CAPCO

CARBON OFFSETS:

TRANSITIONING TO CARBON NEUTRALITY

a **wipro** company

The concept of carbon offsetting is not a new concept, but while the technology has been in place for some time, there remains a lack of maturity around offset projects, the credits they generate, and the ability to manage both in current trade and risk management system (TRM) offerings. In light of the intractable pivot towards net zero, we explore the rationales behind carbon offsets, some of the current challenges, and potential paths forward.

The movement toward a greener future has led to clean energy projects breaking ground worldwide. The International Energy Agency's (IEA) Net Zero 2050 outline estimates that by 2030 the total annual energy investment will rise to five trillion dollars – more than double recent annual averages – due in part to large-scale clean energy initiatives. While recent headlines have outlined risks with the present speed and viability of involuntary transition, there is little doubt that clean energy investment will continue at a blistering pace.

At a consumer level, society has been transitioning to cleaner end use products like zero emission electric vehicles and more efficient homes with solar capabilities. And at the corporate level, businesses are taking steps to improve efficiency from logistics to office lighting. Even with these technological advancements, green investment increases, and consumer and corporate behavior shifting towards carbon emission reductions, the reality is that we will continue to produce carbon emissions for the foreseeable future.

The question is, how can a society that continues to produce an indisputable carbon footprint claim to have achieved carbon neutrality? Carbon offsets are one of the instruments that organizations can use to reach their carbon neutrality goals. In this white paper, we will explore carbon offsets and the challenges of managing offsets in current trade and risk management systems.[1]

WHAT IS A CARBON OFFSET?

Carbon offsets are paper instruments derived from projects that reduce carbon dioxide (CO2) emissions in the atmosphere. Offsets are measured in metric tons of CO2 equivalent, and, after certification, can be traded on several global markets, such as the Climate Action Reserve, American Carbon Registry, Verra, and the Gold Standard. Offset credits are used as indirect reductions of a holder's carbon footprint, meaning if you hold enough credits, you can become carbon neutral.

Carbon offsets are often compared to Renewable Energy Certificates (RECs) due to the instruments' ability to offset emissions; however, they are fundamentally different. A REC allows a producer or purchaser to reduce a portion of their emissions footprint by claiming the creation of one megawatt-hour (MWh) of electricity from renewable sources, whereas an offset is a direct or indirect reduction of CO2 across their entire emissions footprint.

UNDERSTANDING SCOPE AND ACCOUNTABILITY

For companies to achieve net zero goals, they must first understand the breadth of their greenhouse gas (GHG) emissions, and how to account for their total emissions footprint.

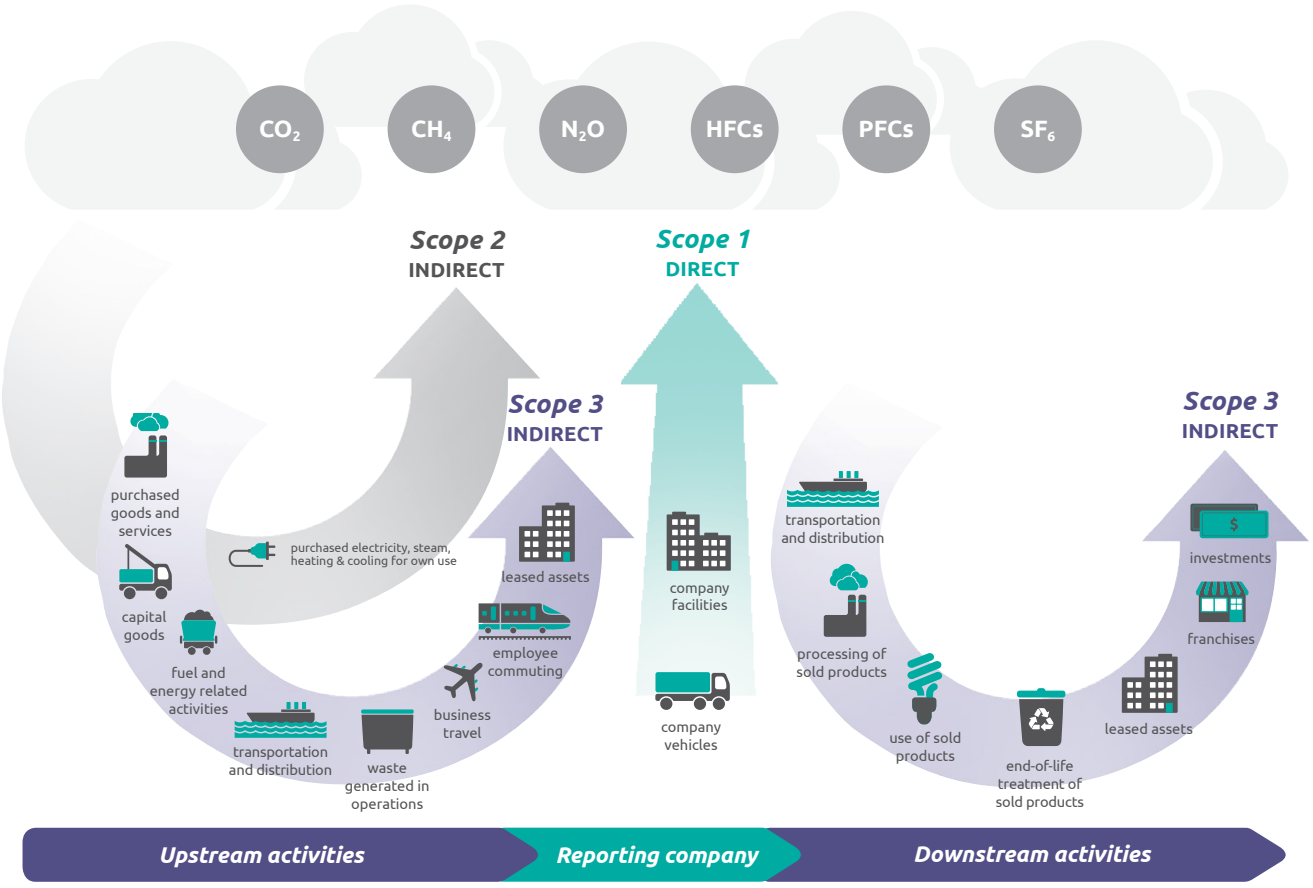
Accountability of GHG emissions uses the GHG Protocol Corporate Accounting and Reporting Standard. This is known as the scope of emissions and is divided into three segments.

