



# Understanding MRV: A Guide for Buying Quality Carbon Credits

How the measurement, reporting and verification of carbon dioxide removal and reduction can provide assurance of climate outcomes and confidence for investing



# Contents

<b>Introduction</b>	<b>3</b>
<b>What is MRV?</b>	<b>4</b>
<b>The Elements of MRV</b>	<b>5</b>
<b>Why is MRV Such an Important Aspect of Carbon Removal?</b>	<b>7</b>
<b>What is Required for Robust MRV?</b>	<b>9</b>
<b>Advice to Buyers</b>	<b>10</b>
<b>Conclusion: The Bottom Line on MRV</b>	<b>12</b>

## Introduction

The carbon dioxide removal industry is abuzz with talk about MRV: the measurement, reporting and verification of carbon credits. But what exactly is MRV and why does it matter to carbon credit buyers? In short, this little acronym encompasses a broad spectrum of practices and technologies that are critical for staving off the worst effects of climate change by ensuring high quality carbon removal and reduction solutions.

This eBook will help buyers understand what each component of MRV comprises, why it is crucial for meeting our climate outcomes, and what buyers need to look at when evaluating the MRV of carbon dioxide removal solutions and the carbon credits they purchase.

CarbonCure Technologies gratefully acknowledges the contributions of experts from Carbon180, Stripe Climate/Frontier and Carbonomics, whose participation in the webinar [MRV: Building Credibility and Trust in Carbon Removal Markets](#) has formed the basis of this eBook.



## What is MRV?

MRV stands for the measurement, reporting and verification of carbon dioxide (CO<sub>2</sub>) removal and/or reduction.

### M

#### MEASUREMENT

The degree to which the CO<sub>2</sub> removal can be accurately quantified through measurement as well as robust modeling.

### R

#### REPORTING

The ability to reliably provide accessible CO<sub>2</sub> measurement data and information in a transparent and usable format.

### V

#### VERIFICATION

The independent scientific validation of the CO<sub>2</sub> removal methodology and project—and the ability for independent third parties to audit the ongoing CO<sub>2</sub> removal and reduction data for accuracy and completeness,

Each letter of MRV represents a set of technologies, practices and processes that varies depending on the carbon dioxide removal pathway, the developer and verification body. More important than the dictionary definition is the functional definition, i.e., what MRV does. MRV provides a way to assess the validity of carbon credits. It's how buyers know that the tonne of carbon dioxide they bought is actually a tonne removed from the atmosphere or avoided. It ensures that promises being made by carbon removal projects are actually being fulfilled and the climate impact is taking place.



## The Elements of MRV

### Measurement of CO<sub>2</sub>

The fundamental challenge in the carbon dioxide removal industry has always been measurement. It can be difficult to precisely quantify CO<sub>2</sub> removal or reductions. Whether a technology-based or nature-based solution, carbon removal projects must:

- define a protocol for quantification of CO<sub>2</sub> removal
- conduct infield measurements and/or develop modeling to quantify the carbon removal and
- revise and update protocols and measurements, as needed, based on best available science.

All of this must be independently verified by a third-party.

Seth Baruch, CEO of Carbonomics, specializes in developing carbon offset methodologies and guiding carbon credit developers through the entire process of generating carbon credits. He explains that some pathways are relatively easy to measure precisely now, while others are impossible or impractical to measure directly and require modeling.

*“You can measure the amount of CO<sub>2</sub> that goes through a direct air capture machine. You can measure the amount of CO<sub>2</sub> that's being injected into concrete,” says Seth.*

With harder-to-measure, more open-ended systems such as enhanced rock weathering, soil carbon, seaweed and kelp growth, he says the industry is working to develop models, which come with their own inherent challenges. How rigorous is the model? How transparent is the model? Is the model peer-reviewed? What is going to get the market comfortable with a model-based approach to MRV for these harder-to-measure kinds of activities?

He's hopeful that these new protocols will be developed and meet approvals, opening up a whole new range of project types.



## Reporting of CO<sub>2</sub> Removal and Reduction

Reporting includes all the processes that project developers put in place for gathering, saving and delivering the data on their carbon dioxide removal projects. This isn't just the amount of CO<sub>2</sub> removed or credits generated, but also the very granular data (or metadata) used as inputs for calculating the carbon removal and reduction.

Project developers may have their own in-house registries that are available only to their buyers or their auditors, or they may report their CO<sub>2</sub> removal/reduction deliveries as credits on public and/or independent third-party registries.

## Third-Party Verification

Verification ensures a certain threshold for the quality of carbon credits. It is conducted by an independent third-party that specializes in the verification of carbon credits and is often approved by entities called standards or registries, such as Verra or Gold Standard.

### The verification process includes:

1. auditing at the initial approval of a project (validation)
2. ongoing monitoring of emission reductions and/or removal (verification).

