DRAFT Ecosystem Mapping
Functionality and Entities across the Carbon Market Infrastructure Ecosystem

Updated based on comments received as of 7th November 2024

Current lack of common understanding between the clear roles and functions of key players such as registry providers, infrastructure operators, exchanges, guideline setters, standards, technology providers, etc., was considered a key bottleneck in strengthening carbon market infrastructure. Following the kick-off meeting for the Carbon Markets Infrastructure Working Group (CMI WG) on June 4th, 2024, one of the key themes that the WG members highlighted was the importance of clarifying and harmonizing the definitions and roles of key players and stakeholders across the value chain of the carbon market infrastructure. In line with the same, one of the key outputs envisaged from this WG was to have an ecosystem mapping of the carbon market infrastructure ecosystem; mapping functionalities and entities. This will help identify the roles, responsibilities, potential governance gaps, and chain of liability and accountability across the carbon value chain.

CMI WG discussions and contributions draw on key principles and standards from leading reports and frameworks—such as those by ICVCM, IOSCO, the Commodity Futures Trading Commission (CFTC), and the Institute of International Finance (IIF). For instance, the report of the IIF's Taskforce on Scaling Voluntary Carbon Markets (TSVCM) called for robust data infrastructure to scale voluntary markets, prevent double counting, and ensure seamless data exchange, particularly by achieving interoperability between carbon registries and trading platforms.[1] The IOSCO Consultation Report 2023 (CR0623) outlines crucial considerations for building resilient voluntary carbon markets, focusing on open access, market integrity, transparency through publicly available data, interoperability, and strong governance frameworks.[2] Additionally, the CFTC's Call for Inputs 2024 (RIN 3038-AF40) proposes standards for voluntary carbon credit derivative contracts, aimed at establishing a regulated market with clear requirements for transparency and market integrity.[3]

This ecosystem mapping i) provides technical definitions of key functionalities and ii) provides a granular coverage in mapping of both functionalities and entities involved within the carbon market ecosystem. The WG's preliminary ecosystem mapping of the carbon market value chain is a living and evolving resource. It includes a list of terminologies, technical definitions, functionalities, and actors; covers all stages (both pre- and post- issuance); and clarifies potential inconsistencies, overlaps, and conflicts of interest.

The ecosystem mapping consists of the following:

- **Table 1: Carbon Asset Value Chain/ Milestones/ Stages in Demand and Supply of Credits**
- **Table 2: Key Entities/Market Players in the Carbon Market Infrastructure Ecosystem**

This ecosystem mapping is a live document, evolving through the comments received from the range of stakeholders involved including comments from the members of the Working Group.

