CARBON MARKET PRINCIPLES

Our approach to strengthening the voluntary carbon market to scale decarbonization solutions

JPMorgan Chase & Co.

Foreword

To halt the accumulation of greenhouse gases in the atmosphere and slow the resulting climate impacts, the world must reduce emissions to as close to zero as possible and deploy carbon removal solutions to address the remainder. The longer this takes, the more difficult and expensive it will be for businesses and communities to cope with the effects of climate change, and the greater the risk will be to long-term prosperity.

The voluntary carbon market is not a silver bullet, but it is an important tool for enabling the low-carbon transition to occur at a pace and scale commensurate with the climate challenge. In particular, it can help to mobilize capital and reduce costs to aid widespread deployment of climate solutions. It can also play a key role in speeding the development and commercialization of new technologies that are needed to further accelerate progress toward net-zero emissions.

However, the voluntary market currently faces several challenges – most notably, an insufficient supply of high-quality credits and low trust in many of the credits that have been purchased to date – that limit its potential to further grow and deliver impact at scale. This is why we see a growing variety of initiatives aimed at enhancing the integrity and function of the voluntary market, as well as a corresponding evolution in practices for many market participants.

As one of the world's largest financial institutions, JPMorgan Chase is uniquely positioned to contribute to these efforts. In addition to evaluating and purchasing credits as part of our own carbon management program, we provide carbon market-related financing, advice and services to clients across many parts of our business. We also continue to engage with and learn from other experts in the field, with the shared goal of scaling a more robust, transparent and effective voluntary market to support the path to net-zero emissions.

It is in this context that we have developed this paper, which details our perspective on the important role that the voluntary carbon market can play, key challenges to be addressed, and how we believe we can support necessary progress. The paper also sets out our Carbon Market Principles, which are designed to align with evolving best practices and guide how we engage with the voluntary market across the Firm.[1]

We welcome the feedback of all stakeholders as we continue to learn and evolve our approach.

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Introduction

Climate change is a critical challenge that is already affecting businesses and communities around the world, with the likelihood of far more disruptive impacts in the future. Research indicates that to avoid the worst of these impacts, the world should aim to limit the increase in global average temperature to below 1.5°C, and that doing so requires achieving net-zero greenhouse gas (GHG) emissions by mid-century, with half or more of the necessary reductions occurring by 2030, from a 2010 baseline.[2]

JPMorgan Chase & Co. ("JPMorgan Chase, the "Firm" or "we") is working to do our part by reducing our operational GHG footprint, as well as helping our clients and other stakeholders navigate the challenges and realize the economic opportunities of the transition to a low-carbon economy. As part of these efforts, we participate in the voluntary carbon market,[3] which is an important tool for optimizing investments in climate technologies to remove, and in some cases, reduce emissions, and to drive progress toward the global goal of net-zero. However, the market currently faces challenges that both affect its ability to scale and make it difficult for companies and investors to effectively engage with it.

This paper outlines our perspective on the role that the voluntary market plays, current market challenges, and how we are working across JPMorgan Chase to support and leverage a more effective carbon market — both for meeting our own climate goals and helping our clients meet theirs. It also presents a set of core principles and additional considerations that we reference when evaluating carbon credits to support the Firm's sustainability commitments and engaging with clients on carbon credit-related transactions.

Although JPMorgan Chase is also involved with several regional and sectoral compliance carbon markets, this paper focuses primarily on our interaction with the voluntary market. For more information, see the box on page 4.

The viewpoints and principles herein are informed by standards and guidance from leading organizations — such as the Integrity Council for the Voluntary Carbon Market (IC-VCM) and The Oxford Principles — as well as the experience and insight the Firm has gained through many years as an active market participant. For a full listing of external references, please see the appendix on page 16.

Finally, while this paper represents the Firm's accumulated knowledge and perspectives today, the voluntary market continues to evolve rapidly and unpredictably. We intend to continue closely monitoring developments and to update our approach and principles as appropriate in the future.

Our Approach to Environmental Sustainability

JPMorgan Chase is committed to addressing energy and climate challenges as part of how we do business and serve our customers, clients, shareholders, and communities each day. Our approach is guided by the three pillars of our environmental sustainability strategy:

Scaling Green Solutions. Focusing our efforts to meet client needs and help scale solutions the world will need for long-term environmental sustainability. This includes mobilizing capital to support climate action, providing climate-related solutions to consumers and investors, and providing tailored advice and support to our clients.

Meeting Needs Responsibly. Using our capital and expertise in a way that is consistent with meeting economic and societal needs, including aligning our financing with the goals of the Paris Agreement.

Minimizing Our Operational Impact. Minimizing the environmental impact of our own operations, including in our buildings, branches and data centers. Our strategy focuses on improving efficiency, sourcing renewable energy, and purchasing energy attribute certificates and carbon credits to neutralize emissions we have not yet eliminated.

For more information, see our most recent Environmental, Social and Governance Report and our Climate Report, available on our website.

The Role of Carbon Markets

We believe it is in the interest of all companies to pursue efforts to avoid, reduce and/or neutralize emissions in their own operations and across their value chains — in that order — and that carbon credits should not be used to unreasonably forestall or supplant these efforts. However, carbon markets can play an important role in both complementing such efforts and accelerating the overall transition to a low-carbon economy. Key benefits include:

- **Enabling flexibility for when, where and how emissions are reduced or removed, which can help lower the aggregate cost of reducing net emissions.** For many companies, particularly those in hard-to-abate sectors, the technologies necessary to address emissions may not yet be commercially available or else may still be prohibitively expensive. By purchasing carbon credits as part of a broader carbon management strategy, companies can address their emissions impacts by enabling greater deployment of climate solutions elsewhere in the economy. The cost of credits also acts as an implicit price on carbon, which can further incentivize a company to invest in direct reductions, especially once the cost of doing so is at or near parity with that of ongoing credit purchases. In this way, the market helps to facilitate investment in the lowest-cost solutions at any given point in time, thereby reducing overall cost. This is a result of the signaling function of markets: pricing provides signals to help buyers and sellers determine whether to enter or exit the market, which in turn helps to direct resources and efficiently balance overall supply and demand.
- **Driving capital toward existing and already scalable solutions, which may help to deliver near-term reductions or removals faster.** By enabling carbon reduction and removal projects to access a wider pool of capital, carbon markets can facilitate more rapid deployment of proven solutions, which can drive down net emissions more quickly. For example, carbon credits are a key source of revenue for forest carbon projects. As demand for credits grows, land owners have increasing opportunities to earn revenue from activities other than harvesting timber, which can attract further investment and scale the implementation of this and other nature-based solutions. This is a result of the incentive function of markets, through which pricing helps to encourage producers to increase supply.
- **Generating economic value for reducing or removing emissions, which can incentivize innovation with the potential to further accelerate decarbonization**. By demonstrating the potential for future revenue, carbon markets can encourage investment to help speed the development and deployment of new carbon reduction and removal technologies. For example, if there is a robust and stable market for carbon removal credits, a company developing direct air capture technology will have greater confidence that the credits it will generate can be sold at competitive prices. This, in turn, can help to attract investment capital to further accelerate its work. This is also a result of the incentive function of markets, which can encourage investment with the potential to further increase supply over time.
- **Creating a range of potential environmental, social and/or economic co-benefits.** Investing in projects via the purchase of carbon credits also provides opportunities for companies and investors to support other important objectives beyond carbon abatement, such as increased biodiversity, pollution reduction, job creation, community development and enhanced resilience. For example, land-use, land-use change and forestry projects — which are currently among the most popular types of carbon projects — can result in both enhanced carbon sequestration and the preservation of ecosystems, which support diverse plant and animal species. As another example, projects located in or near frontline, indigenous or other marginalized communities may be designed with the aim to create new job opportunities and/or to direct a portion of their revenues to support education, local infrastructure or other investments benefitting those communities. A robust carbon market may also help facilitate the transition of jobs from pollution-intensive industries to the green economy. While creating such impacts is generally not the primary aim of credit buyers, doing so can provide additional value, especially where the resulting co-benefits are directly relevant to them or their stakeholders.

For these reasons, we view carbon markets as an important tool for advancing transition efforts, both for individual companies and the economy as a whole. However, we stress again the belief that carbon credits should be used as part of, rather than a substitute for, more comprehensive decarbonization efforts. This is because:

- Carbon markets are unlikely to expand quickly enough to deliver the level of reduction or removal necessary to keep the world on track to net-zero emissions;
- Investments in direct reductions may confer benefits beyond just lower emissions or external co-benefits (such as increased efficiency, lower operating costs, access to new customers or markets, etc.); and
- Incremental investment, engagement and learning can help companies enhance their decarbonization pathways over time.

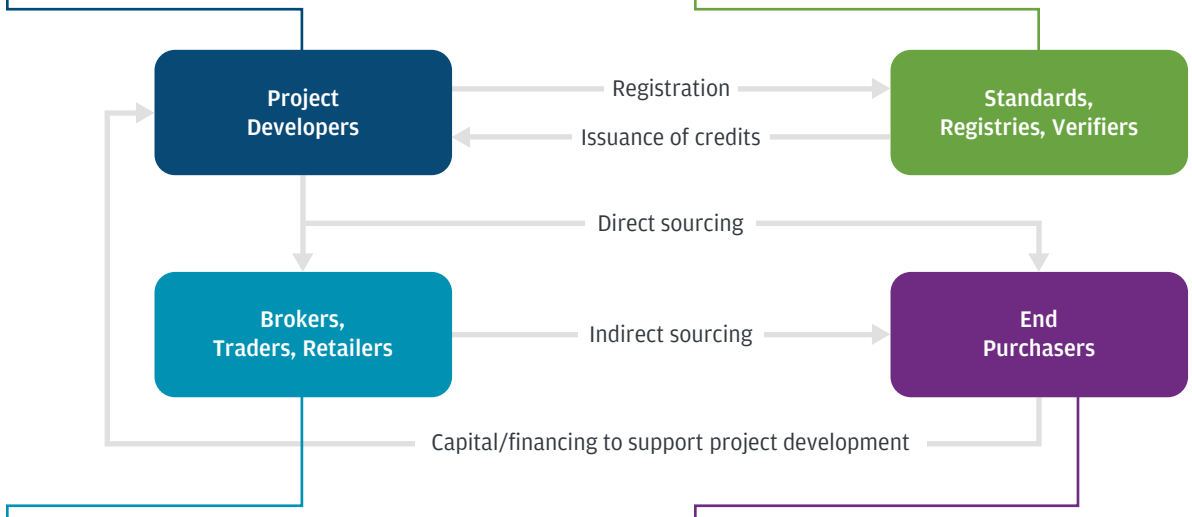
It is also important to note that the voluntary carbon market is not a substitute for robust public policies designed to address climate change. While the private sector can and will provide important solutions, it is up to the public sector to create the conditions needed for those solutions to thrive, and to help ensure that overall progress is sufficient to meet global emissions goals.

VOLUNTARY CARBON MARKET STRUCTURE

The voluntary carbon market enables private parties to buy and sell carbon credits representing the avoidance, reduction or removal of GHGs from the atmosphere. Key market participants include project developers, who generate credits and issue them for sale; end purchasers – typically companies or other institutions seeking to offset their emissions; and various intermediaries such as brokers, traders and retailers, which provide liquidity, distribution and other services. Carbon markets are also supported and influenced by various standard-setting bodies and registries, which set minimum requirements for the creation and issuance of credits, as well as third parties who conduct related due diligence or auditing, either to support issuance or subsequent trading of credits.

Project developers. Organizations that design, develop, and operate carbon projects and sell the resulting credits into the market.

Standard-setting bodies, registries and other verifiers. Entities that set minimum requirements for the creation and issuance of credits, and/or third parties that conduct due diligence or auditing.



Brokers, traders, retailers. Intermediaries that provide liquidity, distribution and other services, which can increase overall participation in the market.

End purchasers. Typically companies or other institutions seeking to offset their own emissions and/or help support climate solutions by purchasing and retiring carbon credits.

