RUBICON CARBON

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A risk adjustment approach for creating high integrity carbon credits

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Executive summary

Problem: Multiple types of risk make it challenging to value carbon credits

Buyers purchase carbon credits to meet climate commitments, whether they are corporations setting voluntary targets or nations looking to help fulfill their nationally determined contributions (NDCs) under the Paris Agreement. To mark their progress with confidence, buyers need to know that each credit they acquire actually represents one tonne of carbon kept out of, or removed from, the atmosphere. However, credits usually cannot be directly measured, and are exposed to different risks that make their environmental benefits challenging to estimate, especially over time. Current carbon credit methodologies account for too little of the uncertainty that these risks introduce. As a result, there can be a gap between the number of credits issued by carbon registries (the independent, technical entities charged with verifying and issuing carbon credits) early in a project's lifetime and the amount of actual, on-the-ground carbon benefit that scientists believe occurred in a given project with the benefit of hindsight (Figure 1). This disparity is creating confusion among carbon credit buyers and severely limiting necessary market activity. Together, these effects, combined with changing market standards, are limiting the use of this critical tool for financing important projects that create positive climate impact.

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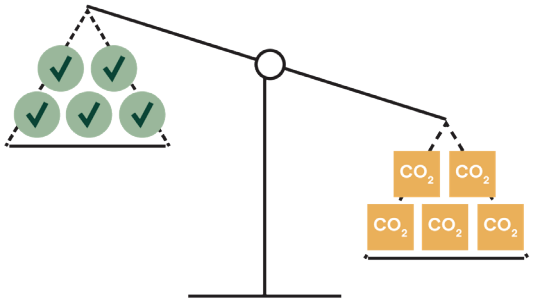
FIGURE 1: **Many credits listed on a registry may now represent less than one tonne of actual emissions reduction or carbon storage. To close this integrity gap we believe we need to, as best we can, quantify the difference and balance it out with additional credits, such that the credits used for offset more closely represent the actual carbon tonnes actually avoided/removed.**



Solution

Address this disparity by adjusting for risk

We have developed and introduced the Rubicon Carbon Tonne (RCT℠) to address these concerns. RCTs are portfolio-backed carbon credits, and we deploy multiple strategies to lower the risk assumed by buyers: 1) each RCT℠ is backed by a diversified portfolio of carbon projects; 2) we apply rigorous quality guardrails to maintain a high level of quality throughout;[4] and 3) we conduct ongoing risk adjustments (the subject of this working paper). The ongoing risk adjustments help close the gap between the number of registered carbon credits and our estimate of the actual tonnes of carbon credits we have invested in. By retiring more credits than are actually used as offsets, as a portfolio holder we can help close the gap between the registered and actual value of the carbon credits that we own. Through technology-enabled monitoring and forecasting, we can quantify how many credits must be retired to compensate for different sources of risk. Backing our risk-adjusted credits with a diversified portfolio of carbon projects further reduces risk for buyers, and creates a framework for producing fungible carbon credits with an intended value of one actual, on-the-ground tonne of carbon benefit. We should note that while we do assess the socioeconomic and benefits sharing aspects of the projects we own via our due diligence and ongoing monitoring processes, the adjustment process we describe here is not yet intended to adjust for socioeconomic risk.

Impact for the broader market

We developed risk adjustment to further enhance the quality of RCTs, beyond the benefits already offered by a diversified portfolio and project curation. However, the approach applies to any carbon credit brought to market by addressing issues such as overcrediting risk, future delivery risk, and other factors that impact credit quality. Improvements to standards and methodologies, while necessary, will not fully safeguard against these issues, and therefore cannot be counted on alone to close the carbon credit trust gap, especially in the very near term and especially for the "legacy" credits currently available in the market. Risk adjustment offers a flexible framework to integrate quantitative outcomes within these processes, which can increase the integrity of the carbon market.

In the remainder of this paper, we will: 1) introduce the concept of risk and explain how it affects the quality of carbon credits; 2) review the evolution of the quality discussion in carbon credits; 3) outline the benefits of risk adjustment; 4) demonstrate how we're applying it within our credit portfolio; and 5) explain why a process and outcome based approach is critical to closing the credit integrity gap.