Table 1: Value Chain/Milestones/ Stages in Demand and Supply		
#	Functionality	Description
i.	Methodology creation	Parties to the Paris Agreements and several independent standards countries may develop and adopt their own methodologies and standardised baselines in the case of VCM and Article 6.2, or adopt those developed by the Supervisory Body of the UNFCCC under article 6.4. Most methodologies in current carbon market schemes draw their approach of accounting greenhouse gases (GHG) from the IPCC Guidelines for National GHG Inventories. The main programmes serving the voluntary carbon market have historically recognised CDM methodologies as an acceptable standard and have also developed additional scheme specific methodologies. In addition, voluntary carbon market schemes can stipulate other (additional) criterion to be fulfilled. [4] Under Article 6.2 guidance adopted at COP26, where a mitigation outcome is measured and transferred in tCO2 eq (i.e. a greenhouse gas metric), the measurement must be in accordance with the methodologies and metrics assessed by the IPCC and adopted by the Conference of Parties serving as Meeting of the Parties to the Paris Agreement (CMA).[5] A rich repository has been created in terms of approved methodologies which may be used for transitioning to the Paris regime. Under the rules, modalities and procedures for the new mechanism established by Article 6.4, the new Supervisory Body is asked to review the baseline and monitoring methodologies in use for the CDM with a view to applying them with revisions as appropriate under the Article 6.4 mechanism. [6] New technologies can add higher frequency and accuracy data. For this reason, methodologies being modular and more adaptable can help to enhance efficiency in the market.
ii.	Project Design and Development	The Project Design stage includes developing a project concept, choosing or developing a baseline, proving additionality and monitoring methodology, and stakeholder consultations.[7]. The PDD contains a description of the chosen technology and explains the methodology used to define the baseline scenario, to demonstrate additionality, and to calculate emission reductions. It also contains information on the monitoring of all relevant technical parameters including how monitoring procedures will be established, measurements made, quality controlled, and records stored and accessed. It contains an estimate of the volume of emission reductions to be achieved by the project. Finally, it documents how the project contributes to sustainable development. The PDD is used throughout the implementation phase to ensure that the project performs according to the parameters outlined in the document.[8] During the project design stage, the project owner prepares the project documentation as required by the standard or the relevant host country's Article 6.2 Policy Framework[9].
iii.	Validation	The developer submits the PDD to an accredited validation and verification body (VVB) that is approved by the carbon offset program [10]. Validation refers to the ex-ante[11] independent assessment of a project's design and implementation against the requirements of a particular GHG program or standard. The purpose of validation is to ensure that a project is capable of delivering the expected GHG emissions reductions or removals, that it complies with the relevant standards and rules, and that it has the necessary systems and procedures in place to monitor and report on its performance[12]. At a country level, especially under article 6.4, existing guidance lays out that Designated Operational Entity (DOE) shall select a competent team to perform the validation or verification for the A6.4 project in accordance with the "Article 6.4 accreditation standard".[13]
iv.	Due Diligence/ KYC & AML Verification	Know your customer (KYC) is the regulatory process in which a financial institution verifies a customer's identity by assessing their credentials before allowing them to use a service. KYC policies allow companies to better understand their customers and their customers' financial dealings, which helps to effectively mitigate and manage risks.[14] Effective KYC protects companies from doing business with organizations or individuals involved in illegal activity, such as money laundering, terrorist financing or corruption. It also allows financial institutions to get a better understanding of their customers' businesses, which can provide valuable insights for financial institutions.[15] Anti-money laundering (AML) is a broader and more holistic practice than KYC. AML compliance is the comprehensive set of policies that a company uses to protect against criminal infiltration, money laundering, terrorism financing, human trafficking and more. KYC is an important part of AML for corporations, banks, fin-techs, and other financial institutions. [16] The development and implementation of AML and KYC guidelines for voluntary carbon markets will help minimise the risk of fraud or money laundering as the market develops.[17] It is argued that implementation of AML and KYC guidelines and processes used within regulated markets should be extended to voluntary carbon markets to check against fraudulent actors who may take advantage of the maturing market.[18]

