CLIMATE ACTION BEYOND GOVERNMENT:
HOW BUSINESS CAN DRIVE ACTION THROUGH VALUE CHAIN BASED GOALS AND
COOPERATIVE INITIATIVES

by
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ABSTRACT

The purpose of this research is to provide recommendations for improved corporate climate action strategies, based on trends in the successful setting and achievement of emissions reduction goals in the business sector of the United States. The primary research objectives of the study include first, identifying trends in GHG reduction goal setting criteria of leaders in corporate emissions reduction. Secondly, the study aims to determine the impacts of scope 3 goal inclusion in these targets. Third, reported corporate sustainability values are assessed for trends as possible success indicators. Finally, the study seeks to produce recommendations for other companies in the U.S. to utilize identified success factors. The focus of the study is on the top 100 U.S. companies from the Fortune 500 2017 list. An analysis of these companies' self disclosure reports to the Climate Disclosure Project (CDP) climate change dataset for 2017, was conducted to address the purpose and objectives of the study. Findings from this study show that the business sector has a huge potential impact in reducing the county's GHG emissions. Primary indicators of success include higher target setting and measurement of scope 3 emissions across multiple scope 3 sources. Recommendations are for large corporations to lead the way in setting emissions demands on suppliers and changing perceived acceptability in corporate emissions output.

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DATA USE RESTRICTIONS

As data used in this study was accessed by direct request of CDP 2017 data responses, it is subject to the terms of use restrictions defined by CDP.

https://www.cdp.net/en/info/terms-and-conditions

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INTRODUCTION

Anthropogenic greenhouse gas (GHG) emissions are now higher than ever, driven mainly by economic and population growth (IPCC 2014). The IPCC's Fifth Assessment Report confirms that if emissions continue at projected levels, the world will exceed the amount of CO_2 that we can emit before temperatures rise to 2 degrees Celsius above pre-industrial levels (IPCC 2014). In the U.S., federal level commitment and support for emissions reduction efforts are largely dependent on political administration. State and local level government efforts can be impactful, but are variable across the country and should not be expected to shoulder the weight of emission reductions alone. What remains is private sector businesses, who's national GHG emissions contributions can be quite significant depending on their industry. Due to their degree of national influence on emissions, as well as influence over industry standards and trends, the business sector can and should play an important role in reduction efforts. The U.S. business sector can be more aggressive in contributing to national GHG reduction by looking at sustainability goals through a value chain inclusive lens.

Research Objectives:

The Primary Objectives for this study are to:

- first, identify similarities in GHG goal setting criteria for U.S. companies that are associated with the greatest publicly reported GHG reductions targets and accomplishments;
- secondly, determine if companies including scope 3 goals in emissions reduction plans have greater overall climate impact and if scope 3 goals are more likely to be utilized by companies taking leadership in climate action.
- Additionally, the analysis will look at whether prioritization of sustainability in overall business strategy has any measurable impact on target setting and/or achieved reductions.
- Finally, a qualitative analysis of how other top companies in the US can utilize these success factors and their national influence to expand climate change efforts will be presented.

The Business Case for Corporate Sustainability Goals

Businesses are increasingly looking at business cases for sustainability in their direct operations and in their supply chains (Lee and Vachon 2016). Avota, McFadzean and Peiseniece (2011) Discuss the economic dimensions of sustainability, which include financial performance, reduction of costs, and economic interests of external shareholders. Further, several key objectives of sustainability from a corporate perspective are discussed, these include:

- ensure employment and generate income,

- enhance human capital

- promote innovation

- consider externalities, and

- improve economic situations for future generations

(AVota, McFadzean and Peiseniece 2011)

The idea of "doing more with less" has caught on widely in the business sector as an argument for corporate sustainability (Lee and Vachon 2016). Areas where there is potential to do more with less include energy efficiency, and efficiency in material and resource use (Lee and Vachon 2016). Other areas gaining attention include circular or "closed loop" product development, recycling, and upcycling (Lee and Vachon 2016). Focused sustainability efforts in these areas allow a company to tap into new economic and resource potential that improves their financial bottom line while also doing something good for the environment. As more consumers demand social and environmental action from businesses, this idea of doing more with less allows the company to appeal to the market demand of environmentally conscious consumers, while also putting money back into their own pocket. Appealing to consumer demand, while decreasing expenditures on energy and resource consumption can be viewed as a win for the company, consumers, and the environment.

Another driving force of dedicated corporate sustainability focus is avoidance of public sustainability disasters (Lee and Vachon 2016). Public relations disasters have cropped up in the news over the last few decades for many major companies around incidents of widespread pollution, use of unsafe chemicals in products and production, and other areas of environmental misuse and degradation. Companies recognize that sustainability efforts are needed to mitigate these risks and avoid public embarrassment.

Understanding The Keys to Effective Goal Setting

The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard, published by the World Business Council for Sustainable Development and the World Resources Institute, provides guidance on GHG accounting and reporting practices (WRI, World Business Council for Sustainable Development 2004). The standard emphasizes that companies focus on relevance, completeness, consistency, transparency and accuracy of their GHG accounting (WRI, World Business Council for Sustainable Development 2004). It suggests also that companies must focus on the complete value chain when assessing the GHG emissions of their operations (WRI, World Business Council for Sustainable Development 2004). "A limited focus on direct emissions from a company's operations may miss major GHG risk and opportunities while leading to a misinterpretation of the company's actual GHG exposure" (WRI, World Business Council for Sustainable Development 2004). Public reporting and participation in voluntary GHG programs are also identified as a way that companies can be recognized for voluntary GHG programs while often being held to specific standards of reporting techniques (WRI, World Business Council for Sustainable Development 2004). Guidance provided by the Green House Gas Protocol Accounting and Reporting Standard will be used to inform analysis criteria questions in this study, and to determine if companies following these guiding principles have been consistently more successful at achieving and setting ambitious reduction goals.

A report by the new climate institute and the climate group presents an analysis of sub-national and non-state climate actions and their impacts on GHG emissions. The analysis includes actions from 250

companies headquartered in the U.S. (Kuramochi, et al. 2017). GHG reduction commitments by companies, not including electric utility companies, were found to be the most ambitious in relative GHG reductions between 2015 to 2025, totaling a 25% emissions reduction (Kuramochi, et al. 2017). The study attributes the ambitious goal setting of these companies to a tendency for companies to take short-term renewable energy use targets or to focus on short-term reduction options (Kuramochi, et al. 2017). The time horizon of company GHG reduction goals was typically found to be a maximum of 10 years (Kuramochi, et al. 2017).