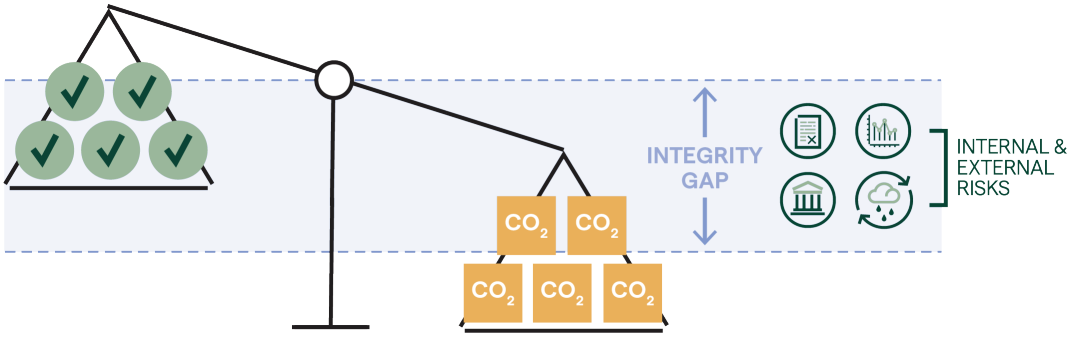
4 The Rubicon Carbon Tonne Standard is used to guide our credit purchases. This Standard can be found at the following link: https://tinyurl.com/Rubicon-Carbon

Risk and carbon credits

An overview

All carbon credits are exposed to risk, coming from both external and internal sources (Box 1). External risks are those imposed from outside the carbon project, attributable to factors beyond the control of the project developer. Internal risks emanate from flexibility in the project methodologies, or from uncertainty in the data used to measure project impact. Both types of risks contribute to the gap between the value of credits reported on a registry and their actual value, for individual carbon projects (Figure 2). When not properly addressed, the size and direction (i.e., whether they lead to over or under crediting) of these gaps is unknown to credit buyers. This uncertainty contributes to eroding trust in carbon credits: buyers are put in a situation where they don't know the true environmental value of credits they're purchasing.

FIGURE 2: **The internal & external risks associated with carbon projects can contribute to confusion about true project outcomes, leading to an integrity gap.**



BOX 1: MAJOR TYPES OF RISK IMPACTING CARBON CREDITS

Examples of external risks include:

- Natural disasters
- Variation in weather patterns or other natural systems
- Changes in governance and other societal impacts

Examples of internal risks include:

- Data or measurement errors
- Miscalibrated forecast models
- Incorrect assumptions

Fortunately, managing these risks can help boost confidence in the value of carbon credits. Managing both internal and external risk involves two separate components: 1) risk mitigation by improving processes (i.e.,-making sure that certain steps are followed); and 2) accounting for remaining risk by assessing outcomes (i.e., checking results after the fact using ancillary data to ensure measuring actual impact against what was expected). Risk can never be fully eliminated, as even in the best circumstances there will always be chance events, or natural variation in climate or other external factors, that can't be accounted for. This means that the best approach to risk management will do both.

In today's carbon market, certifiers of carbon credits remain largely focused on the first step, mitigating risk by improving the rules laid out by credit standards and methodologies. While such improvements are important, fully relying on them has led to a "cookbook approach" to carbon crediting, where buyers must trust that, so long as developers properly follow the rules, carbon credits will be worth the environmental value reported on a registry. This means that any remaining risk, which can be substantial, is effectively ignored. Specifically, the rules set by the carbon registries can fail to adequately reflect internal or external risks in retrospect. Methodologies that were used to manage internal risks and forecast the environmental benefits of a project may turn out to have been flawed. Assumptions about natural disasters and other external risks may have been overly rosy. This tendency to ignore any assessment of the actual outcomes from carbon projects continues today, despite the fact that data and analytical approaches to quantify the outcomes of crediting programs have become widespread.

To understand why this status quo exists, and why there's a need to incorporate outcome-based risk analysis into crediting procedures, it is useful to review the history of the voluntary carbon market.

