Examining Carbon Offset Standards from an Irish Perspective

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Contents

Abstract

This paper examines the various standards under which carbon credits are issued under today. The paper examines how businesses may experience pressure to adopt environmental policies and part of that policy can include purchasing carbon credits. These carbon credits can be issued under voluntary standards or non-voluntary standards. The paper updates earlier research done in the area and identifies differences in existing standards. Differences are identified through examining each standard's approach to several critical factors. Each standard is researched qualitatively to examine the approach to each critical factor. The critical factors are identified through previous research and include all factors that are recognized within the industry as critical factors that affect the efficiency and ability of credits to achieve their objectives. The effectiveness of credits is crucial as their monetary value is linked to the amount of carbon reduction they represent. The paper provides a background to carbon trading and carbon trading before examining each standard identified. The result of this paper examines the differences identified in our analysis and draws attention to important differences. This paper finds that there are some important differences across the standards examined. Any consumer of the credits issued under these standards may find it important to understand the differences found and include that knowledge in their decision process when purchasing offsetting credits.

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Introduction

As more consumers and businesses in Ireland move toward greener policies, offsetting carbon emissions is growing into a multi-million industry. Within the past 10 years there has not been a large-scale study of providers that offer to offset emissions for a fee. This paper will conduct a study of providers that service the Irish market and provide an explanation of the most important factors to consider in choosing a provider. In order to evaluate providers, the paper will build on previous research identifying the most crucial factors in relation to carbon offsetting. It will be achieved by soliciting qualitative data from many providers and identifying where they exceed, meet, or fail to meet reasonable expectations under the critical factors.

The Kyoto Protocol was signed in 1997. The agreement is a multilateral agreement negotiated by the United Nations to reduce greenhouse gases (GHG) to reduce planetary warming. As of 2022 there are 191 states and 1 regional economic integration organization that had signed the treaty. Part of The Protocol required the development of a mechanism where sustainable development initiatives can be financed through issuance of credits, which can be traded on exchanges. The European Union (EU) formed the Emissions Trading System (ETS) in 2005 as a major pillar of the EU's commitment to global warming. The ETS aligns with the Clean Development Mechanism (CDM) article of The Protocol, where carbon trading is specified. China has been developing an emissions trading system since 2010. In 2020 a single system has taken over from multiple regional marketplaces. The singe system covers the energy generation market initially, with other sectors of the economy to follow. In the United States (US), California launched their 'cap-and-trade' system in 2013. Like the EU, the carbon trading system is a central pillar of their plan to cut emissions in the next decade.

Carbon credits are issued under different standards. Some of these credits are eligible for admittance to trading in the EU ETS. Other credits are traded on other voluntary exchanges or sold directly by different organizations to consumers. Under all standards, credits are maintained via registries who record ownership and process any changes of ownership. The EU ETS is the largest exchange in the world. The EU has stated they intend to require more activities in the EU to be required to participate in the ETS. There is evidence more businesses are adopting environmental policies that may include purchasing offsetting credits. As companies navigate this new industry, knowledge around standards will be needed to align their strategic goals with their environmental policy. Identifying the best standard to purchase credits under will help protect companies from potential criticism.

Significant criticism has been levelled at companies in the media, accusing them of "greenwashing" as explained by Pizzetti *et. al* (2021). 'Greenwashing' is seen as businesses

adopting environmentally conscious policies in an ineffective or insincere manner. The concerns of ‘greenwashing’ extend across many sectors and industries from agriculture (Antonio Montero-Navarro *et al.*, 2021) to cryptocurrencies (Sedlmeir *et. al.*, 2021). The consequences of this criticism can be significant - including reputational damage and negative financial impacts. Several of the world’s largest economies see carbon trading as a critical part of their environmental action plan. In the face of potential criticism, it is necessary for companies to ensure the credits they buy are of sufficient quality to protect themselves from scrutiny.

A central tenet of The Kyoto Protocol is ‘sustainable development’. The carbon credits issued under the standard of the CDM are only based on activities in so-called “developing countries”. The idea is that developed countries (who need to purchase credits to meet emissions targets) purchase the credits from developing countries. This acts as sustainable development as knowledge and money is invested in developing countries, developing the host country as it benefits from this foreign investment and technology transfer. An uncomfortable fact of this model is the investment happens in countries that may suffer higher incidence of corruption. Developing countries may not have strong institutions that ensure the same level of accountability or oversight of activities in the country. Companies who choose (or are required) to use emissions credits in their environmental policy open themselves up to a level of criticism depending on the supplier or credit they use.

Many credits can be purchased online through resellers. Where companies are purchasing credits from resellers, they must ensure the credits are recorded in a registry to ensure they have not bought a credit sold multiple times. The organization that maintains the standard is often the same entity that maintains the registry of credits. For a company to manage its reputation and its carbon budget, it is necessary to understand both the registry and the standard itself. In recent years there are more economies and businesses that are pledging to become ‘carbon neutral’. Though The Kyoto Protocol is over 20 years old, there is likely to be significant changes seen in this industry. There is ample opportunity for research to identify changes that will happen in the industry from legislative, accounting and other angles.

This paper is intended to provide a background to the industry and review the existing literature that has already been done in this area. It intends to convey a clear understanding of the crucial issues that surround credit issuance and commentary on the existing standards through the lens of these crucial issues. It intends to build on existing research that has been done in the past and where necessary add specific Irish context to the discussion.

List of Abbreviations

ACR	American Carbon Registry
ACS	American Carbon Standard
AIB	Allied Irish Banks
ANSI	American National Standards Institute
CAR	Climate Action Reserve
CDM	Clean Development Mechanism
CEMARS	Certified Emissions Measurement and Reduction Scheme
CER	Certified Emissions Reduction
CO2	Carbon Dioxide
CORSIA	Carbon Offsetting and Reduction Scheme for international Aviation
EEX	European Environmental Exchange
EIB	European Investment Bank
EPA	Environmental Protection Agency
ETS	European Trading System
EU	European Union
GB	Great Britain
GHG	Green House Gases
ISO	International Standards Office
NZ	New Zealand
OECD	Organization for Economic Coordination and Development
QAS	Quality Assurance Scheme
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
VCS	Verified Carbon Standard
WCC	Wildlife Carbon Code

Chapter 1: Literature Review

While most business in Ireland is not covered by a mandatory scheme where emission reduction is obligated, we can see market forces push business in that direction. AIB's carbon reduction credentials may push competitors to adopt similar strategies. In 2021, Bank of Ireland appointed a Chief Sustainability and Investor Relations Officer (RTE, 2021). Having executive responsibility of both investor relations and sustainability within the group may be a reaction to a market force we will now examine.

Yunas *et. al.* (2019) demonstrates four stakeholder groups that pressure businesses to adopt greener policies, including carbon offsetting. The implication of this is that Irish businesses will adopt more green policies in the face of stakeholder pressure. The study identifies that pressure from the stakeholder groups directly affects the propensity to adopt reduction, compensation and/or innovation policies to improve sustainability. The four stakeholder groups that were examined were media, regulators, creditors and shareholders. The quantitative study used regression analysis to identify the strength of dependent relationships between the companies' emissions policies and the stakeholders. Their dataset was constructed through public sources of information and (crucially) company disclosures. The importance of company disclosures in a dataset like this will provide further discussion in this paper's section on further research. The Yunas *et. Al.* (2019) paper is limited to Australian public companies. Since the analysis does not include Irish companies, there is a question on whether their findings are applicable in Ireland.