One strategy for setting GHG targets, which seems to be commonly agreed upon by the scientific community is that setting science-based targets should show companies where the bar is to be set in terms of GHG reduction goals. WRI, CDP, WWF, and UN Global Compact have come together to develop a draft Science-based Target Setting Manual as a product of the Science-Based Targets Initiative (WRI, CDP, WWF, UN Global Compact 2017). This report states that, at this time, most existing company targets are not ambitious enough and timelines set by most companies are not consistent with maintaining 2∘ C or lower rise into the future (WRI, CDP, WWF, UN Global Compact 2017).

The manual provides best practices for setting science-based targets. The criteria for establishing these targets states that if over 40% of a company's emissions come from scope 3 sources, the targets should include scope 3 (WRI, CDP, WWF, UN Global Compact 2017). Additionally, scope 3 goals need not be science-based, but should be ambitious and measurable (WRI, CDP, WWF, UN Global Compact 2017). The guidance also suggests that clear, consistent, and transparent reporting of goals is important to build credibility and to inform stakeholders (WRI, CDP, WWF, UN Global Compact 2017). This guidance opens up questions as to whether companies recognizing scope 3 emissions and publicly reporting their reduction efforts are consistently more ambitious and successful in their climate action initiatives.

The General Problem with Emissions Targets and Scope 3

For most organizations, scope 3 represents the largest portion of the total carbon footprint (Downie and Stubbs 2012). What specifically, do scope 3 goals include? We can start by defining scope 1 & 2. Scope 1 includes direct emissions from fuel combustion and manufacturing activities, scope 2 refers to indirect emissions resulting from electricity purchases, and scope 3 is emissions from other inputs, including purchased products and services, travel, commuting, and other indirect emissions sources (Blanco, Caro and Corbett 2017). Because these sources of emissions are indirect, it can be challenging to quantify, and therefore companies are slow to adopt emissions goals for these scope 3 sources. Gathering this information often requires cooperation and transparency of emissions from their suppliers in their supply chain. This may require identification of suppliers with shared sustainability values. However, companies may ultimately choose cost efficiency over willingness to disclose or cooperate in sustainability efforts when it comes to their suppliers.

Although many companies have adopted corporate sustainability practices, these efforts have not necessarily been extended to include value chains or supply networks (Lee and Vachon 2016). One of the most convincing reasons for companies to begin extending sustainability practices to the value chain is the protection of the company's brand from unethical or damaging practices by their suppliers. For example, Apple has gained a negative reputation and bad media attention due to poor working conditions at one of its key suppliers, Foxconn (Lee and Vachon 2016). Apple may have very definite and ambitious sustainability goals within its direct operations, but that does not protect them from being associated with the unethical activities of its suppliers. Since then, they have worked hard to regain the trust of customers in the production of their products. Businesses should recognize that by extending sustainability efforts throughout their value chain, they can help to establish expectations of their suppliers and other areas of their value chain, to avoid associating their brand with poor business practices.

One of the other complications to reporting, measuring, and controlling scope 3 emissions is in defining the value chain and the supply chain. The value chain is a broad scope definition to include any process or activity that adds value to a product. The value chain typically includes processes of the supply chain. However, we must understand the scope of the supply chain in order to measure its emissions. An article titled, Defining Supply Chain Management, which was published in the Journal of Business Logistics in 2001, does a good job of explaining this problem (Mentzer, et al. 2001). This article defines supply chain as "a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finance and/or information from a source or customer" (Mentzer, et al. 2001) . They propose that there are different supply chain configurations, but that the customer is always included in the definition. These configurations are: direct, extended, and ultimate (Mentzer, et al. 2001) . The direct configuration includes only the supplier, while the extended includes the "supplier's supplier", and the ultimate includes the "ultimate supplier" sourcing the product at the beginning of the chain, and also includes any financial provider , and third party logistics suppliers (Mentzer, et al. 2001). As you can tell, this could become very complex. However, in this study, the data is confined to self disclosed reports by individual companies. Therefore, the scope 3 data and targets are presented through the individual company's definition of their supply chain. This reveals a potential bias of the data and a constraint of this research model.

Why CDP is Ideal for Gathering Data on Emissions Targets and the Supply Chain and Other Studies Utilizing CDP Data

The CDP, Carbon Disclosure Project was started in 2000 with the goal of asking companies to disclose their own GHG emissions, as well as emissions in their broader supply chain, and includes questions about actions and strategies (Blanco, Caro and Corbett 2017). Reports show that 81% of the largest companies around the world are now participating in CDP (Blanco, Caro and Corbett 2017).

These CDP reports are ideal for looking at scope 3 goal setting and achievements because the database includes quantitative and qualitative disclosures, specifically framed in scope 1, 2 and 3 target areas as defined by the Greenhouse Gas Protocol (Blanco, Caro and Corbett 2017).

CDP works with companies to complete the disclosure form and encourages companies to participate. Companies that do not respond are included in the report and given a score of F for no response, which may encourage companies to participate to avoid public backlash for a poor score. However, the study by Blanco, Caro and Corbett (2017) discusses that studies show that firms disclose the least amount of information possible, often not releasing emission amounts or accounting methods, to avoid public scrutiny. This will be a consideration in use of this data for analysis.

Their study also found that firms often experience greater emissions reductions than expected and that this can sometimes result from disclosure. They also state that CDP disclosures likely play a role in establishing credibility to convince supply chain partners to participate in emissions reductions activities (Blanco, Caro and Corbett 2017).

A study published by Trucost, a part of S&P Dow Jones Indices, looked at Corporate Carbon Disclosure in North America (Werner and Bolton 2018). This study looked at the 2017 data reported by North American companies to CDP and compared it to previous years to identify trends in the data. Their study covers data from scope 1, 2 and 3 emissions sources, specifically, they define scope 3 as it is classified in the Green House Gas Protocol. They found that the number of companies reporting to CDP in 2017 has increased compared to prevvious years, but is still only 6% of all North American companies (Werner and Bolton 2018). However, this analysis found that companies underreported carbon emissions by an average of 7%. Although more companies are disclosing scope 3 emissions from thei supply chains, the most under reported emissions source was scope 3 emissions (Werner and Bolton 2018). The source most identified by companies as a relevant source of their scope 3 emissions was busineiss travel, and as you will see, the data from my report confirms this as well (Werner and Bolton 2018). They also found that

there is a trend in North American companies to engage the supply chain in emissions data collection. 61% of North American businesses engaged their suppliers to implement, measure, and reduce emissions activities (Werner and Bolton 2018). In conclusion, the report suggests that, moving forward, compaies will need to increase disclosure to meet future demands from investors (Werner and Bolton 2018).