v.	Information Security	Information security (InfoSec) is the protection of important information against unauthorized access, disclosure, use, alteration or disruption. It helps ensure that sensitive organizational data is available to authorized users, remains confidential and maintains its integrity. Information assets, which might include financial, confidential, personal or sensitive data, need to be protected. These assets can take the form of digital files and data, paper documents, physical media and even human speech. [19] Throughout the data lifecycle, InfoSec oversees functions such as infrastructure, software, testing, auditing and archiving. [20] It ensures prevention of unauthorized access to, use or destruction of information or systems. It includes measures to protect electronic information & computer systems from theft or damage to hardware, software or information. Examples include Multi-Factor Authorisation (MFA) which is a security measure that requires more than one piece of information to verify an individual's identity.[21]
vi.	Registration	When a credit-issuing standard determines that a prospective project meets the necessary criteria established in a published methodology, including third-party validation and assurance, and gives official approval to list the project in that standard's registry. Once registered, a project can submit requests for credit issuances[22]. The purpose of registration is to ensure that the project meets the basic requirements set by the carbon standard (such as the CDM, VCS, Gold Standard, etc.) and is eligible to generate carbon credits.
vii.	Project Implementation	The actual work to execute the project involves coordination of multiple activities that can include technology deployment, insuring that monitoring systems are calibrated and meet Quality Assurance / Quality Control (QA/QC) requirements in the protocol, conducting the required monitoring, data collection, analysis, and reporting, computing GHG emission reductions based on comparison of baseline and project emissions in conformance to the quantification methodology in the applicable protocol, and identifying any data gaps or other issues that could impact the project outcomes[23].
viii.	Measurement, Reporting, and Verification (MRV)	Measurement, Reporting, and Verification (MRV) refers to the multi-step process to measure the amount of greenhouse gas (GHG) emissions reduced by a specific mitigation activity, such as reducing emissions from deforestation and forest degradation, over a period of time and report these findings to an accredited third party. MRV seeks to prove that an activity has actually avoided or removed harmful GHG emissions additional to the established baseline so that actions can be converted into credits with monetary value. The third party then verifies the report so that the results can be certified and carbon credits can be issued [24,25]. Project owners should document the emission reductions or removals in a monitoring report based on the MRV protocol defined in the project document (PDD) as per the requirements of the relevant standard, and an independent entity should then be contracted to verify the reductions or removals claimed in the monitoring report[26]. Most standards have a list of designated VVBs, which have to go through a process of accreditation under that standard. MRV process can be digitised as well. A (digital) MRV infrastructure includes developing data aggregation platforms and/or dashboards and data quality checks, including import, statistical, and cross-checks. Digitally monitoring data parameters to achieve a reduction or removal of GHG emissions according to the rules and requirements of a standard-setting program. Digital monitoring happens when the registered carbon project activity involves retrieving data from a sensor, meter, and/or aggregate platform. [27]Standardising data requirements and consolidating existing methodologies into a set of standardized, modular components can help increase cost efficiency and expedite the MRV process.
ix.	Third-Party Verification/ Review	Verification is the periodic independent review and ex-post determination of the monitored emission reductions or removals by a qualified, accredited entity[28]. The verification process is intended to confirm: i) Emission reductions or removals per the validated project documents ii) Correct utilization of the applicable methodologies and tools, and iii) that the project activity continues to meet the applicable rules and requirements of the standard/mechanism. [29]. The project owner must follow a monitoring plan that details how to track and report on carbon assets and other data relevant to the project as specified in the applied methodology and independent standard, as applicable[30]. Data can be digitally verified as well, There are currently two models to support digital verification; i) Digital verification occurs via a project type specific digital verification platform developed by the project participant or a third party service provider hired by the project participant. Verification is conducted by an independent third party auditor. ii) Integrated quantification and verification approach where a platform is developed and hosted by an independent entity that conducts both the quantification and verification of data capture and the quality audit simultaneously.[31]
x.	Certification	To receive carbon credits, climate change mitigation projects need to receive certification through a carbon crediting program. Certification is the process of verifying and formally recognizing the emission reductions achieved by a registered carbon offset project and is essential for the issuance of carbon credits. In VCMs, carbon crediting programs set standards for carbon credit quality, certify projects, issue carbon credits, and have a registry to track certified projects, issuance and retirement of carbon credits[32]. Under the CDM, project certification was defined as an assurance from the designated operational entity that the stated/ estimated emissions reduction/ removal has been achieved.[33] The purpose of certification is to confirm that the emission reductions claimed by the project have been achieved, are additional (would not have happened without the project), and are accurately measured.

<table>
<tr><td>xi.</td><td>Issuance</td><td>It is the issuance of a specified quantity of serialized units of emission reductions to project participants' accounts in accordance with the rules and requirements of the mechanism/standard[34]. It is the total volume of offsets generated that are issued following the verification process (conducted by a VVB e.g., VCS); each offset receives a unique serial number that enables traceability and auditing[35] to avoid double-counting and is listed in a registry[36]. Offset credits are typically deposited into the project developer's account in a registry system administered by the offset program[37]. Any ownership transfers or retirements must be reported to the issuing standard's registry[38].</td></tr>
<tr><td colspan="3">(Under VCM) After carbon credits are verified, they are then eligible to be issued and become available for trading. This means they enter the market and can be directly sold to companies that will retire them or enter the secondary market where they will continue to be traded until they are retired to offset their carbon emissions[39].</td></tr>
<tr><td>xii.</td><td>Authorisation/
Endorsement</td><td>(Undertaken at the country level)

<u>Authorisation</u> is the written authorization (through a Letter of Authorization) of units or activities that are subject to the regulatory requirements of the Paris Agreement, CORSIA, or other specified uses. The mitigation activities or units would receive a Letter of Authorization from the host country and provide a commitment by the host country to carry out CAs as needed[40].