We have examined the context and environment in which a business operating in Ireland may decide to offset their emissions. Where companies are not willing or able to reduce emissions to zero, they may decide to offset emission to protect their business from criticism arising from stakeholders (Yunas *et. al*, 2019). There are accessible ways of implementing offsetting emissions - many companies online offer ways to estimate your organization's emissions and purchase the credits necessary online to offset those emissions. We can see from global emissions marketplaces that the price carbon trades at varies significantly across exchanges. While the price on the EU ETS is currently €78.75 per tonne of CO2, the price of carbon offsetting on California's marketplace is currently €24.22 per tonne of CO2 (carboncredits.com, 2021). This discrepancy would give rise to financial arbitrage however markets are not linked to the extent where you can buy credits on one exchange and sell them on another exchange. This financial arbitrage will be examined later in this paper as a topic for further research.

Dhanda and Murphy (2011) undertook an evidence-based study of one hundred and seventeen carbon offset providers from eight countries. They found the price to offset one tonne of CO2 varied from US$1 to US$20. In comparison to the prices of carbon trading on

the EU ETS, these prices appear low. These one hundred and seventeen operators are competing in a market, with simple market mechanisms. There is no regulatory oversight to prevent a website advertising carbon offsetting and taking funds to that effect. For business or organizations to identify the effectiveness and transparency of their offsetting efforts, the scale of the problem is evident in this study.

The first part of their study was quantitative based, where all one hundred and seventeen providers were scored based on information available on their websites. The second part of the study was qualitative based, where consenting providers were contacted via email and asked open ended questions around important issues like transparency, effectiveness, and oversight. Of one hundred and seventeen sample members, the study received fifteen surveys back. The low rate of survey responses raises questions about the sampling bias inherent in the qualitative analysis of this study. The sampling bias means the study is open to criticism that the conclusions reached through qualitative analysis may not be accurate to the entire population.

In what they describe as the “first large-scale study of offset providers”, Dhanda & Murphy (2009) quantitively analysed 114 sellers of credits from across the world. They found there was richer insight to be found in a qualitative analysis than quantitative analysis. Their study reinforced previous studies done that identified the critical factors that we will examine. The logical next step in their study would have been to examine the standards these credits were issued under and sold by the 114 sellers. By focusing on the sellers and not the standards themselves, the study does not provide the necessary analysis consumers can use to identify the best credits they can use that align to their interests.

In a subsequent paper we referenced earlier, Dhanda and Hartman (2011) examined the same sample of 114 sellers under slightly different criteria. As part of their paper, they also examined the standards for those credits. We see this paper as a step towards the aim of their paper- to enable consumers make a more informed decision in purchasing offsetting credits. A limitation of their research is they only focused on voluntary credits. The limitation is an issue since as we see more businesses will be forced to participate in the non-voluntary market. The standards that issue credits in use in non-voluntary market also issue credits for use in voluntary markets. The exclusion of non-voluntary standards limits the ability of consumers to improve their decision making. We see benefit in removing that limitation in our research.

Other research has also examined the standards in use today. Kollmuss (2008) used CDM as a baseline standard and compared eight voluntary standards and two accounting protocols along the following dimensions: market share, additionality, third-party verification, separation of verification and approval process, registries, project types, co-benefits, price.

The value of Kollmuss's research is to use it as a snapshot of the standards at the time of research. While a function like price is separate (nor controlled by) the standard, it can act as a reference point for future research. Some of the criteria examined by Kollmuss can be seen as critical factors. Reviewing past research done on these critical factors, there are benefits to preforming similar research again to identify how things have changed since then. In the event any standard changes its approach to a certain critical factor, it can be identified through reviewing research done by the author and past authors like Dhanda, Hartman and Kollmuss.

Complementing research on credits, there is forestry-specific papers available examining similar themes. While forestry credits are not currently eligible for trading under the ETS (possibly due to issues with CDM limitation and permanence), forestry projects can be examined under the same critical factors of other projects. Merger and Pistorius undertook this in 2011. Not every consumer of credits will see forestry credits as candidates for purchasing. For those that do, it is worthwhile to include them in any analysis done on standards. Including forestry projects in standards examination is particularly important as the ETS considers allowing forestry credits to be traded on the exchange, thereby bringing forestry credits into the non-voluntary credits industry.

The EU ETS captures emissions from the largest producers in Ireland. For organizations outside the EU ETS scheme, adherence to any scheme is voluntary for businesses in Ireland. In 2020 RTE announced Ireland's largest bank by assets intends to become net neutral by 2030. While the bank intends to reduce emissions, it may use carbon offsetting to offset emissions produced by its operations. Having emitted 14,809 tonnes of CO2 in 2019, it would cost the bank €1.1m to offset those emissions on the EU Emissions Trading System. The Irish government (Environmental Protection Agency, 2021) estimates the EU ETS covers approximately 26% of Ireland's emissions. This amounts to 51.5m tonnes of CO2 produced per year outside the EU ETS. Offsetting these emissions would cost €4bn per year for Irish businesses at current EU ETS prices.

In 2019 the EU introduced a Market Stability Reserve (MSR) for the EU ETS. This market mechanism is used as a tool to control supply of emissions credits in the market, with corresponding indirect influence on the process of carbon offsetting. The EU ETS is a flagship policy of the EU climate action plan. As the MSR is the EU's tool to directly influence the price of carbon offsetting, we can infer it will be used as a tool to encourage businesses to move toward greener operations.

This paper will use the ETS as a real-world example for examining a regulatory push toward emissions regulation as it is the largest 'cap-and-trade' scheme in the world and has been operating since 2005.

Offsetting in Aviation

Carbon offsetting has been offered by multiple airlines in recent years. Multiple studies have been done on the take up of this offering. In additional there are studies examining the reduction in airline emissions as a result of the EU ETS (which has included aviation travel since 2012). Comparing these studies, we can identify the relative effectiveness of offsetting according to two pressures: consumer demand and regulatory force.

Consumer demand is examined by Schwirpliesa and Ziegler (2016). They find a high degree of uncertainty around consumer willingness to offset emissions on an individual basis. Their research correlates to research done on air travellers' likelihood to purchase offsetting credits (Araghi et. Al., 2014). Both of these studies indicate that voluntary offsetting by consumers is not currently a driving force behind increased offsetting in flights. These programs allow consumer to purchase offsets at point of flight purchase, transparently increasing the purchase price of the flights. It is unclear and unaddressed in these studies if consumer behaviour would be different if the offset price was included in the purchase price.