Compliance Versus Voluntary Markets

Carbon markets exist in two forms: **compliance** (or regulatory) markets and the **voluntary** market.

Compliance markets are created and regulated by mandatory international, national or regional carbon management regimes. For example, the European Union Emissions Trading System (EU ETS) is a 'cap-and-trade' regime in which regulated entities are granted allowances for a given share of overall emissions, which they can then exchange with others in order to reduce the overall cost of compliance with emissions limits.

The voluntary market functions independently of compliance markets, enabling companies or individuals to purchase carbon credits to meet their own emissions goals. Compliance credits may in some instances be purchased voluntarily by non-regulated entities, but voluntary credits are not allowed to fulfill compliance market requirements unless they are explicitly accepted into the compliance regime.

As previously noted, JPMorgan Chase is involved in many compliance markets – including the EU ETS, the Regional Greenhouse Gas Initiative (RGGI) and the California cap-and-trade program – principally through our commodities trading business. However, this paper focuses primarily on our interaction with the voluntary market, because we believe it presents both clearer challenges and the greatest potential for accelerating progress toward net-zero.

Avoidance Versus Removal Credits

The voluntary carbon market allows for trade in both **avoidance** (also referred to as reduction) and **removal** credits.

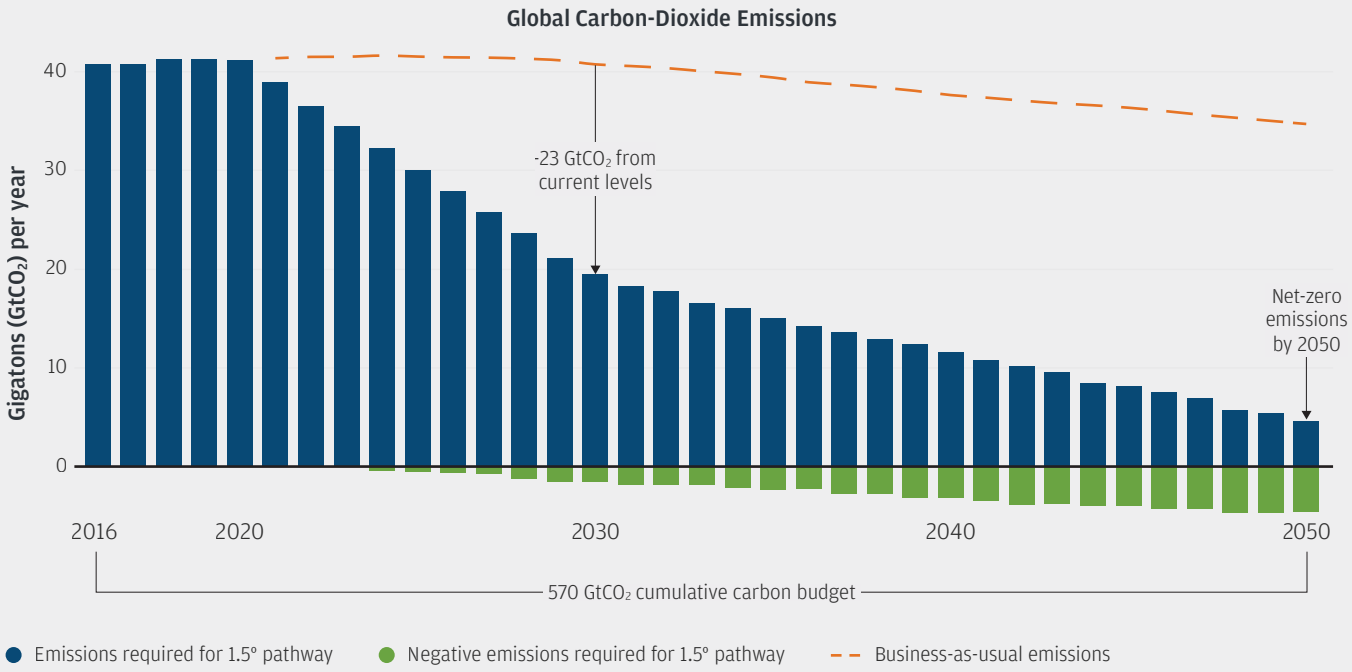
Avoidance credits are generated by activities that reduce or prevent emissions that otherwise would have occurred, such as generating renewable electricity or preventing deforestation. Although these activities do not address the concentration of GHGs already in the atmosphere, they can help make business-as-usual emissions lower than they would otherwise be.

Removal credits, or carbon dioxide removals (CDRs), are generated by activities that take GHGs out of the atmosphere and store them, which is currently possible via nature-based solutions, such as reforestation, or via engineered or technical solutions, such as the deployment of technologies for direct air capture and storage. Nature-based solutions tend to store carbon for shorter periods but are more mature and accessible, while engineered or technical solutions tend to store carbon for longer timescales but are less developed and more expensive.

In the near term, avoidance credits can help accelerate transition by supporting investment in solutions that reduce overall emissions, which is generally the most effective and cost-efficient way to lower carbon concentrations in the atmosphere. However, over time, credits can also help to scale effective solutions for carbon removal, which will be necessary to address residual emissions that are too difficult or expensive to further abate, as well as potentially reduce concentrations attributable to historic emissions.

At present, CDRs are relatively scarce and expensive, and questions remain about both the scalability of removal technologies and whether captured GHGs can be stored for long enough to sufficiently reduce their influence on the global climate system. However, according to the Intergovernmental Panel on Climate Change (IPCC), both dramatic reductions in GHG emissions and the large-scale removal of GHGs from the atmosphere will be necessary to stabilize the climate by 2050 and to preserve a chance of keeping temperature rise below 1.5°C.[4] We therefore believe it is important to support both pathways. Furthermore, given the likely demand for ways to address residual emissions, we also believe that the voluntary market should evolve to provide greater support for CDRs in the future.

IT IS EXPECTED THAT A LARGE QUANTITY OF CARBON REMOVAL WILL BE REQUIRED FOR THE WORLD TO REACH NET-ZERO EMISSIONS BY 2050.

