REDD+ efforts. Since joining the task force in 2008, California has moved ahead to create real projects with two states that showed a capacity for early actions: Chiapas, Mexico and Acre, Brazil. In 2011, the REDD+ Offset Working Group (ROW) was established to answer vital questions related to legal and institutional obstacles, policy considerations for sectoral programs, and performance standards.

The inclusion of REDD+ as an AB32 protocol would be a great step forward for the REDD+ framework in general, and could be mutually beneficial for California, which will need an infusion of new offsets if the price of allowances and offsets rise significantly. However, there are a lot of issues, both political and logistical, with bringing REDD+ into California's system. While Acre seems to be far ahead of Chiapas in sorting out measurement, reporting, and verification (MRV) methods and social issues such as land tenure rights, there are opponents to REDD+ in both countries. Many human rights groups worry that indigenous communities will be exploited or ignored and that decisions about who will be paid for carbon offsets in each country are not clear. Furthermore, MRV standards are not equal to those in the US and REDD+ credits are considered high risk. For these reasons, the REDD+ protocol is not ready for approval by CARB and most believe that if it were to be approved by the Board, it wouldn't happen until 2015 at the very earliest.

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- <sup>13</sup> Belinda Morris, California Director at the American Carbon Registry, phone interview conducted by Hannah Erickson on February 7, 2013.
- <sup>14</sup> California Environmental Protection Agency Air Resources Board, *Proposed Regulation to Implement the California Cap and Trade Program. Part V: US Forest Projects*, October 28, 2010. Available at: <http://www.arb.ca.gov/regact/2010/capandtrade10/cappt5.pdf>
- <sup>15</sup> Stevenson S., Morris B. 2012.
- <sup>16</sup> Ecosystem Marketplace, *State of the Voluntary Carbon Markets 2012*.
- <sup>17</sup> WBCS side event November 30, 2012.
- <sup>18</sup> Adam Smith, Climate Policy and Carbon Market Analyst at Southern California Edison (SCE), phone interview conducted by Hannah Erickson on February 12, 2013.
- <sup>19</sup> Sam Stevenson, Belinda Morris, et.al, *Compliance Offset Supply Forecast for California's Cap-and-Trade Program (2013-2020)*, American Carbon Registry, 2012.
- <sup>20</sup> Stevenson S., Morris B. 2012.
- <sup>21</sup> See Brown S., et. al., *Terrestrial Carbon Sequestration in the Northeast: Quantities and Costs. 2007 & EPA, Greenhouse Gas Mitigation Potential in US Forestry and Agriculture, 2005*
- <sup>22</sup> Stevenson S., Morris B., 2012.

## CONCLUSION

In every carbon market thus far, an overall lack of steady demand for the amount of credits available has been an issue. “We’ve been competing in a market that has been awash for a very long time in credits that are very cheap,” said Jonathan Shopley of The Carbon Neutral Company.<sup>1</sup> This issue is not only detrimental to project developers who need to cover project costs; it is a red herring for investors who hope to see profits from trading offsets on a secondary market. Yet it is unclear how detrimental this has been for the expansion of carbon markets into new regions. If the EU ETS had better forecasted demand, would that have spurred new national cap-and-trade systems in, say, the United States? Perhaps. But demand for new products often takes time to grow, especially if that product cannot be seen, smelled, or heard.

While future demand for carbon offsets remains uncertain, especially in the United States, our research pulls back the curtain a bit on the motivations, processes and preferences of those players who are essential to carbon markets’ viability: the buyers. For both voluntary and compliance buyers, the carbon marketplace can be a confusing realm at first. Almost all buyers rely on other market players such as project developers, carbon brokers, environmental advisors, or regulators for information, and these intermediaries play a central role in shaping demand on both markets. Though the time and money spent interacting with these market players is often obscured—it does not show up in the final dollar per tonne price of carbon—these transaction costs may very well play into companies’ purchasing decisions.

On the California compliance market, invisible transaction costs may deter some companies from purchasing offsets even though offsets are, on the surface, cheaper than allowances. For voluntary buyers, however, these information-brokers add considerable value in terms of legitimizing the very concept of carbon offsets as a part of corporate sustainability strategies and in helping companies communicate the impact of offsetting to others. In both cases, intermediaries facilitate transactions that simply couldn’t occur without them.