Turning to the regulatory force impact of the ETS on aviation emissions, there is no conclusive study which links the ETS to a reduction in emissions. Schinas and Bergmann (2021) compared aviation travel emissions data included in ETS versus aviation travel emissions data in non-ETS countries. They concluded it was not possible using a quantitative approach to attribute a decrease or increase in emissions to the EU ETS. They found the EU ETS implementation resulted in a 10% increase in aviation fuel consumption versus countries without EU ETS. They did not control for economic expansion in their data, which is a major driver of aviation.

What does this comparison tell us? The lack of research on the impact of EU ETS on aviation points to possible issues with the ETS. The studies outlined above point toward the possibility that changes are necessary in the ETS before significant impact is made by the ETS on aviation emissions. The first international agreement on aviation emissions was ratified in 2016 - CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation). This may provide conclusive results in future as to the impact of regulatory schemes on aviation emissions.

Offsetting outside Aviation

Looking at the wider EU ETS scheme, we can see a more definitive picture around the impact of the ETS on emissions. The OECD has found the EU ETS has had significant success in reducing emissions for the period 2005 to 2012 (Dechezleprêtre *et.al.,* 2018). This covers the first two trading period of the ETS however it is not clear if this success was replicated in the third period the ETS operated- 2013 to 2020. The EU has said that emissions fell in 2019 by approx. 9% compared to 2018 (European Commission, 2020).

In 2015 Yang and Solgaard studied how willing consumers were to pay additional money in order to offset in their domestic electricity consumption. How willing participants in the study were to offset depended on individual factors like moral disposition and household wealth. An issue with this study is: while respondents to a study can claim to have an intention to purchase offsets, they may not actually do that, the potential of not purchasing offsets was examined in a study done by Jacobsen in 2011 which identified an increase of carbon offsets purchased within geographical areas which had viewed Al Gore's *An Inconvenient Truth*, a documentary explaining the impact and issues around climate change.

Based on reviewed literature we can say that outside aviation, there is evidence that both regulatory force and consumer choice have an impact on offsetting. Where there are regulations that force companies to offset, those offsets will be used effectively to reduce emissions. Where consumers are offered a choice, there is a demographic which will make the choice to offset.

A critical study by Cambridge Econometrics (2020) has identified that expansion of the EU ETS to construction and transport would not deliver emission reductions due to the inelastic nature of their demand to price. This study addressed only the introduction of road-based transport into the ETS. Aviation emissions are already covered in the ETS. The study does not address why covering road-based transport would be ineffective in light of air transport being already covered, and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) scheme being administered by the International Civil Aviation Organization.

We have seen carbon reduction schemes fail in the past. Looking at New Zealand, Birchall, et al. (2016) surveyed companies who were involved in CarboNZero. CarboNZero was the world's first emissions certification scheme which provided tools for organizations in New Zealand to measure and reduce their carbon emissions. Their research showed that at the time of interviews (2010-2011) 38% of 13 participating organizations had reduced emissions. Within the same survey, respondents strongly agreed their organizations can meaningly contribute to climate change prevention. We can see from this study that while participants believed in the importance of emission reduction, less than half of companies managed to achieve this aim through the program. A similar study has not been done in Ireland as there is no voluntary program being centrally administered or reported on.

To review the Irish experience of adopting an environmental policy, AIB is a good candidate. AIB is a publicly traded bank with over nine thousand employees (AIB, 2021). They have published annual sustainability reports since 2016, providing a significant amount of information related to their environmental policy. In November 2019, they announced their intention to be emitting a 'net zero' number of emissions by the year 2030. This commitment

was addressed within the 2020 sustainability report. Earlier sustainability reports made commitments around reducing emissions, however the 2020 report was the first report which outlined their intention to become net zero in their operations. The concept of ‘net zero’ is an interesting one. AIB has not committed to ‘zero emissions’, but ‘net zero’ emissions. This is not defined within their sustainability reports; however we can infer it likely meets the wording as set out by the United Nations Framework Convention on Climate Change, known as the ‘Paris Agreement’:

“Emissions by sources and removals by sinks of greenhouse gases netting to zero” (UNFCC, 2015)

AIB does indicate in its literature that it intends to reduce emissions to zero by 2030. We believe that it is unlikely as there are operational processes that generate emissions that cannot be reduced to zero. We believe it is more likely AIB intends to offset these emissions through sinks of carbon. Whether these sinks of carbon will be operated by AIB or by someone else is not addressed in their sustainability report. An example of a carbon sink that AIB is operating is a solar array on the roof of a branch. This single solar installation is expected to generate 0.035% of AIB energy consumption at 2021 levels (AIB, 2021). Considering the amount of energy consumed by the bank it is more likely AIB will contract or purchase the carbon offsetting or carbon sinks needed to achieve net zero.

For companies that use offsetting as part of their environmental policy, they may have a limited number of options. They could install carbon offsetting projects themselves, however the cost of acquiring the expertise may be inefficient for them. Outsourcing that function to a provider brings companies to carbon off setters. These providers may advertise online or in trade journals or through other means. Individual organizations may not have the theoretical background to evaluate the providers.

Previous research has found there are different estimates of the carbon emissions of individuals (Padgett *et al.* 2007). Their study looked at ten providers and found significant differences in estimations of environmental impact even though the profile of user remained the same across all providers. The study recorded results around emissions estimates in household electricity use, household heating, household road travel and household air travel. Across these four factors, high provider estimates were sometimes four times the amount of low provider estimates. In other factors the difference was lower. There were gaps in the information provided by the providers around how they calculate emissions. For some factors, citations were evident for most providers. For other factors most providers did not supply citated sources and explanations on how they estimate emissions. How Padgett *et. al* chose these ten providers is unclear, beyond limiting the sample to US based providers for consistency. The authors described the number of providers as growing - a prediction borne

out by Dhanda and Murphy's study published four years later, capturing one hundred and seventeen providers.

Summary

Our literature review has illustrated the various forces at work that may result in companies offsetting or reducing their emissions. We can see there is demand for companies to adopt carbon policies. This demand may come from consumers (with varying success) or from regulatory, media, creditors and shareholders. An Irish company may experience any combination of these pressures either in their home market or in foreign markets. The options of how Irish businesses react to these pressures remain somewhat unclear. How Ireland's largest bank AIB reacts may involve different options than smaller businesses. An accessible and potentially efficient way for Irish businesses to react could be through carbon offsetting. These providers are accessible since they can be employed online without any obstacles. There are economies of scale where providers can combine purchases from many businesses in order to achieve better return on carbon offsetting. There are many efficiencies to be achieved in having providers supply the expertise in carbon offsetting, removing the need for each Irish business to acquire the expertise in operating and investing in offsetting. For those Irish businesses that go down the route of offsetting carbon, there is a lack of information available to help them make a sound decision.

Chapter 2: Research Question and Aims of Research

Based on the review of existing literature, we can see that there is large potential demand for offsetting in Ireland. Ryanair has generated negative news coverage of its green policies (Guardian, 2020), showing a market force outlined by Yunas *et al.* (2019) in effect. This paper will attempt to evaluate different emission providers and provide businesses with an introduction of the fundamental concerns of emission offsetting providers.

