Bringing Nuance Back to the Carbon Offsetting Debate

Evidence of a transition, calls for a transformation

Ash Farber

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Ash Farber

Supervisor: Linda Engström, SLU, Department of Urban and Rural Development

Assistant supervisor: Malte Rödl, SLU, Department of Urban and Rural Development

Examiner: Ann Grubbström, SLU, Department of Urban and Rural Development

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Swedish University of Agricultural Sciences
Faculty of Natural Resources and Agricultural Sciences
Department of Urban and Rural Development
Division of Environmental Communication

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Abstract

Climate change caused by the increase in anthropogenic emissions is currently increasing the frequency and severity of extreme weather events globally (IPCC, 2022) which is having devastating impacts on humans and non-human living beings globally. Rapid and deep decarbonisation is required to achieve the goals of the Paris Agreement and ensure a safe and habitable planet for the future of humanity. This thesis investigates the phenomena of carbon offsetting, and how this is associated with corporate climate action alongside exploring different opinions around this theme and assessing how their opinions come into being.

A mixed methods approach is used to create and assess both quantitative and qualitative data, bringing in theories of bounded rationality, situated knowledge and critical realism to help unpick and understand qualitative data; while Chi squared tests were used to find statistically significant relationships between purchasing carbon credits and company behaviour.

It was found that companies that purchase carbon credits do the more ambitious or advantageous behaviour when compared with companies that do not purchase carbon credits in seven out of eight situations. This difference provides evidence that offsetting is not used instead of taking measures to reduce emissions. This is combined with results of interviews that show a diverse range of opinions about corporate decarbonisation; the practice of carbon offsetting; what is required to achieve the goals of the Paris Agreement and what can be considered as business as usual.

Keywords: Carbon offsetting, corporate decarbonisation, opinion formation, climate change, situated knowledge, bounded rationality, critical realism.

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Abbreviations

BaU	Business as usual
BVCM	Beyond Value Chain Mitigation
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
COP	Convention of the Parties
ETS	Emissions Trading System
EU	European Union
GHG	Greenhouse Gas/Greenhouse Gas
IPCC	Intergovernmental Panel for Climate Change
REDD+	Reducing Emissions from Deforestation and Degradation
SBTi	Science Based Targets initiative
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market

1. Introduction

1.1 Climate Change

Human activity, particularly the burning of fossil fuels in the Global North, has resulted in high levels of greenhouse gasses (GHGs) in the atmosphere. In 2019, atmospheric CO_2 concentration was at its highest point for at least the last 2 million years (IPCC, 2021). Increases in atmospheric CO_2 concentration is the main driver of climate change and is mirrored by the increase of average global temperatures.

Climate change increases the frequency and severity of extreme weather events across the globe (IPCC, 2021). As average global temperature has increased, different regions have felt the effects in various forms. From unprecedented wildfires (Keeley and Syphard, 2021) to mass coral bleaching (Ainsworth *et al.,* 2016); From the 2021 floods in Europe (Kahraman *et al.,* 2021), to the pastoralist farmers of East Africa who already find themselves in an armed conflict exacerbated by water scarcity (Parenti, 2012. Ch.4).

The Intergovernmental Panel on Climate Change (IPCC) report on Impacts, Adaptation and Vulnerability (2022) lays out how some of the negative impacts of climate change are already locked in, for example the 3.3 - 3.6 billion people who already live in areas vulnerable to the effects of climate change. However, preventing warming from exceeding 1.5℃ above preindustrial levels, will curtail the worst effects, give hope for the future and enable natural ecosystems to maintain integrity (Tollefson, 2018).

The IPCC's sixth report on the physical science of the climate is clear; climate change is happening, it is being caused by humans, and it will have devastating impacts on the planet and our way of life if left unchecked (IPCC, 2021). Some would argue climate change is the biggest threat humanity has ever faced (UN, 2021), and research into the new phenomena of climate anxiety has shown the fear of climate change is affecting the mental health of some young people (Hickman *et al.,* 2021).

Although most people agree there is a problem, we still lack a pathway to a solution. This is in part because climate change is a wicked problem (IPCC, 2022), that has

no obvious boundaries or clear solution, but a myriad of solutions that each go a little way to maybe tackling the whole problem (Grint, 2010).

However, making progress in one area, could result in lost ground in another. For example, electrification of transport may reduce GHG emissions, but will increase demand for rare earth minerals that are already causing environmental devastation where they are mined (Agusdinata et al., 2018) and have been linked with human rights issues (Sovacool, 2021) at the source.

GHG emissions must peak by 2030, and we must achieve net zero GHG emissions by 2050 to be within a chance of keeping warming below 1.5℃ above preindustrial levels (IPCC, 2021). Achieving net-zero on a global scale requires two things: (1) reducing emissions and (2) the increasing the quality and availability of carbon sinks (Fankhauser et al., 2021). Various arguments are made for how heavily we should use either of these points; reduce more and remove less or reduce less and remove more. Opinions are influenced by how much one believes removals or reductions to be possible, achievable at scale or socially appetizing (Campbell-Arvai et al., 2017).

1.2 Framing Climate Change Through A Carbon Budget – The Start of Net Zero

To understand how much GHGs we can emit before a certain level of warming is reached, carbon budgets are used. A carbon budget is the cumulative amount of GHGs that can be emitted over a set time to stay within a certain warming threshold (Sussams, 2018). They can be sector, country, GHGs or time specific, making it a useful tool for mapping emissions sources and potential sinks. However, they are limited when considering the impact of other earth systems on warming such as savannization and an increased albedo effect from melting polar ice (Rogelj, 2018).

The global carbon budget remaining to stay within the 1.5□C warming scenario is between 320-740 $GtCO_2$, including non-climatic feedback effects (Rogelj, 2018). This large margin of uncertainty highlights how little we still know about where safe limits lie. Research from the international energy agency found annual emissions in 2022 peaked at 36.8$GtCO_2$ (IEA, 2023), giving us 8 to 20 more years before the budget is spent. Other estimates for when we will have used our carbon budget, range from 9 years (Forster et al., 2022) to 11 years (Pitman and Macadam, 2022) and likely much further.

As with any budget, income must be matched with outgoings to remain stable. Activities that emit GHGs into the atmosphere must be matched to activities to remove GHGs them to achieve global net zero. The phrase ‘net zero’ first made its way into the climate sphere in the IPCCs fifth assessment report (Allen et al., 2022);

and while the words do not feature in the Paris Agreement, the definition of 'achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases' is present in article 4.1 (UN, 2015). Despite almost a decade from creating the Paris Agreement, annual emissions are still increasing and climate change is getting worse.

While there is a global carbon budget, exact breakdowns for how much emissions can be attributed to any country or sector is still debated. The Paris Agreement refers to 'common but differentiated responsibilities and respective capabilities' of different nations (UN, 2015:3). Although national governments are responsible for making policy to reduce emissions, most emissions come from the private sector, not directly from state owned assets. Because of this, the emissions reduction focus often goes onto the private sector.

1.3 Growth of Carbon Neutral and Net-zero in the Private Sector

As companies are responsible for much of the world's emissions, they are also responsible for reducing them and contributing towards achieving the Paris Agreement goals (Sullivan and Gouldson, 2011). But there has been great variation between private sector actors for how much responsibility they are willing to take.

Research by the Carbon Disclosure Project (CDP), an NGO working with disclosure and reporting of GHG emissions found that 25 fossil fuel companies are responsible for more than half of global GHG emissions since 1988 and the top 100 fossil fuel companies are responsible for around 70% of anthropogenic emissions (Griffin, 2017). Yet the industry has been driving climate change denial and delaying climate action for decades (Wright, Nyberg and Bowden, 2021; Megura and Gunderson, 2022). This finding gives evidence towards claims that the fossil fuel industry is unwilling to change and keeps putting profit before a safe and habitable planet for future generations (Greenpeace International, 2023; Gayle, 2022).

Some industry leaders have been making progress to reduce emissions. This includes a company using hydrogen to reduce value chain emissions in steel production (Muslemani et al., 2021); more companies developing low carbon plant based protein options (van Vliet, Kronberg and Provenza, 2020) and the proliferation of renewable energy solutions (IPCC, 2022). These examples still face environmental and social issues, however there is at least a willingness to change with hope of offering some solutions and providing options that have a reduced impact on the climate. Some scholars would still see these ideas as insufficient due to concerns of resource availability and externalities linked with the development of these technologies (Jensen, 2021).

Companies reduce their emissions through first measuring their carbon footprint, often using a methodology set by the Greenhouse Gas Protocol or ISO, after identifying sources of emissions they set emissions reduction targets and make policies to achieve them. Targets are not always communicated publicly, a phenomena that has been labelled as green hushing by some outlets (Visram, 2023; Willis *et al* 2023). To increase transparency and quality control, various organisations such as the Science Based Targets initiative (SBTi) and the Exponential Roadmap Initiative have been created to guide companies on best practice when setting targets that are compatible with global climate goals.

These frameworks are the best available, but still imperfect, and research has found problems with their rigor. For example, research from the New Climate Institute (2023) found climate strategies accepted by SBTi from 15 of 24 companies to be low or very low in integrity (meaning they are unlikely to achieve the goals they set out to achieve) and that for all companies assessed, targets can rarely be taken at face value.

Ways companies are dealing (or not dealing with) emissions are highly diverse. But change is being enforced for certain actors through regulations like cap and trade systems, the EUs Carbon Boarded Adjustment Mechanism, and the EU Green Claims Directive. Today, most companies do not fall under any regulation or law regarding their GHG emissions, but more will be impacted as the EU expands the existing Corporate Sustainability Reporting Directive (Fang et al., 2023).

The combination of increased regulation, scrutiny and a growing public concern around climate change is mirrored by an increase in the number of companies setting net-zero targets (Ceres, 2022). Which have been branded as greenwashing by some due to over-relying on carbon offsets, (units of CO_2e used by companies to compensate for their GHG emissions) (Barry 2021) or avoiding transformative change (Christiansen et al., 2023).

Part of the issue with corporate net zero strategies comes down to different definitions of what net zero really means. The IPCC Glossary defines net zero GHG emissions as when 'anthropogenic emissions of greenhouse gases to the atmosphere are balanced by anthropogenic removals over a specified period' and equal to the term climate neutrality (IPCC, 2023).

However, the definition given by SBTi, defines net-zero as (1) 'Achieving a scale of value chain emissions reductions consistent with the depth of abatement at the point of reaching global net-zero in 1.5℃ pathways and (2) neutralizing the impact of any residual emissions by permanently removing an equivalent volume of CO_2' (SBTi, 2021a).

The definition given by SBTi clearly states that offsetting emissions without making emission reductions at a pace that is in line with the Paris Agreement's 1.5℃ goal is not net-zero. For the SBTi, and several other actors including Gold Standard, the second largest standard for carbon credits (Gold Standard, 2021) and research funded by the Nordic Council of Ministers that included contributions

from over 30 private, NGO and state actors (Ahonen *et al*, 2022), net zero is about both reducing and offsetting (*neutralising*) emissions, doing only one will not be sufficient to make a net zero claim nor to achieve the goals of the Paris Agreement. The IPCC does not make any direct requirements to reduce emissions when defining net zero.

As the term net zero is relatively new, the lacking universal definition may contribute to insufficient actions or poorly defined claims by companies. Equally, public understanding of net zero is also limited. a survey of 7,000 people from the UK found that only 9% reported knowing a lot about net zero and 31% reported knowing 'hardly anything' or had never heard of of it (Demski, 2021). This highlights the potential teething problems that come with new scientific terminology, especially when some companies may misuse the term and public understanding is low.

1.4 The creation of carbon credits & offsetting

One proposed solution to people, organisations, businesses, and nations that are trying to mitigate the GHG footprint is to purchase carbon credits, which can be used to offset their emissions. This is where the polluting entity can purchase a unit of carbon, which is intended to balance out their emissions. For example, a company could emit x tonnes of CO_2e and purchase carbon credits to the value of x to *balance the books* of their emissions, making net emissions zero.

The concept of carbon offsetting came from the Clean Development Mechanism (CDM) which was defined in Article 12 of the Kyoto Protocol (UN, 1998), one of the first agreements to come from the UNFCCC's (United Nations Framework Convention on Climate Change) Convention of the Parties (COP) meetings which was ratified in 1997. The CDM was made to facilitate collaboration between wealthier, higher emitting nations and poorer nations, by funding projects that remove, reduce, or avoid GHG emissions (Taiyab, 2005). The projects commonly took the form of implementing renewable energy systems or increasing energy efficiency in annex 2 countries.