How we got here

A history of crediting and quality in voluntary carbon markets

The focus on risk mitigation is a holdover from the early days of the voluntary market, when the data and analytical approaches necessary to assess outcomes were not widely available (Figure 3). It was during this period that the "big 4" registries -- Verra, Climate Action Reserve, American Carbon Registry, and Gold Standard -- were established, in a set of disparate efforts to provide frameworks for carbon crediting approaches that were emerging out of the Kyoto Protocol and other early international efforts. Given the limited resources available, all of these registries adopted a similar, process-based approach: they each issued a standard that lays out the high level rules for determining credit quality as it relates primarily to additionality, permanence, and leakage, and that standard was then used to guide methodologies for different crediting approaches (i.e., avoided deforestation projects, landfill gas abatement projects, etc.). Risks impacting carbon credits were then mitigated through subsequent revision of these rules.

As major registries focused on developing processes, Earth observation (in which aerial or satellite images are used to assess actual changes in carbon emissions and removals in real places) became a modern science, helped along by both technological developments and policy decisions that increased access to satellite datasets. Scientists began using these new resources to assess the effectiveness of new international efforts to address climate change, such as the United Nations' Reducing Emissions from Deforestation and forest Degradation (REDD+) programme. Even as credits from REDD+ and other projects were being purchased by corporations aiming to become carbon neutral, analyses of satellite data were highlighting the risk that these projects could claim more carbon benefit than they create. However, these analyses -- which focused on using the best available technology to assess actual project outcomes -- were largely being conducted by academics or NGOs, and therefore were largely divorced from the market practices of the leading carbon registries.

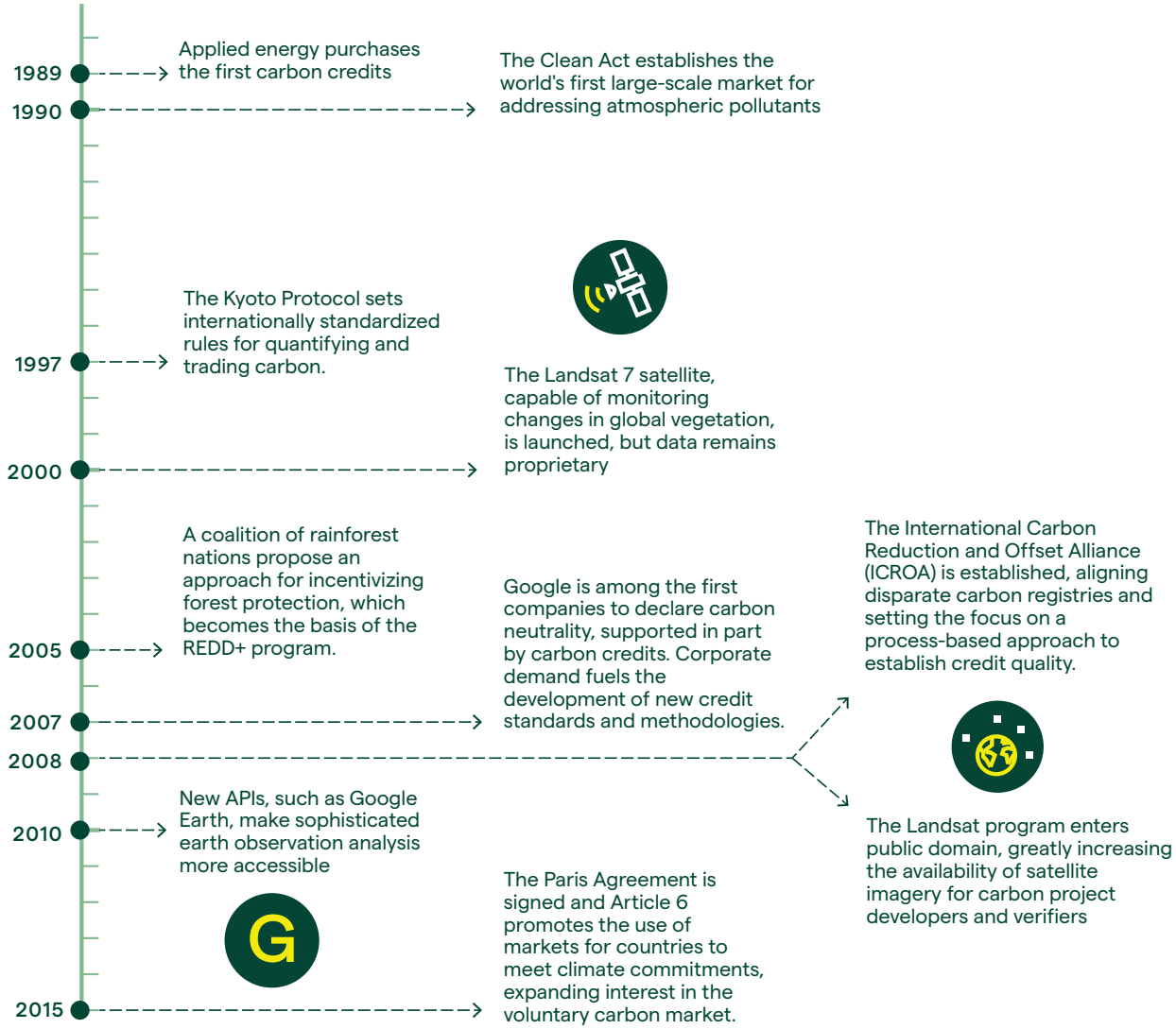
Between 2010 and the first part of this decade, the voluntary carbon market continued to grow under a largely process-based framework. But during this time, pressure was growing for registries to move faster to make improvements. Most recently, increased scrutiny by the media and the public has added to the urgency.