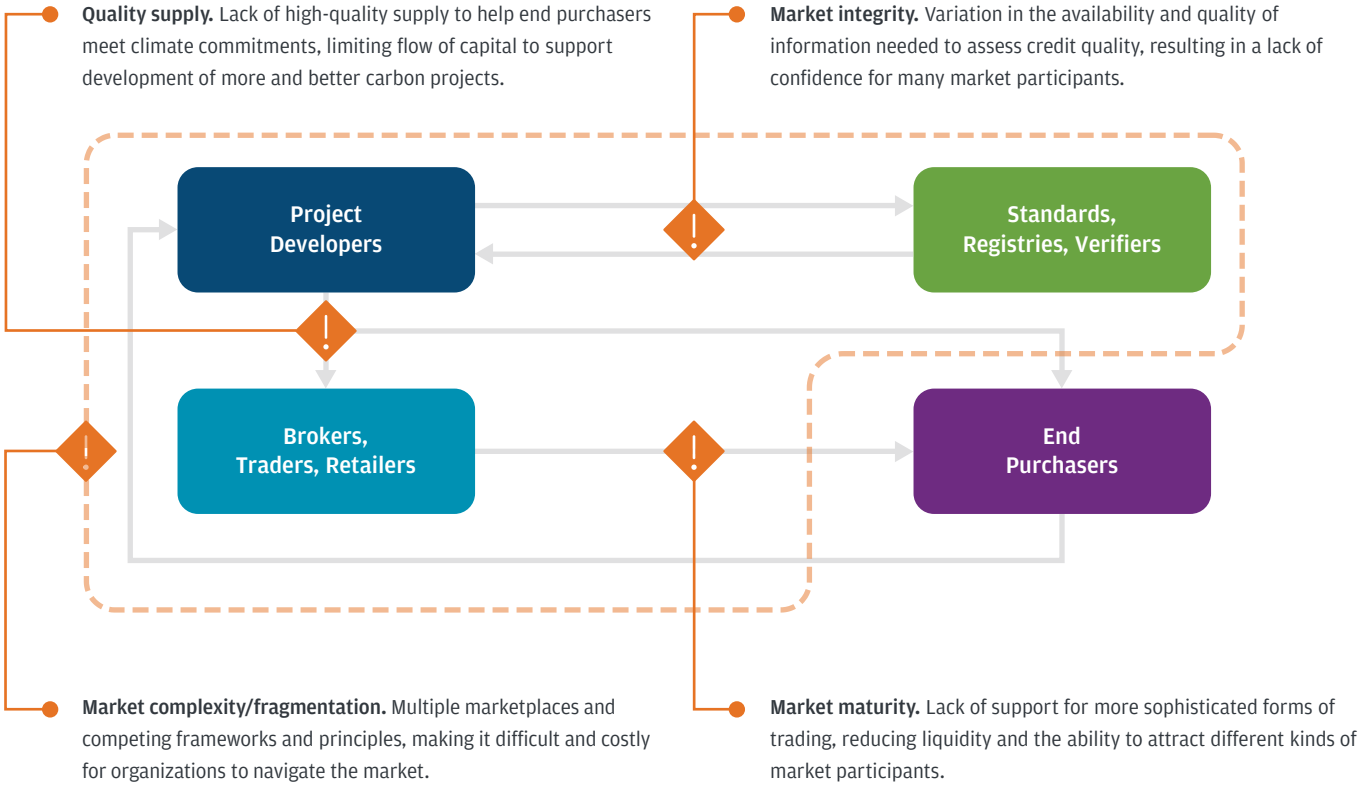


Source: McKinsey 1.5°C Scenario Analysis; IPCC; Le Quéré et al. 2018

Current Market Challenges

The past two decades have seen tremendous efforts to establish and grow an effective voluntary carbon market, and it has enabled considerable investment in climate solutions to date. However, as decarbonization accelerates across the global economy, we anticipate that demand for carbon credits will continue to increase, as will the need to further grow and strengthen the market to meet that demand. For this to happen, several significant and interrelated challenges need to be addressed.

MARKET CHALLENGES



Quality supply. Lack of high-quality credit supply hinders further development of the voluntary market to support large-scale decarbonization. In particular, scarcity of CDRs to help organizations meet net-zero commitments, coupled with excess supply of lower-quality and less-expensive credits, limits the flow of capital needed to enable the development of higher-quality carbon projects. Making more revenue and financing available to the highest-quality projects and technologies will stimulate both further development of the market and more widespread deployment of decarbonization solutions.

Market integrity. Variation in availability and quality of the information needed to assess the quality of carbon credits results in a lack of confidence for many stakeholders, and purchasing low-quality credits can lead to significant financial and reputational risks for market participants. Building alignment around robust principles and enhancing accountability and transparency are necessary to increase confidence and mitigate risk, which will strengthen the utility of the market for all participants. We are encouraged by the many efforts currently underway to address these issues, but we also recognize the need for international standardization.

Market complexity/fragmentation. Multiple marketplaces, competing frameworks and principles, and other complexities make it difficult and costly for organizations to effectively navigate the market. Strong leadership, alignment on best practices and greater continuity are needed to reduce inefficiencies and attract more market participants, which will ultimately increase the flow of capital to support decarbonization.

Market maturity. The voluntary market largely lacks the capability to support more sophisticated forms of trading, which limits its ability to meet the needs of different kinds of participants. Improved trading infrastructure and further development of advanced features such as forward market instruments and reference contracts are needed to support increased liquidity, transparency and risk management, which can contribute to greater scale and efficiency.

Overcoming these challenges will not be easy or quick, nor can any single constituency (e.g., project developers, end purchasers, registries) address them alone. However, with increasing interest in the potential of the voluntary market to help accelerate progress toward net-zero, we believe it is important to continue to engage and contribute to efforts to improve it over time. To that end, we are playing an increasingly active role directly in the market, participating in industry working groups and engaging with multiple stakeholders — including regulators — with a focus on improving standards and enhancing market function for all participants.