The demand for offsets on the voluntary market is primarily made up of only a handful of large companies, which makes it relatively volatile. Each company, obligated by no industry standard or state or federal regulation, may reach its offset goal and discontinue purchasing credits at any given time, thus abruptly shrinking market demand. When Chevrolet finishes purchasing offsets in 2015 to focus more on internal emission reductions, projects will have a difficult time finding another company willing to purchase \$40 million worth of credits from them. Still, demand may ramp up if more corporations incorporate carbon as key to their business model. Companies like Disney and Microsoft are beginning to do this by creating an internal price on carbon. These self-imposed carbon ‘taxes’ help them to factor climate impacts into their decision-

making and also generate a pool of revenue: Disney has raised \$35 million from their carbon tax, allowing them to invest in offset projects.<sup>2</sup> The 'next level' of demand will come when offsetting is used not just to mitigate the carbon impact of travel or events but in the life cycle of specific products.<sup>3</sup>

For the time being, however, increasing demand is largely left up to project developers, marketers, and brokers who need to get creative when communicating with buyers the larger *value* of their offsets beyond just their emissions reductions. Every year there are an increasing number of standards and verifiers that assist developers in proving not only the validity of their offsets, but also a myriad of external co-benefits, such as increased biodiversity, jobs, or even labor rights. Buyers are also more interested than ever in linking their own story with the story of the offsets, and this may require project developers to go a step further not only in communicating their value once in existence, but also choosing what project to develop in the first place. Indeed, some buyers are looking to start offset projects themselves to ensure that they fit within their larger corporate goals or history. The linkage between the offset project and the buying entity may be geography (if the company works in CA, they may want a project in CA), a benefitted group (they may want to have an impact on women), or simply an offset type (a utility company may want to focus on clean energy offsets while a paper company may want to focus on forests), but ultimately all companies seem to be looking for offsets that they can easily explain to their customers.

Increasing demand for offsets on a compliance market is, of course, up to regulators. The more regional, national, and jurisdictional cap-and-trade systems, and the stricter the caps set for every covered entity, the higher the demand for offsets on primary and secondary markets. Covered entities, which are not purchasing offsets on their own accord, therefore have very different motivations for entering the market as buyers. Unlike the buyers on the voluntary market, compliance buyers continue to focus mostly on the price and risk level attributed to offsets, while remaining relatively indifferent to project type, environmental and social co-benefits, and an offset's "story."

Perhaps because compliance entities are not as focused on purchasing offsets that fit within a "story" as much as voluntary buyers are, compliance entities have not necessarily figured out how to use their offset purchases as part of a larger CSR strategy. In fact, some of the companies that we spoke with, including Southern California Edison, separate their sustainability or CSR departments from their compliance teams, effectively cutting off a larger discussion about how the two efforts might better fit together and then be communicated to consumers. Perhaps these companies will become more sophisticated with regard to how they 'play up' their offset purchases in time.

Still, whether costumers look favorably upon companies purchasing carbon offsets, or even care one way or the other, is unclear. This, perhaps, is the largest barrier to increasing demand on carbon markets. If the majority of end users of commodities or



consumer goods fail to lower their own carbon footprint or give preference to those companies that do, corporations will quickly lose interest in offsets on the voluntary market and push even harder against stricter carbon regulations on compliance schemes.

If consumers do begin to think about carbon as a commodity, it would signify a vital paradigm shift that would open the door for many other environmental markets. Carbon markets are, at their essence, an internalization of an externality. As Tanya Peterson of the Gold Standard pointed out, carbon “has a lot hanging on its shoulders at the moment.”<sup>4</sup> As one of the few environmental services that is currently valued in global marketplaces, carbon sometimes serves as a proxy for other outcomes, such as delivery of clean water. While the ‘demand’ for carbon offsets remains uncertain, the fact that companies like General Motors and Pacific Gas & Electric are now transacting environmental assets is a paradigm shift in the last decade. It’s one that has the potential to connect boardrooms and forest communities, utilities and farmers, and other actors all over the world in addressing one of our global economy’s largest externalities.

## CONCLUSION SOURCES:

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<sup>1</sup> Jonathan Shopley, The Carbon Neutral Company, IETA side event, Nov. 29, 2012, COP18 in Doha, Qatar.

<sup>2</sup> Marc Gunther, "Disney, Microsoft and Shell opt for self-imposed carbon emissions taxes," *The Guardian*, 26 March 2013. Available at: <http://www.guardian.co.uk/sustainable-business/carbon-emissions-tax-microsoft-disney-shell>

<sup>3</sup> Shopley 2012.

<sup>4</sup> Tanya Peterson, Gold Standard, IETA side event, Nov. 29, 2013, COP18 in Doha, Qatar.

## APPENDIX A: Interviews and Panels That Informed This Report

Note: Interviews were conducted by Hannah Erickson (HE), Nancy Gephart (NG), Allie Goldstein (AG), or Sam Stevenson (SS). See notation below.