The unregulated nature of the voluntary offsetting market means there are little barriers to entry or exit. Government regulation has been examined in the UK, France, and USA at various times in the past two decades however currently no regulation exists. Contemporary research is needed to evaluate providers as offerings can change within a short period of time. The research needed to evaluate providers and identify the best offerings is significant. This research will apply peer reviewed critical success factors to offerings available in the Irish market.

As examined in this paper the potential size of the market of offsets is valued in the billions of Euros just for business located in Ireland. As with any significant expense, companies have a responsibility to ensure that expenditure is effective and not wasted. To do this, companies will need to familiarise themselves with offsetting standards and registries where they can register ownership of credits. Many standards are issuing credits under programs that are voluntary. The largest credit trading scheme that is mandated is the European Trading System (ETS).

The aim of this paper is to identify what differences exist between the various standards that credits are issued under. By understanding the differences in standards, companies can make an educated decision in where their direct their investment in green offsetting. They can align their strategic interests with the offsets they purchase and as a measure to protect themselves against the stakeholders pressure they experience. The protection offered by aligning strategic interests can be a protection against criticism of “greenwashing”, or insincerity in their environmental strategy. As businesses strive to compete, they align the strategic interests of the firm through each part of the business. Any sustainability policy they have would touch each part of the business. Aligning that policy with the overall strategic direction of the firm could be beneficial to stakeholders.

Chapter 3: Methodology

The author will examine each standard identified as being in use by sellers of carbon credits. The information available on standards will be reviewed using multiple qualitative research techniques.

We understand the clients of these emission offsetting providers may hold unique values and concerns around using the services. The nature of the relationship between the service users and service providers is interpretive. The data presented should be considered in different ways by service users, according to their own concerns.

We can accept the findings of Padgett *et al.* (2007) - carbon calculators offer wildly different estimates of the carbon emissions of individuals. Pitrakkos and Maroun (2018) identify the quality and location of carbon related disclosures are a better estimate of a company's green policy activity than the raw numbers. As such, comparing companies based on data points may give an unclear picture of their policies.

Guigon (2010) outlines how different emission reducing projects are allowed under different formal schemes and exchanges. The providers we will review are essentially unregulated. They voluntarily adopt (or claim to) carbon accounting standards. These standards will be reviewed against the Kollmuss and Lazarus study published in 2010. Until such time as there is an independent, audited framework to compare providers against, users will need to rely on qualitative data.

In gathering the qualitative data, this research will draw on a number of resources. Among these resources will be direct communication with providers and standards, along with the information supplied on their websites or supplied directly. Where governance standards are specified by providers, investigation will be done into those standards to identify if they align with the critical factors of this research.

Kollmuss, A. and M. Lazarus (2010) outline several fundamental themes around carbon offsetting which are of critical importance. These principles are what we will use to evaluate the sincerity and effectiveness of emissions offsets. They are widely accepted and discussed and have been since emerging around 2006. These principles emerged with the emergence of the Clean Development Mechanism (CDM). The CDM is a mechanism defined in the Kyoto Protocol and emerged in 2006 once The Kyoto Protocol took effect. Trines *et. al*. (2006) described these as barriers or obstacles to realizing the full potential of the change. There is risk to the potential of reducing emissions by as much as intended. The four principles discussed in 2006 were expanded to include verification, giving recognition to this mandatory function of the CDM (Dhanda and Hartman, 2011).

Article 12 of The Protocol defines the creation of a clean development mechanism. From this Article, the structure of the carbon credit industry has grown. The protocol specifically required environmental investment to occur in developing countries ("non-Annex B countries). The offsetting benefits are purchased by developed countries ("Annex B countries"). Kim *et. al.* (2020) has found the economic and environmental impact of this activity to be statistically significant. While their paper did measure economic impact through GDP (which can have drawbacks), there is a clear environmental impact.

As we explore in this paper, the effectiveness of carbon credits hinge on several factors. These factors have been identified in multiple papers (Kollmuss *et. al.*, 2008; Dhanda and Hartman, 2011). All these critical factors have been subjects of discussion since the forming of the Clean Development Mechanism. They form the basis of any criticism of standards under which certificates are issued. Using the same critical factors enables us to identify different approaches taken by different standards.

Some standards are focused in certain areas (like forestry). A critical factor like permanence may be applied differently to an activity that is not permanent. While reforestation is seen as a worthy goal in certain areas, it could be unreasonable to expect permanent reforestation for an indefinite period. This has given rise to temporary certificates, where offsetting activates are certificated to happen for a limited time.

As we examine each critical factor in turn, we can relate their importance to the effectiveness of the standards and their contribution to effective credits.

Additionality

Additionality focuses on the principle that emissions projects gaining certification (and therefore economic value in certification) should not be projects which were going to be proceeded with in their current form regardless of certification. One interpretation of this is to limit certifications to projects that are financially unviable without certification. An alternative approach would be to limit certification to projects which display lower emission rates than comparable projects. Stakeholders can advocate for one approach over another- complications arise when comparing the approaches. To take the first approach, an evaluator needs to compare the project viability against a "baseline" or a scenario where certification did not exist. Creating this baseline by looking into the past and applying current market conditions could be a challenge. The second approach can also be difficult to implement. If the second approach is used, certification may happen for projects that are using current efficient technology but being compared against past projects that had to use prevailing inefficient technology. There is an increased risk that certification will be granted for projects that would have pursued without certification. In these cases, the economic value granted by certification acts as a subsidy to the project. Like accounting rules, there

are conservative and liberal approaches, where a balance has to be found. Having ‘too strict’ rules on additionality may frustrate stakeholders and fail to stimulate engagement in the most global agreement on emissions trading. On the other hand, if the approach is too loose then it may open emissions certifications to criticism and irrelevance. Gillenwater (2012) has published multiple papers examining these issues in detail. While it is unclear which approach is best, it is clear this principle is fundamentally critical to the sincerity and robustness of emissions standards.

Measurement

Measurements focuses on identifying how much carbon is being removed in the project. Measurement may involve defining the parameters of where the project is and the scale of the inputs, then applying a series of assumptions based on the ecosystem of the project. Emissions certification aims to standardize the measurement of carbon reduction or sequestration. This aim may conflict with the aim of getting accurate measurements. The unique nature of the project, the location and other variables may cast doubt on the veracity of the measurements. It is assumed the costs of measuring any project will decrease as the scale of the project increases (Izaurralde and Rice 2006, Gehl and Rice 2007). The cost of measuring may act as a barrier to certifying smaller projects accurately. While new technologies may help measure certain factors more accurately, it is likely there will be an element of projecting in use in the measurements. The nature of the project may mean that measurements may require several observances or recordings taken over a period of time, increasing cost. If time becomes a variable in measurements, this introduces the possibility that changing conditions have affected the measurements through no action of the project being measured. The intention of this factor is to accurately account for possible emissions reductions or removal. The concern exists that project managers may overstate (or deliberately engineer) the initial state which the project is affecting to have excess emissions, therefore gaining an oversized measurement of emissions reduction. This action would also affect the first factor we examined of additionality.