Leveraging Our Role to Enhance Voluntary Carbon Markets

As one of the world's largest financial institutions, JPMorgan Chase participates in the voluntary carbon market in a variety of ways — both as part of our own carbon management strategy, and in support of our clients' efforts to transition to a low-carbon economy.

With our global reach and market expertise, we believe we can play a part in helping support a more robust voluntary market. In particular, we see an opportunity to help drive the financing of high-integrity carbon projects at scale (i.e., those which generally align with the criteria set out in this paper), which will help to increase supply and decrease costs. The following summarizes the key ways we currently engage with the voluntary market, and how each may provide opportunities to advance potential solutions to the challenges highlighted above.

PROVIDING STRATEGIC ADVICE TO SUPPORT CLIENTS' TRANSITION EFFORTS

Through our Corporate & Investment Bank (CIB) and Commercial Banking (CB) businesses, we provide advice to support clients' strategies for transitioning to a low-carbon economy, which can include purchasing and/or generating carbon credits. Through these efforts, we seek to accelerate progress for our clients and the economy as a whole, including helping to enhance the credibility and function of the voluntary market.

For example, our Carbon Compass℠ methodology, which we use to develop and implement emissions intensity reduction targets for key sectors in our financing portfolio, specifies that only high-integrity removal credits can be counted toward meeting our targets. This not only encourages clients to purchase the highest-quality credits available, but also mobilizes additional capital to support growth of this important segment of the voluntary carbon market. We recognize that carbon markets are rapidly evolving with a focus on improving both the quality and quantity of available credits. We will continue to monitor developments and consider the feasibility of recognizing additional types of offsets in the future.

ENHANCING LIQUIDITY THROUGH CREDIT TRADING

Through our Markets business within our CIB, we are expanding our capabilities to support large-scale trading of voluntary carbon credits, with services including market-making and the provision of risk management solutions such as price hedging. These activities support increased transparency and liquidity, which enable a larger number and variety of organizations to participate in the carbon market and improve the flow of capital for decarbonization.

CONNECTING BUYERS AND SELLERS

Our Markets business also helps to facilitate relationships and transactions between developers of credit-producing projects and clients who are looking to finance projects (often with the goal of accessing specific types of credits in the future). This helps the relevant parties to overcome market complexity and more easily identify sources of credits or financing to meet their needs.

DEPLOYING CAPITAL TO SUPPORT DECARBONIZATION

We work across multiple segments of our business to help deploy capital in support of decarbonization, including in ways that are likely to support further development of the voluntary market. For example, in 2021 J.P. Morgan Asset Management[1] acquired Campbell Global, a worldwide forest management and timberland investment company, with the intention of scaling its capabilities to deliver both competitive returns and meaningful climate solutions. The acquisition allows us to offer an important new asset class to our investment clients while tapping into ongoing growth in private markets to help support carbon-related investments.

By deploying additional capital to support a range of decarbonization solutions, we aim to amplify our impact on reducing emissions and increase the supply of high-quality credits over time.

DELIVERING FINANCING TO MEET THE NEEDS OF DIVERSE MARKET PARTICIPANTS

Our CIB and CB businesses provide strategic advice, raise capital and extend credit for a wide variety of clients, including many involved in the generation and sale of carbon credits, as well as companies purchasing credits to meet their own emissions goals. Our goal is to apply our deep expertise across multiple sectors and financing solutions to help ensure market participants have access to capital to support these activities.

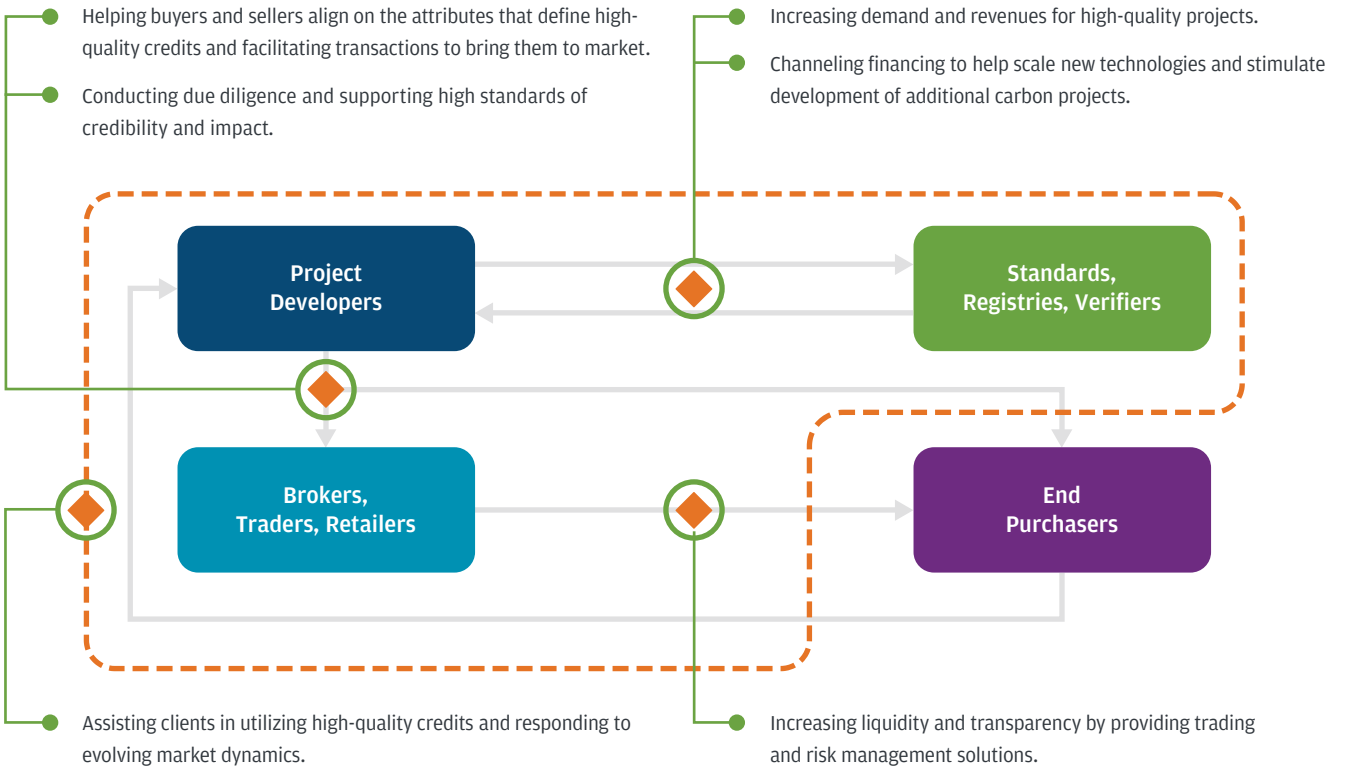
For example, in 2022, J.P. Morgan served as sole placement agent for a CHF 600 million round of equity financing for Climeworks, a Swiss company that has pioneered direct air capture technology and currently operates the world's largest direct air capture and storage plant in Iceland. The financing is expected to be used to further scale and deploy Climeworks' technology and operations, in anticipation of significant future demand for large-scale carbon dioxide removal.