- **Scope 1:** Direct emissions come from company owned or controlled sources, which include owned facilities and chemical production, production boilers and furnaces, and factory fleet vehicles.[2]

- **Scope 2:** Indirect emissions are from the generation of purchased energy, for example, gas or coal-fired plants, heating and cooling used during production, and even computer systems running a plant.[2]

- **Scope 3:** Indirect emissions, not included in scope 2, from sources not owned by the company, which include upstream emissions that occur across the lifecycle of a product or the source materials, up to the point of sale. Downstream emissions also occur during the life cycle, though after its point of sale, and these might include storage, distribution, leased assets, or fuel for leased assets. Scope 3 accountability stretches as far as emissions from employees' commutes to corporate travel. It is often referred to as the Corporate Value Chain Standard and is usually the greatest share of a company's carbon footprint.

It is important to note that while carbon takes center stage in energy transition headlines, GHG accountability is not limited to only CO2. Methane (CH4), nitrous oxide (N2O), and fluorinated gases accounted for approximately 20% of the total U.S. GHG emissions in 2020. Methane offset projects, either through direct burning or reuse, nitrous oxide offsets, such as nitrate abatement in fertilizer, and advancements in containing fluorinated gas leakage are beginning to have larger roles in efforts to reduce total emissions.[3, 4]



Source: Scope 1 and Scope 2 Inventory Guidance | US EPA

CARBON SEQUESTRATION – THE BIRTH OF AN OFFSET

Carbon sequestration is the process of removing and storing carbon from the atmosphere, and it can occur naturally or from technological processes. Natural CO2 reducers are often referred to as 'sinks' for their ability to soak up carbon, and they include oceans, plants, and even the atmosphere itself.

Conversely, technological sequestration is a process where carbon is either captured at the source or from open air, then moved through a production process or stored underground in geologic formations. Both natural and artificial means of sequestration can generate a carbon offset per ton of carbon removed; however, there is a key caveat. To receive the offset, you must be able to prove that the carbon was sequestered, the project or process was validated, and that you possess a claim to the ownership of the process.

Beyond direct sequestration, companies can also take internal measures to reduce GHG by utilizing low emission products for efficiency, such as LED lighting. Not only do high efficiency products reduce direct emissions, but they also limit emissions indirectly, thus reducing the demand for inefficient products and the heavy GHG processes that produce them. While this is not a sequestration method or credit generator, it directly offsets a company's GHG footprint. On a broader scale, demand for higher efficiency products is a net GHG benefit because it spurs additional innovation, reduces costs in the long term, and promotes cleaner upstream production processes.

SEQUESTRATION – NATURAL VS. TECHNOLOGICAL

Of the **natural carbon sequestration** methods, forestry is the most common biologic GHG reduction mechanism, and currently, the only viable offset generator. This is largely due to the geographic confinement and steady state of accountability, meaning trees can be counted, borders can be drawn, and ownership can be determined, versus attempts to determine ownership and 'sink' accountability of ocean-size bodies of water or the atmosphere. An existing forestry provides an immediate and natural carbon removal source; however, some elements of accountability, such as over-reporting and leakage, time to market, and risk of loss, present their own sets of challenges.

Forestry accountability is an inexact science due to a variety of variables, some of which include geolocation, the age of timber, how much timber has been removed for logging operations, how much timber has been replanted, or the risk of loss from fire or other natural disaster. Ultimately, forestry is still an offset creator without the need for additional technological advancements through the natural wonder of photosynthesis.