Leakage

Leakage is a factor that focuses on ensuring emissions are reduced and not moved elsewhere or offshored. The so called ‘’waterbed’ effect occurs where projects reduce emissions by moving activities that produce emissions out of the jurisdiction. This would result in emissions in the jurisdiction decreasing but increasing by an equivalent amount in the offshored location. The overall effect would be zero reduction in emissions. Certifications generated in the jurisdictions would not reflect an overall reduction in emission. The relevance of this factor can vary project to project. While it may not be possible to offshore some agricultural activities, it may be much easier to do so in manufacturing or construction. The importance of jurisdiction is fundamental to this issue. In theory it should be impossible

to offshore emission heavy activities if there is no place that is ‘offshore’. Under an emissions framework that all countries are active participants in, leakage should not be an issue. Any governance standards that try to prevent leakage may struggle in the face of many offshore jurisdictions that are not recording or reporting their domestic emission activities. Obstacles to reducing leakage may include lack of transparency across borders and lack of transparency by emitters. As Ewers and Rodrigues published in 2008, leakage is a particularly large concern in the area of forest regeneration. Forest managers claiming credits for not clearing forests in one location may move their felling activities to other forests.

Permanence

Permanence ensures carbon is kept out of the atmosphere for a reasonable length of time. Forestry again comes up as a focus area for this factor. Any credits gained on not felling forests must also guarantee that forests are not felled for a significant time. The Kyoto Protocol’s CDM has reacted to the ambiguity in forestry by issuing either long-term certified emission certificates or temporary certified emission certificates. Both of these can be traded and are priced separately. While permanence in forestry attracts a lot of study and research and estimations, it is a critical factor for non-forestry projects also. The risk of a project being abandoned or discontinued or changed after certification remains a risk that is mitigated through measurements and verification.

Verification

Verification aims to ensure each endeavour is measured before initialization and after completion. This ensures the carbon credits being issue correspond to the carbon being reduced or sequestered. The Kyoto Protocol’s CDM has issued a manual of verification, including general principles which we can use to define verification. The CDM requires accuracy, completeness, conservativeness, consistency, relevance, and transparency in verifying carbon offsets. In addition to these principles which are to be applied to the project, the CDM requires additional principles to be applied while undertaking the verification process: independence, ethical conduct, fairness, competence, and confidentiality.

The CDM verification guidelines can be seen as being ‘in tension’, as some of them may conflict. For example, verification bodies may struggle to be accurate while at the same time being conservative. They may need to balance relevance while at the same time ensuring completeness in the verification process. As the CDM specifies, the verification process is a “rules based” mechanism. The CDM specifies the methodologies acceptable in their use of verification.

These five factors will be used as the critical factors in evaluating the data collected on the providers. How successful providers are in showing they adhere or mitigate for these factors will decide how reliable and trustworthy their methods will be judged.

Chapter 4: Analysis & Findings

Our analysis has found that most providers reviewed used third party verifiers and carbon accounting standards. Within the carbon credit world, there are several different sets of standards that have gained popularity. This means the analysis undertaken has focused on the standards applied to the projects, rather than the providers themselves.

Gold Standard

The Gold Standard proves significant information on involving stakeholders through their 'Principles and Requirements' (Gold Standard, 2019). The monitoring activities required for certification also requires ongoing feedback and consultation with identified stakeholders. For businesses that value the input of stakeholders in and offsetting project this may be valuable, however this is not one of the critical factors we are examining.

In relation to Permanence, Gold Standard does not limit certification to projects to activities that permanently or temporarily removes carbon. Gold Standard requires projects to specifically align to three 'Sustainable Development Goals' as set out by the United Nations (UN). Under the Gold Standard, each project attaining certification must either reduce/remove emissions or adapt current conditions to climate change. Permanence is not specifically accounted for under Gold Standard.

Additionality tests are required under this standard. The methodology used to test for additionality must be approved by Gold Standard or UNFCCC. Gold Standard may require changes or clarification around additionality in the certification process. Gold Standard does not limit additionality tests according to one of the two approaches examined earlier in this paper.

Verification is required under Gold Standard. Gold Standard maintains a registry of approved verification bodies who must be involved in verification of projects to gain certification. Project certification only happens after impacts have been realized.

Unlike verification, measurement under Gold Standard does not have to be performed independently of the project manager. Variables are identified and their method of measurement documented. To account for base measurements changing significantly over time, Gold Standard requires recertification every five years.

Leakage is addressed under Gold Standard measurement principle. The identification of leakage is limited to projects involving reforestation and agriculture.

Verified Carbon Standard

Verra claims the Verified Carbon Standard as "the world's leading voluntary GHG Program" (Verra, 2022)

By meeting the VCS program, project managers can be issued ‘Verifiable Carbon Units’ (VCUs) which can be traded on Verra’s registry. The existence of the registry results in financing being directed toward greener projects. Via the registry, companies can retire credits on behalf of people or businesses willing to pay to offset environmental activity. The VCS spells out explicit criteria that addresses several of our criteria. VCS requires certifications to be measurable against a credible baseline. The methodology used to measure and identify the baseline is required to be outlined and documented under the standard, however it does not limit the approach to one of the two outlined earlier. Either methodology can be used in creating a baseline to verify the test of additionality, one of our critical factors.

To avoid leakage as defined by our critical factor analysis, the VCS requires use of a method outlined by the CDM. This brings the leakage test in line with mechanisms outlined by the Kyoto Protocol.

The verification process is undertaken by VCS after validation. Validation of the project offset is undertaken by an independent body. VCS attempts to ensure independence of validation bodies by requiring a rotation when reverification is required. As such, the project is validated by a different body that undertook the initial validation. The verification body must be chosen from a list of entities that have been approved by Verra.

Similar to Gold Standard, VCS does not require measurements to be undertaken independent of the project manager. Conservative estimates are to be used.

VCS issues VCUs immediately upon verification in the event that emissions are permanently removed. VDSs are issued for a shorter time period in the event that emissions are reduced for a shorter time period or in the event there is uncertainty around future emissions. This satisfies our critical factor of permanence. In the event of a reversal of permanence, VCS requires additional activities to be undertaken to replace that reversal. Alternatively, the VCUs issued may be reduced.

Climate Action Reserve

Like Verra, Climate Action Reserve (CAR) runs a voluntary registry where individuals or businesses can finance offsetting activities. CAR requires verification by a body independent of the project manager in order to issue the credits.

Similar to other standards, CAR requires a permanence test. Any offsets that are reversed must be accounted for and compensated for in the undertaking of additional offsetting activities. Like Gold Standard, CAR aims to align activities to the 13 Sustainable Development Goals. Additionality is required under the standard. The additionality test is specified under the standard. Unlike some other standards we have analysed, CAR requires

a standardised approach. CAR specifically references Broekhoff's 2007 study in justifying this approach as being less costly than the alternative and easier to apply a standard approach across multiple projects. In applying this additionality test, CAR bars projects from certification if they are found to be required on a legal or regulatory basis. CAR's test of additionality also tests additionality through identifying if projects result in less emissions that would have otherwise been emitted. In applying their test of additionality, CAR does deviate from The Kyoto Protocol's CDM.

