

MARITIME DECARBONIZATION INVESTMENTS SHOULD LEVERAGE THE CARBON CREDIT MARKET TO OVERCOME INVESTMENT HURDLES

Blue Sky Maritime Coalition
Finance, Commercial & Chartering Workstream

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EXECUTIVE SUMMARY

Blue Sky Maritime Coalition (Blue Sky) is committed to accelerating the transition of waterborne transportation value chain in the United States (U.S.) and Canada toward net-zero GHG emissions.¹ Among many potential tools to support that goal, Blue Sky believes the U.S. and Canadian maritime sectors should create and use voluntary carbon credits. Through conducting research and interviews with marine, energy, policy, and finance industry participants, Blue Sky confirmed there is a precedent for credit creation in other transport sectors and a market for these instruments. Analogous credit standards specifically include physical investments in technology and infrastructure projects that avoid or remove carbon in addition to nature-based offsets. Furthermore, our research emphasized the value created by transparent and traceable credit protocols and the role standards bodies play in providing trusted mechanisms. The maritime industry and its financial partners should work together with corporate, financial market participants, and governmental entities to support a more liquid market that enables an accelerated transition to GHG-reducing technologies.

This position paper addresses:

1. the current market landscape, including existing regional compliance schemes;
2. the voluntary carbon market today; and
3. the mechanics of the credit creation process.

¹ For more information, please visit www.BlueSky-Maritime.org. Please note that this whitepaper reflects current viewpoints of Blue Sky Maritime Coalition based on the analysis set forth of the information, materials and data referenced; accordingly, this whitepaper does not necessarily reflect the views of any particular person or Blue Sky Member.

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I. CURRENT MARKET LANDSCAPE

GHG emissions reductions are increasingly important for the maritime industry as companies strive to create a roadmap for reducing environmental and community impacts in addition to being prepared for future regulatory changes. Decarbonization requires significant upfront investment and coordination across the sector to ensure that installed infrastructure supports on-vessel and port-based technical solutions. Incentives to accelerate the path to net-zero emissions in the U.S. and Canadian markets are rapidly evolving, with federal and state government compliance markets targeting the adoption of lower carbon fuels and implementing regional carbon pricing programs, but the carbon market across geographies remains fragmented.

Voluntary carbon credits offer an alternative funding mechanism to encourage investment in carbon-reducing projects. Tapping voluntary carbon markets is a complex and time-consuming process, and some early examples experienced challenges verifying tangible greenhouse gas benefits and achieving lucrative pricing sufficient to incentivize investment.

As the market moves forward, quality and traceability are critical to longer-term adoption and attaining a liquid market. In addition, **companies buying voluntary credits should pair an offset strategy with a robust technical opportunity funnel, seeking to remove and reduce emissions first.** Quality voluntary carbon credit demand is projected to increase as companies create more ambitious greenhouse gas targets. The increase of demand and supply of voluntary offset credits will drive technological improvements and advance verification methodology, allowing for easier transactions with less risk.

AN INTRODUCTION TO CARBON ACCOUNTING AND CREDIT MARKETS

The WRI/WBCSD GHG protocol outlines how companies account for their generated emissions by dividing them into scopes 1, 2, and 3 [GHG Protocol]. Scope 1 emissions are direct outputs from a company's activities, including stationary sources and vehicles. Scope 2 arises primarily from the offsite generation of power for a company's onsite usage. Scope 3 GHG emissions are from sources related to a company's activities outside its direct control (such as emissions from travel). By organizing emissions into different scopes, companies can avoid double counting while still understanding their activities' impact on the GHG emissions. Tracking another company's scope 1 or 2 emissions within an individual company's scope 3 is necessary for analyzing supply chain structure and areas of improvement.

Carbon programs come in various forms, including voluntary carbon credits, compliance market carbon credits, low-carbon fuel standard credits and renewable energy certificates. A voluntary carbon credit or offset represents the removal, avoidance, or reduction of one ton of carbon from the atmosphere and can offset a company's unavoidable carbon emissions as reported against their annual targets. They are usually not tied to a specific, centrally administered regulatory program but instead are issued by or purchased by companies individually or as part of an industry framework. Once a project generates a voluntary carbon credit, it may be sold or retired against a company's reported emissions.

Compliance carbon credits are regulated by a central authority to reduce carbon emissions over time and include renewable and low-carbon fuel standards and cap-and-trade programs. Renewable energy certificates (RECs) target a company's scope 2 emissions. When a power provider creates energy from renewable sources, it generates a REC for each megawatt-hour which becomes a tradeable market-based instrument [EPA.gov]. The certificate proves the company in possession of the REC contributed to generating electricity sustainably and can claim it on their emissions accounting.