How Corporate Values Impact Sustainability Targets and Scope

Research shows that factors influencing corporate sustainability include both personal and organizational values (AVota, McFadzean and Peiseniece 2011). The study, *Linking Personal and Organization Values and Behavior to Corporate Sustainability*, describes that there are a set of most common organizational values that cover three dimensions of sustainability: Economic Dimensions, Environmental Dimensions, and Social Dimensions (AVota, McFadzean and Peiseniece 2011). These organizational values are as follows:

- Respect and fairness
- Accountability
- Customer focus
- Quality and creativity
- Innovation
- Use of technology, and
- Premium return on assets

(AVota, McFadzean and Peiseniece 2011)

To develop successful partnerships with suppliers, the company and its suppliers must have shared vision and objectives (Lee and Vachon 2016). When it comes to emissions reduction efforts, if suppliers choose to provide partial carbon emissions data, information can be distorted and a company can miss opportunities to improve supply chain sustainability (Lee and Vachon 2016). Ensuring that these opportunities are not missed, requires cooperation from top management to align sustainability focused values and goals (Lee and Vachon 2016). Due to the importance of corporate values and the success of scope 3 emissions reduction efforts, a partial focus of this study will include whether the company integrates sustainability into its business strategy. Willingness to make this integration will be used as an indicator of the prioritization of sustainability in the company's value system.

METHODS

This analysis identifies GHG emissions reductions and offset goals of the top 100 ranked US companies from the fortune 500 2017 list, their success in achieving those goals to date, and identifies similarities in goal setting strategies and reporting for companies achieving the greatest GHG emissions reductions and offsets, including a specific focus on scope 3 target inclusion.

Table 1 shows the list of 100 U.S. companies evaluated.

Table 1 Fortune 2017 Ranking

Company	Rank	Company	Rank	Company	Rank
		Microsoft	28	Lockheed Martin	56
Walmart	1	Anthem	29	Sysco	57
Berkshire Hathaway	2	Citigroup	30	FedEx	58
Apple	3	Comcast	31	Hewlett Packard Enterprise	59
Exxon Mobil	4	IBM	32	Cisco Systems	60
McKesson	5	State Farm Insurance Cos.	33	HP	61
UnitedHealth Group	6				
CVS Health	7	Phillips 66	34	Dow Chemical	62
General Motors	8	Johnson & Johnson	35	HCA Holdings	63
AT&T	9	Procter & Gamble	36	Coca-Cola	64
Ford Motor	10	Valero Energy	37	New York Life Insurance	65
AmerisourceBergen	11	Target	38	Centene	66
Amazon.com	12	Freddie Mac	39	American Airlines Group	67
General Electric	13	Lowe's	40	Nationwide	68
Verizon	14	Dell Technologies	41	Merck	69
Cardinal Health	15	MetLife	42	Cigna	70
Costco	16	Aetna	43	Delta Air Lines	71
Walgreens Boots Alliance	17	PepsiCo	44	Best Buy	72
Kroger	18	Archer Daniels Midland	45	Honeywell International	73
Chevron	19	UPS	46	Caterpillar	74
Fannie Mae	20	Intel	47	Liberty Mutual Insurance Group	75
J.P. Morgan Chase	21	Prudential Financial	48	Morgan Stanley	76
Express Scripts Holding	22	Albertsons Cos.	49	Massachusetts Mutual Life Insurance	77
Home Depot	23	United Technologies	50		
Boeing	24	Marathon Petroleum	51	Goldman Sachs Group	78
Wells Fargo	25	Disney	52	Energy Transfer Equity	79
Bank of America Corp.	26	Humana	53	TIAA	80
Alphabet	27	Pfizer	54	Oracle	81
		AIG	55		

Company		Company		Company	
Tyson Foods	82	Exelon	89	Charter Communications	96
United Continental Holdings	83	General Dynamics	90	Northwestern Mutual	97
Allstate	84	Rite Aid	91	Facebook	98
Publix Super Markets	85	Gilead Sciences	92	Travelers Cos.	99
American Express	86	CHS	93	Capital One Financial	100
TJX	87	3M	94		
Nike	88	Time Warner	95		

In order to compare emissions reduction and offset goals among a diverse set of companies, a standardized format for data collection must first be established. Many of these companies produce thorough sustainability reports or disclose climate change programs in CSR reports. Due to the variability in the way that data is presented in these reports and the variation in the detail of information disclosed, this is not the preferred method for gathering data on climate change related sustainability goals for comparison across a large data set. Instead, the Climate Change Program response database (CDP 2017) was used to collect information on climate goals in a standardized format. Each company choosing to report to CDP Climate Change Program, self discloses information in the form of a standardized questionnaire. In contrast to assessing sustainability reports, this standard survey format ensures that all questions are uniformly presented to each company and that answers are provided in response to a specific questions. The reasoning for choosing CDP specifically as the disclosure database for this study was also discussed in the introduction of this paper. The structure of CDP questions reduce bias and potentially incorrect deductions from what the company chooses to disclose in a public report, but also includes potentially otherwise missed information around scope 3 targets and achievements.

Not all 100 companies on Fortune's top list for 2017reported to CDP, but a large majority have provided data to assess. It is important to understand that a lack of information from CDP on any of the company's evaluated should not be viewed as poor sustainability performance or lack of climate change effort. In many cases, non-participation is a conscious effort by the company.

A standard set of questions from CDP reports was looked at for each reporting company. Answers to these selected questions were compiled into a dataset for further analysis and comparison. Table 2 shows the variables displayed in this dataset.

Table 2 Dataset Variables Collected

	Variable	Description
1	Fortune Rank	The company's ranking from the fortune 500 2017 list
2	CDP Reported	Did the Company Report to CDP Climate Change Program response database for the reporting year of 2017
3	CDP Score	The score provided by CDP based on the results of the company's Climate Change Program Reporting. If the company did not participate this is either blank or a score of F.
4	Is climate change integrated into the business strategy?	This is question CC2.2 on the CDP Climate Change Program Disclosure Form
5	Absolute Target Goal (%)	If the company set absolute targets, these targets are reported in CDP by percent emissions reduction from baseline year. This is question CC3.1a on the CDP Disclosure Form. Some companies have multiple absolute target goals. In this case, all absolute targets were captured.
6	Scope of Absolute Targets	Do the absolute targets include scope 1, 2 and/or 3
7	Base Year of Absolute Targets	The baseline data collection year for the absolute target goal(s)
8	Target Year	Target Year for the absolute target goal(s)
9	Intensity Target Goal (%)	If the company set intensity targets, these targets are reported in CDP by percent of the provided metric. This is question CC3.1b on the CDP Disclosure Form. Some companies have multiple intensity target goals. In this case, all intensity targets were captured.
10	Metric	The metric set by the company for each intensity target
11	Scope of Intensity Targets	Do the intensity targets include scope 1, 2 and/or 3
12	Base Year of Intensity Targets	The baseline data collection year for the intensity target goal(s)
13	Target Year of Intensity Targets	Target Year for the intensity target goal(s)
14	Renewable Energy Targets	% renewable electricity to be produced or consumed by target year based on the company's reported renewable energy goals.
15	Renewable Energy Target Year	The year by which the company aims to meet renewable energy targets
16	Did the company set	Are there reported goals for scope 1 and/or 2 emissions?