Since the inception of the carbon market and CDM projects, many other standards and project types emerged; ranging from projects that remove GHGs from the atmosphere through tree planting (Plan Vivo Foundation, 2020) or direct air capture (Climeworks.com, 2017); prevent emissions by conserving existing carbon stocks (UNFCCC, 2013) or reduce the quantity of GHGs being emitted through renewable energy projects (Goldstandard.org, 2017).

Since carbon offsetting had been created, it has been subject to scrutiny. Projects have received critique for lacking measurable additional benefit to the climate (Schneider, 2009), risk of human rights violations (Finley-Brook and Thomas, 2011) and if development can ever be truly sustainable (Subbarao and Lloyd, 2011).

However, the practice of purchasing carbon credits persists and is compulsory in certain circumstances such as global aviation and for companies that are regulated by cap-and-trade systems such as the EU Emissions Trading Scheme.

Despite concerns around the efficacy of projects used for carbon offsetting, the voluntary carbon market (VCM) where credits are traded has never been larger. In 2021 the VCM surpassed $1 billion, an economic value that represents 188.2 $MtCO_2e$ (Forest Trends' Ecosystem Marketplace, 2021). That is carbon that was removed from the atmosphere or not added to the atmosphere because of the money that was invested, assuming all projects are working as intended.

1.5 Offsetting Debate

The growth of the VCM comes with a growth in criticism that companies are buying carbon credits to avoid making difficult emissions reductions that may damage their business model. The term 'business as usual' (BaU) has been used frequently (Ghussain, 2020; Timperley, 2021), to suggest that companies offset emissions because it is cheaper than reducing them.

Due to the critique of carbon offsetting, new language has arisen to increase clarity on corporate behaviour and reduce opportunities for greenwash. SBTi has broken down what was previously just offsetting into Beyond Value Chain Mitigation and Neutralisation. This is defined as financing activities that remove, reduce or avoid GHG emissions, but may not be counted towards the GHG footprint of the company (SBTi, 2021b) and measures companies take to remove and permanently store GHGs to counterbalance unabated emissions (SBTi, 2021a) respectively[1].

However, there has been little research on if companies that purchase carbon credits behave any differently to those that do not regarding their rate of emissions reduction or if they are taking steps to improve their impact on the climate.

A report which used data collected from CDP to understand the relationship between purchasing carbon credits and wider business sustainability goals found that companies purchasing carbon credits typically reduce their direct emissions faster than those who do not. Stating '*offset buyers are more engaged in direct emissions reductions activities compared to companies that don't offset*' (Forest Trends, 2016, p.13). More recent research of 100 companies found companies purchasing carbon credits are reducing their scope 1 and 2 emissions[2] almost twice as fast compared with those who do not purchase carbon credits (Sylvera, 2023).

The findings above indicate that companies purchasing carbon credits are more likely to reduce emissions faster and put more effort into reducing emissions. This

[1] Due to the proliferation of terms since this research began, and the way the question was phrased in the CDP database, all hypotheses and subsequent results are phrased as if a company purchases carbon credits or not, and not if they offset emissions, engage with beyond value chain mitigation or neutralization.

[2] Direct emissions from company owned assets and from energy use.

is counter evidence to ideas published by Greenpeace who stated, *"Carbon offsetting is a licence to keep polluting"* (Greenberg, 2021).

Despite polarized views, the practice of offsetting prevails and is backed by the United Nations who have an online platform to offset lifestyle emissions by purchasing carbon credits (Climateneutralnow.org, 2022). Further, consensus was found at COP26 on Article 6, the section of the Paris Agreement related to international carbon trading and the last part to be agreed (UNFCCC, 2021). Meaning that regardless of the current debate and critique on the efficacy and neoliberal methods of offsetting (Lohmann, 2012), it will be part of the toolkit used to mitigate climate change.

1.6 Aims of this Thesis

The VCM is a multimillion-dollar industry and must be researched to generate understanding of if it can be used to achieve climate goal and create best practice guidelines for companies that engage with it. Carbon markets currently sit as one of many heavily debated proposed solutions to climate change, and this research aims to contribute knowledge to this part of the puzzle.

The key, overarching aim of this thesis is to find out more about carbon offsetting and its relationship with climate action, from different angles. This can clearly be broken into three questions:

1. **What is going on**?
   Do companies that purchase carbon credits engage more than those who do not across a broad range of climate related issues?
2. **What different opinions exist?**
   What different opinions are there about offsetting and its relationship with climate action?
3. **How are different opinions formed?**
   How are opinions about offsetting and its relationship with climate action formed and what are they based on?

This thesis will utilize the statistical analysis of the behaviour of 2582 companies to understanding if purchasing carbon credits is associated with a higher level of climate action, and five semi-structured interviews will uncover different opinions and understand how they are formed. A mixed methods approach was chosen to allow for a deep understanding of measured phenomena, but also provide information about that which cannot easily be quantified, appealing to both ends of the ontological spectrum.

Following this introduction, this thesis shall describe the mixed methods approach used including the hypotheses tested. Next will be a results section where data will be described before a deeper discussion to combine findings from both methodologies and go deeper into how interviewees understand carbon offsetting and corporate climate action.

2. Theories

Lake (2011, p.465), stated ‘academic sectarianism produces less understanding rather than more’ and highlighted the importance of people from different viewpoints or ontologies working together. Although Lake’s essay focused on ‘academic sects’ rather than boundaries separating academic from practitioner, the general idea that working together from different viewpoints only helps create a more rounded understanding of phenomena is still applicable.

This section describes relevant theories and methods used in this research. The decision to follow a mixed methods approach is based in the ideas of critical realism, that although research can create knowledge, knowledge and findings can never exist separately from the mind and its preconceived ideas (Forsyth, 2023).

2.1 Bounded Rationality

Bounded rationality was used as a key theoretical framework to understand the qualitative data only. It considers humans are unable to understand all there is to know about a given topic; and lack the cognitive computing power to accurately assess all information (Sent, 2018; Simon, 1990). Although this theory was devised to help understand economic decision making, it can be applied to how people form opinions, especially as opinions dictate decisions.

The idea of bounded rationality was put forward to counter the underpinning ideology of neoliberal economics that humans should behave ‘rationally’ given set circumstances (Simon, 1990). The key point was that without the ability to know all there is to know about an issue, humans can never be truly rational, we are bound by the limits of our knowledge, and how good we are at utilising it. Moreover, humans often rely on shared norms, rather than complete knowledge to create opinions or do certain behaviours (Gigerenzer and Selten, 2002).

Alongside how individuals or organisations process information, the options available are also important. Jones (1999) stated that there may be a clear goal, but it is possible that none of the options available will achieve it, and it is common that if an option can achieve the goal it may have a negative impact on other goals. Moreover, limited options can constrain behaviour, thus behaviours become fluid depending on available options and information (Sargent, 1981).

Bounded rationality can also be applied to how people make decisions or form opinions, especially when linked to heuristics: mental shortcuts that humans use to make quick decisions (Gigerenzer and Selten, 2002). A branch of the work by Gigerenzer and Selten (2002) is the psychological plausibility premise, which focusses on using limited knowledge to decipher situations and decide which opinion is optimal. Making decisions based on experience saves time, energy and allows humans to thrive in familiar environments, but it also makes it difficult for us to change our minds when contradicting information is presented and may contribute to being unable to see nuance where we have previously seen absolutes.

There is still another layer of complexity that this idea does not consider: it is difficult to assess opinions built with emotions. Emotions function not just as a contribution of feeling towards decision making, but also give weighting towards what information should have a strong or weak influence in overall opinion (Pfister and Böhm, 2008). For example, if a piece of information creates a strong emotional response, it is likely to feature highly in decision making. In this context, it could mean that knowing some projects used to generate carbon credits are linked with land grabbing will generate a strong emotional response and thus that information will have a larger impact on opinion formation than information that stirs less emotion.

2.2 Situated Knowledge

Situated knowledge comes from two different backgrounds, first knowledge that originates from the margins of society or non-mainstream science; and second from learning that takes places through observation and practice rather than dedicated study (Hunter, 2009). It is concerned with understanding ways that people conceive the world, and how these conceptions create limitations to knowledge (Simandan, 2019). Situated knowledge systems have no set boundaries or fixed rules and are thus pragmatic and plastic to the situation at hand (Hunter, 2009).

This theory focusses on the gap between the realized world, compared with the witnessed situation, highlighting how our personal biases, blind spots and cognitive constrains may be a barrier to ever fully understanding reality (Pronin *et al,* 2004). The information one person adsorbs, is only ever a sub set of the total information within any situation (Simandan, 2019). Moreover, the remembered situation can often be more than the confessed situation, as knowledge sinks into our unconscious or may be unacceptable to say within our social groups without conflict (Simandan, 2019).

Donna Haraway writes extensively around situated knowledge, pitting it against objectivity and stating that '*only partial perspective promises objective vision*' (1988); meaning all knowledge is just a function of perspective. This perspective continually changes across geographical space and time as a result of cultural change and environmental stimuli. For example, what it means to be a good

parent or business owner varies temporally between today and in the 1940, and geographically between Sweden and Uganda. This is because the perspective we create norms and knowledge with is fluid and dependant on the ideas of a set time and place. Only by accepting this and seeing just how situated our knowledge is will we ever get close to objectivity (Haraway, 1988).

This theory will be of interest when understanding the results of the interviews, and trying to untangle opinion from reality, but also how expression may be further regulated by the desire to socially conform or due to blind spots. The ideas of situated knowledge share similarities with bounded rationality; both are interested with the ways in which we make sense of the world with limited perspective and incomplete information.

2.3 Critical Realism

Critical realism focusses on the difference between what is real and what is observed. Stating humans can generate knowledge but it can never be completely separated from other biases and linkages (Forsyth, 2023). Scholars have separated all knowledge into three domains of 'real', 'actual' and 'empirical' where each is a subset of the former and only the latter two can be truly seen by observers (Bhaskar, 2008). Only in the domain of the 'real' are mechanisms such as gravity at play which have been constants during our history and deemed irrefutable.

Figure 1 Overview of the three domains in critical realism

This research will develop data and understanding of the actual, through quantitative data analysis to discover regularities using positivist research methods. It will also generate empirical information through interviews and trying to understand how people experience the world.

By generating results and discussing different domains of knowledge, levels of information are reduced to their core (actual and empirical) and used together to create a more rounded, yet still imperfect, understanding of the real. A key part of critical realism is to be anti-reductionist when explaining complex phenomena (Holmen, 2010). By using the mixed methods approach described below, this research can be in line with this anti-reductionist ethos and contribute to a holistic understanding of carbon offsetting, its relationship with climate action and how it is understood.

3. Methods

To answer the questions above, this paper will follow a mixed methods approach. While there is variation in what can be classed as mixed methods, common themes in its definition are: the use of quantitative and qualitative data; the multiple purposes of the research and the goal of achieving both breadth and depth (Johnson, Onwuegbuzie and Turner, 2007).

The research structure can be seen in Figure 2. After background research was conducted to better understand the research topic, phase one began. Greater detail on each phase is written below.

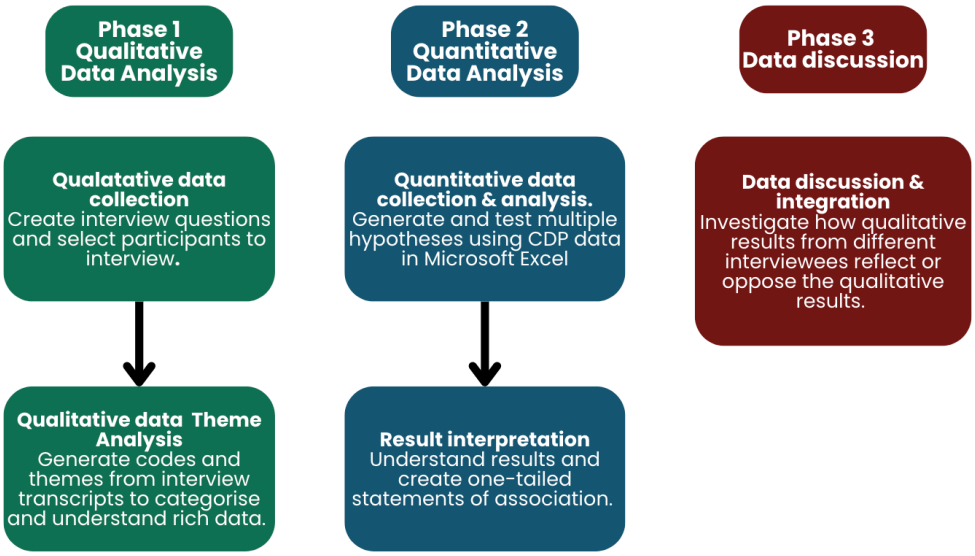


Figure 2 Research Design Diagram - Phases of data collection, analysis and interpretation.