Developments in international policy, such as the rise of jurisdictional and nested REDD+ projects, created demand for methodologies that better leveraged modern Earth observation techniques. A string of reports argued that improved forest management (IFM), REDD+, and other types of carbon projects were claiming

far more benefit than they actually created. Registries and other non-governmental organizations such as the Integrity Council on the Voluntary Carbon Market (ICVCM) began to recognize that the status quo was insufficient. And within the last couple of years, a suite of carbon credit ratings agencies emerged and began using satellite analysis to provide credit quality assessments directly to buyers, placing further pressure on certification bodies to do more to assess the actual value of credits they backed. The uncertainty created by the added scrutiny has undoubtedly depressed buyer confidence and voluntary market activity.

The failure of legacy certification and standards bodies to adopt an outcome-based approach sooner has contributed heavily to the trust gap that exists in today's carbon market. Widespread availability of analyses for monitoring outcomes has offered increased transparency, but the fact that these results are usually ancillary information (i.e., reports from the credit ratings agencies) and not directly integrated into crediting approaches means thus far they have had limited impact on buyer confidence. What is missing is a framework for integrating outcome-based analysis into the strong foundation that has been established by decades of development of process-based carbon credit standards and methodologies. The risk adjustment approach that we have developed and implemented is such a framework. In the next section we will explain how that framework can help elevate the quality and integrity of the voluntary carbon market.

FIGURE 3: **A history of credit quality in carbon markets**



Benefits of the risk adjusted approach

Our risk adjustment approach is this: if a project is exposed to risks that create a gap between the number of registered credits and the actual environmental benefit of a project, we account for this gap by retiring (i.e. removing from the market forever) additional credits with no beneficiary from a risk adjustment buffer pool.[5] We implement the risk adjustment at the portfolio level, though the risk adjustments are calculated on a project by project basis. The risk adjustment retirements from the portfolio are in addition to the buffer pools maintained by registries at the registry level, which are intended to hedge against non-permanence risk due to wildfire or other catastrophic reversal events.

This outcome-based risk management framework improves the quality of the existing credit supply, and helps to future-proof the market. This is done by continually assessing the gap between credits put on a registry and actual value on a per project basis, then applying adjustments to ensure that each RCT℠ corresponds as closely as possible to one tonne of carbon benefit in the real world. Risk adjustment has several benefits:

1. **First, and most obvious, it allows buyers to know what they're getting.** Buyers are hesitant to make purchases today because they don't know which credits they can trust, and conducting both initial and ongoing due diligence is an expensive and time consuming process. Risk adjustment helps ensure that credits represent one tonne of impact and are equivalent from project to project.

2. **Risk adjustment can restore the value to many legacy credits already on the market.** Many credits on the market are creating real environmental value, even if their impact is likely being overstated. Risk adjustment can be applied to address overcrediting in legacy carbon projects, providing they can clear basic quality hurdles. This ensures these assets are put to use, rather than adding to a surplus of unretired credits that weighs on the market.