		scope 1 or 2 goals?	
17	Did the company set scope 3 goals?	Are there reported goals for scope 3 emissions?
18	Reported YTD Achieved reduction	This is reported in percentage of each goal achieved to date
19	Reported time to goal	This is reported in percentage of time that has passed to reaching the target year of each goal
20	Active Scope 3 emissions reductions	Whether or not the company reported scope 3 emissions decreases in 2017 due to active emissions reduction efforts by the company and in what area those emissions reductions occurred. This is question CC14.3 on the CDP Disclosure Form
21	Purchased Goods Scope 3 emissions	Does the company find purchased goods emissions relevant to their operations and are they currently calculating these emissions.
22	Upstream Transport Scope 3 emissions	Does the company find upstream transport emissions relevant to their operations and are they currently calculating these emissions.
23	Employee Commuting Scope 3 emissions	Does the company find employee commuting emissions relevant to their operations and are they currently calculating these emissions.
24	Business Travel Scope 3 emissions	Does the company find business travel emissions relevant to their operations and are they currently calculating these emissions.
25	Use of Products Scope 3 emissions	Does the company find use of product emissions relevant to their operations and are they currently calculating these emissions.
26	End of Life Treatment of Products Scope 3 emissions	Does the company find end of life treatment of product emissions relevant to their operations and are they currently calculating these emissions.

Other variable assessed include whether the company is listed on the Science Based Targets current list of companies taking action for 2017 (Science Based Targets Initiative 2017) and if the company also reports to the CDP Supply Chain Members list.

The Variables for analysis were selected based on their ability to demonstrate the company's established goals, their progress toward those goals, the company's values and prioritization around climate change, and their aggressiveness in calculating and reducing emissions beyond their direct operations. Questions 18-26 are around scope 3 emissions goals, reductions, and calculation. Setting of scope 3 goals and

calculation of goals in these areas of the company's operations demonstrate a desire to understand their larger impact on society and the planet. Purchased Goods, Upstream Transport, Employee Commuting, Business Travel, Use of Products, and End of Life Treatment of Products are all newly trending areas where companies are starting to consider their emissions and develop programs to reduce emissions in these area. These areas are not relevant for all companies. For example, if the company does not produce a physical product then it is likely not relevant to calculate emissions from use of product and end of life treatment of product.

This data is then compiled to compare strategies of these companies. The goal is to determine if there are trends that can be identified for companies setting the most aggressive targets, and/or for companies making the greatest progress toward their goals.

After this first dataset is developed, a second dataset of progress to total targets in comparison with time will be created to get an overall picture of whether companies are on track to their goal. This will be done with a simple formula of: % progress to goal - % time to goal . A positive number indicates that the company is ahead of it's target, a zero means that the company is right in line with meeting its target, and a negative result means that the company is falling behind in meeting its target. This will be used to quantify total number of companies that are on target to meet all of their goals.

The absolute target data will be used to quantify total potential reduction as a result of the target and total actual reductions. This will be done with the following equation:

CO_2e measurement at baseline * targeted % reduction from baseline = Total absolute target

A sum of all total absolute targets minus any targets where targeted scopes overlap within the same company will be gathered from these total absolute targets to get a sum total absolute target CO_2e reduction if all companies goals were 100% met. This sum will not be a total reduction from global or US CO_2e, as the target year of these total absolute targets will vary, meaning that these targets will be met at

different times. It is simply a sum total result of absolute target setting from the reported targets to CDP in reporting year 2017.

An actual reduced CO_2e measurement will be made using the following equation:

Total absolute target * %progress to goal = total actual CO_2e reduced as a result of absolute targets

This will also be added for all companies, after removing any overlapping absolute target reductions reported within each company, to get a sum total actual CO_2e reduced as a result of absolute targets. This is a sum of CO_2e reduced from all absolute targets ongoing in CDP reporting year 2017, regardless of baseline year. Quantification of this sum total is to quantify impacts of absolute target setting.

from this data, the top absolute target setters and the top actual absolute target reducers will be identified. These lists of top performers will then be used to draw conclusions based on similarities within the lists.

A regression analysis of targets versus actual reductions will be run to determine whether there is a correlation between the size of the goal set and the actual reduction achieved. This regression analysis will be corrected for time by multiplying the target by the percent time to the goal, to prevent a skew in the data based on the differing baseline years.

An assessment of scope 3 measurement and ambition of absolute targets based on inclusion of scope 3 emissions in goal setting will also be run. First, for companies who find the Scope 3 emissions areas listed in table 2 to be relevant to their operations, a sum of those companies who calculate those goals and those who do not yet calculate those goals will be presented. Next, a two-sample t-Test, assuming unequal variances, will be run on total absolute targets vs inclusion of scope 3 emissions in goal setting.

RESULTS

Of the top 100 Fortune rated companies evaluated, 72 self reported climate change initiative responses to

CDP. One of these 72 companies had data that was unavailable. The remaining 28 companies either:

1.) declined to participated in the CDP reporting of climate change goals,

2.) their results were submitted but not scored,

3.) they provided no response, or

4.) their status was listed as "other" by CDP with a score of F.

Is Climate Change Integrated Into Your Business Strategy?
(question CC2.2)
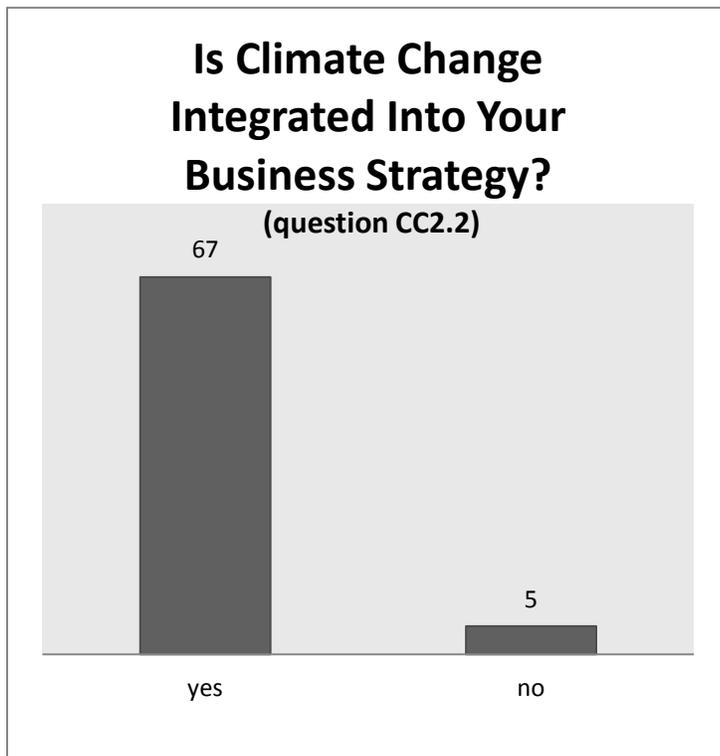
Of the 72 companies reporting to CDP with climate change data, 67 reported that climate change is integrated into their business strategy. The CDP 2017 climate change results provide the company's response to whether climate change is integrated into their business strategy under question CC2.2 as reflected in figure1.