EXAMPLES OF COMPLIANCE-DRIVEN PROGRAMS

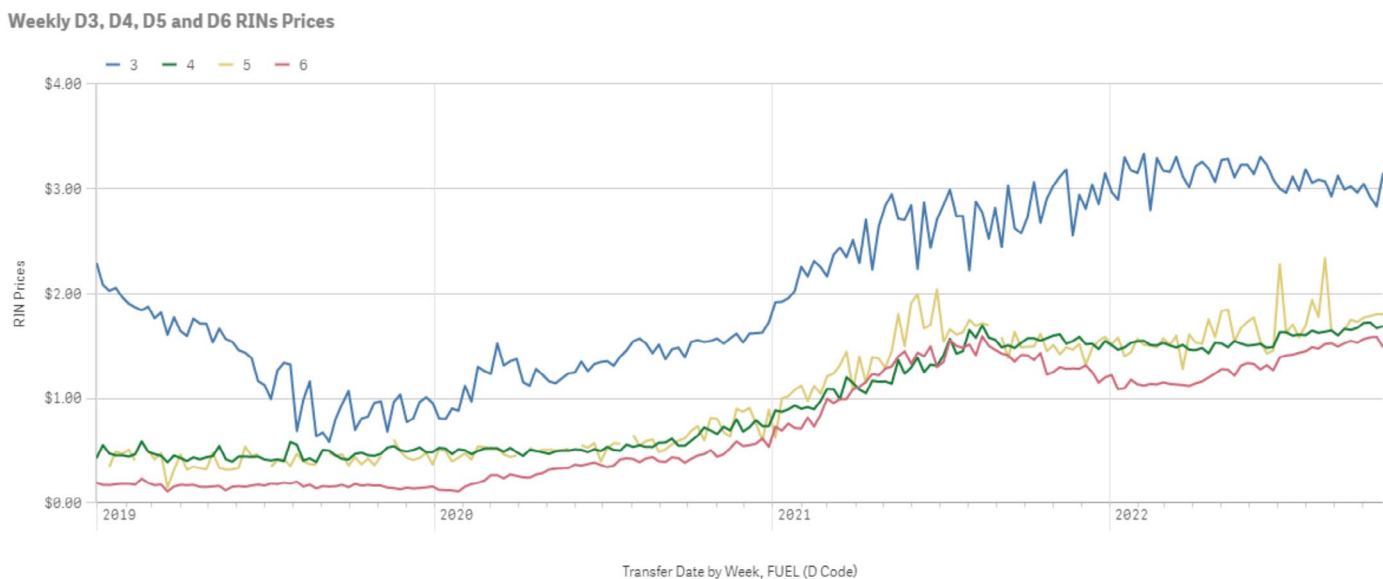
To understand the voluntary carbon market, reviewing compliance markets and their mechanisms for targeting GHG emissions reductions helps set the context for creating incentives through market-based structures. Below is an outline of four compliance markets functioning in regulated and unregulated markets.

EPA RENEWABLE FUELS STANDARDS

The Environmental Protection Agency's (EPA) Renewable Fuel Standard (RFS) is an example of a compliance-driven program. The EPA designed the RFS to require refiners and importers to incorporate renewable products into fuels. It divides participants into obligated parties and renewable fuel providers and uses Renewable Identification Numbers (RINs) to track the gallons of renewable fuels produced annually. Each year the EPA specifies a refiner's or importer's Renewable Volume Obligation (RVO), or the amount of renewable fuel that must be included by fuel category: Renewable biofuels (D6), Cellulosic biofuel (D3), Bio-mass based diesel (D4), and advanced biofuels (D5). While there are volume requirements for each type of biofuel, more advanced fuels with higher GHG reduction profiles may be substituted for less advanced renewable fuel requirements through a nesting structure. Renewable fuel producers create RINs when manufacturing or importing renewable fuels, which are separated after the fuel is blended into traditional hydrocarbon-based fuels. The RIN is then traded to obligated parties (fuel refiners, blenders and importers [Energy.gov]), retired against RVOs or kept for future use. Figure 1 below outlines the recent historical prices for RINs denoted by renewable fuel type. More information regarding the EPA's Renewable Fuel Standard can be found at the following link: [Renewable Fuel Standard Program | U.S. EPA](#). The RFS applies to the marine sector only for vessel applications meeting specific criteria.

Figure 1.