‘

3.1 Phase 1 - Qualitative Data Analysis

To generate qualitative data, the researcher carried out interviews in English with five people in Sweden who were known to have different opinions on carbon offsetting and corporate climate action. Participants were selected for their knowledge of climate change, carbon offsetting or environmental justice. For purposes of anonymity, each participant will only be referred to by their initials, a basic description of their background is given below.

Table 1 The background and place of work for each interviewee

Initials	**Background/Place of work**
KA	Environmental activist employed by large environmental NGO
CW	Corporate climate strategist, CEO of company selling carbon credits
NF	PhD researcher in degrowth economics
GF	PhD researcher in political ecology of carbon removal
SN	Corporate climate strategist and environmental activist.

Semi structured interviews using the same core questions were conducted on Zoom, allowing interviewees to explore topics in their own way (Lewis-Beck and Bryman, 2007), guided by professional knowledge of the researcher. This allowed participants to elaborate on their views and what they are founded upon.

Topics covered in the interview process:

- Is climate change a threat?
- Are carbon offsets ethical?
- Do projects that produce carbon credits work?
- Does the purchase of carbon credits deter companies from making emission reductions?
- Is it right to put a price on nature?

After completing all interviews, a Thematic Analysis (TA) was performed to understand the viewpoints of interviewees. TA can be broad and has been described as an approach that bridges the divide between quantitative and qualitative thinking (Boyatzis, 1998; Terry et al, 2017), hence it suited this mixed methods approach.

This TA takes the experiential orientational focus, assuming that language reflects a reality (either personal or universal) and focusses on what participants believe and value; in contrast to critical orientation that would suggest language creates, rather than reflects reality (Terry *et al,* 2017, p.19). Although both focusses could have worked, because this thesis aims to understand opinion formation, it was decided to accept language used to reflect personal truth, rather than create it.

The questions asked were devised to create themes, however, interviewee responses did influence the codes and themes created. By creating codes in conjunction with analysing responses, it allowed for more specific categorisation of data and ensured no utterance fell between the cracks of a predefined framework. Terry *et al* state that '...coding 'gets better' (i.e., develops depth and moves beyond the obvious surface level) through immersion in, or repeated engagement with, the data' (2017, p.20).

There is no single way to analyse data because there is no single truth (Terry *et al*, 2007, p.20). It is up to the researcher to create their own working method which allows them to understand and to mine desired findings from the rich data set, chiselling away at the transcript to sculpt a useful result. The methodological steps of TA are set out below.

3.1.1 Step 1: Familiarisation & Coding

After completing all interviews, recordings were transcribed using the online tool Otter.AI. The transcription was read while watching the video to find and correct any mistakes made by the transcription tool. Each interview was then read as a transcript to increase familiarity of the responses and to allow the researcher to better understand the data. Through this process of familiarisation, it became possible to see patterns within and between interviewees responses which helped define codes.

Select quotes were then taken from the transcript and added to a Microsoft Excel spreadsheet. Quotes were selected for being clear responses to a question, revealing a specific way of thinking or explaining why a view was held. All utterances that fit into a certain code were coded and included, however not all utterances were coded as this process is for reducing the quantity of data to compare and contrast responses (Terry *et al,* 2007, p.26.) Some utterances were left uncoded and did not make it into the results section because they were irrelevant to the research aims or lacked cohesive links to other codes. The interview transcripts could be used to answer a variety of different questions and if the research aims were different, some utterances that were left uncoded could have been used.

For example, all participants were asked, 'What is the main cause of climate change?' how they directly responded to this question was taken as a quote and coded as 'cause'. Alternatively, if an interviewee responds to a question with framing such as '*in my personal experience*' or specifically referenced things they had seen/done it was coded as 'experience'.

This process was useful for sculpting the data as TA allows for coding that is meaningful to the purpose of the researcher. The process of code generation is iterative and went through multiple revisions to merge codes together or separate them to give optimal parameters for comparison and specificity.

3.1.2 Step 2: Theme Development

This step was used to identify and form patterns by grouping codes together under specific headings, called themes to keep the richness of the data without getting lost in the details.

Each theme is underpinned by a central organisation concept (Terry *et al,* 2007, p.28). Interview questions were setup to create set themes with clear boundaries, while the codes within the themes were influenced more by the interviewee's responses.

3.1.3 Step 3 - Refinement of Code and Theme

After codes had been grouped into themes, the data in its new form was reviewed and checked for conformity. Meaning each code shall appear in only one theme. Codes and themes were further redefined to ensure clear boundaries and potential for analysis. Each theme became a different way to understand why people hold certain opinions about carbon offsetting and corporate decarbonisation efforts.

After this stage, the final Themes, Codes and quotes were ready for compiling as results and written in table 2. The data was used both illustratively - using direct quotes and analytically, where extracts are discussed, compared, and evaluated (Terry *et al.* 2007, p.32)

3.1.4 Limitations of the Qualitative Research Method and Results

Firstly, all interviewees are known to the researcher as friends, acquaintances and in one case as an employer. While this sample allowed for diverse responses to the questions and a comfortable interview situation (Brewis, 2014), it is not without its drawbacks.

This research is unlikely to step into the territory of betrayal or disloyalty towards friends (Brewis, 2014) as all are open about the opinions shared in this research and none of the topics covered were sensitive. However, pre-existing ideas held by the researcher are likely to influence how utterances are understood, as all previous experience with the participant will go into decoding what is said in interviews, meaning some assumptions may be made. These assumptions may make the results more or less accurate than if the researcher did not know the participants.

The selected interviewees do not cover all different opinions in this area, but this was never the intention. The participants were selected for their varied opinions,

and knowledge that there would be multiple points of conflict and different ways of understanding the same phenomena.

Aside from this, by doing interviews before analysing the quantitative data, some talking points that could have developed insightful results were missed. If the quantitative analysis had taken place first, the interview questions could have included the finding of that section, allowing for a greater connection between results.

3.2 Phase 2 -Quantitative Data Analysis

To generate quantitative results, a data set was purchased from the CDP, a non-profit organisation that collects data on thousands of companies and over 150 cities and states to help measure impact and risks associated with climate, water and deforestation. The CDP database is frequently used in academic studies on corporate emissions disclosure as the data structure makes it possible to compare between the thousands of entries (Oktay et al.).

The following steps were applied to the data to create the conditions for hypothesis generation and testing.

1) From the original 2021 data set of 5941 companies, the companies that are regulated by a compliance market such as the EU Emissions Trading Scheme, Columbia Carbon Tax, and others were removed from the data set because this could act as an extraneous variable impacting results. This leaves the 2582 companies that are freely able to take part in the VCM without obligation to purchase carbon credits.
2) Null hypotheses were generated based on data availability and relevance to the research question. All hypotheses are listed below.

Engagement and Activities to Reduce Emissions

a) Companies that purchase carbon credits are not statistically more likely to have an internal carbon price[3] compared with those that do not purchase carbon credits.
b) Companies that purchase carbon credits are not statistically more likely to engage with their value chain on climate related issues compared with those that do not purchase carbon credits.
c) Companies that purchase carbon credits are not statistically more likely to have emissions reducing activities in place compared with those that do not purchase carbon credits.

[3] An internal carbon price is when companies voluntarily choose to set aside a set amount of money for each tCO_2e emitted to create an economic incentive to reduce emissions. That money is then often spent on initiatives to reduce GHG emissions within or beyond the value chain (CDP, 2022).

Measurement and Disclosure of Emissions

d) Companies that purchase carbon credits are not statistically more likely to measure and disclose all emissions from scopes 1 and 2 compared with those that do not purchase carbon credits.
e) Companies that purchase carbon credits are not statistically more likely to measure more scope 3 categories compared with those that do not purchase carbon credits.

Target Setting

f) Companies that purchase carbon credits are not statistically more likely to set emissions targets compared with those that do not purchase carbon credits.
g) Companies that purchase carbon credits are not statistically more likely to have targets that are approved by the SBTi compared with those that do not purchase carbon credits.

Environmental Claims and Governance

h) Companies that purchase carbon credits are not statistically more likely to have board-level oversight of climate-related issues compared with those that do not purchase carbon credits.
i) Companies that purchase carbon credits are not statistically more likely to classify any of their existing goods and/or services as low-carbon products or enable a third party to avoid GHG emissions compared with those that do not purchase carbon credits.

Aside from hypothesis *I*, all others can be considered to be in relation to a positive behaviour within a broader climate strategy.

3) In the sample of 2582 companies, 335 (13%) purchase carbon credits and 2247 (87%) do not (Figure 3). Figure 4 shows the primary activity of each company in the sample, including the percentage and absolute quantity. This sample of companies used to test each hypothesis and a chi squared test was used to find if any difference was statistically significant. All data handling and statistical analysis was done in Microsoft Excel version 16.74.

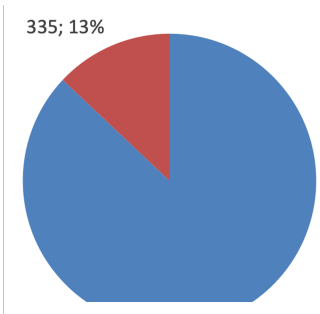


Figure 3 The proportion of the sample that purchases carbon credits (red) and does not purchase carbon credits (blue). N= 2582

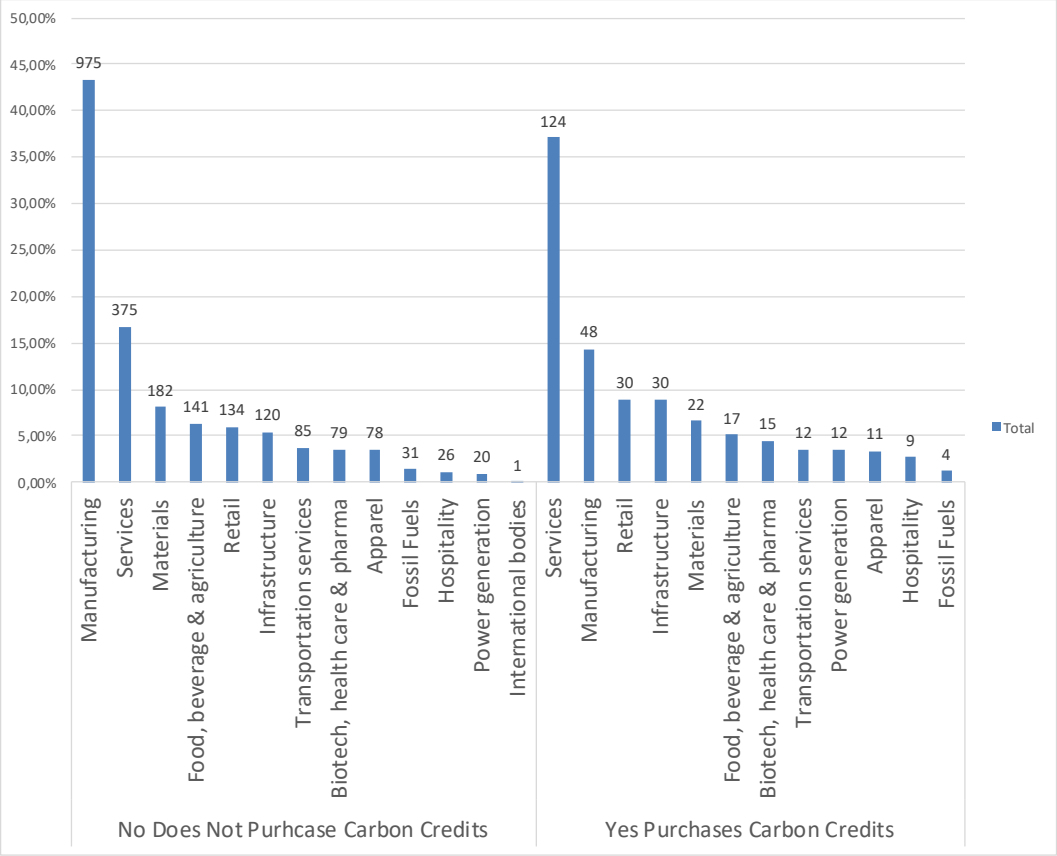


Figure 4 The primary activity of companies that do and do not purchase carbon credits, shown in percentage on the y axis and the aboslute quantity in the data label above the bar end.

4) Results were written up and used in the discussion alongside the results from phase 1.

3.2.1 Limitations of the Quantitative Analysis and CDP Data Set

Data was set out in a functional way for comparing categorical data, as has been reflect in the type of hypothesis tested in this thesis. However, it did not permit the comparison of continuous data, resulting in the inability to compare actual rates of emissions reduction between companies.