Leakage is addressed by CAR through the measurement. The CAR requires all effects to be captured through effective measurement. Capturing negative and positive effects leads the CAR to claim that any potential leakage will be captured in the project specific measurements. The CAR requires projects to define the GHG 'boundary'. This boundary is the area encompassing all activity that could be affected by the project. If a project operator were to offshore emission activities, this leakage should be captured as long as the offshore location is within the project boundary.

Like other standards CAR does require independent verification of emissions. This verification is done under standards laid out by the International Standards Office (ISO) 1064 and 1065. This verification is done before certification (Verra, 2022).

American Carbon Registry

ACR is involved in multiple parts of the offsetting industry. It maintains a registry which is approved for trading under California's ''cap-and-trade' program. This program is like the EU ETS in aims and operation. Like EU ETS, ACR is used for aviation offsetting under CORSIA. In the area of voluntary offsetting, ACR independently verifies carbon offsets (American Carbon Registry, 2022).

Like CAR, the ACR requires verification from an independent body that meets ISO standards 1064 and 1065. The ACR tests for additionality using both 'project' and baseline approaches - the first approach identifies if the project would only be viable through certification, whilst the second approach compares the project against a standardized baseline. The ACR allows both approaches to be used.

Permanence is required under the ACR and projects must be monitored for any reversal. In the event of reversal then mitigation activity must be undertaken. Leakage is expected to be addressed under measurement of the project. Like CAR, ACR sees leakage as an issue covered by defining and measuring the activities affected by a project. Similar to other standards there is no requirement for independent measurements of the project prior to verification.

Plan Vivo

Plan Vivo issues offsetting credits that are maintained and transacted on a registry run by a third party. Plan Vivo tests for additionality through a project approach that examines if projects would have proceeded without the existence of certification. It does not allow certification to happen for projects that follow a standardized approach. Measurement can be undertaken by project managers and monitoring activities can be done by project managers also (Plan Vivo, 2022).

Leakage is addressed by Plan Vivo by requiring all potential sources to be identified and mitigated. Plan Vivo allows a threshold of 5% of the total climate service whereby any leakage above that must be mitigated. Plan Vivo specifically addresses the seasonality of some activities by requiring cyclical activities to be measure over the entire cycle of activity.

Plan Vivo approaches permanence in a different way than we have seen with other standards. Under this standard, all projects must have a buffer of 10% built in. Certificates issued under Plan Vivo will only be issued up to a maximum of 90% of the offsetting activities. This 10% buffer is used to reduce the impact of potential reversals. While monitoring should identify instances where reversals occur above the 10% buffer, the monitoring activity is not indefinite and limited to a period by which the long term effects of the activity are evident. Verification under Plan Vivo is performed by a limited number of specific independent bodies. Reverification takes place every five years.

Woodland Carbon Code

The Woodland Carbon Code is a UK based entity which sets out a voluntary standard resulting in certificates being issued for woodland specifically (Woodland Carbon Code, 2022). In contrast to other standards the Woodland Carbon Code is specific to forestry. The WCC tests for additionality through a project based approach that examines whether the forestry activity would happen without the benefit of certification. Measurement and verification standards differ under the WCC depending on the size of the forestry activity. Smaller projects undergo less frequent measurement and monitoring. The measurement and monitoring can be undertaken by the project manager. At verification stage before credits are issued, an independent third party must verify the calculations of the project. Subsequent validations do not require an independent body and can be done by the project manager. We see this as failing to uphold the important principle of verification, where verification should be done by an independent third party. The WCC limits offsetting activities to the UK. This becomes an issue in relation to leakage. Leakage is defined by WCC as land intensification happening within the UK. It does not address the possibility of potential land intensification happening outside the UK. Permanence is addressed as an important factor to manage in this standard. It is defined by the WCC as any reversal of carbon sequestration

over the project lifetime. Any reversal in the project needs to be reported to the standard. The risk of reversal is part of the project scope and risk of reversal to natural and unnatural events needs to be mitigated against. The WCC mandates different actions in the event of reversals. For avoidable reversal, all credits issued must be reimbursed. For unavoidable reversals, only credits lost to reversal need to be reimbursed.

QAS for carbon emissions

The UK's Quality Assurance Scheme for Carbon Offsetting has been ended since June 2011. Any offsetting provider selling credits under this standard may be using an outdated standard that is no longer in use or certifying new credits.

Certified Emissions Reductions (CERs)

CERs are issued by the Clean Development Mechanism (CDM) Executive Board under the terms of the Kyoto Protocol. They can be traded via the EU ETS, with some restrictions.

The framework around CERs specifically address materiality with greater detail than seen in other standards. It specifies what activities in the project are considered material and what activities are considered immaterial, therefore not needed to be included in the project verification. CERs involve accredited operational bodies at two stages in order to oversee the issuance of CERs. They are involved at a 'validation' stage, where the calculations are measured, therefore satisfying our measurement requirement. They are also involved at the verification stage prior to issuance of CERs, satisfying our verification measurement.

Additionality is addressed through the application of specific baselines. The CDM has approved baselines that can be used to test for additionality under the project approach, where projects are considered for environmental impact in absence of certification. Where an approved baseline does not exist, project managers can submit a new baseline or request an existing baseline be amended for their project.

CERs account for leakage using an approach taken in other standards. The project boundary is identified as activities that are affected under the project, and the impact of all material activities are measured to account for leakage. Materiality is quantified as discussed earlier. An issue with leakage appears under this approach for CERs. CERs are issued for afforestation/reforestation, and under these projects the project boundary is defined as a geographical area under the control of the project participant. This raises the question of whether leakage is measured if emissions are increased due to the project in an area not controlled by the project participant.

Permanence is measured through measurement of offsets over the life of the project. In projects here this is an issue (such as forestry), temporary CERs are issued and priced accordingly.

Chapter 5: Discussion

Our findings from the research performed shows there is importance in checking the standards under which offsets are issued. A central piece of research is the 2010 study of Kollmuss and Lazarus. Their examination of offsets offers importance to offsets since offsets are a central mechanism of so called ‘cap-and-trade’ systems. Cap-and-trade have become the largest environmental markets after the signing of The Kyoto Protocol. No other global agreement approaches the reach and magnitude of The Kyoto Protocol. The European Union created the largest emissions market that meet the requirements of The Kyoto Protocol. The CDM which emerged from The Protocol generates credits, of which 80% are purchased through the EU ETS (Capoor and Ambrosi, 2009). There is a distinction to be made between the various standards we have examined. Several of the standards are voluntary, where the credits they issued will not be purchased for regulatory reasons or in order to comply with market rules. These voluntary standards attract purchasers for various reasons which may include marketing or ethical reasons. Project Managers may specifically engineer their projects to comply with voluntary standards to attract green investment or generate a higher return on investment as the issued credits offer a source of income from purchasers. The overall thrust of ‘cap-an-trade’ systems is to add financial incentives and penalties to economic activity that impacts the environment. In economic terms, costs of economic activity are called “externalities”. The environmental cost of economic activity is not regularly captured in the global economy. Cap-and-trade offers a mechanism where economic activity that impacts the environment can be penalized. It can also offer a way for activity which sequesters carbon can be compensated.

