



# Google's Carbon Offsets: Collaboration and Due Diligence

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## Introduction

At Google, we reduce our carbon footprint through efficiency improvements, generating on-site solar power and purchasing green power. To bring our remaining footprint to zero, we buy carbon offsets.

Purchasing carbon offsets means investing in green projects that have very little to do with our core business. When we purchase a carbon offset, we rely heavily on research, collaboration, standards and due diligence to guarantee we're getting a quality offset that provides long-term global benefit. This paper describes the process we use to select carbon offset projects and apply carbon credits to our carbon footprint.

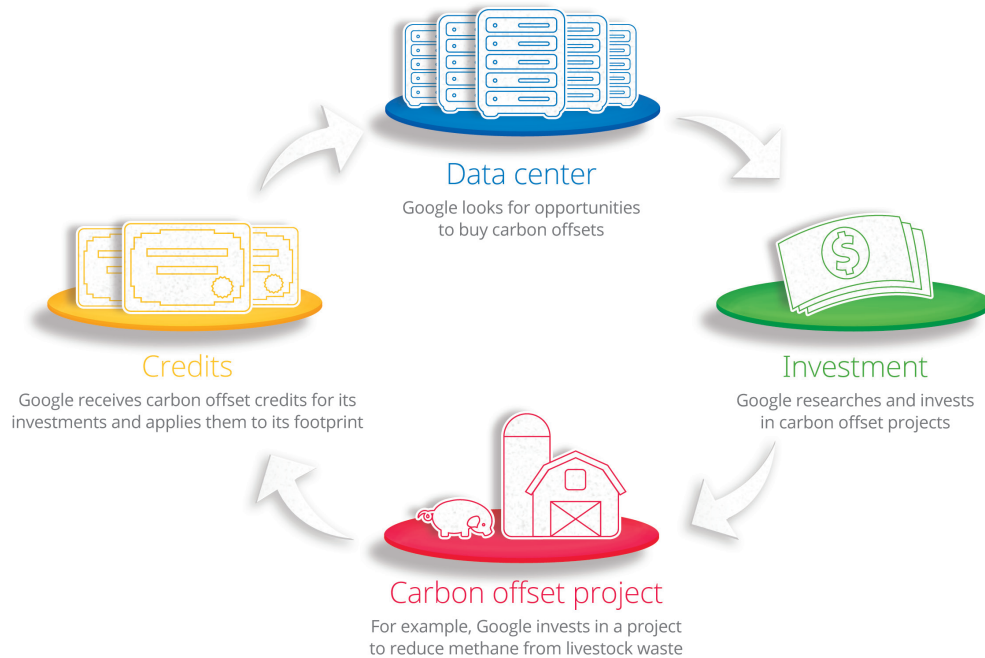
## What are carbon offsets?

A carbon offset is an investment in an activity that reduces carbon emissions. The reduction in carbon emissions is represented by a carbon credit. The credit, usually verified by a third party, signifies that greenhouse gas emissions are lower than they would have been had no one invested in the offset. One credit equals one metric ton of carbon dioxide prevented from entering the atmosphere.<sup>1</sup> The credit purchaser can use the credit for carbon accounting.

Here's a hypothetical example: Say there is a Google data center in an area with little renewable power. First, we reduce our data center electricity usage through energy efficiency improvements. We then talk to the local power utility about purchasing more green power. Unfortunately, we discover that there aren't additional green energy sources close to our data center, nor are there plans to build more in the near future.

Until we can power our operations entirely with renewables or reduce our emissions in other ways, we can use the offsets to fund projects that reduce greenhouse gas emissions, indirectly reducing our total carbon footprint. For example, close to our data center, we discover a large farm that produces a lot of animal waste. Livestock waste produces methane — a particularly potent greenhouse gas that's more than 20 times as harmful as carbon dioxide.<sup>2</sup> We invest in a project that allows the farm to collect this waste and process the methane out of it, and they credit us, their fiscal sponsor, with reducing global greenhouse gas emissions.

When we apply that credit to our carbon footprint, it offsets our emissions from using non-renewable energy. We might not know much about manure, and farm operators might not know much about search engines, but through this collaboration we reduce global greenhouse gas emissions and contribute to the communities in which we operate.