PURCHASING CREDITS TO ADDRESS OUR OWN EMISSIONS

While we continue to prioritize efforts to reduce our operational emissions on an ongoing basis, we also purchase voluntary carbon credits to meet our commitment to maintaining carbon neutral operations year over year.[3] This builds on our experience as a purchaser of voluntary credits since 2008. As a large financial institution, we set high standards and conduct extensive due diligence, contributing to both the overall demand signal and the advancement of best practices for evaluating high-quality credits.

As we move forward, we aim to progressively shift our focus from shorter-durability, nature-based carbon credits toward high-durability carbon removal. This reflects not only our desire to offset our emissions with the highest-quality, available credits, but also our interest in helping drive investment in the technologies needed to address residual emissions in hard-to-abate sectors of the economy, which the IPCC has recently said "is unavoidable if net-zero CO_2 or GHG emissions are to be achieved."[5]

HOW JPMORGAN CHASE CONTRIBUTES TO VOLUNTARY CARBON MARKETS



Assessing the Quality of Carbon Credits

Until there is convergence on a common set of standards and accountability mechanisms, organizations must largely rely on their own processes for navigating the voluntary market to meet their business and sustainability goals. With this in mind, we have defined a set of core principles and supplemental considerations that guide the Firm's engagement with the voluntary market.[6]

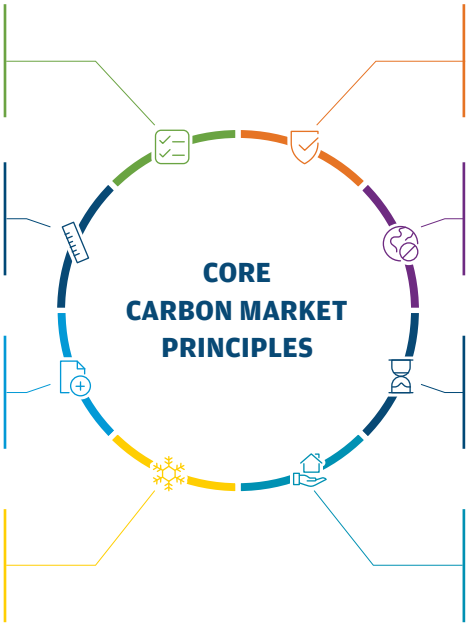
These are derived from a review of available literature, standards and guidance from leading organizations; internal deliberation; and consultation with experts and stakeholders. In addition to guiding our evaluation of credits we purchase for our own business, the criteria also inform the advice we give to clients, our decisions on carbon credit-related transactions and our overall perspective on how carbon markets should evolve to help meet global decarbonization goals.

Real. All emission reductions and removals, and the project activities from which they are generated, should be proven to have genuinely taken place.

Measurable. All emission reductions and removals should be quantifiable, using recognized measurement tools against a credible emissions baseline.

Additional. The project would not have been undertaken without the carbon credit revenue, and the impact would not have been realized if the project had not been carried out.

Unique & Traceable. No more than one carbon credit may be associated with a single emission reduction or removal as one (1) metric ton of carbon dioxide equivalent.



Independently Verified. The purchased credit should be certified by a recognized GHG crediting program or verified by an independent third party to reduce risk of low-quality credits.

Leakage Avoidance. Projects should not create carbon reductions in one location by displacing the high-emitting activity to another location.

Durability/Permanence. Carbon credits should represent durable sequestration of carbon from the atmosphere.

Climate Equity. Project should support and elevate frontline, indigenous or other marginalized communities, where feasible.

Additional Considerations:

Strong Co-benefits. Proactively advancing other measurable sustainability objectives or benefits.

Cost. Projects that yield real emission reductions or removals with competitive costs, and/or demonstrate a path to future affordability.

Scalability. Projects that have significant scalability potential.

Innovation. Use of technology or other innovation to improve carbon market outcomes.

CORE CRITERIA

The following are the criteria we prioritize when evaluating the quality and credibility of carbon credits.

Real. All emission reductions and removals, and the project activities from which they are generated, should be proven to have genuinely taken place. This may be substantiated by a reputable third-party verification organization and evaluation of available evidence such as the Project Description Documentation (PDD), on-the-ground observation or remote sensing data. The reputation and track record of the project developer and any other project participants should also be carefully assessed.

Measurable. All emission reductions and removals should be quantifiable using recognized measurement approaches and tools (including adjustments for uncertainty and leakage) against a credible emissions baseline. This may include the application of relevant standards or protocols, as well as any additional efforts to address measurement challenges specific to a given project type. For example, to mitigate uncertainties inherent to many nature-based projects, measurement may be bolstered by methods such as remote sensing and monitoring, or the use of formal forest or grassland inventories, in order to gain a more robust understanding of carbon sequestration over time. Where appropriate, projects should also adhere to plans or protocols for ongoing monitoring, reporting and verification.