Figure 1 Climate Change Integration to Business Strategy

There does not appear to be any clear correlation between CDP score and/or participation in CDP Climate

Change reporting and Fortune 2017 ranking. This is reflected in figure 2.
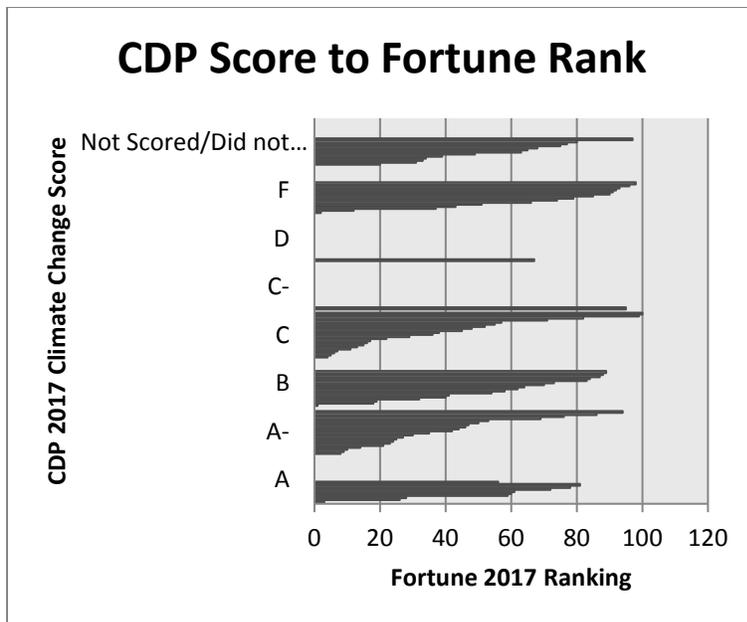
Figure 2 CDP 2017 Climate Change Score to Fortune 2017 Rank

It should be noted that a score of F does not necessarily reflect poor environmental performance, but may instead indicate a choice not to participate in CDP climate change reporting for the reporting year of 2017.

Companies reporting climate change goals to CDP for 2017 either reported goals as an absolute target, an intensity target, or a renewable energy target. Some companies stated that they did not have any active emissions reduction, renewable energy consumption or production targets during the 2017 reporting year.

Business Sector

Of the companies reporting to CDP the following table shows how many businesses fall into each business sector or type:

Table 3 Businesses by Sector

Business Sector	Number
Agriculture	1
Air Travel/Aviation	4
Automotive	2
Banking/Finance	9
Chemical	1
Energy/Electric	2
Entertainment	2
Health Care	5
Insurance	5
Oil/gas	2
Pharmaceutical	4
Retail	16
Security/Aerospace	1
Shipping/Delivery	2
technology	16

Goal Setting and Achievement

Of the 72 companies disclosing data to CDP for the 2017 reporting year, 47 companies set at least one absolute target, 30 set at least one intensity target, and 27 set at least one renewable energy target.

63 Companies set at least one goal. Of these 63 companies, 42 companies are on track to meet or exceed all goals set. The remaining companies are behind on meeting at least one goal.

Absolute Targets

Absolute targets are measured in metric tonnes CO_2e, which means that the potential GHG reductions from these targets can be more readily compared to one another than intensity targets. For all companies setting an absolute target, these goals were added together to estimate total reductions if all targets were to be met.

These goals alone could result in at least 1,060,919,375 metric tonnes of CO2e reductions over time.

It is important to understand that this is not a total reduction from current US emissions. Reduction goals have been set from varying baseline years and have a wide range of target years for meeting each goal. Target years range from 2017 to 2050. Therefore, this does not necessarily account for operations growth beyond the target year. Any overlapping absolute targets within the same company have been removed from this total, however it could be possible that some scope 3 emissions overlap across companies. Many scope 3 goals are related to business travel emissions, which would be unlikely to overlap across companies, but emissions goals for shared suppliers could overlap. This total also includes Walmart's Gigaton Goal, which is by far the most ambitious absolute target set by any company on this list. The Gigaton Goal accounts for one billion tonnes CO_2e of this total. Many of the goals provided by companies are also set company wide, which may mean that not all reductions would take place in the United States.

Total actual reductions to date from companies setting absolute targets is 22,604,959 metric tonnes CO_2e reductions over time. However, it is important to note that this number does not include reductions exceeding set absolute targets, so reductions are likely greater than this.

33 companies report actual absolute reductions of greater than 10,000 metric tonnes CO_2e. 23 companies report actual absolute reductions of greater than 100,000 metric tonnes CO_2e.

These companies reporting greater than 100,000 metric tonnes CO_2e reductions from absolute targets are:

Table 4: Companies Reporting Greater Than 100,000 Metric Tons CO₂e Reduction

Company
Alphabet
Delta Air Lines
Bank of America Corp.
Kroger
3M
Wells Fargo
IBM
Disney
PepsiCo
Home Depot
Procter & Gamble
J.P. Morgan Chase
Best Buy
Microsoft
Lockheed Martin
Citigroup
Pfizer
Intel
Cisco Systems
Goldman Sachs Group
Johnson & Johnson
AT&T
Apple