3. **Risk adjustment can help futureproof the carbon market**. As forward purchasing of carbon credits becomes increasingly common, buyers will have to contend with the risk of carbon projects underdelivering against expected results. Risk adjustment can be used with ex-ante crediting and other forward financing mechanisms to safeguard against delivery risk.

4. **Risk adjustment pushes the market toward higher quality.** In the risk adjustment framework, there is a higher cost associated with taking on lower quality projects (i.e., a greater rate of risk adjusted retirements to reach one tonne equivalency). Outcome-based adjustments incentivize carbon credit portfolio holders to invest in high quality due diligence that will identify projects with the lowest risk of over-crediting.

In the next section, we'll illustrate how Rubicon Carbon's approach to risk adjustment works, using an example based on adjusting for overcrediting risk in a portfolio of industrial avoided emissions projects.

How Rubicon's proprietary approach works

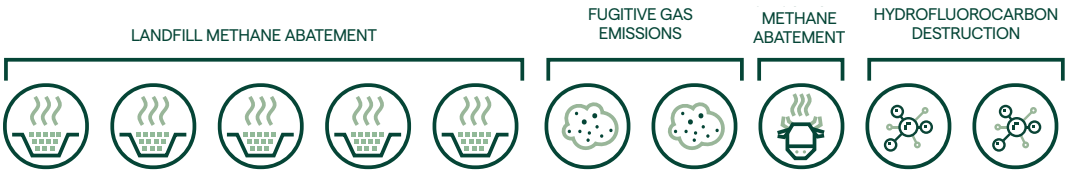
Even before risk adjustment is applied, other approaches to mitigating risk are employed to increase the integrity of Rubicon's RCTs. The first of these is the use of a diversified portfolio of carbon projects. Much like any portfolio of diversified assets, the values of the projects are not necessarily correlated with one another, meaning that as a pooled, diversified asset one RCT℠ inherently has less risk than a single project tonne. Sec-

5 While in today's market it is more common for a project to be overcredited, it is also possible for a project to have issued fewer credits than it should have, based on the actual environmental impact of the project. For example, an afforestation project may grow more quickly than projected if the environmental conditions are especially favorable for growth. In such cases, it would be possible to adjust for this at the portfolio level by managing the portfolio-level risk adjustment buffer.

ond, rigorous quality guardrails that go beyond what is required by certification bodies screen out the higher risk projects, increasing the quality of the portfolio (see footnote 4). As discussed above, however, even with these steps some level of residual risk remains for all carbon credits, and this is where risk adjustment comes in.

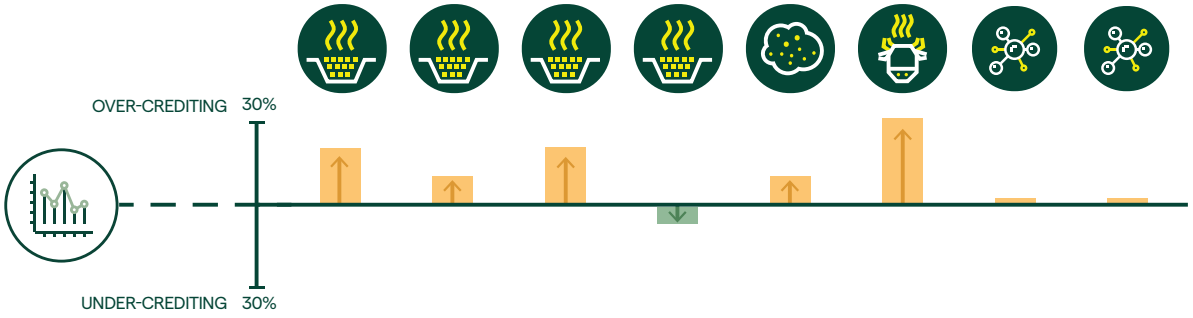
To illustrate how our risk adjustment approach works, we'll focus on an example of using it to address over-crediting. Overcrediting has received significant attention in recent months, thanks to a series of media reports detailing how corporations have overstated their carbon offsetting efforts by purchasing credits that created less carbon impact than what was reported on registries. This makes it a particularly relevant example for outlining the risk adjustment approach.