For example, data for scope 1 and 2 emissions could be reported using no less than 50 intensity metrics, and no absolute unit was provided. This means that no accurate comparison can be made between the average rate of scope 1 and 2 decarbonisation between companies that do and do not purchase carbon credits.

Further, for hypothesis *d,* there was no data on why companies did or did not disclose emissions sources. It could be that they are reported separately, in the form of differentiating parent companies from their subsidiaries, or it could be

that some data has deliberately not been reported, a concern for transparency and accountability.

3.3 Phase 3 – Result Integration, Discussion & Conclusion

In this final phase, results were discussed in relation to each other, and the theories described in the previous section. The thesis then concludes with how this research should be used and pointers for future research.

4. Results

4.1 Phase 1 Results – Outcome of the Theme Analysis

Table 2 Themes and codes developed from the analysis of interviews

Theme	**How offsets impact achieving climate goals**	**Causes of Climate Change**	**Offsetting Projects & Their Use**	**Ethical implications of offsetting**	**Opinion Formation**
Codes	Business as usual	Causes	Offsetting Projects	Ethics	Experience
	Reduction	Economic	Offsetting Concept	Colonialism	Information & Bias
	Solutions	System	Creative accounting & Honesty	Justice	Pragmatic
				Commodifying nature	Scale
					Specific

Broadly speaking, CA was the most positive towards carbon offsetting and its relationship with climate action, while CA and NF were most opposed. GF and SN gave answers that supported and opposed this phenomenon depending on the question area and level of specificity used.

4.1.1 Theme 1: How The Practice Of Offsetting Impacts Climate Goals.

This theme is made of 4 codes and focuses on how interviewees see the interplay between carbon offsetting and achieving of climate goals. A key part of this thesis is to quantitatively understand this question but to also understand what opinions are held and what underpins them. Responses from all participants centred around if offsetting emissions permitted polluting behaviour to continue, with particular

focus around if projects used for offsetting are solutions to climate change and the relationship between offsetting and the speed of reduction.

1.1 - Business as usual (BaU).

All interviewees were directly asked to define BaU and if carbon offseting promoted it. Definitions of BaU varied considerably, which sets the tone for the divergence in subsequent answers. NF defined BaU as *"keep(ing) … a capitalist mode of production where the means of production is controlled by the capitalist, and they pay a wage to their workers… which over time has a tendency to increase exploitation on the environment…";* KA broadly agreed with BaU being "*a continued extractivist mindset".* On the other hand, SN defined BaU as a situation where "*companies continue to increase their emissions, don't set ambitious climate targets and don't take climate action*."

For some people, companies taking action to reduce emissions will still fall into the negative categorisation of BaU because they are for profit companies that exist within a wider system of extractive capitalism. However, others see offsetting as an acceptable practice providing it is in addition to, rather than instead of, reducing emissions.

1.2 - Reduction

All participants referenced the need to reduce global GHG emissions to meet climate goals. KA said *"I'd rather see imaginary organic lentil company X invest in reducing their emission than offsetting schemes*[4]" which highlights the view that emissions reduction should be prioritized, but also that KA sees these things as mutually exclusive rather than being done in unison. KA also stated "*offsets are used at COP as an excuse not to cut emissions as rapidly as we need to*", highlighting how they believe offsetting is used instead of reducing, rather than as well as.

Meanwhile, NF brought up how intensity-based reduction targets are supporting incrementalism and do not address the root cause of the problem, while also distracting from real solution.

1.3 Solution

There was divide between interviewees on if offsetting or the projects used to generate carbon credits can be classed as part of the solution to climate change. NF said, "*offsetting is like putting a band aid on global carbon emissions when it's like haemorrhaging open heart kinda stuff"*, suggesting that offsetting makes too small of a difference to have impact on the global scale and do not address the root cause of the problem; while KA referred to offsetting as a *"false solution*

[4] The broader discussion was about if it's ok for any companies to purchase carbon credits, using an imaginary situation of an organic lentils company that wants to offset their indirect emissions.

presented by large states or the fossil fuel industry", suggesting that it is a deliberately deceitful mechanism.

On the other hand, GF believes that technological removals "*based on Sound geological science that says it will stay there for millennia… gives us as a human race, a bit of breathing space to be able to think about how we can change the rest of our economy";* while CW stated that "*we need to do more of everything. In that sense, we need carbon offsets*".

4.1.2 Theme 2 - Causes and Consequences of Climate Change

This theme brings together what people see to be the cause of climate change and how it will impact the living world. Figure 5 below shows the outer boundaries of response levels given on the causes and consequences of climate change. Participants that focused on cause 1 also expanded their answer to mention points in consequence 2, while participants who focused on cause 2 did not expand the systems thinking of their answer to include issues from consequence 2.

Figure 5 The boundaries of response given to the causes and consequences of climate change

2.1 Causes

All responses included some reference to the build up of GHG in the atmosphere being the cause of climate change. However, there was variation on how much detail was given about what causes the build-up of GHGs and what the ultimate cause was compared to what is just a symptom of a broader issue.

2.2 Economic

Every participant referenced the global economic system in some way. The most subtle reference was from CW who described "*overconsumption"* as a *"major problem today"* and the *"elephant in the room"*. More overt references to the economic system came from other participants who referred to climate change as a *"symptom of the current economic and capitalistic system"* or the "*continuation of a colonial extractivist mindset.*"

2.3 System

This code has some overlap with code 2.2, as drawing boundaries between causes and consequences of climate change along with how interconnected climate change is with the economy varied on the participant. However, the economy features so prevalently in multiple answers that it was given a separate code of it's own.

While climate change was seen as a symptom of a broader problem, it was also seen as a driver of other problems. Different interviewees engaged with the broader systems around climate change to different degrees. KA engaged broadly with the causes and consequences and described *'climate change as an accelerator of other social ills',* referenced a climate justice lens with *'people who are the most affected are the ones who have the least responsibility'.*

4.1.3 Theme 3 - Offsetting Project & Their Use

Ideas around the efficacy of projects used to offset and thoughts around the concept itself varied between interviewees. Individuals that believed the projects themselves were problematic also had less faith in the overall concept of offsetting. However, GF offered the most nuanced approach to both the concept and the project, citing that *'the whole concept of offsetting makes complete sense … from a carbon accounting perspective…. but we're not just deadline with an excel ledger, we're dealing with real biophysical impacts of what these emissions will do'* and *'in theory, basically every offsetting programme could be absolutely perfect and (have) other kinds of cool benefits… but in practice we have seen multiple failures.'* Different interviewees focussed on the overall concept of offsetting emissions, the projects producing carbon credits that are used as offsets and the companies that use the carbon credits as offsets.

3.1 Offsets Projects

Concerns of permanency were raised by SN as being very integral to any offsetting project and multiple participants referenced concerns about how to verify if a removal/reduction/avoidance happened and how those things should be defined. CW frames that the aims *'of the carbon market was always to get technology and know-how to transfer to the global south',* while NF spoke negatively about *'implementation of them [projects that provide carbon credits] is in countries that are far away from us'.* The critical of this phenomena is significant to how these participants understand the broader topic of climate change and offsetting.

3.2 Offsets concept

The general concept of being able to offset emissions was discussed in different ways. NF was critical of the general idea, stating that offsetting is *'being able to claim that you avoided emissions that didn't exist in the first place'* going on to

describe projects that avoid emissions as *'the most blocking bullshit system I've ever heard in my life'.* CW and GF both focussed on the residual emissions budget, with quotes of '*"If supply of offsets is limited, which companies should get it?'* and *"our capacity to draw down co2 and other greenhouse gases is finite, kind of by definition. And then it needs to be negotiated, who gets a slice of that pie slice of that residual emissions budget"* retrospectively. The thinking around the quantity of carbon removal capacity we have being finite did not feature in the utterances of other participants.

3.3 Creative Accounting & Honesty

Multiple interviewees referenced concerns around what they called 'creative accounting' and honesty for both the projects generating carbon credits and the companies that use them.

At the project level, KA said '*creative accounting tricks…. have led to a huge increase in false solutions'* while SN said '*some or many projects might skew the numbers a little bit, or like, tweak the numbers… so that they show Oh, no, no, we're not profitable, we need this offsetting money'* both of which suggest that the organisation developing the projects are deliberately manipulating information in order to create an environment in which they can be a solution to a problem and bring in more finance.

At the level of the companies using carbon credits as offsets, NF referred to offsets as '*very cheap permits'* which allow companies to *'rid themselves of the guilt… and say we are the totally greenest, sustainable, big company in the world. Which I think is misleading'* while KA said that companies are '*following the same playbook as the tobacco industry, [by] casting doubt and misinformation… and casting the responsibility onto individuals'.*

4.1.4 Theme 4 - The Ethical Implications of Offsetting

NF takes a strong and sweeping position by stating '*I think their (offsets) fundamental existence makes them unethical'*, which is in part supported by GF's statement that projects have '*been awash with all kinds of ethical problems, injustice and corruption'.* Most utterances focussed on ethical dilemmas of projects themselves, with focus typically given to their location, which was perceived to be in the Global South, far away from the buyers of the credits which are typically companies in the Global North. However, NF did not explicitly state why it is problematic that these projects take place in the global south, but it can be assumed that they saw it as being further linked to colonialism and the ownership of land rights by the global north.

4.1 - Ethics & Justice

Only CW spoke about the ethics around only certain companies taking action while others do not, '*so the ones who are doing it [offsetting], pay the price and take the burden',* going on to suggest *'all companies set aside their 50, 60, 70 dollars or whatever it is per tonne. But they only need to do it if all companies are doing it'*. This highlights how they view the need for collective corporate action, whether voluntarily or through government intervention and regulation, rather than a system that allows inaction. NF spoke of '*ethics and double standards'* for different companies, mentioning they were unsure if companies below 10 employees could be eligible to offset their emissions or if all companies should follow the same system and '*we should apply the same ethical foundations towards every company'*.

4.2 - Colonialism

Both SN and KA spoke about issues of land grabbing for the purpose of generating carbon credits, KA elaborated that they believed the ITMO system enshrined in Article 6 of the Paris Agreement will also '*be a continuation of land grabbing and neo-colonialism'*. CW took a different perspective on this issue and focussed on people in the global south being paid to do a job, *'why shouldn't we get money for doing this? This isn't about colonialism at all. This is about [people in the global south] doing a service and why on earth should the global south do a service for the whole of the planet and not be getting paid decently for it?'*

4.3 - Commodifying nature

Interviewees viewed the trade of carbon differently, as part of a positive or negative system. SN sees economically valuing forest as a positive way to keep it standing as *'Otherwise… trees have more value when they have been cut down'*, highlighting the point that there is an economic incentive to remove trees for timber or expanding agricultural land, so it is good to provide a funding mechanism that gives payments to keep trees standing. CW also looks positively on the trade of carbon for money, stating that *'it's trade to do with helping them get money from their land. They already have that land, it's not wild… So it's like me and you having a garden and loaning out a few square metres of it.' (*In reference to project that involve small holder farmers).

On the other hand, GF describes the commodification of nature as a *'huge issue'* as the system is '*obsessed with standardisation… So, it becomes commensurable becomes tradable…And it completely loses sight of what we're actually dealing with here'* and NF sees commodifying nature as an extension of global capitalism which they see as the root cause of the climate change in the first place.

4.1.5 Theme 5 - Opinion Formation

This was developed as a theme as the purpose of this research was not just to understand what the interviewees think, but also why they think it. These results

will be combined with the theoretical frameworks presented in the theories section during the discussion in order to extract and analysie the utterance presented in this section of the results.

Different participants built their view based on various kinds, and levels, of expertise or the information they consume mixed with how they value different ways of thinking. This includes how interviewees framed their opinions around the pragmatic thing to do or how they used specific details regarding the workings of corporate GHG reporting and reduction, how the project producing carbon credits work compared with broader statements around 'businesses' or 'offsetting' as a broadly inclusive concept.

5.1 - Experience

All participants except NF referenced their own experience in their answers, CW made nine references to his/her own experiences being used to shape their answers and understanding of the topics discussed. CW and SN both referred to their experience as working with companies when explaining how they thought offsetting impacted other aspects of corporate climate action.

SN and KA both referred to their experience making them more or less frustrated or anxious, SN noted '*I was a bit more… radicle, a bit more critical. Now I work in the private sector and see lots of solutions and that companies are doing lots of things I'm a bit calmer'* where KA had made the opposite journey *'I studied engineering, learning about all the solutions to climate change and thought OK, why is nothing happening? And that's why it turned towards activism'*. The difference in outcome that their experiences gave them came from SA focussing on actions - *'seeing lots of solutions'* while KA looked for results and saw '*nothing happening*'.