## Carbon offset project standards

Carbon offset producers have an incentive to pitch planned business improvements as carbon reduction projects to attract outside investment dollars and conserve their own capital. For example, if the farm in the previous example already had plans to build a methane capture system because it made financial sense or was required by law, giving them additional money through carbon offsets would not create any additional benefits for the environment. Since our goal is to offset our carbon emissions, we only support projects that would not come into being without our investment.

When Google first purchased carbon offsets in 2007, we were aware of the difficulties in buying an effective offset. To counter the information asymmetry between Google and carbon offset producers, we do rigorous research to make sure we are buying only quality offsets, based on four standards: additionality, leakage prevention, permanence and verifiability.

### **Additionality**

As previously discussed, Google’s first priority when examining a carbon offset project is proving that it provides additionality—meaning that the proposed project reduces greenhouse gas emissions that would not be reduced through other incentives. We work to guarantee additionality by examining past financial information on the project, project details, potential carbon reductions and similar projects in development. We also talk directly to project owners and operators. The goal of these assessments is to determine if our investment would lead to a carbon reduction that would not otherwise happen.

### **Leakage prevention**

An additional criteria is leakage. A reduction of greenhouse gas emissions through one project might simply shift, or leak, to another location or activity. To prevent leakage, we closely examine the community and environment in which the project is going to take place. Identifying project risks and key stakeholders are the primary components in determining potential leakage.

Leakage typically occurs in situations where resources are being protected. For example, if a carbon offset program focuses on protecting a forest from being logged, it’s entirely possible that loggers might move their operations down the road to another forest. Ensuring that reductions are more global—and not just local—is critical to preventing leakage.

## Permanence

Tied into leakage prevention is the standard of permanence. Greenhouse gases prevented from entering the atmosphere should be stopped permanently. We need to be certain that the projects we invest in are not temporary methods of carbon reduction or greenhouse gas sequestration.

This is typically a concern with forestry projects or anything where greenhouse gases are being stored for a period of time. If there is significant risk that the stored carbon would be released through events such as a forest fire or a leak from sequestered carbon, the project would need to account for this, such as through insurance or a buffer of additional reductions.

## Verifiability

The last requirement is verifiability. An objective third party—someone other than the project developer and Google—must be able to look at project data and confirm that the carbon reductions are real and credible. The third-party verifier determines the proper baseline for greenhouse gas reductions and verifies that the reductions adhere to strict monitoring and reporting standards.

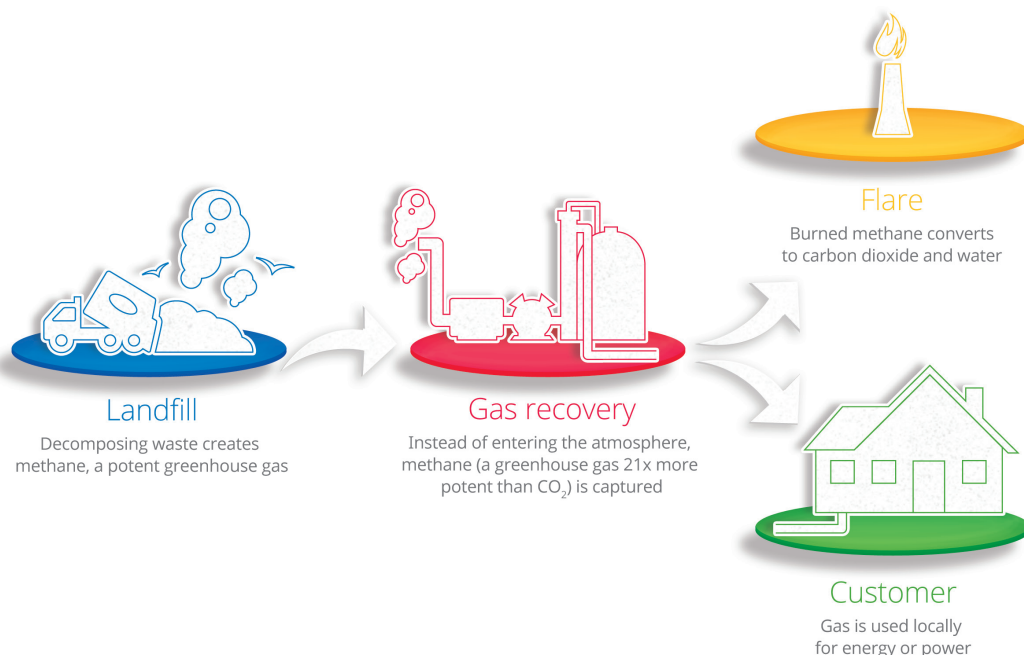
## Types of carbon offset projects

A number of different project types qualify for carbon offsets, and more are becoming available as new technologies for reducing greenhouse gases are developed. The kinds of projects Google considers for carbon offsets include:

### Landfill gas capture

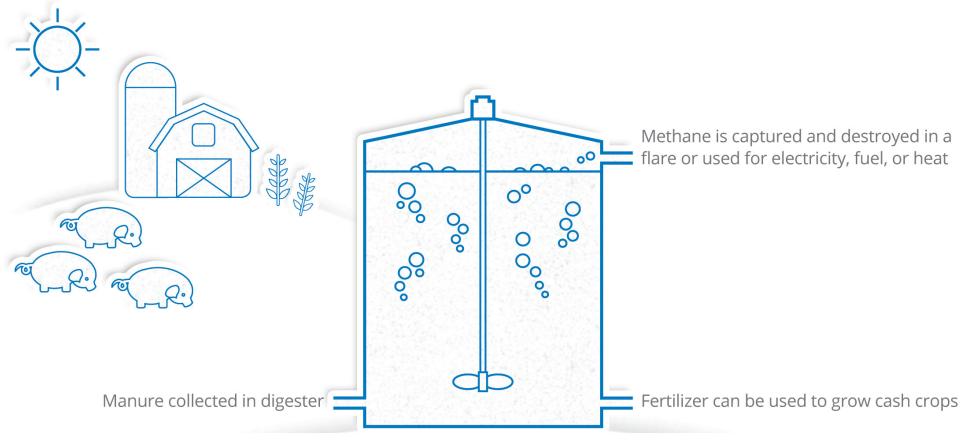
Decomposing waste creates methane gas, which is a potent greenhouse gas. Small and medium-sized landfills in many U.S. states are not required to capture or process methane, and thus the methane vents freely into the atmosphere. Capturing and destroying this gas reduces the total emissions of greenhouse gases. Captured methane can be burned to generate electricity or heat; or after treatment, it can also be injected into the nearby natural gas grid or used locally as compressed natural gas (CNG) for vehicles and other uses. When other options to use the gas aren't available—such as due to the small volume of gas created or the project's remote location—the gas might instead be burned in a flare.

It might sound counterintuitive that burning something reduces carbon emissions, but when methane is burned it converts into carbon dioxide and water. Carbon dioxide is a less potent greenhouse gas than the original methane, effectively reducing greenhouse gas emissions. Currently, the bulk of Google's carbon offsets come from investment in landfill gas projects.



## Agricultural methane capture

Similar to landfill gas, agricultural methane is produced at farms from decomposing animal waste. Carbon offset projects are designed to collect this waste and process it into usable products, including energy and heat. One method involves collecting manure into a huge, circulating tank called a “digester.” The digester promotes bacterial growth, which breaks down the waste into usable organic fertilizer and methane. The methane is then captured and used or burned.



### Agricultural methane capture

Animal manure is broken down into usable organic fertilizer and methane, a greenhouse gas, which is destroyed or used for energy

## Forestry projects

A large amount of carbon is stored in forests. As forests grow, they absorb and sequester additional carbon. However, as forests are logged, degraded or burned, carbon is released. There are various kinds of forestry projects offering carbon offsets, but the concept is either to protect forests from destruction and degradation or to enhance and develop new ones.

## Procurement and due diligence

Carbon offset projects are verified by third-party investigators using published public standards. Once a project is verified as creating a credible reduction in greenhouse gases, a carbon registry issues a carbon credit for each metric ton of carbon dioxide (or equivalent) reduced.

Google takes a hands-on approach to pursuing offset projects to ensure that we're getting the highest quality offsets available. We source projects in a variety of ways, including requesting proposals from project developers and working directly with project owners, marketers and brokers. While we rely heavily on third-party standards, if we find projects that we believe meet our criteria where no standard exists, we may pursue them and develop a new standard.