Historical RIN Market Pricing (\$/gal) per Renewable Fuel Type



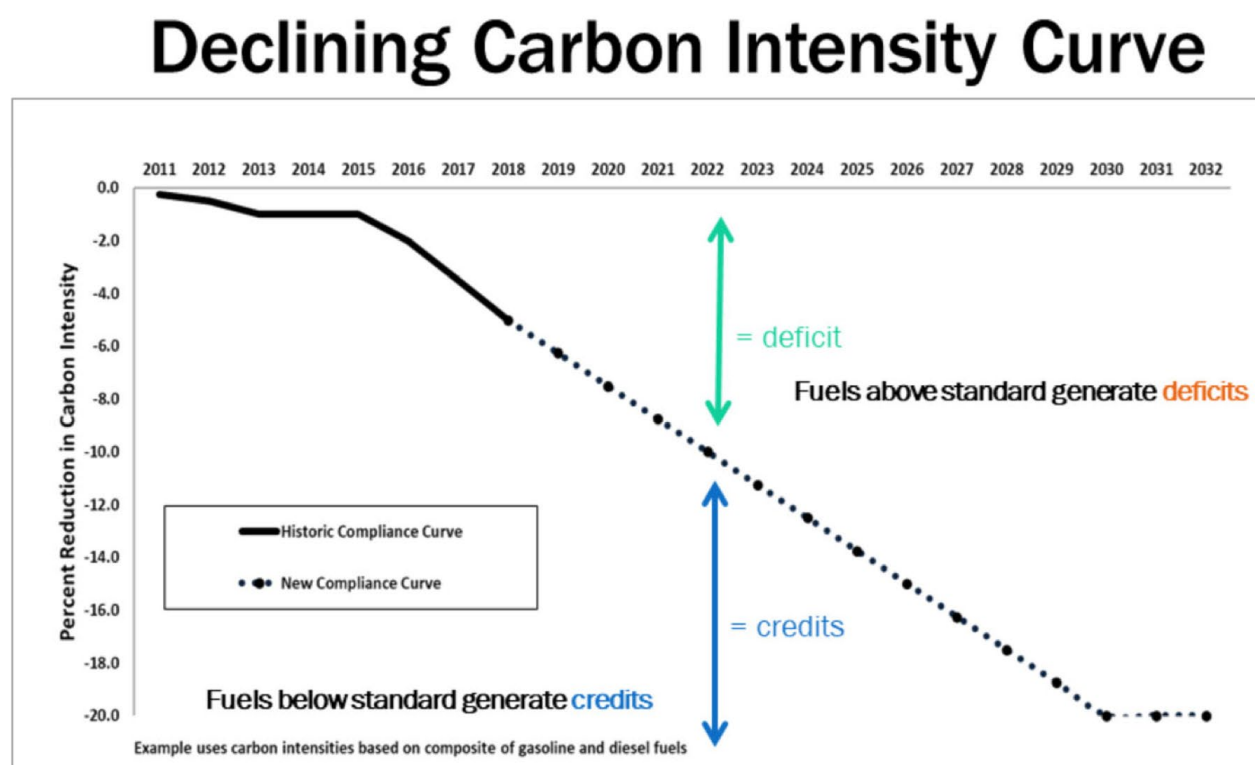
Source: [RIN Trades and Price Information](#), U.S. Environmental Protection Agency

LOW CARBON FUEL STANDARDS

Like the federal Renewable Fuels Standard, California's and Oregon's Low Carbon Fuels Standard (LCFS) aims to reduce emissions from transportation fuels but focuses on carbon intensity rather than fuel volumes. Each year the states set a carbon intensity (CI) target for diesel and gasoline that progressively declines over time. If marketed fuels are delivered to customers with a CI rating above the state's requirement, they incur a deficit. Marketers offering fuels under the CI limit generate a credit they may sell to others who need to fulfill their deficit obligations or retire them against their obligations. Carbon intensity is calculated on a full life-cycle basis, and biofuels and electric vehicles count as generating credits with low CI scores. The required fuel carbon intensity declines yearly, making achieving the target with traditional fossil fuels more challenging and incentivizing markets to deliver more sustainable fuel types. Figure 2 below outlines California transportation fuel's required annual lifecycle carbon intensity. As the maritime industry considers the role of biofuels in the transition to cleaner fuels, compliance markets like the LCFS can drive volumes to specific markets with more significant incentives, particularly if supply is constrained. HVO (Renewable Diesel) pricing, for example, considers credits received through compliance markets.

Figure 2.

LCFS Annual Lifecycle Carbon Intensity Requirements for California Transportation Fuels



Source: [Low Carbon Fuel Standard](#), California Air Resources Board

CALIFORNIA CAP AND TRADE

California's Cap-and-Trade program targets industrial emissions from stationary emitters and fuel distributors whose operations or products emit 25 kilotons of CO₂e or more per year. The state distributes allowances and holds quarterly carbon credit auctions. Emitters must provide allowances or purchased credits for their allocated emissions over a three-year period, and if companies produce less than their allocated emissions, they can sell credits to other companies or bank allowances for use in subsequent years. There are, however, limits to how many credits will translate from period to period. By controlling industry allowances and credit auction volumes, the state can mandate emissions reductions over time. Purchased offsets, in addition to auction credits and allowances, may account for up to eight percent of cap-and-trade credits, but the percentage will drop over time, requiring the industry to reduce emissions output or pay higher prices. More information about California's Cap-and-Trade program can be found at [Cap-and-Trade Program | California Air Resources Board](#). Cap-and-Trade mechanisms are important for the maritime industry because they may soon be included, as is the case in recent Emissions Trading System legislation.

EMISSIONS TRADING SYSTEM (ETS)

The European Union's Emissions Trading System is globally the largest compliance carbon market and operates similarly to the California Cap-and-Trade system, assigning or auctioning allowances to carbon-emitting industry installations. Companies must either meet their allocated carbon cap or buy allowances on the secondary market to satisfy their obligation [Europa.eu]. The EU-approved proposals include the maritime industry in the ETS program starting in 2023, phasing in through 2026 [Europa.eu, Carbon Herald, Norton Rose Fulbright]. Half of the emissions for voyages beginning or ending in the EU count toward a company's carbon cap, while all emissions count if the journey remains within EU territories. Companies that do not comply face fines or an expulsion order for not complying within two reporting periods (Norton Rose Fulbright).