Additional. All emission reductions and removals should be proven to be additional — i.e., the project would not have been undertaken without the proceeds from the sale of carbon credits, and the associated emissions impact would not have been realized if the project had not been carried out. Assessment of a project's additionality is dependent on the strength of the modeling of its emissions baseline and associated business-as-usual scenario, as well as the ability to demonstrate a causal relationship between the project's activities and its claimed carbon impacts. Specific factors evaluated may include but not be limited to the availability and accessibility of underlying data and assumptions; whether projects are being undertaken because of current or anticipated legal requirements; what share of the project's revenues are dependent on carbon credits versus other sources; and whether the project developer credibly demonstrates (e.g., via detailed financial modeling) that credit revenues were a decisive factor in pursuing the project. When evaluating baselines, it is important to thoroughly evaluate the methodologies used and to test the validity of key assumptions. The use of additional analytical tools or methods — such as comparison to similar projects, dynamic baselining, or remote sensing and monitoring — can also help further strengthen the credibility of assessments for certain project types.

Unique and Traceable. No more than one carbon credit may be associated with a single emission reduction or removal as one (1) metric ton of carbon dioxide equivalent (CO_2e). Each credit should be stored and retired in a registry enabling any party to trace it back to the specific project that generated it. In evaluating this criteria, efforts should be made to ensure no double counting, including cross-checking multiple registries, verifying that details on the nature and origin of credits are consistent with other public project information, and that the purpose of credit retirement is clearly indicated and irreversible via the program registry.

Independently Verified. All emission reduction and removal credits should be certified by a recognized GHG crediting program or verified by an independent third party that attests it meets all the above criteria. This helps to minimize the risk of sourcing low-quality credits, as recognized crediting programs impose strict rules and requirements that take into account the need for emission reductions or removals to be additional, durable or permanent; conservatively measured; third-party reviewed; and exclusively claimed.

Leakage Avoidance. Projects should seek to avoid the displacement of emissions whereby they may create carbon reductions in one place while shifting high-emitting activity elsewhere, thus nullifying the benefits gained. This may occur in various ways: for example, if preservation of one area of forest just shifts logging to another or if restrictions on emissions in one jurisdiction result in emission-generating activities simply being moved elsewhere. Evaluation should focus on the quality and extent of project developers' accounting for potential leakage and steps taken to avoid or mitigate it.

Durability/Permanence. Durability or permanence of a carbon project refers to the physical longevity and integrity of its carbon storage. The durability of stored carbon is limited by both natural and anthropogenic risks of reversal, which can cause carbon to be re-released into the atmosphere. Durability varies by project type, from short- or medium-term (e.g., forestry credits) to long-term (e.g., mineralization credits), with longer, more durable storage terms translating into greater market value. Therefore, in evaluating the durability of a removal credit, care should be taken to understand what is typical or feasible for a given project type, and what if any efforts have been made to avoid or mitigate common risks of reversal.

Climate Equity. Projects should seek to support and elevate frontline, indigenous or other marginalized communities from the impacts of climate change, where feasible. Examples include local and/or indigenous-led project development, projects that directly contribute to climate adaptation for underserved communities, and projects that clean air, water or soil from proximate pollution sources, etc.

ADDITIONAL CONSIDERATIONS

We also encourage additional consideration be given to carbon projects based on their possession of or impact on a range of other factors.

Strong Co-benefits. Additional weight may be given to projects that proactively advance other measurable sustainability objectives (e.g., water stewardship, waste reduction, biodiversity protection) or community benefits (e.g., job creation, health improvement), especially in areas relevant to a given organization's strategy and/or operations. For example, in choosing between two similar forestry projects, an organization may give preference to one that is also likely to result in added employment opportunities in the region where it is based, or which may contribute to the conservation of water resources that its operations directly rely on.

Innovation. Projects may receive additional weight for the use of technology or other innovation to improve carbon market outcomes, such as reducing certification cost per metric ton of CO_2e, democratizing selling/buying opportunities, or overcoming other barriers to market liquidity or scale. Again, in some cases, this may lead to selection of projects that are less practical or affordable in the near term, but which may contribute to increasing the overall size or function of the market in the future.

Cost. Key to the overall development of carbon markets is delivering the greatest possible impact on emissions at the lowest possible cost. Priority should therefore be given to projects that yield real emission reductions or removals with competitive costs, and/or demonstrate a path to future affordability at scale. In some cases, this may lead to selection of projects that are significantly more costly in the near term, with the expectation of realizing greater impact and/or savings in the future.

Scalability. Priority may also be given to projects that have significant scalability potential. This may include projects involving the application of promising new technology for driving larger-scale reductions or removals in the future, and/or for which there are sufficient available resources, sites or other factors to enable replication. For example, if Project A offers 100 tons of carbon removal with an approach that can only be applied in specific circumstances, while Project B offers 100 tons of carbon removal with an approach that can be widely replicated, then it may be beneficial to steer more capital toward Project B.

Types of Carbon Projects

As the voluntary market matures and as new technologies and approaches for reducing and removing emissions are developed, the variety of project types continues to grow. Each presents unique opportunities, challenges and other factors to be considered when evaluating potential transactions or investments. The table below outlines our current perspective on both established and emerging project types, and identifies several specific benefits and risks that should be considered when making related decisions.

Type	Examples	Storage	Benefits	Risks
AVOIDANCE/REDUCTION				
 **Forestry**	• Avoided deforestation • Improved forest management[7]	N/A	• Maintains existing carbon sink • Provides vital funding for conservation • Potential co-benefits (e.g., green jobs, preservation of habitat/biodiversity)	• Complexity of establishing baselines • Potential for leakage (e.g., if more logging occurs elsewhere to compensate for loss of access to this land) • Potential to displace communities
 **Soils/ Agriculture**	• Livestock methane capture	N/A	• Avoids high-potency GHG emissions • Potential co-benefits (e.g., improved air/water quality, additional energy or economic opportunities for farmers)	• Complexity of establishing baselines • Potential for leakage (e.g., by creating incentives to increase the size of livestock herds)
 **Energy**	• Energy efficiency • Fuel switching • Renewable energy (e.g., solar, wind, hydropower)	N/A	• Provides capital to accelerate deployment of low-carbon energy solutions • Potential co-benefits (e.g., improved air/water quality, green jobs, local economic development, technology advancement)	• Concerns around additionality as adoption increases and cost decreases, especially in developed countries
 **Household Devices**	• Household devices (e.g., cookstoves) • Water sanitation	N/A	• Avoids widespread emissions from inefficient domestic activities • Potential co-benefits (e.g., improved air quality, sustaining local ecosystems)	• Labor-intensive (e.g., to train users to cook differently) • Potential for leakage (e.g., if family continues to also use traditional methods)
 **Chemical Processes/ Fugitive Emissions**	• Fugitive emissions • Methane capture • Ozone-depleting substances • Waste heat recovery	N/A	• Avoids high-potency GHG emissions • Potential co-benefits (e.g., improved air quality, ozone protection)	• Potential to disincentivize regulation on GHG emitting entities