Before a project is validated, the independent third-party assesses the project's plan for calculating or measuring the CO<sub>2</sub> avoided or removed to ensure it is scientifically sound and robust. Validation also includes determining additionality, review of negative impacts, assessing permanence and risk of reversal, and adjusting for leakage.

Once a project is validated, the project is then in a position to have its carbon savings verified and issued. The registry or standard assigns unique serial numbers to individual offset credits, tracks and transfers their ownership, and records the purpose of their use and retirement. These entities also regularly check the project data (see *Reporting of CO<sub>2</sub> Removal and Reduction*) to ensure accuracy.

The verification process is detailed and rigorous. Project owners must provide all the data to clearly demonstrate how they are reducing emissions, submit to having the data spot-checked to find errors and inconsistencies and then rectify them. As a result, it can take a lot of time to get carbon credits issued. "It's not an easy process," says Seth. "But it is a critical component for the integrity of the whole market."



## Why is MRV Such an Important Aspect of Carbon Removal?

MRV is an accountability and trust-building mechanism that is vital for the carbon removal ecosystem to achieve the outcomes it's pursuing—and to make sure carbon dioxide removal and reduction efforts don't backfire.

### Climate Outcomes Needed

Peter Minor, Director of Science and Innovation at Carbon180, says we need to think of MRV in the context of why we're doing carbon dioxide removal in the first place. "We're trying to fend off the worst effects of climate change. Lives are literally at stake," says Peter.

Joanna Klitzke, who builds procurement and ecosystem strategy for Stripe Climate, agrees. "First and foremost, it's critical that we're generating the climate outcomes we want when we purchase carbon credits or develop a carbon removal solution."

MRV ensures this work is being done successfully, effectively and justly. We're not going to have the same impact accomplishing that if we're removing or reducing less carbon than we expected.

### Confidence to Invest

In the past, it hasn't always been easy to measure CO<sub>2</sub> removal accurately. There have been cases where CO<sub>2</sub> removal was grossly overestimated, where carbon removal was reversed, and where the industry has been manipulated for profit. As a result, carbon credit buyers have become concerned about the integrity of the credits they are buying.

Carbon180 asserts that high accountability MRV is, unequivocally, one of the most important components of building the carbon dioxide removal industry.







## What is Required for Robust MRV?

One of the challenges the carbon removal industry grapples with is how to set really robust MRV standards without slowing down the development, implementation and scaling of carbon removal solutions.

“We have to move incredibly quickly from a climate perspective,” says Joanna. We’re trying to compress 10 to 15 years of carbon removal development in the next three to five years.”

With such a diverse range of possible solutions and technologies, developing one set of protocols for MRV that will be effective for all is going to be very difficult. However, there are some common principles that Carbon180 offers to guide buyers in their selection of carbon removal projects.

### 1. Direct accounting of removals and impacts

High-quality MRV protocols measure captured CO<sub>2</sub> as directly as possible. For some carbon dioxide removal solutions that will be extremely straightforward; for others it's almost impossible. However, just because something is hard to do, it doesn't mean the standard should be lowered. Companies can develop new practices that can increase the certainty of measurement. Technologists have developed new MRV tools that answer key questions about how directly and accurately we can measure sequestration, which didn't seem possible before. The key may be to put the right incentives in place.

### 2. Tracing reversals over time

Capture is one core part of carbon dioxide removal; permanent and durable storage is the other.

Carbon removal credits can have varying degrees of durability or permanence, from decades to centuries to millennia. The more durability the better. However, we are going to need some carbon dioxide removal methods that are not going to be at the highest end of the durability spectrum. They will have a risk of reversal. For example, a stand of forest protected through carbon credits could burn to the ground in a wildfire, releasing the CO<sub>2</sub> stored back into the atmosphere.

“There will be reversals; that is going to happen, and that’s okay,” says Peter, “as long as we can actually monitor the state of sequestration, and trace and understand when those reversals are occurring.”

With that information, we have a true picture of our progress and can make informed decisions.

### 3. Appropriate incentive structures (that don't encourage fraud)

CO<sub>2</sub> is an invisible, inert, highly diffuse gas. Whether carbon dioxide removal is extremely successful or completely inept, we never see it. As Peter warns, the chance that people will not actually deliver on their promises and collect money from buyers and federal incentives is extremely high. Verification needs to take place in a framework that has financial and other types of incentive structures that minimize the risk for fraud. “Really robust, high-accountability MRV is the best way for us to make sure that fraud is minimized or doesn't happen at all.”

### 4. Data transparency

We need to make sure that project information is being made available to all stakeholders. Traditionally, that is thought of as project owners, financiers, credit buyers and, oftentimes, regulators. But from an accountability perspective, Carbon180 makes the case that it's really important that data be shared with communities as well. “They are party to these projects in a very direct way. It's important for them to be a part of the design process and party to any information being created,” says Peter. “That transparency is the best way to ensure high-quality outcomes.”