II. CURRENT STATE: VOLUNTARY MARKETS

VOLUNTARY CARBON CREDIT MARKETS

Voluntary carbon credit markets, not linked to a regulated program, come in different forms. Figure 3 outlines the various categories of voluntary credits divided into nature-based solutions and industry offsets. Nature-based solutions focus on removing or avoiding emissions through projects such as agriculture and forestry, while industry offsets concentrate on developing projects that remove or avoid carbon through engineered improvements. In the voluntary market, companies may participate individually or as an industry. The International Civil Aviation Organization (ICAO) pioneered one of the first industry-wide voluntary carbon credit programs, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), in 2019. CORSIA entered its piloting phase in 2021, which will be followed by two voluntary phases before implementation in 2027 [CORSIA].

Without an industry-specific framework, the maritime sector would participate on an individual company basis; however, existing standards or protocols already provide a pathway for maritime-specific methodologies. Gold Standard has a maritime carbon credit methodology, covering emissions reductions linked to retrofits that improve vessel hydrodynamics and engine performance. Carbon credits have been issued under that methodology, and more projects are underway. Another example of an emerging opportunity is adapting truck stop electric vehicle methodologies (fuel switching) to maritime vessels. Individual companies can continue building investment pathways by developing additional protocols with the standards rating bodies.

Figure 3.
Voluntary Carbon Credit Categories

Industry Offsets	Nature-Based Solutions
Brown Carbon Offsets Emissions reductions from increased industrial efficiency	Blue Carbon Offsets Carbon removal or avoided emissions in marine environments
Red Carbon Offsets Carbon removal using innovative technologies	Teal Carbon Offsets Carbon removal or avoided emissions in freshwater environments
Yellow Carbon Offsets Emissions reductions from renewable energy projects	Green Carbon Offsets Carbon removal or avoided emissions in terrestrial vegetated ecosystems

Source: *The Colours of Carbon*, Fair Carbon

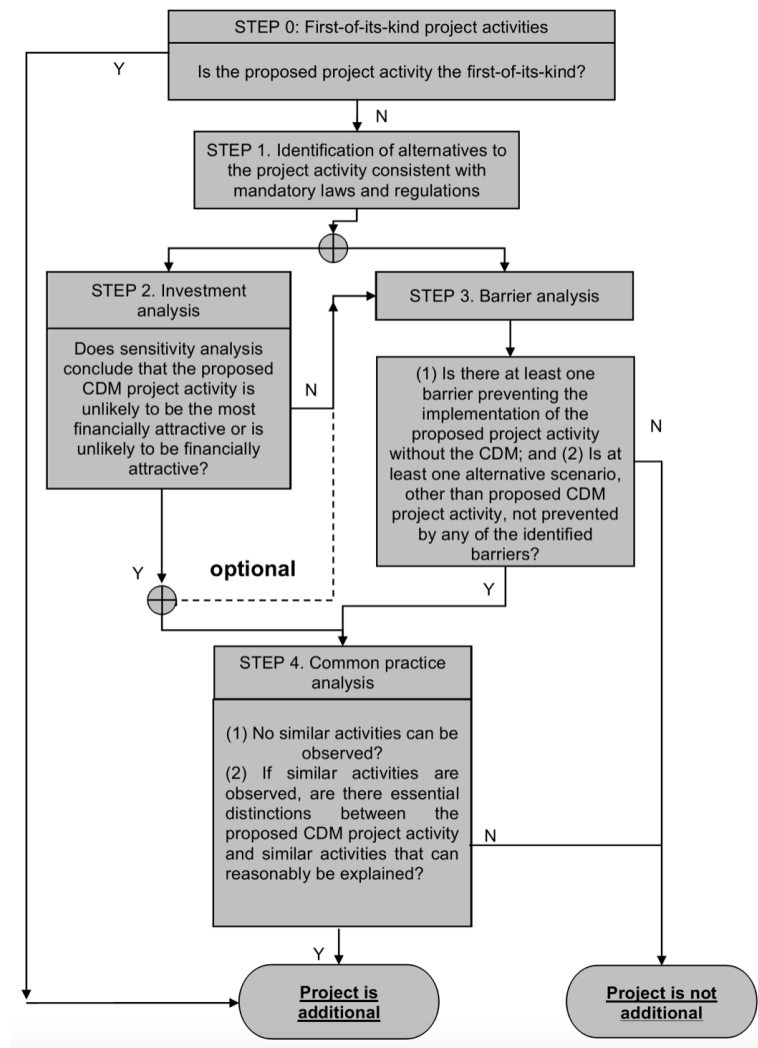
VOLUNTARY CARBON CREDIT REQUIREMENTS

Higher-quality carbon credits follow a methodology or standard developed by a third-party independent verification body to create carbon credits. Credit quality is increasingly important and must demonstrate the following transparent qualities:

Additionality - Projects seeking voluntary carbon credits must be in addition to efforts that would have taken place due to regulatory requirements or normal economic business activities. To test credits, standards agencies developed additionality workflows such as the flow chart from Gold Standard outlined in Figure 4 below [UNFCCC]. Projects create credits and then sell them in the market for the retirement of other emissions; therefore, if created credits are not in addition to projects that would have already continued forward, they risk acting as a funds transfer rather than accelerating emissions reductions as argued in a recent Wall Street Journal article [Shifflet].