### Interviews

**Bill Barry**, Sustainability Consultant at Macmillan Publishing, phone interview conducted by AG on March 8, 2013.

**Derik Broekhoff**, Vice President for Policy at the Climate Action Reserve (CAR), phone interview conducted by HE on February 7, 2013.

**Jonathon Burnston**, consultant at Karbone, phone interviews conducted by AG and SS on August 25, 2012 and October 16, 2012.

**Katherine Hamilton**, Director of Ecosystem Marketplace, phone interview conducted by AG on August 20, 2012.

**Buddy Hay**, Assistant Vice President of Sustainability Strategies at Interface, phone interview conducted by AG on March 15, 2013.

**Mark LaCroix**, Senior Sustainability Officer at the Carbon Neutral Company, phone interview conducted by AG and HE on November 13, 2012.

**Joel Levin**, Vice President Business Development at the Climate Action Reserve (CAR), phone interview conducted by AG and HE on February 15, 2013

**Larry Merritt**, Director of Sustainability at Ford, phone interview conducted by HE, NG, and AG on October 16, 2012.

**Belinda Morris**, California Director at the American Carbon Registry, phone interview conducted by HE on February 7, 2013.

**Patrick Nye**, Senior Consultant at Bonneville Environmental Fund, phone interview conducted by HE and AG, November 8, 2012.

**Charlie Parker**, Deputy Director, Forests and Climate at World Wildlife Fund (WWF) US, in-person interviews conducted by HE over summer 2012.

**Molly Peters-Stanley**, Carbon Program Director, in-person interview conducted by AG on December 19, 2012.

**Mark Proegler**, Director of Climate and Energy Policy at British Petroleum, phone interview conducted by HE, NG, and AG on November 11, 2012.

**Ethan Ravage**, West Coast Representative at the International Emissions Trading Association (IETA), phone interview by HE on December 18, 2013.

**Adam Smith**, Climate Policy and Carbon Market Analyst at Southern California Edison (SCE), interview by phone conducted by HE on February 12, 2013.

**Kevin Townsend**, Chief Commercial Officer at Blue Source, phone interview conducted by HE on November 20, 2012.

**David Tulauskas**, Director of Sustainability at General Motors, phone interview conducted by HE and NG on November 19, 2012.

**Andrea Tuttle**, Pacific Forest Trust, phone interview conducted by HE on February 6, 2013.

## Panels

**Conservation International and the Verified Carbon Standard Association**, “Mobilizing Private-Sector Finance for REDD+: Innovative Partnerships for Scaling Up Investment.” Panelists included Mike Korchinsky of Wildlife Works and Noami Swickard of Verified Carbon Standard. November 29, 2012, COP18 in Doha, Qatar.

**International Emissions Trading Association (IETA)**, “Climate Leadership and Future Trends for Voluntary Carbon Markets.” Moderator: Molly Peters-Stanley, Ecosystem Marketplace. Panelists included William Battye of ClimateCare, Tanya Peterson of Gold Standard, Jonathan Shopley of Carbon Neutral, and John Kadyszewski of ACR. November 29, 2012, COP18 in Doha, Qatar.

**International Emissions Trading Association (IETA)**, “The Private Sector and How It Interacts with REDD+” Moderator: Sophy Greenhalgh, IETA. Panelists included Florence Bernard of the ASB Partnership, Tony LaViña of the Informal Group on REDD+ of LCA (Phillipines), Alfred Gichu of the Kenya Forest Service (REDD+ Readiness Coordinator), Armin Sanhoevel of Allianz Climate Solutions, and Jonathan Shopley of Carbon Neutral. November 29, 2012, COP18 in Doha, Qatar.

**World Business Council for Sustainable Development (WBCSD) and Climate Action Reserve (CAR)**, “Ambition and markets—working hand in hand to deliver global benefits.” Panelists included Derik Broekhoff of Climate Action Reserve California, Matt Peterson of New Zealand (UN delegate), David Hone of Shell (senior climate change advisor), Giles Dickson of Alstom, Andreas Klugsechied of BMW, and Xueman Want of the World Bank (China). November 30, 2012, COP18 in Doha, Qatar.