When we invest in a carbon offset project, we perform due diligence by:

1. Reviewing the documentation from the offset seller and from third-party sources, including reviewing emissions data, permits and site testing results.
2. Visiting the project site and meeting people in charge of day-to-day operations.
3. Reviewing the verification reports, if a project has already been verified.

Only when we are confident of the operation's quality and have confirmed that the project meets our standards do we purchase the carbon credits associated with the project.

For example, in 2010, Google decided to purchase the offsets associated with the Berkeley County landfill gas project in South Carolina. This project involved collecting methane gas from a landfill and using the gas to generate electricity. A local electric utility, Santee Cooper, would purchase the methane from the site to fuel a nearby power plant.

With revenue from gas sales, Google had to carefully review the project's financials in order to verify additionality.<sup>3</sup> We took into account the costs to install the methane capture system versus the estimated revenue from the sale of landfill gas. We had to answer the following question: If there wasn't revenue from the sale of carbon offsets, would the revenue incentive from the sale of landfill gas to generate electricity be enough for the landfill to install the system anyway?

When we calculated the financial rate of return, we compared two sets of financials: One with carbon offset revenue and one without. In the case of Berkeley County, the project wasn't financially viable for the landfill based on the natural gas revenue alone—gas prices would have needed to be much higher to make the project financially feasible. Thus, the project passed our criteria for additionality, and we invested in it.

## **Applying carbon credits to our footprint**

Once carbon credits from a project are verified by a third party and issued by a carbon registry, ownership of the credits is transferred from the project owner to Google. The carbon credits are then permanently retired and applied to our carbon footprint. When we retire a credit, the serial numbers of the credits are located in the carbon credit registry that created them and permanently designated as retired.

At the end of this long process—finding and reviewing projects, verifying the emission reductions, contracting for the offsets, taking delivery of carbon credits, and then retiring the credits—we finally apply the credits to our own carbon footprint. Until retirement, the metric tons of greenhouse gases reduced from the carbon offset project are an estimate. Once we have an exact figure from the carbon credit registry, we apply those metric tons to our footprint.

Given the uncertainty of estimating the exact number of metric tons from each project, it is difficult to apply a strict rule of offsetting our footprint year with the year the offset was created. Instead, we currently apply a window of up to three years between the footprint year and the year the reduction occurs. Considering that the global warming potential of these gases is calculated over one hundred years or more, the difference in three years is quite small.

## **Conclusion**

In addition to improving our efficiency and investing in green power, we will continue to purchase carbon offsets to bring our carbon footprint down to zero. However, not all carbon offsets are created equal and ensuring that a carbon offset represents actual greenhouse gas reductions can be a long process.

Carbon offsets are still very new. In fact, it's entirely possible that how we offset our emissions a few years from now will be very different from how we do it today. Our offsets may be more personalized, more local and rely on emergent technologies that have a global impact. Google hopes to be part of the evolution of these new offsets, and will continue to foster current offset projects through research, collaboration and investment.

1. Or one metric ton (1,000 kg or 2,204 pounds) of carbon dioxide equivalent (CO<sub>2</sub>e). Carbon dioxide equivalent is a quantity that describes, for a given mixture and amount of greenhouse gas, the amount of CO<sub>2</sub> that would have the same global warming potential (GWP), when measured over a specified timescale (generally, 100 years).
2. Some greenhouse gases are more potent than others. Carbon dioxide has a global warming potential of 1, since it's the baseline. Over 100 years, methane has a global warming potential of approximately 20 to 25 times more warming than carbon dioxide. Processing methane converts it to carbon dioxide, reducing it from a GWP of 20 or 25 to 1.
3. An apparent irony of methane destruction projects is that determining whether or not they are additional becomes more complicated if the gas is actually used for electricity, heat or fuel. If the only revenue is from carbon offsets, it is usually quite clear that the large investment in a gas collection system (which can cost up to \$1 million) was made for the carbon offset revenue. On the other hand, with a system that has revenue from both carbon offsets and gas or electricity, it's possible that the revenue from the gas or electricity would have been enough to make the project financially attractive. Even though the analysis of carbon offset projects with "beneficial uses" is more complicated, we always prefer to buy credits from projects where the methane is used for something good, and not just burned in an open flare.