Figure 4.

Clean Development Mechanism Additionality Flow Chart Tool



Source: *Clean Development Mechanism*, UNFCCC

Determining additionality is a complex topic. Maritime decarbonization requires investing in long-lived assets deployed in a dynamic environment and buying early equipment that has not yet benefited from learning curve cost reductions. Voluntary carbon credits can help fill the investment gap by qualifying as “first of its kind” project activities as denoted in the “STEP 0” additionality test shown in Figure 4.

Additionality also can consider several other factors, including whether selling carbon credits was a deciding factor in whether the project moved forward [Carbon Offsets], if barriers prevent implementation, and if similar activities are already observed in the market.

Permanence - To qualify as a high-quality credit, GHG removal or avoidance must be permanent and not released into the atmosphere later, canceling the project’s benefit. For example, in the case of nature-based solutions, if trees are protected from deforestation but removed in the future, the credit is deferred rather than permanent.

Measurability - To accurately determine the number of credits produced, projects must correctly measure and verify their GHG impact. Protocols or standards from the major standards agencies provide clear guidelines for measuring and reporting carbon avoidance or removal. It would be useful for vessel owners to utilize real-time emissions measurement technology to facilitate efficient voluntary carbon market project verification.

Exclusivity - Participants must ensure credits are not double counted or credited to multiple parties for the same environmental impact. The party who provides capital and executes the project receives credit for the reduction; however, the originator may allocate credits to a separate party in a pre-determined contract as long as they do not duplicate the created offsets. Registry systems help to eliminate the risk of double counting by assigning exclusive identification to each created credit.

For example, in the case of truck stop electrification, if Company A invests capital in installing electric plug-in stations at truck rest stops, they receive the credits. Company B’s trucks that use electric plug-ins can reduce their emissions because they do not use diesel while idling, but Company A receives the credit since they provided the capital to install the plug-ins. Company A can agree to allocate credits to Company B through a pre-determined agreement if they wish.

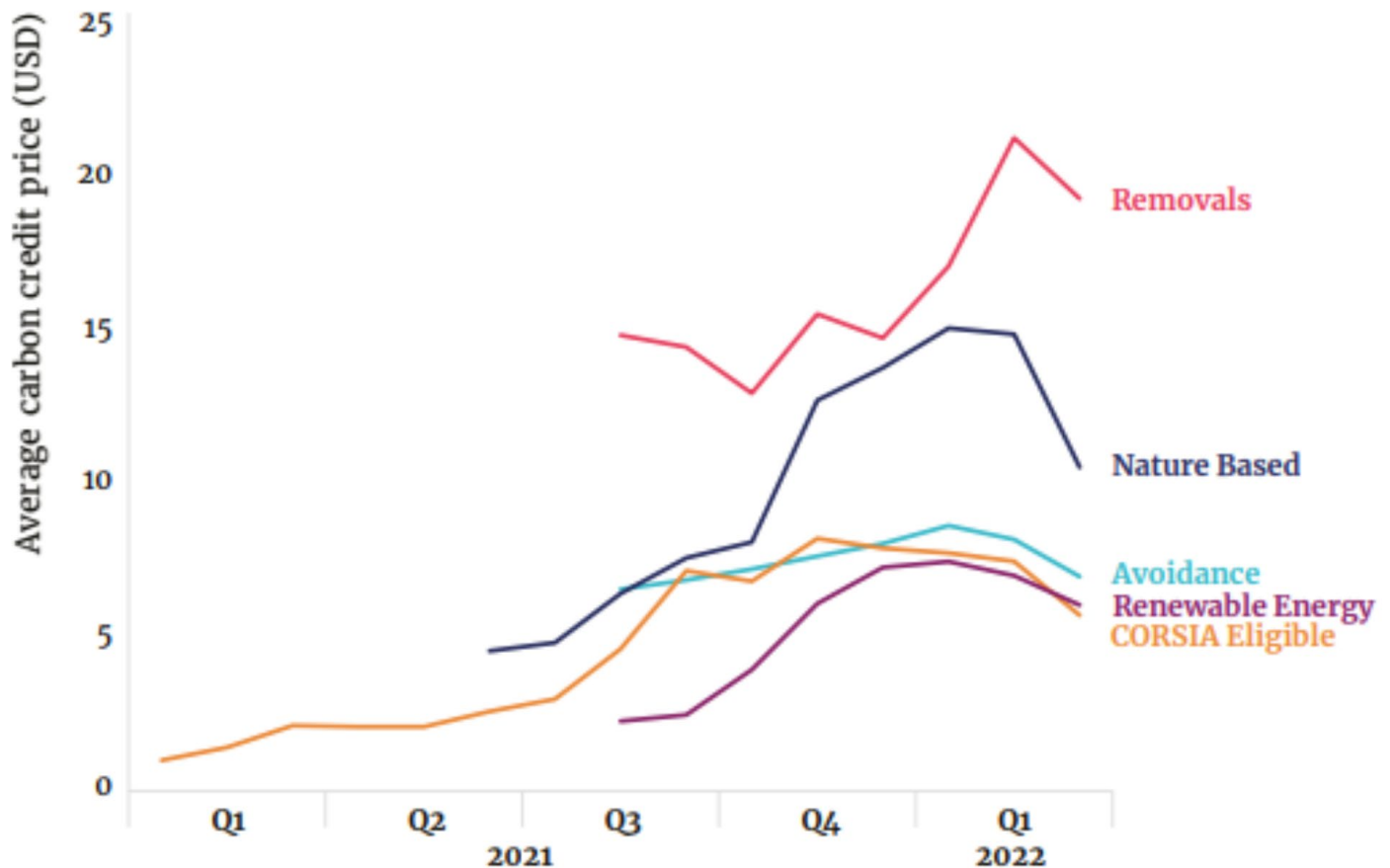
Social and Environmental Impact - It is important to ensure carbon credit creation does not negatively impact local communities or the environment. Maritime projects targeted at reducing port emissions should help alleviate residents’ health effects but should still consider unintended economic or environmental consequences related to investment infrastructure or vessel improvements.