Technological carbon sequestration utilizes a mechanical process to reduce CO2 from entering the atmosphere, or remove existing CO2 from entering the atmosphere, then using

the captured carbon for a production process or storing it in underground geological formations. The two most common forms of technological sequestration are Carbon Capture and Storage (CCS) and Direct Air Capture (DAC).[5, 6, 7]

- CCS scrubs carbon directly from the emissions source, then the scrubbed carbon can either be used to power or advance a production process or be stored permanently in geological formations. For each ton of CO2 removed through these methods, an offset is issued to the plant owner. CCS projects are highly efficient and can lead to almost 100% capture rates, unfortunately they are often cost prohibitive or not geographically feasible due to a lack of nearby storage locations. However, their offset generation can balance other internal carbon emission activities, or can be sold in an offset market, which can reduce their cost basis investment over time.

- Conversely, DAC facilities take a different approach to capturing carbon emissions by using collectors to draw in air around the carbon. As air is drawn in, specialized filtering materials collect CO2, and once the filters become saturated, a captive heating process re-releases the carbon as concentrated CO2. Similar to CCS, the captured concentrate can be reused or permanently stored, and since DAC facilities consume open air, they do not need to be at an emissions source. Also, for production reuse, their location flexibility is aided by their modularity.

- While DAC plants have been mostly small-scale projects thus far, large-scale projects are starting to receive heavy investment and are poised to become major technological breakthroughs by 2030. In 2022, Occidental Petroleum (OXY) outlined plans for a billion-dollar DAC project that would, by annual CO2 removed volume, be 100 times larger than all other existing projects combined.

Emphasizing an increasing willingness to invest in DAC technology as a profit center, corporations have already discussed long-term contracts to purchase offsets generated from OXY's sequestration plant. A total of 11 large-scale DACs are in the advanced planning stages with commitments for more than 70 by 2035, which will increase current capture rates by a factor of 700. As a result of these technological advancements, growing markets of scale, and a world continually seeking ways to reduce carbon footprints, DACs have an opportunity to become substantial business units over the coming decades.

OFFSET CHALLENGES IN TRM AND BEYOND

To achieve net zero commitments, an organization must fully understand their GHG footprint across all scopes and implement an offset plan that includes internal reduction efforts and external offset purchases. However, there are a number of challenges to overcome.

- **Lack of calculation standards:** Even with a total account of the sources of emissions, it is important to remember that CO2 calculations have not been completely standardized and offsets are still immature in both the marketplace and price variability. These issues can test the flexibility of trade management systems and their accompanying ancillary systems.

  As an example, before a forest project can become an offset tool, the parcel must first be certified, and the initial certification process requires eight years of lead time to prove both viability and sustainability. Additionally, a reassessment process occurs every two to three years to ensure continued sustainability and account for additional forestation or

deforestation. By embedding a time element into a forestry offset, the instrument begins to look and feel like an option, which, like an option potentially expiring worthless, could render the project a total loss due to natural events, such as a fire, or unforeseen accounting changes that deem the project non-viable.

- **Multiplicity of registries:** It is important to remember that offset markets are still in their infancy and there can be multiple registries that trade within the same jurisdiction. This leaves valuation as an arbitrary marker that is neither standardized nor centralized.

- **Illiquidity:** Markets are often illiquid, which leaves buyers at risk of receiving pricing estimates that are based on a posting of the latest trade, an opinion on the viability of the project, or derived from a non-standardized curve.

- **Certification:** In relation to forestry, the certification process itself has not been widely standardized, which has led to a cottage industry of certifiers that range from self-certifications based on due diligence to utilizing registries, such as Gold Standard to assist with a formal certification process. To help mitigate fears, some registries have teamed up to form alliances. For example, California and Quebec have combined their cap-and-trade programs to support a more liquid market, set key jurisdictional benchmarks, and give projects a level of validation they would not be able to achieve independently.

- **Compliance:** Most jurisdictions currently view offsets as a voluntary compliance tool, and without standardized reporting methods and jurisdictional oversight, providing governance documentation is at the discretion of the buyer or holder of the offset.

NET VALUE ADDED

Overall, the lack of centralization for calculation standards, certification, and compliance, can lead to substantial variability with inventory management and obligation. Combined with the lack of centralized markets, both the physical offset tool and the offset credits generated face a number of valuation headwinds. The current immaturity of the offset market is accompanied by the fact that TRM offerings are also immature in terms of their ability to fully support accountability calculations, obligations, and valuation.

While the offset market can be difficult to navigate, there is no denying it will continue to mature and grow. Continued technological developments and governments refining corporate compliance requirements are beginning to lead to the consolidation and maturation of registries and trade markets. As both society and governments transition to a carbon neutral future, the time to prepare your systems starts now.

Whether you are looking to begin an offset portfolio or manage existing credits, a well-developed strategy and the right advisory team will be the difference between adding value or not. Are you ready to turn your vision of net zero into a reality?

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