Let's walk through how this process works for an example industrial avoided emissions portfolio that includes several landfill methane abatement projects, alongside two fugitive gas emissions projects, an agricultural methane abatement project, and two hydrofluorocarbon destruction projects. These are project types that have overall good reputations in the market, owing to strong additionality claims when they aren't adversely impacted by the regulatory environment, but which can to varying degrees be at risk for overcrediting.



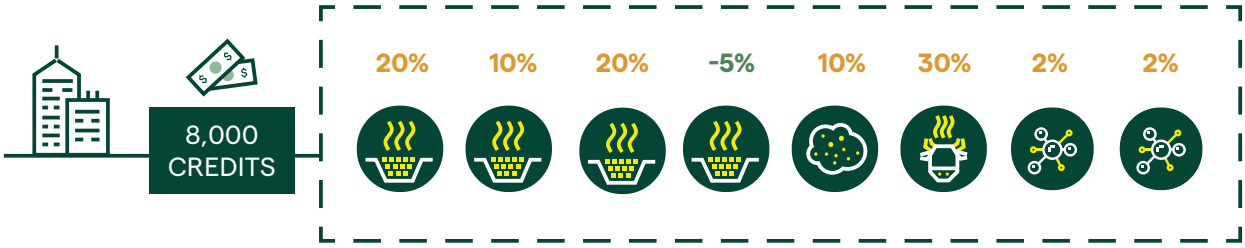
In the first step, among an initial pool of projects, ten are evaluated for purchase using a rigorous quality standard. Let's assume that eight of ten projects pass high integrity quality guardrails (see footnote 4). Of the remaining two, one is eliminated because an uncertain regulatory environment calls into question the overall additionality of the project. One of the fugitive gas projects is eliminated because background research shows that it has only been partially effective, creating too high of a risk of overcrediting.

The eight projects that are incorporated into the portfolio are assessed using a detailed, technology-enabled measurement, reporting, and verification (MRV) approach, which includes assessing independent baselines for the projects and using these to recompute the number of credits they create, separate from what is reported on registries.



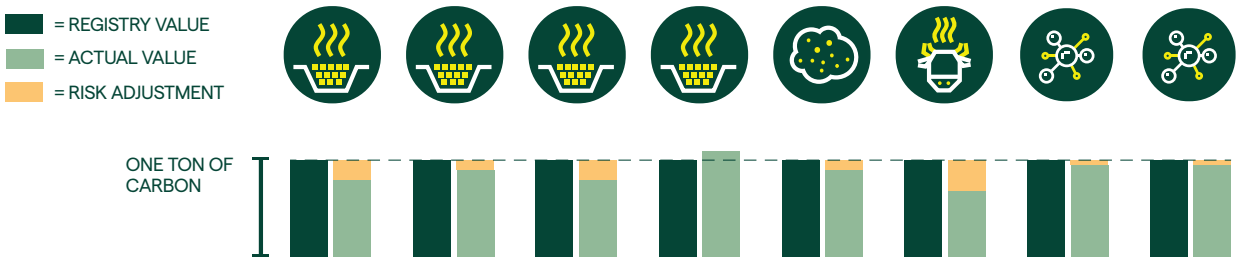
Results of this work suggest that seven projects are overcrediting their actual value, resulting in risk buffers ranging from 5-30 percent. The two hydrofluorocarbon (HFC) reclamation projects are found to have very low risk for overcrediting because they use robust measurement procedures and were conducted in countries that do not regulate HFC destruction. One of the landfill gas projects is found to undercredit its registered value by 5 percent, when monitoring shows it is emitting less methane to the atmosphere than it is mandated to deduct for by the project methodology.

A corporate buyer has just revised its Sustainability strategy, and decided it wants to use offsets to address a portion of its scope 3 emissions. The corporate buyer purchases 8,000 risk adjusted credits from this portfolio because the portfolio holds a diverse set of high quality projects from around the world. The buyer keeps these credits for the future rather than retire them immediately, because in this hypothetical case it is simultaneously making good progress meeting its Scope 1 emissions targets.



Risk adjustments are reanalyzed on a periodic basis using the procedure described above, and we continue to monitor for changes in regulation that may impact the credit vintages in the portfolio.