VOLUNTARY CARBON CREDIT PRICING AND DEMAND FACTORS

Figure 5 outlines historical pricing for different classifications of carbon credits. Standards bodies and markets classify carbon credits as either avoidance or removal projects. Avoidance credits include projects, like the truck stop electrification methodology mentioned above, which allow trucks to plug into electrical power rather than burn diesel while idling. The project enables truck drivers to avoid emissions by providing a power source with a lower carbon intensity than a diesel powertrain. Removal projects like carbon capture and storage remove emissions permanently from the atmosphere and tend to trade at a premium compared to avoidance credits. Removal projects usually require additional upfront capital but also may benefit from the ability to accurately measure and verify the quantity of sequestered carbon vs. less centralized and more intensive collection methods.

Figure 5.

Prices of Standardized Carbon Credit Contracts (\$/tonne)



Source: State and Trends of Carbon Pricing 2022, The World Bank / S&P Global Platts

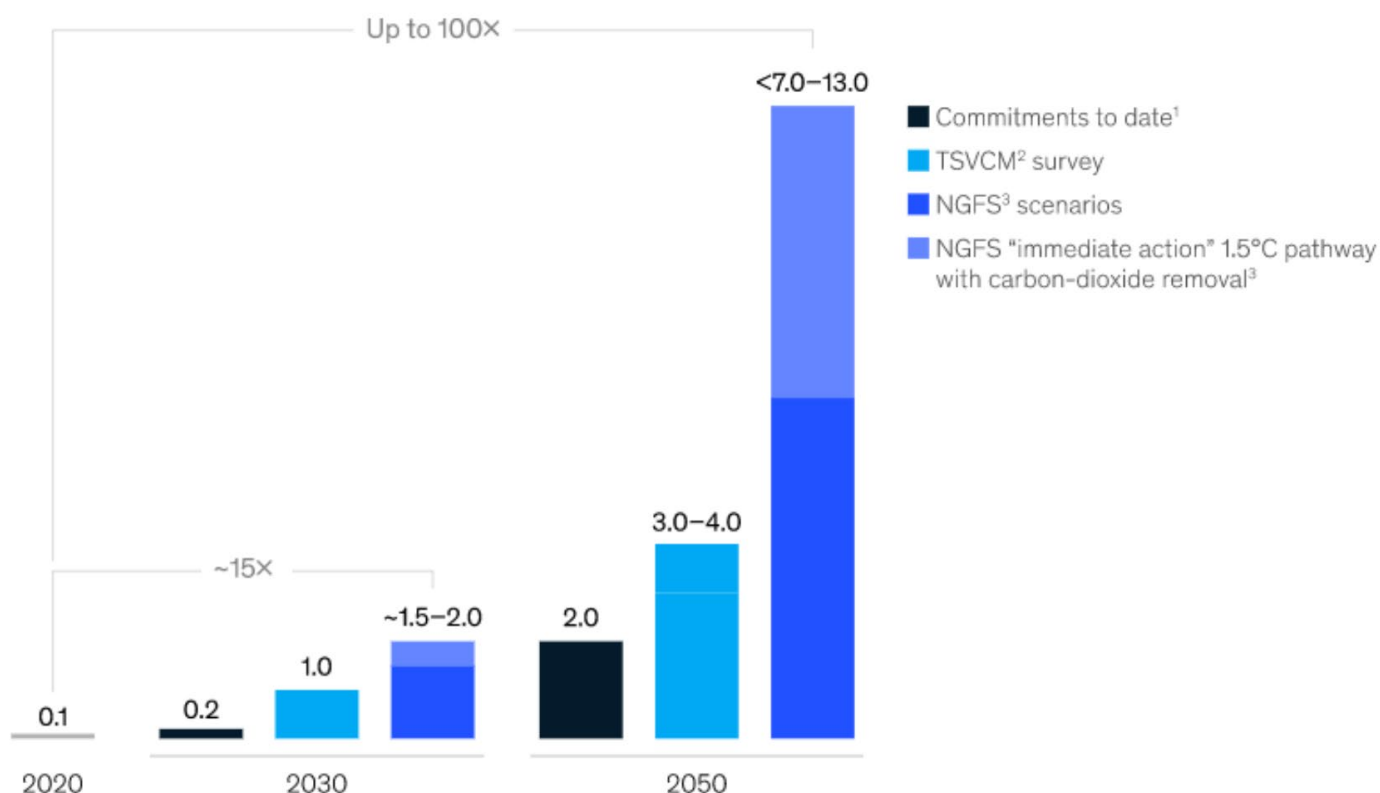
Effective measurement and permanence are essential when determining the risk and value of carbon credits. Buyers want to ensure carbon credit originators maintain quality project management and accurate measurements throughout the award duration. The market prices in permanence risk and also considers location and vintage when deciding which credits to purchase. Often credits that benefit a buyer’s operating locations or surrounding community may positively impact pricing as companies prefer to buy credits in places that benefit direct stakeholders, economically disadvantaged regions or areas that may make emissions verification easier.