5.2 - Information & Bias

Participants noted getting their information from different sources. NF and GF stated getting their information from mostly peer reviewed academic journals in political ecology or economics; CW referred to Carbon Pulse (a newsletter for the carbon markets) and WRI but that they were also influenced by information they hear from colleagues. KA and SN both mentioned getting information from various NGOs and SN specifically noted these sources coming up on their social media feeds. The different sources of information utilized by different participants gives some reason for their different views on the broader topic of offsetting while discussion with colleagues and social media feeds highlight the potential for the evolution of information bubbles. However, their social situation also gives reason to why they consume information from these sources. This creates a chicken and egg dynamic where it is hard to disentangle if they have their opinions because of the information they consume, or they consume information that already confirms their pre-existing opinion.

In relation to the bias in information received, NF said *'everybody is putting out propaganda. It's just like whether you think their propaganda fits with your worldview'* further suggesting that they read from sources '*with more bias that what you actually agree with'* suggesting they frequently try to push their own boundaries to challenge their own opinion. This statement shows recognitions of their own bias, and an understanding of the bias of other people, while trying to push their own limits by reading outside of their existing ideals. However, NF goes onto say they '*only read non-fiction'* which may indicate that they believe all the information they receive to be facts or truth?, rather than non-factual information that is used by others.

5.3 - Pragmatic

Pragmatism was given as a reason in support of offsetting by CW and SN in different ways. CW's pragmatism was mixed with a sense of urgency *'We need everything today that we possibly can… in a pragmatic way, we need to do that [offset]today",* SN showed some support for allowing fossil fuel companies to offset as '*they're contributing to climate finance which is much needed climate finance'* by doing so.

While all participants discussed some of the limitation of offsetting projects, some justified their use on a basis of pragmatism, while not shying away from their imperfections. In response to questions about the appropriateness of intensity based emissions reduction targets, CW responded with '*It's a tricky one….if we need something, then we need the companies that are supplying that with the lowest carbon emission'* demonstrating they believe we must balance human needs with developing low carbon solutions in a pragmatic manner, rather than rendering intensity based reductions as absolute.

5.4 - Scale

Multiple interviewees brought up issues of scale relating to both the size of companies using offsets and the size of the projects, with large companies and large offset projects being highlighted as problematic. CW stated that *'If we allow oil companies to continue business as usual by offsetting, then that's not doing us or the planet or climate any favours',* while KA directly referenced fossil fuel companies 21 times throughout the interview, showing that they view corporate climate action through a lens of the few big polluters, rather than the many more smaller companies that make up the private sector. KA also noted that *'there's a small amount of offsetting schemes that may be beneficial. However, on this large scale, offsetting as such is such a tremendous risk.'*

5.5 - Specific

Different participants delve into the specifics of different ideas and criticize generalisation where it is deemed appropriate. For example, CW states *'critique is too broad brush…activism is always broad brush. But unfortunately, it's not*

moved, not necessarily helping us forward.'. Their critique of broad-brush critique is mirrored by their many references to their own experience, it may be that the level of resolution the interviewee sees is not reflected in the resolution and specificity of the critique faced by offsetting and corporate climate action.

Meanwhile, NF becomes specific about the information they use to form their opinions, citing the need to engage with more radicle narratives as most literature and solutions provided are from a rather narrow school of thought, which they articulated as '*economic dynamism, and growth, adjust, and blah, blah, blah'*. The point they make is that there is more variation to be found at the more extreme margins of discourses than there is in the majority of texts.

All participants made specific remarks in some areas, demonstrating different depths of knowledge in different areas. For example, KA had multiple specific examples of poor practice by the corporate sector which they used to justify their typically critical opinion about offsetting while GF made more detailed comments about issues about the political ecology of carbon removal, but still emphasized the need for it to meet goals set out in the Paris Agreement.

4.2 Phase 2 Results – CDP Data Analysis

In this section of the paper each of the hypotheses are laid out and the result is given in the form of a chart or graph alongside the results and parameters of the statistical test performed. This is done to clearly answer the first research question and try to discover *What is going on?* Do companies that purchase carbon credits engage more than those who do not across a broad range of climate related issues?

4.2.1 Engagement and Activities to Reduce Emissions

Hypothesis *a* – Internal Carbon Price
Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to have an internal carbon price compared with those that do not purchase carbon credits.

An internal carbon price is money a company may voluntarily set aside per tonne of CO_2e emitted to invest in climate change mitigation activities. An internal carbon price can be set arbitrarily by the company or could follow third party figures such as those set by the EU's ETS, which reached over €100 per tonne in 2023 (Hodgson and Sheppard, 2023), or from academic research which recently suggested a price of $185 per tonne of CO_2 (Rennert et al., 2022).

The percentage of companies that have an internal carbon price is significantly higher (+28,46%, $p<0.05$) for companies that purchase carbon credits compared with companies that do not purchase carbon credits (Chart A).

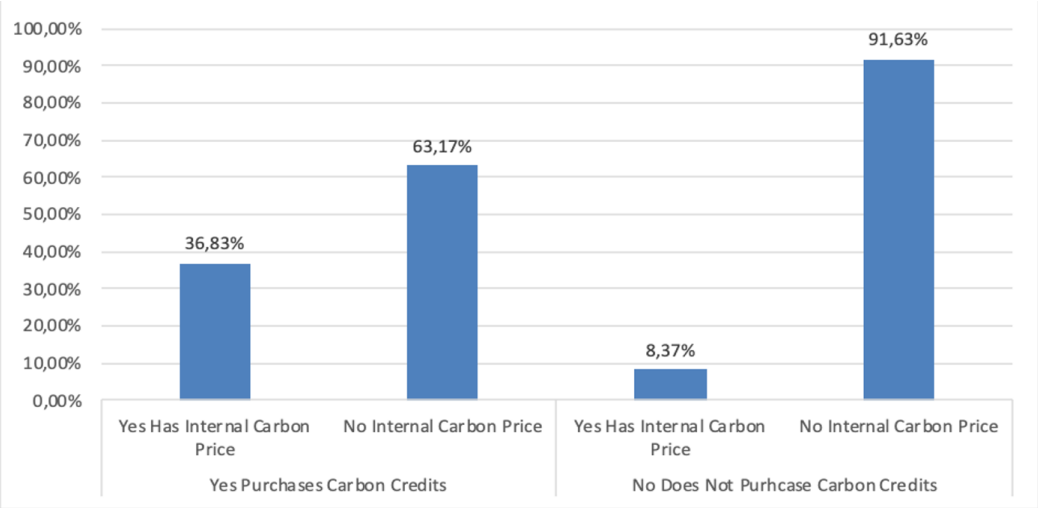


Chart A Differences in the frequency of companies having an internal carbon price broken down by if they do or do not purchase carbon credits.

Hypothesis *b* - Value Chain Engagement
Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to engage with their value chain on climate related issues compared with those that do not purchase carbon credits.

The percentage of companies that engage with their value chain on climate related issues is significantly higher (+13,58%, $p<0.05$) for companies that do purchase carbon credits compared with companies that do not purchase carbon credits (Chart B).

Further findings include companies that do not purchase carbon credits are more likely to not engage with any of their value chain on climate related issues or to only engage with their customers. Companies that purchase carbon credits are more to engage 'Other partners in the value chain, customers, and suppliers'.

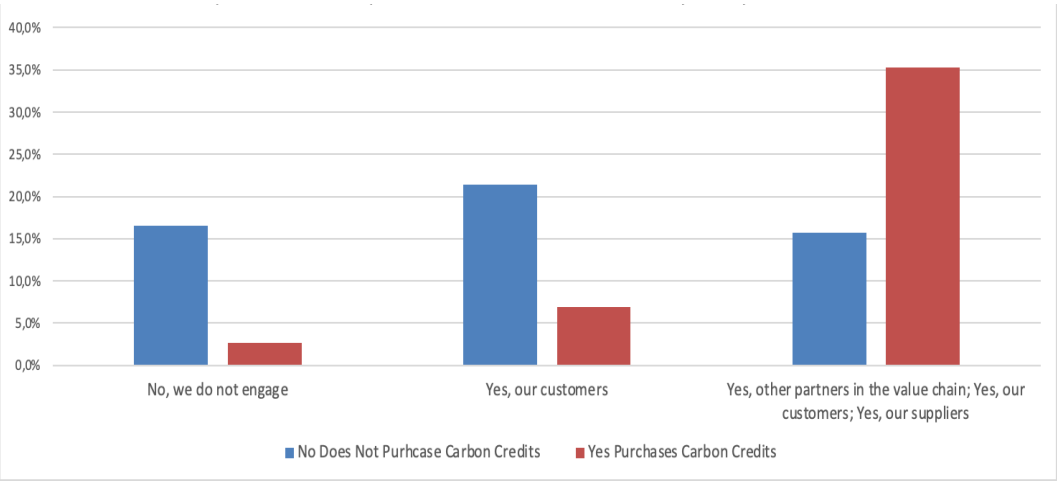


Chart B Differences in the frequency of companies that engage with different part of their value chain broken down by if they do or do not purchase carbon credits.

Hypothesis *c* – Emissions Reducing Activities.
Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to have emission-reducing activities in place compared with those that do not purchase carbon credits.

The percentage of companies that have emissions reducing activities in place is significantly higher (+14,62%, $p<0.05$) for companies that do purchase carbon credits compared with companies that do not purchase carbon credits (Chart C).

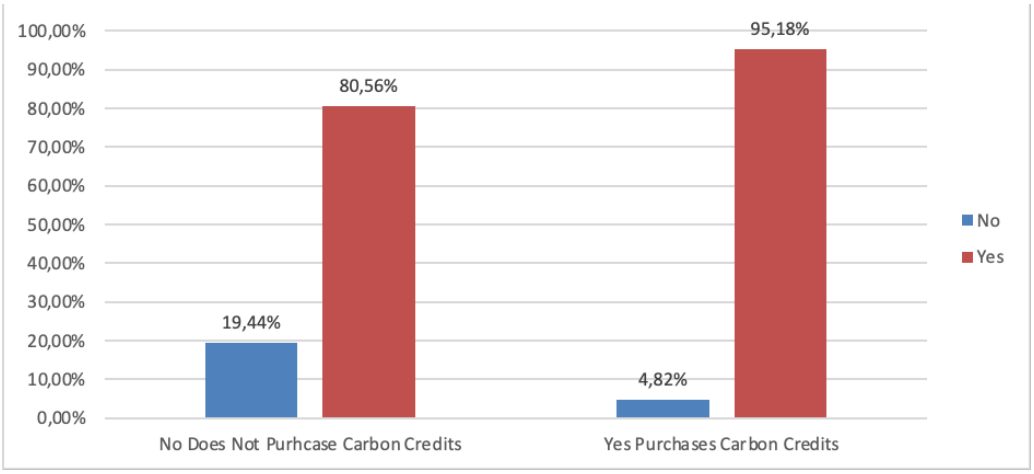


Chart C Differences in the frequency of companies that have emissions reduction activities in place broken down by if they do or do not purchase carbon credits.

4.2.2 Measurement and Disclosure of Emissions

Hypothesis d – Measure and Disclose Scopes 1 and 2

Reject the null hypothesis. Companies that do not purchase carbon credits are statistically more likely to measure and disclose all emissions from scopes 1 and 2 compared with those that do purchase carbon credits.

The percentage of companies that measure and disclose all of scopes 1 and 2 is significantly higher (+7,65%, $p<0.05$) for companies that do not purchase carbon credits compared with companies that do purchase carbon credits (Chart D).

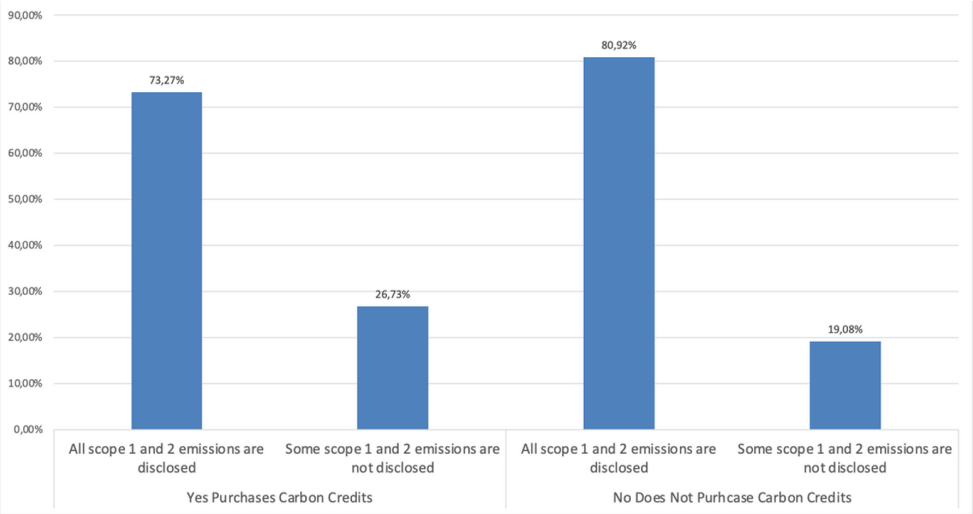


Chart D Differences in the frequency of companies measuring and disclosing all of scopes 1 and 2 broken down by if they do or do not purchase carbon credits.