When the buyer is ready to retire its risk adjusted credits, the current risk adjustments are applied to each project to calculate the number of credits that will be retired to address overcrediting risk. For ease of presentation, we use the sum of the individual project risk buffers, which – if we assume the portfolio is equally weighted among the eight projects – results in retiring an additional 890 credits without a beneficiary (i.e. they are not credited to any specific buyer), purely to close the gap between the registered and actual project values.. In practice, however, because diversification itself is a risk mitigation strategy, the portfolio level risk may be lower than the sum of the individual project risks, and it would be appropriate to use this estimate instead.



The result – after the extra 890 credits are retired with no beneficiary — is that the actual value of the 8,000 credits retired on behalf of the buyer more accurately reflect, in our opinion, the actual environmental benefit, and this can be demonstrated by detailed quantitative analysis. The buyer gains confidence from a system that quantifies and integrates outcomes instead of relying solely on standards and methodologies. The portfolio holder (Rubicon Carbon in this case) assumes the cost of project-level risks and, through active management, seeks to reduce overall portfolio risk by incorporating higher quality projects. The buyer was able to buy the precise quantity of credits it needed and the environmental value of those credits did not change over time despite changes in the real world impacts of the carbon projects in which the buyer invested. When risk adjustment becomes more widely adopted, the market shifts towards higher integrity projects, as the cost of adjusting credits with high overcrediting risk becomes prohibitive.

Next steps

Other applications of risk adjustment

Currently, Rubicon Carbon is using risk adjustment to account for the discrepancy between the actual value of ex-post carbon credits and the claimed environmental value reported on registries, for the purpose of reducing the risk of purchasing RCTs for buyers. However, this is only one application of the risk adjustment framework. Here are some other examples of applications or enhancement we can see going forward:

Addressing delivery risk of ex-ante credits: As forward purchases of carbon credits, and particularly removal credits, become increasingly common, future delivery risk is emerging as a major consideration for credit buyers. If the uncertainty around forecasted credit value is quantified, risk adjustment can be used to account for both nature-based and technological removals projects failing to meet purchase commitments.

Providing an “extended warranty” on retired credits: As the pace of science and investigation into carbon crediting approaches continues, many buyers will find credits they own called into question after they have already been retired against their climate commitments. By reanalyzing historical baseline and project scenarios, risk adjustment can be used to maintain the integrity of retired credits even as market conditions change.