As more global companies make greenhouse gas reduction pledges, the demand for quality carbon credits is expected to increase. In the United States, Waste Management [[Waste Disposal & Recycling | WM](#)] and Ascend Performance Materials [[Ascend Performance Materials LLC — Homepage \(ascendmaterials.com\)](#)] are noteworthy examples of companies monetizing some of the carbon emissions reduction they achieve to help finance the necessary investments. Figure 6 below from Mckinsey’s January 2021 article entitled “A Blueprint for scaling voluntary carbon markets to meet the climate challenge” outlines potential demand scenarios for VCCs through 2050 and shows a substantial increase in demand.

Participation by the maritime sector could help fill the quality credit gap while facilitating infrastructure to drive change sustainably and improve the economics of future lower-carbon fuel technology. While credit standard opportunities are likely driven more toward avoidance protocols, maritime applications could create predictable credit volumes and enhance credit quality through the ability to provide traceable measurement procedures augmented through digital solutions over the qualifying project life. Potential areas of interest could include implementing on-ship or port technical improvements, offsetting traditional fuels, installing on-ship carbon capture or developing electrical infrastructure for reducing local port emissions.

Figure 6.

Voluntary Demand Scenarios for Carbon Credits, gigatons per year



¹These amounts reflect demand established by climate commitments of more than 700 large companies. They are lower bounds because they do not account for likely growth in commitments and do not represent all companies worldwide.

²TSVCM = Taskforce on Scaling Voluntary Carbon Markets. These amounts reflect demand based on a survey of subject-matter experts in the TSVCM.

³NGFS = Network for Greening the Financial System. These amounts reflect demand based on carbon-dioxide removal and sequestration requirements under the NGFS's 1.5°C and 2.0°C scenarios. Both amounts reflect an assumption that all carbon-dioxide removal and sequestration results from carbon credits purchased on the voluntary market (whereas some removal and sequestration will result from carbon credits purchased in compliance markets and some will result from efforts other than carbon-offsetting projects).

Source: NGFS; TSVCM; McKinsey analysis

Source: [Global Demand Projections for Voluntary Carbon Credits, McKinsey](#)