Hypothesis e – Scope 3

Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to measure more scope 3 categories compared with those that do not purchase carbon credits.

The percentage of companies that have calculated all relevant scope 3 categories is significantly higher (+19,33%, $p<0.05$) for companies that do purchase carbon credits compared with companies that do not purchase carbon credits (Chart E1). The breakdown of the measurement of each scope 3 category is given in Chart E2.

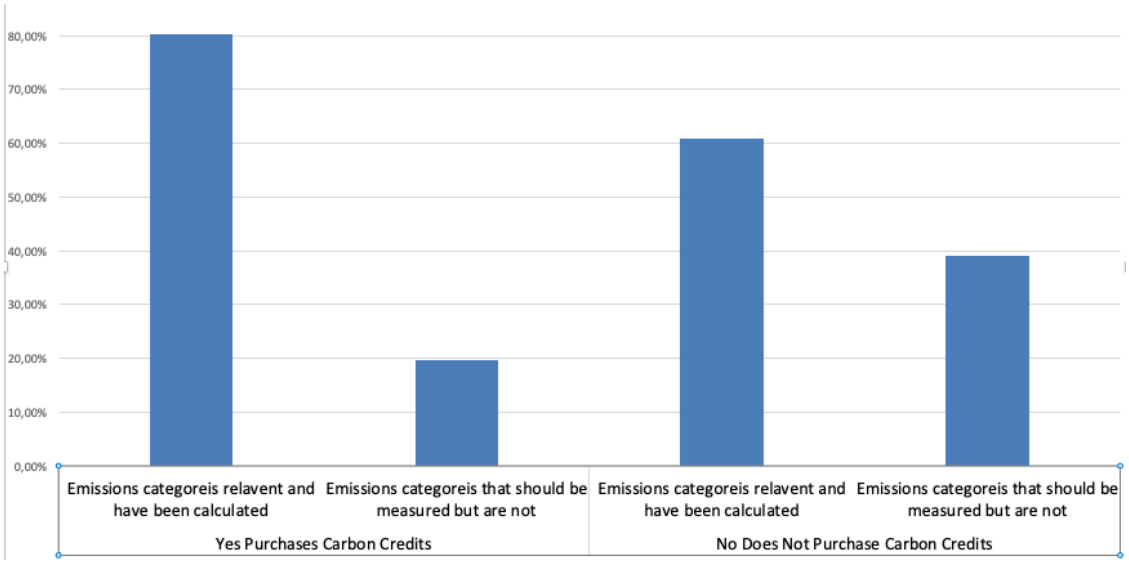
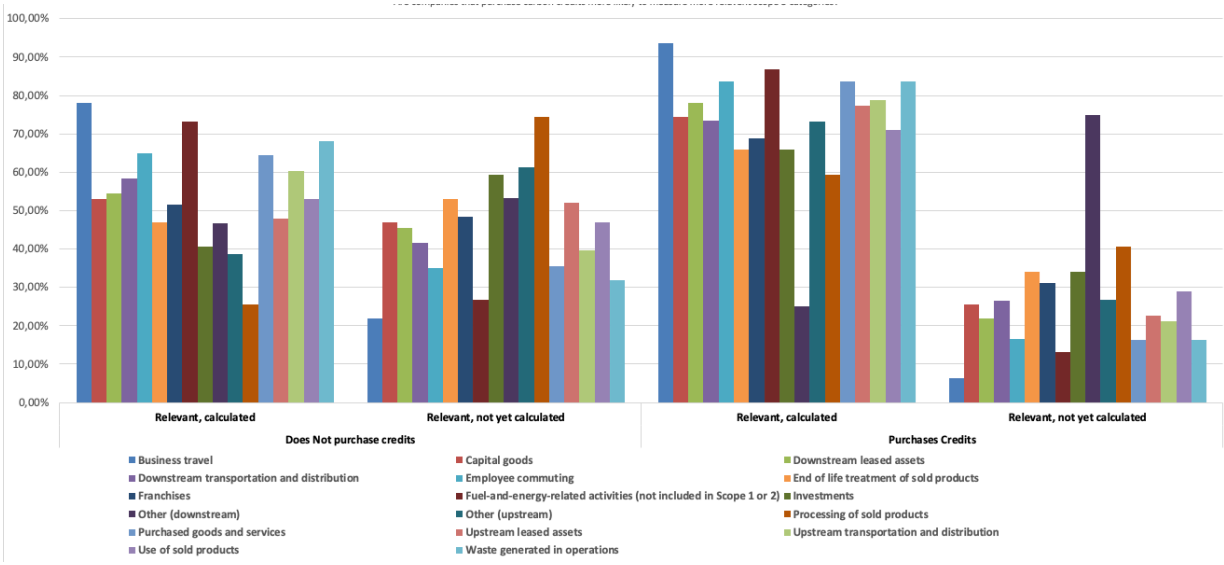


Chart E1 Differences in the frequency of companies that have calculated all relevant scope 3 categories broken down by if they do or do not purchase carbon credits.



E2 Differences in the frequency of each scope 3 category calculated broken down by if they do or do not purchase carbon credits.

4.2.3 Target Setting

Hypothesis *f* – Setting Emission Targets

Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to set emissions targets compared with those that do not purchase carbon credits.

The percentage of companies that have set some form of climate target is significantly higher (+13,76%, $p<0.05$) for companies that purchase carbon credits compared with companies that do not purchase carbon credits (Chart F).

Not only are they more likely to set goals, but they are also more likely to be absolute goals or a combination of absolute and intensity goals. Companies that do not purchase carbon credits are more likely to set only intensity goals.

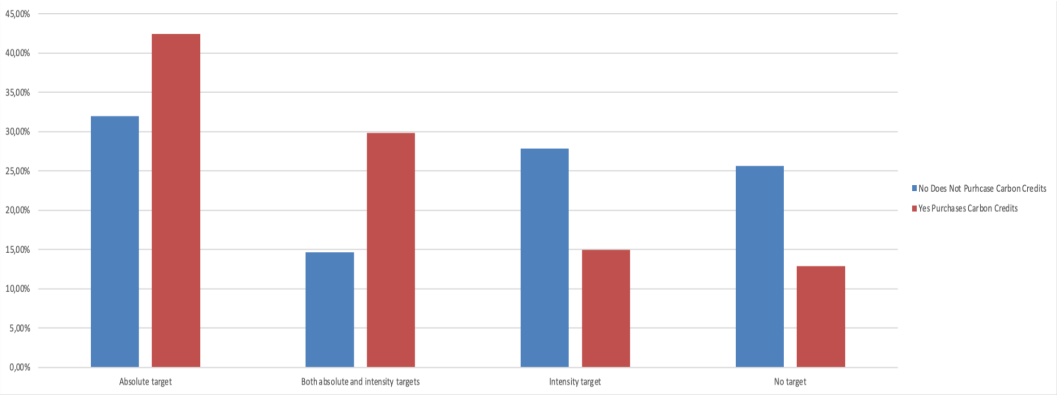


Chart F Differences in the frequency of companies that set different levels of climate goals broken down by if they do or do not purchase carbon credits.

Hypothesis *G* – Target Type and Science Based Targets
Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to set targets that are approved by SBTi compared with those that do not purchase carbon credits.

The percentage of companies that had targets approved by SBTi was significantly higher (+16,54%, $p<0.05$) for companies that purchased carbon credits compared to the companies that do not purchase carbon credits (Chart G, bar 2).

It can be seen in bar 1, companies that do not purchase carbon credits are more likely to consider targets not approved by SBTi to be science based, even though they have not been third party verified (Chart G, bar 1). Companies not purchasing carbon credits are more likely to report planning to begin with science-based targets in the next two years (Chart G bar 3), but the difference may be due to more companies already purchasing credits have already completed this step.

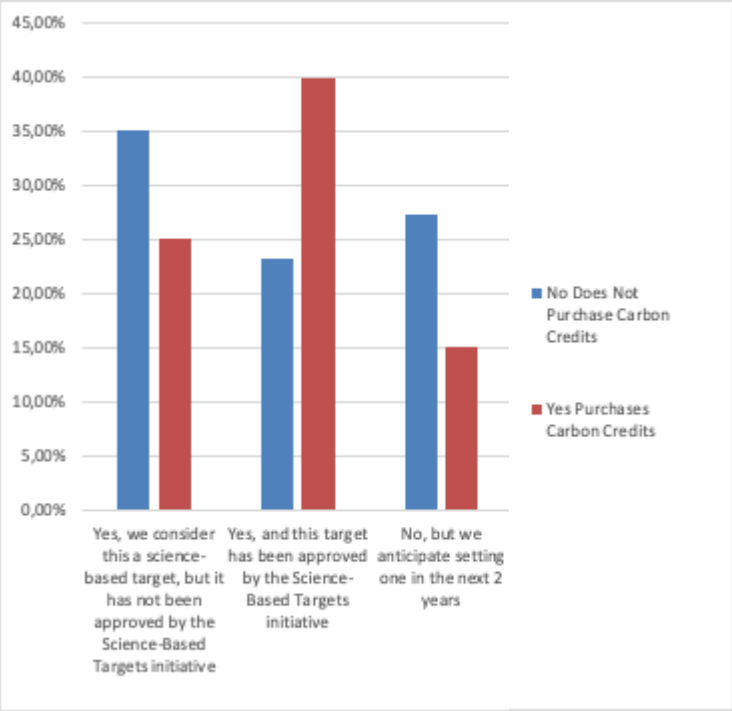


Chart G Differences in the frequency and type of company target setting broken down by if they do or do not purchase carbon credits.

4.2.4 Environmental Claims and Governance

Hypothesis *h* – Board Level Oversight
Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to have board-level oversight of climate-related issues compared with those that do not purchase carbon credits.

The percentage of companies that have board level oversight of climate related issues is significantly higher (+9,03%, $p<0.05$) for companies that purchase carbon credits compared with companies that do not purchase carbon credits (Chart H).

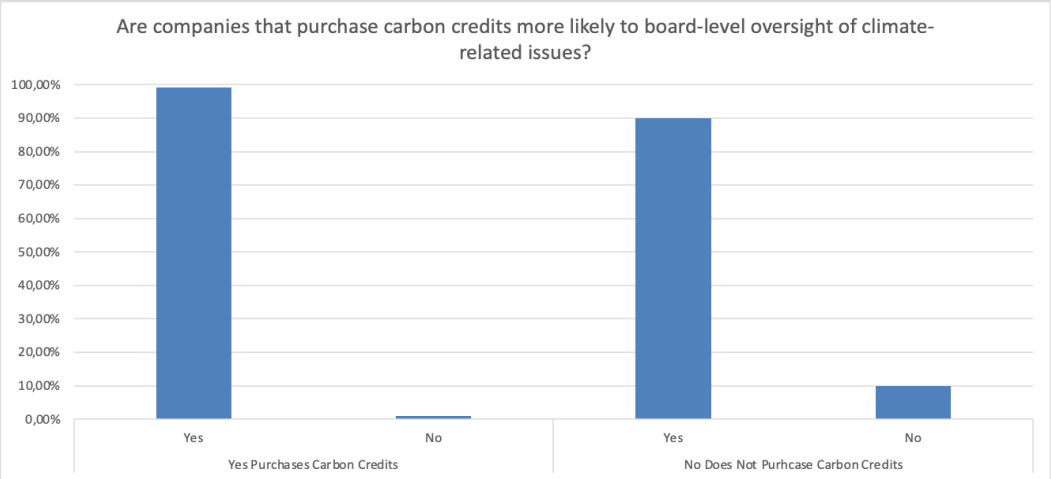


Chart H Differences in the frequency of companies that have board level oversight of climate related issues broken down by if they do or do not purchase carbon credits.

Hypothesis *i* – Carbon Related Claims

Reject the null hypothesis. Companies that purchase carbon credits are statistically more likely to classify their existing goods/services as low-carbon products or enable a third party to avoid GHG emissions compared with those that do not purchase carbon credits.

The percentage of companies that claimed to have goods/services they sell that are low carbon or enable a third party to claim avoided emissions was significantly higher (+24,21%, $p<0.05$) for companies that purchased carbon credits compared to the companies that do not purchase carbon credits (Chart H).