Going forward

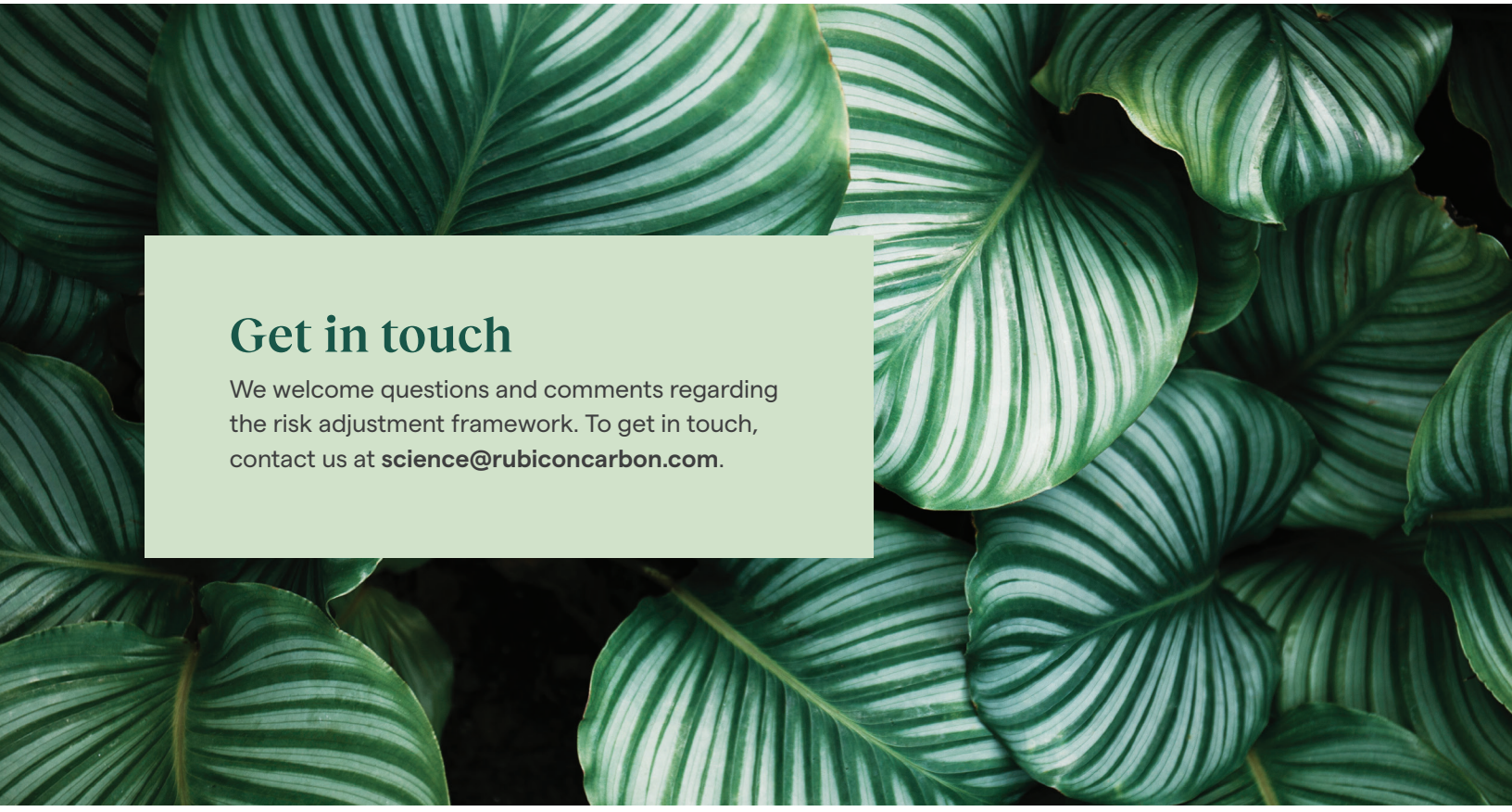
Risk adjustment in the broader market

If the carbon market is to resume its upward trajectory, buyer confidence in carbon credits must be restored. After more than a year of negative headlines on projects developed with a legacy, process-based approach it is clear that this issue cannot be addressed via improvements to process-based standards and methodologies alone. We all need to integrate quantitative outcomes into crediting, and Rubicon Carbon’s risk adjustment framework provides a simple approach for accomplishing this.

Multiple efforts are underway to add depth and rigor to international carbon credit and corporate claims standards, including the work of organizations such as the ICVCM, the UN’s Article 6.4 Supervisory Body, and the Voluntary Carbon Markets Initiative. Moves toward Jurisdictional approaches, as applied by the LEAF coalition through the ART-TREES and by Verra through its jurisdictional and nested REDD+ framework, are seeking to improve the quality of data and analyses used to assess project baselines. Other efforts like the Carbon Removal Alliance are bringing together project developers to agree on better standards across different project types. All of this means that the evolution of quality in the carbon market is moving toward higher quality

credits and improved implementation. We are eager for these new methodologies to permeate the market, as they will help to raise the floor on what constitutes a carbon credit with quality and integrity.

Even with these improvements, however, risk adjustment will be necessary to maintain the integrity and liquidity of the carbon market. The recent reexamination of carbon markets in the media, brought on by the failure of legacy certification bodies to integrate outcome-based monitoring, has ensured that no matter how robust, the solely process-based approach will not be sufficient. As the market grows it will bring new project types and approaches, each of which will present a unique suite of risks to buyers of carbon credits. Unless actively managed, these risks will once again lead to over and under crediting, which could bring about future crises in confidence in carbon markets. This can and should be avoided. Regardless of circumstance, the risk adjustment framework we have developed is the basis for a more robust and trustworthy approach to carbon credits – one in which the environmental benefit of a carbon credit is and will remain aligned with what a buyer expects and purchases. In the end, it is our hope that this risk adjustment process will allow for carbon credits to resume their place as a necessary and useful tool to finance climate action at scale.



Get in touch

We welcome questions and comments regarding the risk adjustment framework. To get in touch, contact us at **science@rubiconcarbon.com**.

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