The identification of critical factors in our research is based on the 2010 study of Kollmuss and Lazarus. These criteria remain critical and are addressed in multiple ways in the standards we examined. Consumers of this research may look at these critical factors and not consider one factor as more important or more “critical” as the others. As outlined in our methodology, these factors are considered critical as failings in any one area can fundamentally change how credits issued under those standards can be viewed. As an example, the CDM requires significant verification of the figures and accounting of carbon offset in the project. For any standard where verification is not necessary, that standard can be viewed as untrustworthy or view with scepticism. Along the same lines any standard which implements a buffer in verified figures can be seen as considering the factor as very important. As with any significant purchase, trust in the product being purchased is important. Consumers of offsets may be households who are purchasing a small number of credits, or multi-billion euro companies like AIB Group Plc. as examined earlier.

Additionality

We see all standards examined required additionality tests. These tests are fundamental criteria for all the standards. In some cases (Gold Standard, CER) the standards body may have developed specific baselines that project managers can use. In other standards (VCS, ACR) the standards body allows project managers not to use a baseline however the additionality calculations will be examined to ensure the principle is met. The possibility of standards using either method could in theory lead to 'standards arbitrage'. In this scenario a project manager could calculate their offsets using both methods and submit using the tests which yield the higher offsets on paper. For the same activity, any incidence of this would suggest a weakness in accepting both approaches. If we look back at The Kyoto protocol, additionality is addressed in Article 12.5. The CDM guidelines that have come out of The Protocol have specified that additionality rests on the financial viability offered by the CDM certificate issuance. Any change to the CDM will have a major impact on emissions trading considering the enormous size ETS holds in the market. The emergence of an alternative test, separate from the CDM points toward the possibility of alternative testing (involving project calculations) being viable and even necessary in the market. The merits of both types of tests were addressed earlier in this paper. A consumer may prefer to use credits issued under one additionality test or another. The repercussions of any future change in this area are open to interpretation.

Measurement

Measurements is considered a critical factor as it contributes toward the entire life cycle of a project. The projections created under this criterion will contribute to making a decision on whether the project is financially viable or not. How a project measures and projects may vary under each standard. The standards examined are geared toward certification and issuance of carbon offsets. As discussed later in this chapter the standards examined rely on verification by accredited bodies. At that point the standards body steps in and performs their intended purpose of issuance of the certifications (if verification is successful). The standards are less involved in the process of measurement activities taken outside the verification stage. However, the project requires many measuring activities to happen before verification. As noted, measuring may contribute to a viability decision before the standards body is even aware of the project or any effort to verify is undertaken. Measurement also impacts other critical factors like permanence, additionality, and leakage. The effectiveness and completeness of the measuring activities impacts the tests of leakage and additionality. As some factors may change over time, permanence may need regular monitoring. The frequency and scope of this monitoring is decided according to the standards of measurement built into the project.

We see Gold Standard standing out in this area. Its comparatively heavy focus on ‘stakeholder engagement’ means it requires a lot of detailed information around the results of that engagement. The interests and concerns of stakeholders must be engaged, measured and reported throughout the project. All measurements can be undertaken by the project manager. VCS specifically requires the measuring of permanence while other standards would include that factor in the verification calculations. Under Plan Vivo, projects which impact a cyclical activity (like agriculture) requires the measuring of activity over the entire cycle of that activity.

In contrast to other standards, CER requires the involvement of an independent body for measuring the activities to be undertaken. Adhering to this requirement may increase the costs of undertaking a project. Whether this requirement improves the quality of measuring or quality of credits subsequently issued is an open question.

Leakage

Leakage is a fundamental factor that is popularly referred to as ‘the waterbed effect’. A fundamental concern of The Kyoto Protocol as not to ‘offshore emissions’. Pollution and emissions do not stay within national boundaries. Any standard should ideally be testing for the possibility a project is moving emissions activities to another region, outside the monitoring ‘reach’ of the standard. In this principle we see many standards require leakage to be measured within the project boundary. The Gold Standard only requires leakage to be addressed in reforestation and agriculture projects. As such, we see The Gold Standard failing this criteria. There is an expectation that consumers of credits under this standard would consider leakage to be a critical factor. By not involving leakage tests across all their projects The Gold Standard is opened to criticism. The Kyoto Protocol does require Leakage tests to be provided. Many of the standards examined met this requirement. We have seen standards (Plan Vivo) which only required activities that materially affected the offsets to be addressed. Any leakage activity that affected overall offsets by less than 5% would not need to be mitigated against, but that would be included in the verification measurements. We can take this to indicate that Plan Vivo considers any activity affecting overall emissions by 5% to be part of the ‘waterbed effect’. This approach is in stark contrast to the approach taken by The Gold Standard.

Defining the boundary of a project and examining leakage within it is an issue that raises questions in other standards also. The Woodland Carbon Code limits the project boundary to within the UK. If a project involves intensification of forestry activities outside the UK, then this would not be captured within the certification.

Permanence

Permanence is the principle that emissions are kept out of the atmosphere for a reasonable period of time. As a carbon store, reforestation is a popular offering in the carbon emissions markets. While ideally any carbon credit purchased represents carbon permanently reduced, the financial mechanism of cap-and-trade aims to provide financial incentive to reforestation. In order to do this, sellable credits have to be issued for forestry that stores carbon. As explained earlier, The Kyoto Protocol's CDM allows the issuance of long-term certificates or temporary certificates. The EU ETS does not allow any credits related to forestry to be traded on its exchange. We see the different standards approach permanence in different ways. Under the Gold Standard, permanence is not tested. We find the Gold Standard not upholding this critical factor. Other standards (VCS, CER) issue certificates based on duration the carbon is expected to be removed or reduced. This issuance is done again to financially incentivise projects that temporarily reduce carbon. Some standards (ACS, Vivo) add permanence as a feature of monitoring and measurements. Under those standards, any reduction in permanence is to be compensated or the corresponding credits will be reduced. This approach is also taken by the WCC and taken one step further in the event of avoidable reversal. For avoidable reversal, all credits issued must be reimbursed by the project to the WCC.

Looking at trends in this area, we note the European Commission announced in 2020 that forestry will be included in a 'cap-and-trade' system. While the EU ETS has no experience in this area, we can see there are multiple operations standards in place already to address forestry.

Verification

The criterion of verification is upheld across nearly all of the standards examined. The approach taken by different standards can vary slightly. Some standards require verification by one of their approved bodies (Gold Standard, VCS, Vivo). Other standards require verification to be undertaken by entities that meet certain accreditation.

There is some constancy across several standards where verification can only be done by entities which accredited under certain ISO standards administered by the American National Standards Institute (ANSI). The standards that look for this accreditation are CAR, ACR and VCS. We see consistency across most of the standards whereby verification bodies are required to be registered with the standard and in many cases accreditation under certain ISO standards will be central to getting approval.

The outlier regarding this critical factor is the WCC. Possibly out of necessity, verification standards differ depending on the size of the project. In addition, revalidations can be done

by the project manager. This Standard's provision fails to uphold our critical factor of verification.