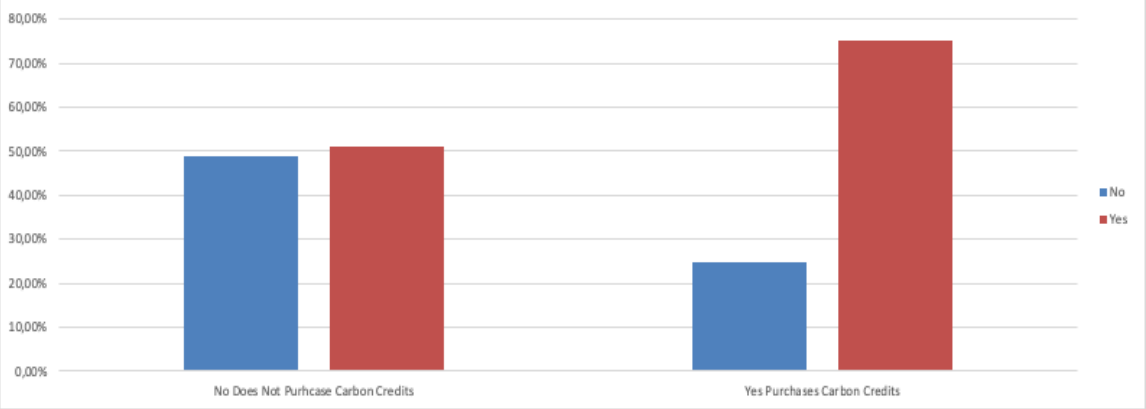


Chart I Differences in the frequency of companies claiming to sell low carbon goods/services or enable a third party to claim avoided emissions broken down by if they do or do not purchase carbon credits.

Of the 9 results given above, all results were significant and the only hypothesis where companies that do not purchase carbon credits outperformed those do is hypothesis d, regarding measuring and disclosing all of scope 1 and 2. Hypothesis I is not graded as positive or negative.

5. Discussion

This section will go into detail and give greater analysis to some of the points raised in the TA, using bounded rationality and situated knowledge to understand the results before bringing together the results of the quantitative and qualitative analysis.

This section will clearly return to the overarching aim: to find out more about carbon offsetting and its relationship with climate action from different angles, including: if the purchase of carbon credits is associated with other behaviours; what different people thing about the relationship between offsetting and climate action; and why they think it.

5.1 Using Bounded Rationality & Situated Knowledge to Understand Theme Analysis Results

Bounded rationality and situated knowledge both suggest that any individual's perception of reality is limited. Humans can only ever take in a subset of all the relevant information (Simandan, 2019) and thus our knowledge and understanding will forever be incomplete, limited by our own perceptions and the perceptions of those who made the knowledge that came before us (Haraway, 1988).

The results from interviews show how boundaries of knowledge impact opinions on things people are less familiar with. Figure 6a displays the relationship between sector specific experience and the belief in the premise that carbon offsetting is beneficial to achieving climate goals. It is not surprising to see people with more direct experience with offsetting are more likely to think the work they do is making a positive contribution towards achieving climate goals, while those who have less experience believe the contrary. There is also a relationship between believing the global economic system to be a root cause of climate change and claiming that projects producing carbon credits have a negative impact on local people (Figure 6b).

It could be expected that if there was more overlap between participants having personal experience offsetting; or if they all had a similar level of education

around the links between economic growth and GHG emissions, their opinions would be more homogenous. However, their different backgrounds and knowledge bases are reflected in the different opinions expressed. This is because the knowledge of each participant is situated to their life and thus limited to only a subset of relevant knowledge.

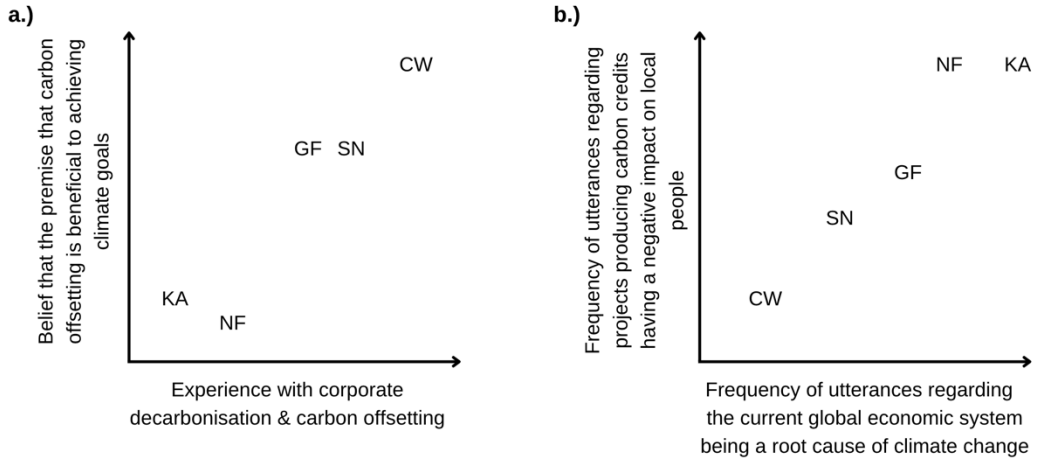


Figure 6a. The relationship between experience with corporate decarbonisation and carbon offsetting and the belief that carbon offsetting is beneficial to achieving climate goals; and 6b. the relationship between the frequency of mentioning the economy as the root cause of climate change and the frequency of utterances regarding projects producing carbon credits to have negative impacts on local people[5].

The concept of heuristics presented by Gigerenzer and Selten (2002) is also visible, where people use their pre-existing knowledge to shape their opinions around issues they know less about. As all interviewees reported getting their information from different sources, it is not surprising the see their beliefs about certain issues where their knowledge is limited also differed.

The opinions given by CW are examples of heuristics in the fact they do not see projects generating carbon credits to be colonial, but a fair exchange of money for a *'valuable service'*, even though there is evidence that would refute their opinion (Fisher et al., 2018; Lyons and Westoby, 2014). Meanwhile NF and KA believe offsetting projects perpetrate '*land grabbing'* and '*colonialism*', despite there being evidence that would suggest projects have been beneficial to local people and with their prior informed consent (Asquith, Vargas Ríos and Smith, 2002; Stringer et al., 2012). In these cases, interviewees are using the personal experience or pre-existing knowledge to form opinions about an incredibly large and complex phenomena, without knowing all there is to know about the issue. There are always exceptions to the rule and a large amount of nuance can be found between 'good' and 'bad' (or 'better' and 'worse') projects.

[5] There are no axis labels as these figures just illustrate the relationship of qualitative data and do not display quantitative data, interviewee position on the chart has been decided by quantifying specific utterances and weighting overall opinions

Heuristics are linked to where people receive their information. Interviewees that mentioned projects being colonial reported getting their information from NGOs, while CW, who believed the projects to be a useful and an example of fair trade reported getting their information from the World Resources Institute and Carbon Pulse[6]. The observed difference in opinions around colonialism is likely linked to the different information being used to understand the topic and gives boundaries to their rationality. Moreover, the knowledge they use to build their opinion is situated in different schools of thought using different values and norms. The information that is being used to build the limited opinions of interviewees (and all people) is also limited as it contains limited perspectives and preconceived ideas.

Different sources of information possess certain bias that is likely to influence how the reader forms their opinions about other related issues, this was mentioned directly by NF. A combination of information received, and social interactions held (Moussaïd et al., 2013) are factors of bounded rationality that have a compounding effect on how opinions are formed (Gerard and Orive, 1987). Thus, CW's pro-offsetting sources of information combined with their frequent interactions with projects that produce carbon credits and companies that use them explains their opinions; while KA's opinion is built on NGO publications and the social interactions they have as an activist. All people are likely to conform to the norms and options of the groups they spend their time with (Gigerenzer and Selten, 2002) which helps to gives more reason for different opinions to be held by people who exist in different social groups.

Both CW and SN drew from their personal experience of working with companies and offsetting projects they viewed to be positive examples. Moreover, SN noted feeling much more anxious about climate change until they saw the work being done by companies to reduce their emissions and the by projects to remove GHGs from the atmosphere, giving an example of how experience has changed a person perspective. This is an example of building an opinion through anecdotal evidence, rather than searching for more robust forms of evidence, and is common in complex situations where subjectivity and interpretation are key (More and Stilgoe, 2009). KA on the other hand seemed to be previously relying more on anecdotal evidence before changing their stance after seeing more robust forms of scientific evidence which showed atmospheric GHG concentrations continuing to rise year on year.

Information used to construct opinions has varying perspectives baked into it. Publications created by NGOs or academic research often do have direct contact with projects producing carbon credits but it may be limited to just a single or few visits to the project site purely for research with predefined goals (Fischer, Giertta and Hajdu, 2019), compared with a more long-term relationship that may occur between companies and the projects they purchase carbon credits from. Alternatively, researchers have used remote sensing methods to monitor forest carbon stock (Coffield et al., 2022) which resulted in significant controversy

[6] a newsletter for carbon markets actors

around REDD+ (Reducing Emissions from Deforestation and Degradation) projects being published in the Guardian in 2023 (Greenfield, 2023). The method used by Coffield *et al* (2022) was refuted for being inaccurate by project developers (Thiel, 2023) and other research has found it to be misguiding without the application of synthetic controls (Rana and Sills, 2018) as remote sensing typically measures greenness, not carbon. The different results from research into projects producing carbon credits is yet more evidence towards bounded rationality and situated knowledge, it is the methods applied combined with the context and aims of the researcher that generate incomplete knowledge.

Situated knowledge scholar Simandan (2019) also highlighted how some opinions may be unacceptable in our social groups that define what we class as knowledge, truth or fiction. This is an important aspect in understanding the opinions of the different interviewees as their social situations and workplace environments differ substantially. Humans are social creatures, surrounding ourselves with people who think the same as we do and finding information that confirms our pre-existing beliefs (Gao, Do and Fu, 2018). For example, CW is a CEO of a company selling carbon offsetting services, while KA works as an activist for a large environmental NGO. If CW adopted the ideas of KA in their work setting and put carbon offsetting in the category of *'false solutions'*, they may find themselves in a socially awkward situation and likely lose their job. Meanwhile, if KA, surrounded by environmental activists highly concerned with scenarios of land grabbing and neo-colonial thinking, was to start explaining carbon offsetting as like someone '*renting out some space in their garden'*, they may find it difficult to connect with others as their opinion would also stray outside what would be classed as socially acceptable within their cohort.

Moreover, the examples given above all fit securely into Haraway's definition of situated knowledge, that all knowledge comes from a perspective and only by confronting the limitations of that perspective can we get closer to objectivity. Some interviewees referred to the limitations of their knowledge (showing awareness of bounded rationality) and other utterances addressed perspective in the form of bias (showing awareness of situated knowledge). It is important to be aware of these factors and how complete any opinion can really be in the face of the tiny subset of knowledge one can comprehend in comparison to the incomprehensible quantity of information out there.

It is difficult to decipher exactly what comes first in this matrix of opinions, sources of information and social bonds. Do people form their options after hearing about an issue from their peers, then consume information that confirms their newly held belief? Or do they already hold a belief, and then find information and social groups that confirm and build upon it? But more importantly, how willing, or able are people to change their opinions through changing the bounds of their rationality and the situations in which they find knowledge?

5.2 Discussing the Quantitative Results and How they Align with Interviewee Responses

This section will work to combine the quantitative and qualitative results to present a rounded picture of how companies are behaving and how this is aligned with opinions expressed by interviewees. This is following the critical realist school of thought to try and avoid reductionism and include multiple methods and types of data to gain a more complete understanding of phenomena.

5.2.1 How Are Companies Behaving And Is It A Continuation Of Business As Ususal?

A central part of the interviews was getting participants to define BaU, a phrase that has been used often in media and research (Hausfather and Peters, 2020; Barry, 2021; Wright and Nyberg, 2017; Genshaft-Volz, 2023), and has received varying definitions by interviewees. While some referred to BaU as being a company that only offsets emissions but makes no effort to reduce them; others defined it as a 'continued extractivist mindset' with reference to offsetting propping up a problematic global economic system.

This is important to understand as it shows that different people set a different bar for what is acceptable climate action and what the role of companies can be in achieving broader climate goals. For individuals that see the continuation of the current economic system as being incompatible with the achieving the Paris Agreement goals, the level of decarbonisation made by a company, or if they choose to offset their emissions or not may be superfluous; because they still exist within a wider system that is deemed incompatible with a future stable climate.

These findings would indicate that any non-radicle behaviour by companies would be seen as an incremental form of change, while academic study could lead individuals to have a greater desire for systemic transformation. While transformation of the economic system may be desirable to achieve climate goals (Roggema, Vermeend and Dobbelsteen, 2012), it is no mean feat and some have called pragmatism a major obstacle in achieving a meaningful transformation (Turnhout and Lahsen, 2022).