III. THE VOLUNTARY CARBON CREDIT CREATION PROCESS

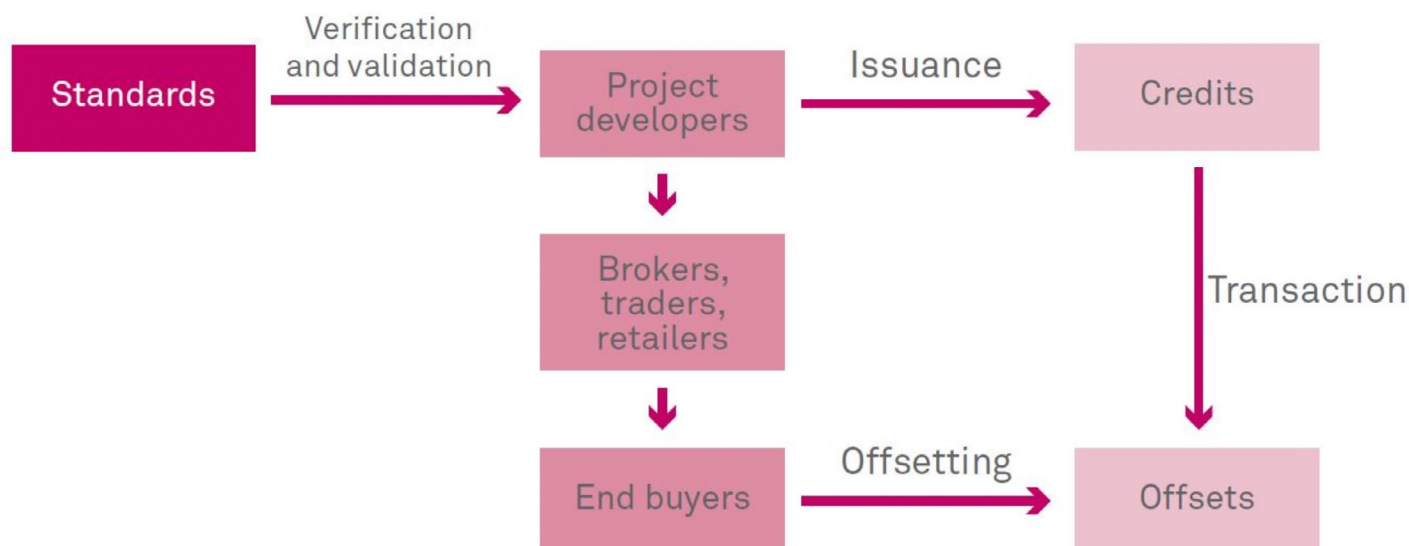
Figure 7 below, from S&P Global Platts, outlines the key players in the voluntary carbon credit market. Carbon credit creation starts with a project developer willing to supply the capital for an opportunity to reduce emissions. To develop quality credits, they must follow an approved methodology, protocol or standard created by a standards organization. Examples of standards organizations, which usually are non-profits, include firms like Gold Standard, Verra and The American Carbon Registry. Standards, methodologies or protocols outline the method for reducing emissions, measurement procedures and the process for verifying that emissions reductions meet carbon credit validation requirements. Developing a new protocol can take up to two years and involves public and scientific reviews.

Once a standard is in place, the project originator can record emissions savings per the outlined requirements and periodically submit data for verification to the standards organizations that review the data and issue voluntary credits. Standards bodies maintain registries and issue identification numbers to ensure credits are properly retired and avoid double counting. Detailed information on initiating or developing voluntary carbon credits against a standard, protocol or methodology can be found on the standards organization's websites.

Figure 7.

Key Participants in the Voluntary Carbon Credit Market

The structure of the voluntary carbon market



Source: *Voluntary carbon markets: how they work, how they're priced and who's involved*, S&P Global Platts

CHALLENGES TO CREATING A LIQUID CARBON CREDIT MARKET

While liquid voluntary carbon credit markets are expanding as more firms establish intermediaries for trading and packaging credits, their varied nature still requires firms to expend resources to ensure projects create lasting environmental impacts. Proper due diligence allows companies to avoid situations where their GHG pledges are invalidated by purchasing lower-quality offsets not approved by standards rating agencies, which may be challenging to measure.

Technology efforts could help to fill the verification gap. For example, in the nature-based category, firms are beginning to verify forestry credits with satellite data that physically validates that natural assets remain in place. When combined with independent verification databases, technology applications could help increase credit quality and the need for in-depth due diligence on each protocol [Forbes]. As the maritime industry modernizes and technology to measure emissions output and efficiency becomes more commonplace, data gathered can help companies establish GHG baselines and reliably track emissions savings linked to credit protocols.

In addition to physical verification, establishing best practices and guidelines for developing standards and buying voluntary credits will help drive the greater market to demand higher-quality credit offsets and removals. Companies should consider the underlying goal of using voluntary carbon credit instruments to accelerate the transition to lower emissions through incentivizing industry-changing infrastructure and technology improvements.

IV. SUMMARY

Blue Sky supports expanding carbon credit creation and usage to enable maritime decarbonization investments that otherwise would not be economically feasible. Pioneering decarbonization pathways in an industry with long-lived assets (>20 years) and high capital requirements entails significant inherent risk; employing voluntary carbon credits can help fill the incentive gap in the absence of a unified compliance market. Standards exist to create high-quality, traceable and permanent credits via existing pathways, and companies can also work to develop additional protocols. As the carbon market continues to evolve, advocacy by maritime and financial sector participants should support efforts to incentivize carbon-reducing technologies and be open to pathways to merge existing credits with future regulatory structures or, when enacted, compliance markets.

Blue Sky is committed to accelerating the transition of the waterborne transportation value chain in the U.S. and Canada toward net-zero GHG emissions. Expanding access to carbon credit instruments and enhancing market liquidity are important tools in progressing to lower-carbon technologies.

ABBREVIATIONS

CI: Carbon Intensity

CORSIA: Carbon Offsetting and Reduction Scheme for International Aviation

EPA: Environmental Protection Agency

ETS: Emissions Trading System

GHG: Greenhouse Gas

HVO: Hydrotreated Vegetable Oil (Renewable Diesel)

ICAO: International Civil Aviation Organization

LCFS: Low Carbon Fuel Standard

RECs: Renewable Energy Certificates

RFS: Renewable Fuel Standard

RIN: Renewable Identification Number

RVO: Renewable Volume Obligation

VCC: Voluntary Carbon Credit

WBCSD: World Bank Council for Sustainable Development

WRI: Work Resources Institute

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