Type	Examples	Storage	Benefits	Risks
REMOVAL*				
 **Forestry**	• Afforestation/ reforestation • Agroforestry • Improved forest management[7]	Short (<100 yrs)	• Provides additional natural carbon sink • Potential co-benefits (e.g., green jobs, habitat/ biodiversity impacts)	• Low/uncertain durability • Land tenure disputes • Potential displacement of communities or other market opportunities
 **Soils/ Agriculture**	• Improved grassland management • Improved soil management • Regenerative agriculture	Short (<100 yrs)	• Significant potential for carbon storage • Potential co-benefits (e.g., conservation funding, green jobs, habitat/biodiversity impacts)	• Low/uncertain durability • Relative market immaturity • Difficult to monitor, report and verify
 **Oceans**	• Mangroves • Seaweed/seagrass • Wetland restoration	Short (<100 yrs)	• Provides additional natural carbon sink • Potential co-benefits (e.g., green jobs, ecosystem restoration, climate adaptation services)	• Low/uncertain durability • Jurisdictional challenges • Difficult to monitor, report and verify • Potential displacement of communities or other market opportunities
 **Hybrid**	• Biochar • Biomass with Carbon Removal and Storage • Building materials • Enhanced rock weathering	Medium (100-1,000 years)	• Longer-term storage with near-term potential to scale • Potential to leverage existing infrastructure and value chains • Potential co-benefits (e.g., green jobs, energy generation)	• Competition for natural resources (e.g., land, biomass feedstocks, minerals) • Difficult to monitor, report and verify due to limited research • Potential displacement of communities or other market opportunities
 **Engineered/ Technical**	• Direct air capture and Storage • Mineralization	Long (1,000+ yrs)	• Potential for very long-term storage • Potential co-benefits (e.g., green jobs, technology advancement)	• Currently limited in scale • High cost of current credits • Incidental impacts of infrastructure • Potential displacement of communities or other market opportunities • Potential diversion of capital away from already-proven avoidance/ reduction opportunities

* **Nature-Based (forestry, soils/agriculture, oceans):** refer to managing or restoring working lands and natural ecosystems to remove carbon dioxide from the atmosphere.

Hybrid: refer to carbon dioxide removal solutions that combine natural systems and technology.

Engineered/Technical: refer to technology solutions to remove carbon dioxide from the atmosphere.

Looking Ahead

We recognize both the necessity and the many challenges of harnessing the voluntary carbon market as part of the transition to a low-carbon economy. With the world increasingly focused on the path to net-zero emissions, there is a clear need for the voluntary market to achieve greater scale, credibility and functionality, in order to deliver the scope of emission reductions and removals that will ultimately be required.

We also recognize the important role we can play in this journey. As one of the world's largest financial institutions, we have the opportunity to help define and implement best practices and influence the further development of an effective voluntary market. That is why we've worked to align our approach and principles across the Firm, and to articulate our perspective in this paper.

Moving forward, we plan to continue working to refine and incorporate our principles across relevant business activities, to further strengthen our due diligence processes and to increase transparency into our approach and purchases. We plan to focus particularly on better evaluating the impact and durability of nature-based removal projects, and on helping to develop the market for much higher-durability removals over time. We also plan to continue supporting more unified global standards and improvements in market infrastructure, which we expect to help attract more capital to support high-quality projects of all types.

Finally, we intend to continue learning from and working with others who share the goal of strengthening voluntary carbon markets in support of decarbonization, because it will take a broad effort for the world to deliver the pace and scale of emission reductions and removals that are required to meet global net-zero goals.

We invite all stakeholders to follow and provide feedback on our efforts.

Appendix

EXTERNAL REFERENCES

Key external references include:

- Carbon Direct/Microsoft Criteria For High-Quality Carbon Dioxide Removal
- Integrity Council for the Voluntary Carbon Market (IC-VCM) Core Carbon Principles
- International Emissions Trading Association (IETA) Principles
- Net Zero Banking Alliance (NZBA) working group on carbon offsetting
- Oxford Principles for Net Zero Aligned Carbon Offsetting
- Task Force on Scaling Voluntary Carbon Markets (TSVCM)
- Voluntary Carbon Market Integrity Initiative (VCMI)

ENDNOTES

1 J.P. Morgan Asset Management's approach is separate from that of JPMorgan Chase & Co. Investment decisions made for J.P. Morgan Asset Management clients may differ from decisions from other JPMorgan Chase lines of businesses.

2 IPCC, 2018: Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.)]. In Press.

3 Carbon credits and the market for them are evolving rapidly. Although we endeavor to source high-quality carbon credits verified by independent third parties, the ability to use carbon credits to fully and permanently "offset" emissions or achieve carbon "neutrality" relies on certain assumptions and is subject to debate among experts.

4 IPCC, 2022: Summary for Policymakers. In: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.001

5 Ibid., p. 40.

6 These principles and supplemental considerations are provided for informational purposes only, based on certain assumptions, and subject to uncertainties. We make no guarantee and provide no assurance that the carbon credits we or our clients buy, sell, trade or otherwise transact in, whether in the past or in the future, adhere to or follow any or all of these principles and considerations, in whole or in part.

7 Improved forest management projects typically produce a blend of avoidance and removal credits.