Of these companies, eight are technology sector companies, six are retail companies, and five belong to the banking and finance sector.
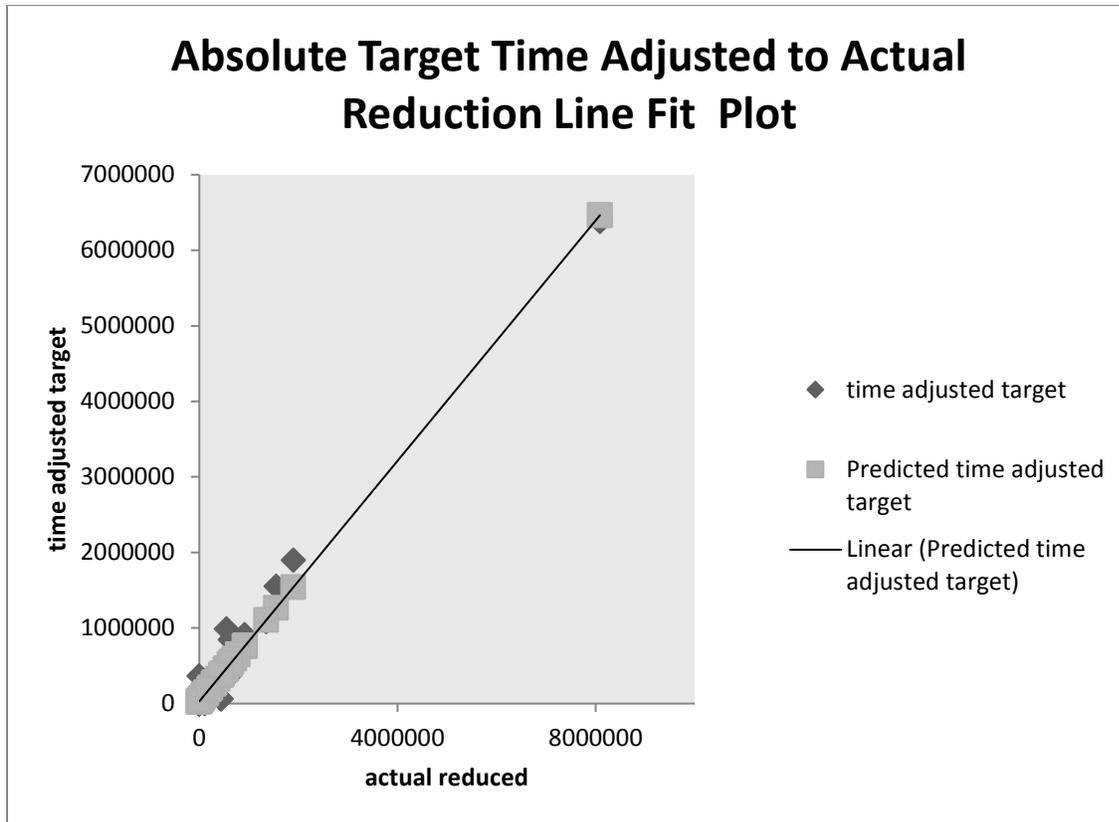
Figure 3 Target Adjusted for Time vs Target Achieved Line Fit Plot

After removing Walmart's Gigaton Goal as an outlier from the data, a regression analysis on each non overlapping absolute target to actual reduction was conducted. There is a significant linear relationship between achieved CO_2e reductions as a result of absolute emissions reduction targets and the absolute targets set when adjusted for time to the goal. This linear regression analysis gives an R-squared value of 0.987029135060052and a p-value of 1.5551570235765E-54.

Nine companies have set absolute targets of one million tonnes CO_2e or more that are currently active. This does not include any past targets that were not reported on the 2017 CDP report. These companies are shown in table 5.

Table 5 Absolute Targets Greater Than One Million Tonnes CO₂e

Company
Walmart
PepsiCo
Intel
3M
Delta Air Lines
Alphabet
Bank of America Corp.
Procter & Gamble
Kroger

Alphabet, Delta Air Lines, Bank of America and Intel report greater than one million metric tonnes CO_2e actual reduced emissions as a result of absolute emissions goals for CDP reporting year 2017. This does not mean that these other companies have not reduced more than one million metric tonnes CO_2e. This could be the case if the company did not disclose these reductions in the 2017CDP report (previous year's CDP reports were not evaluated) or if the companies reduction come from other goals, such as emissions reduction goals or intensity targets.

Intensity Targets

As discussed previously, 30 companies set intensity targets. Intensity targets are measured in a given unit of emissions per chosen unit of economic output. Some companies chose to measure targets in units of CO_2e per unit of production, others chose metric tonnes CO_2e per unit of revenue. Some companies chose more unique measures for their targets, such as Verizon's metric tonnes CO_2e per terabyte of data. Given the wide range of metrics for intensity targets, it is challenging to compare these targets across companies or to quantify total potential CO_2e reduction for any given target.

Some intensity targets include scope 3 emissions. For example, Ford Motor company chose to set a goal of 48% reduction in grams CO_2e per kilometer for the use of sold products by 2030. Overall, seven companies set intensity targets that include scope 3 emissions.

Six companies set more than one intensity target that was active in the 2017 reporting year. Companies

setting multiple intensity targets include:

Ford Motor
General Motors
HP
Nike
Oracle
UPS

Emissions Targets

Twelve companies set a goal of reaching 100% renewable energy or 100% renewable electricity

consumption. See table 6.

Table 6 100 Percent Renewable Energy Targets

Fortune 100	Renewable energy target	Target year
Alphabet	100% renewable electricity consumption by 2040	2040
American Express	100% renewable electricity consumption in US data centers and global headquarters by 2021 and 100% powering all US operations by 2040	2021/2040
Apple	100% renewable electricity consumption worldwide in data centers, corporate facilities, and stores	No Target Year
Bank of America	100% renewable electricity consumption	2020
Capital One Financial	100% renewable energy by 2017	2017
Goldman Sachs Group	100% renewable electricity consumption by 2020	2020
Johnson & Johnson	35% renewable energy consumption by 2020 100% renewable energy consumption by 2050	2050
Merck	50% renewable purchased electricity by 2025 and 100% renewable purchased electricity by 2040	2040
Microsoft	100% renewable energy consumption by 2025	2025
Nike	100% renewable electricity consumption by 2025	2025
Walmart	100% renewable energy - no target year	None Set
Wells Fargo	100% renewable energy consumed by 2017	2017

Goal Scope

Of the 72 companies reporting to CDP Climate Change report in the 2017 reporting year, 21 companies reported having active scope 3 emissions reduction goals.

38 companies reported having a measurable decrease in scope3 goals for this year due to active emissions reduction activities.

Five of the seven companies setting absolute targets of greater than one million metric tonnes CO_2e have included scope 3 in at least one of their reported targets. Six of the companies setting 100% renewable energy targets have also set scope three goals.

However, when running a two sample t-test of all set absolute targets for companies setting scope 3 goals compared with absolute targets for those not setting scope 3 goals, there was not sufficient evidence to determine a significant difference in the data. It is worth noting that this was a small sample size with great variation in targets. See table 7.

Table 7 t-Test: Two-Sample Assuming Unequal Variances

	no	yes
Mean	870102.7361	73830482.78
Variance	4.46323E+12	7.16435E+16
Observations	18	14
Hypothesized Mean Difference	0	
df	13	
t Stat	-1.019887103	
P(T<=t) one-tail	0.163193842	
t Critical one-tail	1.770933383	
P(T<=t) two-tail	0.326387683	
t Critical two-tail	2.160368652	

Measurement

It was also evaluated whether companies measure certain areas of their scope 3 emissions. These areas of measurement included: 1.) Purchased goods and services 2.) Upstream transportation 3.) employee commuting 4.) Business Travel 5.) Use of Products 6.) End of life treatment of products. See Table 8 and Figure 4 for summary of total measurements in these areas.