The quantitative results show that companies that do purchase carbon credits are more likely to advertise their goods/services as low carbon or enable a member of their value chain to claim this. Companies using environmental statements in marketing are typically doing it to sell more or project an image of quality and environmental sensitivity (Boztepe, 2016). Further, environmentally concerned consumers have a greater inclination to purchase green products (Ulusoy and Barretta, 2016); all consumers would rather purchase a product with a green claim than without one (Aagerup, Frank and Hultqvist, 2019) and research in the

Nordics demonstrated an increased willingness to pay for eco-labelled goods (Bjørner, Hansen and Russell, 2004). This means there is a clear business reason for companies to engage with environmental marketing: consumers want to buy it and they are willing to pay more for it. From this, it could be argued that this type of marketing is incompatible with achieving our global climate goals, as the creation and sale of more products relies on continued extraction of natural resources at the expense of further transgressing planetary boundaries (Kosoy et al., 2012).

On a systemic level, an increase in economic output was a key warning behind the Limits to Growth publication (Meadows et al., 1972), which highlighted the issue of exponential economic growth putting pressure on what we now define as planetary boundaries (Butler, 2017). Even if products have a low carbon footprint, or if their footprint has been offset, the resources used to produce them and the impact of their production and use on the other eight non climatic planetary boundaries is still likely to be negative. Thus, always aiming to increase sales of goods and services is likely to be detrimental to achieving climate goals and remaining in the safe space of the planetary boundaries. We do not have infinite resources, the never ending increased production and sale of goods must come to an end, either through running out of material input, or the build up of damaging externalities exacerbating climate change and damaging environmental health beyond acceptable levels.

Doughnut Economics is a suitable a-growth idea that addresses this issue that all societies need a certain quantity of resources to function, but in achieving that level of resources they must not overstep planetary boundaries and find harmony in the safe operating space in the middle of the doughnut (Raworth, 2017). This idea was hinted at by CW in their statement '*if we need something, then we need the companies that are supplying that with the lowest carbon emissions'.* The difficulty is finding and promoting the sale of products that have a lower environmental impact, where their sales and use do not overstep the meeting of societies needs into superfluousness, but also ensure that the increase of their sale in balanced out by the decrease in sale of higher impact products.

When the continuation of the existing economic paradigm is seen by some as the main driver of climate change, it explains why the idea of commodifying nature in the form of carbon credits is more troublesome for some than others. The sale of carbon stored within trees is viewed negatively due to market-based mechanisms being unfavourable. However, other respondents made statements about how by commodifying nature, we can preserve it. A forest has a huge economic potential as timber or to be converted to farmland, if it cannot provide an income to local people through carbon, they may see more reason to cut it down. This idea is incredibly context dependant, as some land holders may not be using all their land, in which case gaining carbon payments faces no negative trade off, while for others it may be asking people to change their food systems and negatively impact on food security. It seems that arguments for dismantling the current economic system are at odds with arguments for pragmatism regarding how best to remove and store carbon or how to also conserve forest ecosystems.

This is in line with findings from research on ecological restoration which identified values, beliefs and human nature relationships that fell into clusters of 'virtuous stewardship' which foregrounds human responsibility to care for nature and 'pragmatic wise use', which foregrounds the use of nature by humans and the importance of practical considerations (Hertog and Turnhout, 2018). However, this research is still limited by perspective and according to critical realism is still inseparable from the bias of the researchers that created it and the political ecology school of thought it belongs to (Bhaskar, 2008).

Aside from economically valuing nature, a method that proponents claim encourages it's protection, there are also systems of carbon taxation such as the EU Emissions Trading System for companies, which covers 40% of emissions within the EU (Zhang and Wei, 2010) and the new EU Carbon Border Adjustment Mechanism (European Commission, 2023) which aim to make it so expensive to emit GHGs, companies pushed to reduce their emissions.

Companies can also self-impose a carbon price, where they make policy to set aside a given amount of money for every tonne of CO_2e emitted. There are various reasons a company may choose to do this, such as: risk management and strategic planning to work out long term investments (Bento and Gianfrate, 2020). Research on 500 American companies found that the use of an internal carbon price reduced emissions per employee and per revenue by 13.5% and 15.7% retrospectively (Zhu et al., 2022), while a similar study on Japanese companies found the combination of an internal carbon price and signing up to the SBTi had a positive and synergistic impact on emissions performance (Kuo and Chang, 2021). However, it is important to note that reducing emissions per employee and per revenue is still an increase in total net GHG emissions from a company, and setting science-based targets does not always equate to a company achieving the emissions reduction required for a 1.5□C world.

The data used in the analysis does not give information on the economic value of the chosen carbon price, and the question of why it has been adopted is beyond the scope of this research. However, due to the positive association between an internal carbon price and emission reductions provided in other studies, setting an internal carbon price should be viewed as a positive step companies can take towards reducing their emissions.

The result of the data analysis shows that companies that purchase carbon credits are more likely to have an internal carbon price than those that do not. Although this could be classified as a positive step, the thoughts given by some interviewees would likely put this in the category of incrementalism; rather than contributing to the transformation they feel is needed, this continues along as BaU.

5.2.2 Companies that purchase carbon credits are more likely to put more effort into reducing their emissions, so why is offsetting looked at negatively?

All interviewees noted that reducing the quantity of GHGs emitted into the atmosphere is a certain requirement if we are to suitably mitigate climate change, and the IPCC confirms that this is required (2022a). Some participants referred to companies using offsets instead of reducing their emissions, while others noted that from their experience companies that offset their emissions also work to reduce them. An article written by two individuals that have worked in the creation of some of the largest carbon credit standards state that only companies that both reduce emissions from their value chain while also paying to remove emissions are doing enough to mitigate their emissions and be part of the solution (Höglund and Hewlett, 2023).

However, the results show that companies that purchase carbon credits are more likely to have emissions reducing activities in place. This finding provides evidence against the idea that companies offset emissions rather than making effort to reduce them.

Companies that purchase carbon credits are more likely to engage with their value chain, meaning they are not just working on reducing their direct scope 1 and 2 emissions, but are working with other actors to reduce emissions in scope 3. By focussing on multiple actors in the value chain, emission reductions can be greater and lead to the transformation of whole sectors and industries. Engagement in the value chain could constitute things such as selecting low emissions shipping of goods (MAX Burgers, 2023) or choosing internet servers that are powered by renewable energy and feed excess heat into district heating system (Kivra, 2023).

Companies that do not purchase carbon credits are more likely to only engage with their customers on climate related issues. Putting the onus of responsibility onto the consumer was identified as *greenshifting* and is a form of greenwashing according to Willis et al., (2023). Examples of how this could include when airlines offer passengers the options to offset the emissions of their flight (Norwegian Airlines, 2019) or how fossil fuel companies have individualised responsibility (Supran and Oreskes, 2021).

Part of the reason for this is that companies that purchase carbon credits are more likely to have a better understanding of their value chain because they measure more relevant scope three categories. Companies that purchase carbon credits are almost 20% more likely to have measured the climate impact of their purchased good and services and an average of 17% more likely to understand the impact of the upstream and downstream transport, which would give them a better understanding of the climate impact of their value chain.

Following on from the need to reduce emissions is what type of targets companies set to reduce their emissions. Only NF and SW brought up target setting in their responses; NF referred to intensity-based targets being a form of '*incrementalism and …used as an excuse not to tackle to root cause*' while SN referred to her experience of helping companies set climate targets, also noting that setting ambitious climate targets is an indicator a company is not following a BaU plan (by their own definition).

Companies that purchase carbon credits are more likely to have targets that are approved by SBTi while companies that do not purchase carbon credits are more likely to not have set any climate targets at all or to only have intensity-based reduction targets.

However, it is important to reiterate that SBTi approved targets are not always good (New Climate Institute, 2023), and in all cases, targets represent intended action, not actual reductions in GHG remissions. Moreover, while intensity-based targets have been criticised by some participants in this study and do have potential for prioritising economic growth over a living planet, there are some sectors (such as start-ups providing renewable energy or plant-based foods) where intensity based targets make the most sense. If all reduction targets must be absolute, then the composition of companies will remain the same into the future as all new companies will inherently be increasing their emissions from the day they begin.

Generally, it has been found that leadership from the board of companies is essential for addressing sustainability issues such as climate change as it is the board who steer the direction of the whole company (Ramani and Ward, 2019). Although the data does not provide information on how engaged the board is with climate related issues, the results show that companies that purchase carbon credits are more likely to have board level oversight of climate related issues. It is possible that the difference in board level oversight is the predictor variable for all other variables measured, meaning that it is decisions from the board that are making companies engage with SBTi, adopt emissions reducing activities, measure more scope 3 emissions etc. However, determining this statistically will be difficult as the method for this is a multiple regressions analysis, which only works for continuous data where the data set available was mostly categorical.

The only point where companies purchasing carbon credits perform worse than companies that do not is the finding that companies that do not purchase carbon credits are more likely to measure and disclose all scope 1 and 2 emissions from all locations and premises. This finding bucks the trend, however an explanation for why the results are this way is not clear, and the data set does not give any further information on the types of gasses, businesses or locations that are excluded. One possible explanation is that units within a larger company structure report their own emissions, so emissions are not double counted between parent and daughter companies reporting to CDP, however further study is needed to fully explain why this result is an outlier to the rest.

6. Conclusion

Critical realism states that ontology determines epistemology: the way things are affects the extent to which they can be known and one research method is insufficient to understand any single phenomena (Bahskar, 2008). This is why this thesis has used a mixed methods approach to bring together different ontologies and epistemologies to help understand the relationship between carbon offsetting and corporate climate action.

The practice of corporate carbon offsetting is a contentious mechanism that is only growing in prevalence. Quantitative data analysis using the largest data set available found that in general, the purchase of carbon credits is used in addition to, rather than instead of other strategies to measure and reduce emissions. However, the bigger picture of how continuing to use market-based mechanism to address the biggest market failure in history is much more difficult to measure. Concerns from academics and NGOs about the logical flaws of offsetting emissions and the opportunity for ethical issues in projects that produce carbon credits must not fall on deaf ears.

The quantitative data analysis has shown that on seven out of eight tested hypotheses, companies that purchase carbon credits are statistically more likely to do the behaviour that can be considered more advantageous or a step towards achieving broad climate goals. This gives evidence against the idea that offsetting emissions is used instead of working to reduce emissions, or that offsetting is used to avoid taking responsibility.

To gain more information in this area, it could be useful to select a subset of the 2582 companies analysed and delve deeper into their sustainability related communication or interview relevant employees to see how they view carbon credits in their overall climate strategy. This type of research could help to give a reason why the results of this thesis have been observed.

The qualitative results show that different people have vastly different opinions around the same phenomena. Ranging from what can be classed as BaU; if projects producing carbon credits are colonial or empowering to local people and how much the underlying global economic system is at odds with the existence of a climate that is fit for human habitation.

Opinions around the need for a transformation of the economic system set the scene for what can be classed as BaU and what can be seen as part of the solution to climate change. Thinking projects that produce carbon credits are colonial and

bad for local stakeholders is linked with thinking that companies using them to offset their emissions are also bad and using offsetting to avoid taking real responsibility for their emissions.

The reason for the different opinions can be put down to the different information utilized to form their opinions and the social groups they surround themselves with that help to create and reinforce values and opinions. This fits clearly into the ideas of both bounded rationality and situated knowledge in that all knowledge is built upon just a subset of all relevant information and that no knowledge is free from values, ideologies and perspectives.

Basing opinions around personal experience means the focus is drawn away from big picture thinking about systemic issues. Interviewees that draw their opinion from reading literature focus on the systemic level and have little experience of dealing with companies or projects that produce carbon credits and those who have experience may be naïve to the systemic problems that underpin their proposed solutions.

People who are negative towards offsetting frame their ideas around oil companies and airlines, the biggest emitters that are incompatible with a 1.5□C future. A small minority of companies cause the majority of emissions, but this small number of companies have a disproportionate influence on the way opinions are formed for some people. However, it should be noted that it is these high emitting fossil fuel and aviation companies that must be dismantled or completely transformed if we are to reach the goals of the Paris Agreement, and thus debating the behaviour of millions of small companies is superfluous to the discussion when it is arguably only the behaviour of large emitters that counts.

Overall, it is hoped that this thesis can contribute to the knowledge base on corporate climate action and carbon offsetting and provide ground for greater collaboration in this space. Only through uniting those of different viewpoints, and by measuring complex phenomena with a variety of different methods can an optimal path forward be found. Knowledge in this space is still limited, and will always be laden with values, but by continuing to understand what is taking place and how people understand it, we can keep moving towards a safe climate for our future.

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