VCS requires a rotation of verification bodies. This control is an additional requirement not seen in other standards. This is an implementation of an auditing best practice to ensure independence of the verification body. In theory, if the original verification was done in error, the subsequent verification by a different body increases the likelihood of the error being identified.

As mentioned earlier the EU ETS is examining how to include forestry in the credits traded on the ETS. Verification and monitoring of forestry is evolving. With the advent of drone and satellite technology, the standards of verification may need to be changed to accommodate this new technology as there are practical challenges to verification in forestry projects. The challenges can result from projects located in isolated areas or on terrain that is difficult to navigate in the verification process.

Limitations of Research

Emergent Critical Factor(s)

This paper has focused on critical factors that have emerged since the Kyoto Protocol has been signed and carbon trading has emerged. There is a reliance on pre-existing research to identify the importance and relevance of these critical factors. A limitation of this research is it has not examined the possibility of other unidentified factors. Any factor not identified in this factor could be a critical factor that remains unexamined. As outlined in research, the media is a stakeholder who influence the business of consumers and originators in this industry. The trustworthiness of carbon credits is relevant (Dhanda and Hartman, 2011) and important. Any missing critical factor could emerge and be publicized, reducing trust in the carbon trading mechanism and exposing possible abuses of the mechanism. The standards we examined may have controls in place however many of these standards operate in an unlegislated market. Oversight and transparency of these standards could be an issue. A standard may place the importance of growth or financial gain above the importance of ensure integrity in their issuances. In that case standards may be applied in a lax manner and certificates issued without an effective reduction in emissions. If that were to pass it would mean the aim of this research is weakened. This paper would be less effective at highlighting the differences in standards.

Emergent Standards

This paper has focused on standards in common use - where certificates issued under these standards are widely available for purchase online or traded widely on ETS. Were a new standard created and gain widespread use, this paper could be considered in complete in

examining differences in standards. As outlined, a benefit of the research undertaken in this paper is to update previous research. Future research will be able to include emergent standards.

Merged Standards

There are multiple opinions on where the carbon standards we have examined will go from here. To gain economies of scale some standards may combine with each other. We have identified that as a possibility earlier in this chapter. In the event of standards combining, it is likely some changes to the standards would occur. Those changes would not be reflected in this research, leading to part of this paper becoming outdated. Any future research taken on this issue will be able to identify changes to standards in the events multiple standards have merged in the intervening period.

Chapter 6: Further Research

As mentioned in our analysis the possibility of standards shopping exists under some standards. This occurs where project managers can avail of higher certificates depending on the verification procedure they go through. We can examine if the possibility exists where a credit can be sold for different prices depending on the sales channel. CERs are certificates issued by the CDM. They are eligible for trading on the EU ETS - if they are not from forestry activities. On the last day of March in 2022 the spot price of carbon credits traded on EU ETS was €76.25 per tonne (EEX, 2022). Purchasing credits verified as CER credits through a reseller gives a price of GB£6 per tonne (€7.19 per tonne) (onecarbonworld.com, 2022). While forestry related offsets would trade at different prices than offsets tradable on ETS, this does not appear to explain the difference in price. This large price discrepancy is an indication that there is a possibility of arbitrage. Arbitrage would occur here if the CER could be purchased from a reseller and deposited to a trading account with EU ETS and resold at the higher price. As discussed earlier the EU ETS implemented a mechanism that controls the prices to ensure the price of carbon does not reduce significantly. This could be an explanation for the prices difference, however that warrants further research.

Our research shows there are commonalities across the standards. Some standards are using the same accreditation standards in their verification processes. In the face of shareholder pressure on international businesses there may be consolidation across some standards to meet the demand of large purchases. Consolidation of market participants is a common feature of a maturing instruction. Participants may seek out economies of scale or want to expand their product offering in line with their stated mission. We see merit in further research identifying where different standards may be able to open their certification process to cross certify carbon offsets. As an example, while Gold Standard and CAR approach the verification and certification process differently, they both require projects to be aligned with the UN's 13 Sustainable Development Goals. They have aligned their organizational activities to the UN's development goals. Since both standards have similar goals there is a possibility for further alignment.

The standards we have examined operate in both voluntary and non-voluntary markets. Further research would be beneficial to understand to implications of operating in these two types of markets. Currently, it is unacceptable for forestry related VCS to be traded on non-voluntary markets in EU ETS. Further research can examine what changes (if any) standards need to undergo in order to align with non-voluntary requirements. The EU ETS captures approx. 41% of all emission generating activity in Europe (European Commission, 2022). The EC have published legislation that would extend the EU ETS to the maritime sector and establish a new ETS for emissions in transport and fuels used in buildings. As we

see the market for offsets growing it is possible standards may be adopted for non-voluntary use. Further research can be done to identify the important considerations for standards that are operating in voluntary and non-voluntary markets.

As we have identified, stakeholder influence in businesses may drive environmental standards adoption. These stakeholders may be regulator or come from other sources. The issues of regulatory oversight on voluntary standards have been under discussion for several years in multiple countries. Further research is needed to identify the effect of regulation in this industry. As operator of the ETS, the European Union has demonstrated how legislation involving a carbon standard can work. The European Commission publishes annual reports on the operation on the ETS. These annual reports have identified advantages and drawbacks of the legislative oversight of standards. Some issues the ETS has faced include market manipulation, fraud and money laundering. Legislation is intractably linked to the operation of the ETS. An example of this is European Climate Law, which lowers the supply of allowances that companies received as part of their ‘cap-and-trade’ allowances. European legislation also affects carbon credits where they are traded on exchanges outside the ETS. Where credits are traded on secondary exchanges (like ICE Endex in Amsterdam), MiFID legislation applies.

Conclusion

Our research set out to review and analyse the certification standards that are in use. We have found there are multiple possible sources of pressure on Irish businesses to move in this direction. As businesses start to navigate this area, the potential market for carbon offsets would grow significantly. Choosing an offset provider in Ireland is contingent on understanding the standards those offsets are issued under. All carbon offsets exist in an environment where there are several critical factors to consider. These critical factors could affect how companies navigate the offset markets. As we have demonstrated there is differences in how standards approach these critical factors. As companies undergo change through stakeholder pressure, they may decide to discount certain standards due to not upholding or addressing certain critical factors. Understanding the importance of these critical factors can help business make sound decisions that are supported by evidence. The evidence used in arriving at decisions will help companies manage stakeholder pressure and withstand criticism.

Examining the standards has revealed significant alignment between the standards and The Kyoto Protocol. The Kyoto Protocol's CDM issues VCS which are directly aligned with the Protocol. The similarity between VCS and other standards shows how many standards are aligned with the Kyoto Protocol. This alignment is important to demonstrate even though the standards are both voluntary and non-voluntary. As we can see, the standards are in operation in non-voluntary industries. This operational readiness means that if businesses are forced by regulators or by other stakeholders to adopt offsetting rules then the standards exist to accommodate that.

As businesses navigate the offsetting markets, they can use their knowledge of the standards to identify projects that fit their strategic mission. The research undertaken in this paper will enable them to do that with more understanding and competence. Aligning the offsetting credits purchased to the strategic aims of a business can protect them from pressure or criticism we have examined from stakeholders in our literature review.

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