## APPENDIX B: Survey Questions

*Thank you for taking the time to complete this survey. We are looking forward to learning more about your company's expectations and plans for California's compliance greenhouse gas regulation.*

**What sector does your company operate in?**

- Electricity Generation
- Electricity Marketer
- Refiner
- Cement
- Stationary Combustion
- Other

**If other, please specify the sector your company operates in:**

**Does your company have a defined carbon management strategy?**

- Yes
- No
- Under development

**Who is involved with defining your company's carbon management strategy? CHECK ALL THAT APPLY.**

- All the company
- Board
- Corporate Social Responsibility (CSR) team
- HR
- Marketing
- Procurement
- Operations
- Senior Management
- Sustainability Committee/Green Team
- We have not defined a carbon management strategy
- Other

**If other, please specify who is involved with defining your company's environmental objectives:**

**What is your company doing, if anything, to prepare for AB32, California's compliance greenhouse gas regulations? CHECK ALL THAT APPLY.**

- We are creating an internal strategy
- We are hiring consultants
- We are creating an inventory of emissions
- We are purchasing pre-compliance offset credits
- We are planning to buy excess credits to bank for the next compliance period
- We are not doing anything differently
- Other

**If other, please specify what your company is doing to prepare for AB32:**

**How does your company expect to meet AB32, California’s compliance greenhouse gas regulation?**

**CHECK ALL THAT APPLY.**

- We plan to reduce internal emissions
- We plan to buy offset credits
- We plan to sell offset credits
- We plan to buy allowances
- We plan to sell allowances
- We plan to move our operations outside of California
- Other

**If other, please specify how your company expects to meet AB32:**

**What do you expect the financial impact of California cap-and-trade on your company to be?**

- We expect it to be very costly
- We expect it to be costly
- Neutral
- We expect it to be profitable
- We expect it to be very profitable

*This section asks about your company’s plans to purchase offset credits as part of complying with California’s greenhouse gas regulation. If your company does not plan to purchase offset credits, please click NEXT to skip to the next section.*

**How many pre-compliance offset credits has your company purchased as of today, if any? (metric tons CO<sub>2</sub>e) [drop down menu]**

- None
- < 5,000
- 5,001 – 30,000
- 30,001 – 100,000
- 100,001 – 200,000
- 200,001 – 500,000
- 500,001 – 750,000
- 750,001 – 1,000,000
- > 1,000,000
- Don't know

**Approximately how many offset credits does your company expect to purchase between January 2013 and December 2014 (Compliance Period 1), if any? (metric tons CO<sub>2</sub>e) [drop down menu]**

- None
- < 5,000
- 5,001 – 30,000
- 30,001 – 100,000
- 100,001 – 200,000
- 200,001 – 500,000
- 500,001 – 750,000
- 750,001 – 1,000,000
- > 1,000,000
- Don't know

**Approximately how many offset credits does your company expect to purchase between 2013 and 2020 (the entire compliance period), if any? (metric tons CO<sub>2</sub>e) [drop down menu]**

- None
- < 5,000
- 5,001 – 30,000
- 30,001 – 100,000
- 100,001 – 200,000
- 200,001 – 500,000
- 500,001 – 750,000
- 750,001 – 1,000,000
- 1,000,001 – 2,000,000
- 2,000,001 – 5,000,000
- 5,000,001 – 10,000,000
- > 10,000,000
- Don't know

**What channel(s) does your company expect to buy offset channels through? CHECK ALL THAT APPLY**

- Retailer
- Broker
- Exchange
- Project Developer
- Originate Own Project
- Other

**If other, please specify the channel(s) through which your company expects to buy offset credits:**

**What are the most important factors your company considers when purchasing offset credits?**

	Very important	Important	Unimportant	Very unimportant	Not sure
Geographic location (where the credits originated)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recommendations from partners or environmental advisors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fit with existing CSR activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project type	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Community benefits of projects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Biodiversity benefits of projects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vintage of offset credits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peer companies' decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Are there other important factors beyond those mentioned above that your company considers when purchasing offset credits? Please specify:**

Please rate the desirability of the following types of emission reduction projects. *The first 6 project types are already approved by the California Air Resources Board; the last 3 (Coal Mine Methane, Conversion of Pneumatic Controllers, and REDD) are under consideration.*

	Highly desirable	Desirable	Undesirable	Highly undesirable	Not sure
Reforestation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoided Conversion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved Forest Management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Urban Forestry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ozone Depleting Substances	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Livestock Methane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coal Mine Methane	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conversion of Pneumatic Controllers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
REDD (Reduction of Emissions from Deforestation)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What average price (\$/tCO<sub>2</sub>e) does your company expect to pay per offset in 2013?

[drop down menu]

- 
- < \$10
- \$10.00 – \$14.99
- \$15.00 – \$19.99
- \$20.00 – \$29.99
- \$30.00 – \$49.99
- \$50.00 or more

What average price (\$/tCO<sub>2</sub>e) does your company expect to pay per offset in 2015?