Table 8 Scope 3 Sources Calculated

| Scope 3 Area	Relevant calculated	Relevant Not Yet Calculated
Purchased goods and services	39	19
Upstream transportation	31	15
employee commuting	32	23
Business Travel	56	5
Use of Products	26	16
End of life treatment of products	14	15
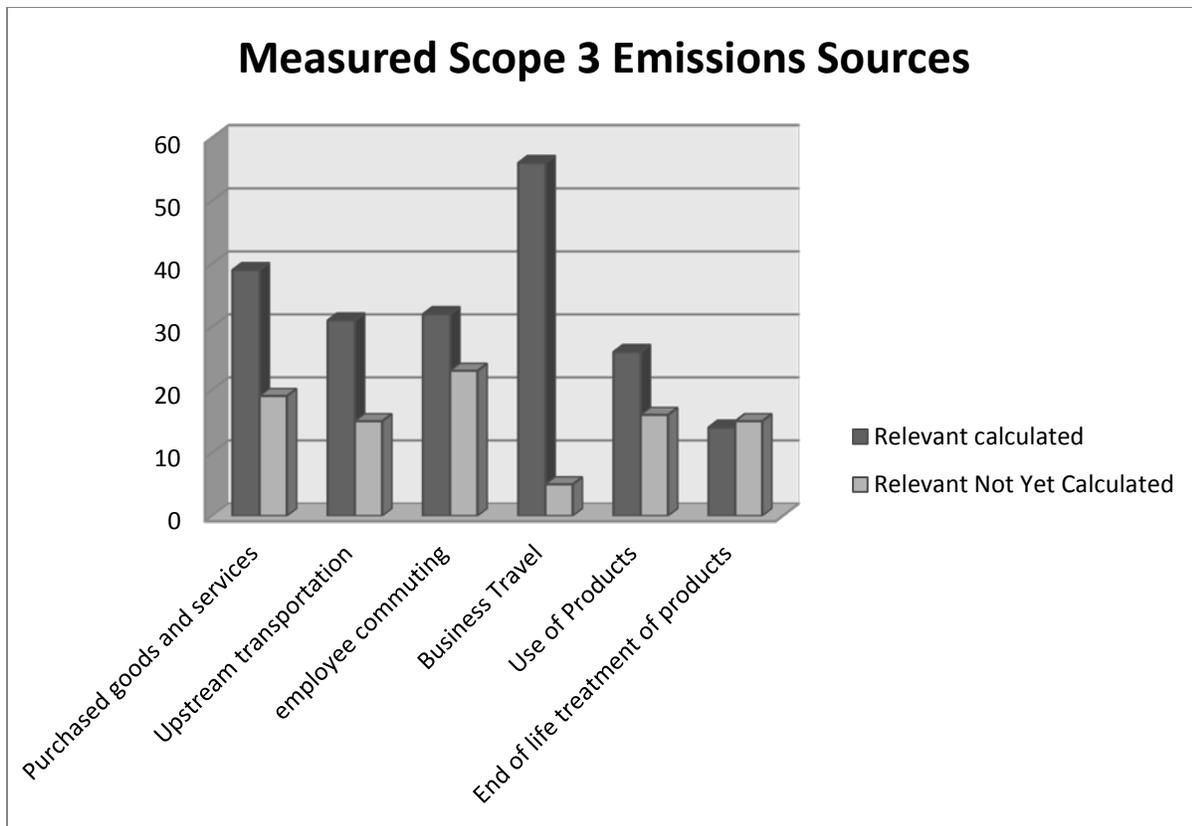
Figure 4 Measured Scope 3 Emissions Sources

The area most calculated is Business Travel, while the emissions source least calculated by companies is emissions resulting from the end of life treatment of products. All other companies, not reporting as relevant calculated or relevant not yet calculated, either did not answer the question or stated that the source of emissions is not relevant to their operation.

Of the companies calculating end of life treatment of products, the majority of these companies are retail or technology sector companies.

Participation in Other Disclosure Programs or Climate-Related Discussions

The following companies from the fortune top 100 list also participate in the Science-Based Targets initiative.

Table 9 SBT Member Companies

Cisco Systems
CVS Health
Dell Technologies
Hewlett Packard Enterprise
HP
Merck
MetLife
Nike
PepsiCo
Pfizer
Procter & Gamble
Target
United Technologies
Walmart

The following companies are CDP supply chain members.

Table 10 CDP Supply Chain Member Companies

AT&T
Cisco Systems
Coca-Cola
Dell Technologies
Ford Motor
General Motors
Hewlett Packard Enterprise
HP
Intel
Johnson & Johnson
MetLife
PepsiCo
Walmart

45 companies reported to CDP that they engage directly with policymakers on climate-related issues.

Seven of the companies with absolute targets greater than one million tonnes CO_2e report that they

engage with policymakers on climate-related issues. The most common topics of engagement are clean energy generations and energy efficiency.

47 companies report to CDP that they are on the board of or provide funding beyond membership to one or more trade associations likely to take a position on climate change legislation.

Six of the companies with absolute targets greater than one million tonnes CO_2e are on the board of or provide funding beyond membership to one or more trade associations likely to take a position on climate change legislation.

Company Values

Five companies reported that climate change is not integrated into their business strategy. Only one of these five companies received a CDP score higher than a C. There is no question in the CDP climate change disclosure form that asks the degree to which climate change is integrated into the business strategy. However, reporting climate change targets to CDP and setting climate-related targets demonstrates some level of commitment to climate change. It is unclear why companies reporting that climate change is not integrated into their business strategy reported this, despite all of them having set at least one absolute or intensity target.

Due to the overwhelming majority of reports that sustainability is in fact integrated into the company's business strategy, no conclusions can be drawn as to whether this has any indication of actual corporate values surrounding sustainability. It could simply be that most company's chose to mark yes to this question to avoid public scrutiny.

DISCUSSION

If nothing else, these results put into perspective the tremendous potential that companies have at reducing GHG emissions. In 2014 U.S. GHG emissions totaled 6,870 million metric tonnes CO_2e (U.S. EPA). Only 48 U.S. based companies setting absolute targets have reduced 22,604,959 metric tonnes CO2e of their emissions goals. When we project ahead to look at the potential of their planned targets, their ambitious goals spread over time equate to a significant percentage of total U.S. GHG emissions. One company alone, Walmart, has set a one billion tonne CO_2e goal.