Seth agrees: “MRV can't be a black box; it has to be a fishbowl.”

## Advice to Buyers

Joanna, Peter and Seth all encourage buyers to have expectations around their purchase of carbon credits and to ask questions. The reason MRV is being talked about at all is because companies are buying carbon removal and/or reductions at a meaningful scale. While we don't want to stifle innovation, it's very clear what is eventually going to be required for success. When governments come in, buying carbon offsets in the billion dollar range using taxpayers money, there's going to be a lot of accountability required. Until then, buyers must look at each project and evaluate it based on its own merits, including its MRV. Some advice and inputs around making those evaluations include the following:

### Scrutinize the methodology

Ask about the execution. For example, how much CO<sub>2</sub> was injected or how much algae grew? Ask about the science and any further research that may be required. For example, how much alkalinity is transferred to deeper ocean waters before it results in atmospheric removal? Probe for counterfactual claims. For example, how confident are we in the additionality of carbon removal vs. the baseline?

### Consider the potential

What would it take to quantify outcomes for a certain pathway? How confident are we that it can do that with certainty given best available approaches, best available research, best available models? Use the above information to inform what level you buy at.

### Carbon credits with higher quality MRV may cost more

There is a cost to developing the methodologies and reporting systems, and going through the third-party verification process, and this will be reflected in the purchase price. While a high purchase price does not guarantee high MRV, a "bargain" carbon removal credit will not likely have a high-quality MRV. Is the cost of the MRV (development costs, verification and registry fees) baked into the cost of the carbon credits in a way that is transparent?



### Remember 100% certainty isn't necessarily the goal

We need lots of different kinds of carbon removal and reduction to fight climate change. In addition to solutions with high quality MRV, you may want to support open-ended solutions or emerging technology. You can use historical data to estimate and account for leakage or reversal. If you're uncertain about a technology, you can consider doing a R&D grant or do a smaller purchase to help the developers develop their methodologies, reporting and go through the verification process. But, before you start attributing tonnes at scale, you'll want a good handle on the MRV of a particular project and your expectations for climate outcomes.

### Think about what role you want your dollar to play

There's no guidebook on where to put your dollar or what portfolio to create. It will depend on your emissions footprint, your budget for spending and the dimensions of quality that you value. Some may want lower cost credits to cover more of their footprint, while others want to buy the expensive credits to help catalyze the market. You'll have to balance that with MRV and other factors like cost, scalability and co-benefits.

### Follow the leaders

For now, well-known buyers of early permanent carbon removal solutions are spending a lot of time doing "bespoke" verification of deliveries, thinking about frameworks, validating whether protocols are comprehensive, and comparing measurement approaches. That's a pretty heavy lift for an average buyer in the ecosystem. Until a comprehensive system can be developed, consider following their lead and relying on other leading, independent third-parties, standards and registries, whose job it is to make sure that data is being reported accurately and honestly.



## Conclusion: The Bottom Line on MRV

The measurement, reporting and verification (MRV) of carbon removal and reduction is a rigorous process designed to ensure the integrity of carbon credits.

### High quality MRV carbon credits:

- directly measure carbon removal and reduction or use models well-validated by field measurements
- provide a permanent solution with low risk of reversal
- have robust methodology for measurement
- provide full transparency to the data and metadata
- offer detailed, consistent reporting on their own or public registries
- are third-party verified by reputable standards like Verra or Gold Standard

Buyers who purchase carbon credits with robust MRV can have the confidence to invest in proven CO<sub>2</sub> removal and reduction solutions.

While it's important to develop all types of CO<sub>2</sub> removal and reduction, solutions with high quality MRV assures carbon credit buyers that their investment is making a measurable impact in the fight against climate change.





# Invest in CarbonCure's Carbon Credits

## **Make a concrete impact to fight climate change**

Hundreds of leading concrete producers around the world use CarbonCure's award-winning carbon removal technologies to decrease the carbon footprint of concrete, reducing and permanently removing tens of thousands of CO<sub>2</sub> each year, and generating high-quality carbon credits you can trust to deliver immediate, scalable, high-impact climate benefits.

Your carbon credit purchase will help us build a global network of concrete plants that are accelerating and scaling the decarbonization of the concrete industry.

For more information about purchasing carbon credits from CarbonCure, visit [carboncure.com/carbon-removal](https://carboncure.com/carbon-removal). To get in touch with a CarbonCure representative, email us at [sales@carboncure.com](mailto:sales@carboncure.com) or call us at **+1 (902) 448-4100** (Worldwide) or **+1 (844) 407-0032** (North America).