[drop down menu]

- 
- < \$10
- \$10.00 – \$14.99
- \$15.00 – \$19.99
- \$20.00 – \$29.99
- \$30.00 – \$49.99
- \$50.00 or more

Does your company have a preference for offset credits originating in California?

- Yes
- No

Would your company be willing to pay a price premium for any particular project type?

- Yes
- No



**Overall, how do you expect your company will be affected by California's compliance greenhouse gas regulation, if at all?**

[short text field]

**What are the main risks you see, if any, in purchasing offset credits for your company?**

[short text field]

**Do you consider certain project types to be riskier than others? If so, which ones, and why?**

[short text field]

**Would you like to receive a copy of key findings from this survey?**

- Yes
- No

**Anything else you'd like us to know?**

[short text field]

## APPENDIX C: International Compliance Carbon Markets

Australia	<p><b>Cap-and-Trade Program</b></p> <p>Australia's cap-and-trade Program is set to start in 2015, following the nation's Carbon Pricing Mechanism carbon tax program currently in place. Australia's carbon pricing mechanism requires around 500 of Australia's biggest polluters to pay a fixed carbon price for their emissions. The scheme covers around 60% of carbon pollution. Both a price floor and price ceiling will be in place for the first three years of the flexible price period.</p>
China	<p>China is scheduled to launch pilot emissions trading schemes in six provinces and cities in 2013 with a view to develop a nationwide trading scheme by 2015.</p>
European Union	<p><b>European Union Emissions Trading Scheme (EU ETS)</b></p> <p>Commencing in 2005, the EU ETS is the world's first and largest mandatory cap-and-trade scheme for CO<sub>2</sub> emissions covers all 27 EU members states, and three non-members (Iceland, Liechtenstein, and Norway). Currently in Phase 2 (2008–12), the EU ETS covers roughly 11,000 facilities in the electricity generation sector and major energy-intensive industries, which are collectively responsible for roughly 50% of the EU's emissions of CO<sub>2</sub> and 40% of its total greenhouse gas emissions.</p>
New Zealand	<p><b>New Zealand Emissions Trading Scheme (NZ ETS)</b></p> <p>In operation since 2008, the mandatory NZ ETS currently covers emissions from forestry, stationary energy, industrial processes and liquid fossil fuels, which are collectively responsible for roughly 50% of New Zealand's emissions. Emissions from waste are covered by the NZ ETS from 2013, while emissions from synthetic gases are covered by the NZ ETS or a levy from 2013. Since January 1, 2012, the agricultural sector has had mandatory reporting obligations under the NZ ETS.</p>
South Korea	<p><b>Korean Emissions Trading Scheme (KETS)</b></p> <p>Scheduled to begin in 2015, Korea's emissions trading scheme will require about 470 of Korea's largest polluters to pay for their CO<sub>2</sub> emissions, collectively covering roughly 60% of Korea's greenhouse gas emissions. The ETS will follow Korea's voluntary KVER carbon market and Target Management System (TMS) program that requires Korea's largest companies to lower their emissions by a specific target by 2015.</p>
United Kingdom	<p><b>CRC Energy Efficiency Scheme</b></p> <p>Established in 2010, the CRC Energy Efficiency Scheme is a mandatory cap-and-trade scheme applying to large non-energy-intensive organizations in the public and private sectors that are not covered by the EU ETS. These organizations are responsible for around 10% of the United Kingdom's emissions.</p>
United States	<p><b>California's Cap-and-Trade Scheme</b></p> <p>California's Global Warming Solutions Act (AB32) passed in 2006, and cap-and-trade took effect in January 2013. Roughly 85% of greenhouse gas emissions in the state from 360 businesses will be covered by the scheme.</p> <p><b>Regional Greenhouse Gas Initiative (RGGI)</b></p> <p>RGGI is a mandatory cap-and-trade scheme covering 209 fossil fuel electricity generators across ten northeastern states in the United States. It requires participants to hold a tradable allowance for each tonne of CO<sub>2</sub> they emit by purchasing auctioned allowances or carbon offsets.</p> <p><b>Western Climate Initiative (WCI)</b></p> <p>The WCI is collaboration between 10 Western US States and Canadian Provinces. The cap-and-trade scheme was due to begin on January 1, 2012, covering emissions from electricity, electricity imports, industrial combustion, and industrial process emissions. It is expected to be expanded in 2015 to include transportation fuels and residential, commercial and industrial fuels. Approximately two-thirds of total emissions in the WCI jurisdictions will be covered initially, while nearly 90% of the GHG emissions in WCI states and provinces will be covered by 2015.</p>

Information gathered by Hannah Erickson from *The Future of Global Carbon Markets* report by Ernst and Young, 2012.