Why is Walmart's goal so ambitious in comparison to that of other companies? It is a scope 3 goal covering both upstream and downstream operations. Walmart recognizes that looking beyond their direct emissions and widening their view to the entire value chain of their operations requires them to recognize and take responsibility for emissions beyond their immediate control, but that still contribute to the operation of their business. Emissions from the value chain are much greater than emissions from direct operations, and therefore offer greater opportunity for reduction. Understanding this, Walmart has set a much larger goal than is typical for reductions within a company's scope 1 & 2 operations. Their goal does not have a baseline, as it is a cumulative emissions reduction goal over time. What could be achieved if companies across the country followed suit?

Five of the nine companies with the greatest absolute targets overall set scope 3 goals. Of all the 72 companies reporting to CDP, 21 of these companies have set active scope 3 goals. This begs the question of whether there is greater potential for companies to reduce GHG emissions if more of these goals included scope 3.

The evidence from this study does not conclude that setting scope 3 goals leads to any greater actual achieved emissions reduction. Why then, should we care if including scope 3 goals in emissions targets correlates to setting higher total emissions targets? To answer this, we must look for any obvious similarities in the companies reporting the greatest achieved emissions reductions.

Because we cannot quantify total reductions from intensity targets or renewable energy targets based on the given data, we must look at absolute targets for achieved results. When looking at the list of 23 companies achieving 100,000 metric tonnes CO_2e reduction or more, there is no apparent rule that they all share. However, looking closer at the data reveals that none of these companies set an absolute target of less than 100,000 metric tonnes CO_2e. It may seem obvious that setting a higher target is correlated to higher achieved results, however, the data here has reinforced this with the regression analysis from figure 3. The other shared trait of these companies is measurement of scope 3 emissions. Only 6 of these 23 companies reported that any areas in table 8 were relevant, but not yet calculated.

It would seem that the best way to have greater impact on emissions reduction as a company is first to measure all areas of relevant emissions to get the full picture of your impact, and second, to set the highest practical targets possible.

Another interesting finding from the results is in the overall sources of scope 3 emissions calculated by the companies. Most companies report that they are calculating the emissions from employee business travel. Perhaps this is because most companies are likely to keep careful records of total miles traveled, which could then be readily used in a simple calculation of emissions per mile traveled. The emissions area least calculated is end of life treatment of products. The end of life treatment being the least calculated area of emissions makes sense, as it is impossible for a company to know exactly what customers due with each of their products at the end of the product life. However, more and more companies are looking into circular options for products, which allow customers to return the product to the company, where it can then be recycled to make other materials or new products. As the circular economy trend continues to grow, this area of emissions measurement may become more common practice.

Finally, the overwhelming majority of companies that report that climate change is integrated into their business strategy demonstrate a strong societal trend. Of these 72 companies named in the top 100

companies by Fortune, who are providing data to CDP, 67 have confirmed that they recognize the importance of climate change impacts. These strong performance companies are leading the way in the U.S. business sector, not only in economic growth but in environmental action. Today, social responsibility in business is a simple equation of supply and demand. Today's generations demand social and environmental awareness from the companies that they choose to do business with. The business sector's response to this demand is demonstrated plainly in the results of this study. Top performing companies have recognized that integrating climate change actions into their business strategy is a benefit to their business.

CONCLUSIONS

In conclusion, the business sector has great potential to make a big impact on the progression of climate change. The majority of this potential has yet to be unlocked. Some of these large and well-known corporations topping the Fortune 500 list are setting very ambitious GHG reduction targets and reporting tremendous reductions already made as a result of their efforts. The question then is, can and should other companies in the U.S. be expected to make such changes?

A lot of the discussion of this paper has been around scope 3 targets because of a lot of emissions these areas contribute throughout a company's value chain. Emissions reductions are created in these areas by holding suppliers to higher standards when it comes to emissions. It also means that emissions measurements need to include data requested by companies from their supplier in certain areas of emissions production and resource use. Larger companies may be more successful at imposing these types of demands due to their size and potential value to the supplier. Making space for the non-corporate giants to make these types of demands may require a shift in the corporate culture. By this I mean that the biggest companies will need to pave the way for these types of demands to become a norm of doing business before smaller companies will be able to make the same requests to their suppliers. Normalizing higher demands on suppliers to control their emissions will ultimately require a societal shift in the

perception of acceptable emissions levels from companies and their suppliers. Changes to perceived acceptable behavior are difficult to bring about and take considerable time. However, changes in demand and expectation over time have shaped the sustainability field in business today. It is possible that increased expectations from consumers and other industry stakeholders can push expectations even further. By looking at the emission reduction goals of the companies in this study, it is possible to understand where these companies view more acceptable emissions for their brand. As these companies reduce their overall emissions, smaller companies may be pressured to justify their own emissions in comparison to these larger operations.

Another practice to reducing scope 3 emissions is putting emissions reduction in the hands of the consumer. Companies are doing this by making more energy and fuel efficient products. Putting emissions reduction in the hands of the consumer means that the day to day use of the product by the consumer, in replacement of a more resource demanding product, gives the customer the ability to play a role in the sustainability effort. These products often serve the added benefit of saving the customer money in energy or fuel purchase, which lends product use emissions reduction to be a beneficial target area both for the company and the consumer. As consumer demand for these energy efficient products continues to grow, this area of emissions reduction can be a target for companies of all sizes.

Finally, end of life treatment of products is a growing area where companies will likely begin to focus. Creating products with a circular life cycle can ultimately save money and resources for the company. Product take back programs allow this type of material recycling to be possible and also puts some of the ability to measure product end of life emissions back in the hands of the company. This is likely another area where larger companies will need to go first to show how these circular processes can be developed efficiently and effectively. Much like other areas of environmental progress, when the first companies to take the leap show a positive return or savings from these types of actions, other companies will then follow suit.

As with all areas of progress, leaders are needed to pave the way. Many of the companies evaluated in this study have already established themselves as climate change leaders, but more business sector leaders are still needed. There is also need for future science to capture the benefits and potential that some of these relatively new emissions reduction goals will produce in the years to come.

RECOMMENDATIONS

Future studies in this area should include a larger sample size than the one hundred companies evaluated in this study. There was inconclusive evidence of any correlation between scope 3 target setting and the ambition of the goal set by the company. There is also no evidence around scope 3 goal setting and actual success at achieving greater GHG reduction. This may be due in part to how new the trend of setting scope 3 goals is in the U.S. corporate culture. The ability to make more significant measureable reductions in GHG overtime if scope 3 goals are included in company climate action targets should be assessed in the future. These scope 3 goals are just now being set into motion. It will require future science to assess how the success of these scope 3 goals plays out over time. The inclusion of corporate values and/or supplier values could also be a good perspective for future assessments of the success of scope 3 emissions reduction goals.

Another area of study that is needed is measurement of potential reductions from intensity targets and renewable energy targets. This study did not attempt to quantify actual reductions or project possible total reductions based on these targets. This data would be beneficial to try to gain a better picture of overall potential GHG reductions from the business sector.

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