<u>Endorsement/ Acknowledgement:</u> If applicable, a host country may issue an optional Letter of Endorsement/ Acknowledgement to indicate the recognition of a mitigation activity and its link to the host country's NDC. This optional letter is expected to endorse the claim that the mitigation activity, or units, contributes to the financing or implementation of the host country's NDC. For avoidance of doubt, an endorsement does not commit the host country to CA[41].</td></tr>
<tr><td>xiii.</td><td>Labelling</td><td>(Undertaken at the country or standard level)

Standards/Mechanisms may choose to label units to indicate their compliance with the Paris Agreement, CORSIA, or other uses, and to highlight key attributes[42], such as the application of a CA and a Letter of Endorsement/ Authorization. These labels are intended to allow different use cases by transparently listing the characteristics of units[43]. For example, Letter of Approval, Carbon Credit Label, Certified Emission Reduction (CER) Label, Climate, Community & Biodiversity (CCB) Label, Verified Carbon Unit (VCU) Label.</td></tr>
<tr><td colspan="3">(For CCM) The country's registry should publish information, as needed and transparently, on how carbon assets are used for different purposes (towards own NDCs, others' NDCs or other programs), once carbon assets are issued, authorized for specific use (if needed), and transferred to another participant party. Based on this information, the host country should record the need to carry out a CA on an annual basis in the country's accounting system[44].</td></tr>
<tr><td>xiv.</td><td>First Transfer (relevant only for ITMOs)</td><td>The definition of "first transfer" varies depending on whether ITMOs are transferred between countries and contributes to a Receiving Country NDC or whether ITMOs are transferred to international market based schemes such as CORSIA.

In particular, in the first case, "first transfers" refer to "the first international transfer of the mitigation outcome" whereas in the second case, "first transfers" refer to transfer which can occur at "(1) the authorization, (2) the issuance or (3) the use or cancellation of the mitigation outcome, as specified by the participating Party"[45]. This is still under negotiation.

This definition refers to a specific UNFCCC agreement - and any amends there would supersede what is written here.</td></tr>
<tr><td>xv.</td><td>Trading</td><td>Carbon credit trading is a process wherein once carbon credits have been issued and added to a registry, the issued credits may be purchased, traded, and sold to buyers, either OTC through brokers or through exchanges on secondary markets, both spot and derivatives. Many purchasers of carbon credits are motivated to offset their own emissions or to contribute to climate change mitigation. Some purchasers of carbon credits are investors that hope to achieve a return through their subsequent resale at a higher price. Alternatively, other purchasers buy carbon credits to retire them to claim an emissions reduction or contribute to climate change mitigation efforts. After a carbon credit has been retired, it cannot be traded again. [46]</td></tr>
</table>

xvi.	Primary Market Trading	It refers to the initial transaction of offsets from the project developer to the first buyer in line – this can be an offset retailer or broker (i.e., the "secondary market") or a buyer of offsets for "end use" (i.e., end user or end buyer) in the voluntary or compliance carbon offset markets. [47] Project owners have several ways that they can transact in the marketplace: • Direct sales, i.e., offtake agreements with an 'end-user'[48] • Selling to a retailer, who purchases the offsets with the intent to find a match with an end-user[49] • Decentralised peer-to-peer trading: Decentralized trading of carbon credits refers to the use of blockchain and other decentralized technologies to facilitate the buying, selling, and trading of carbon credits without relying on a central authority or traditional intermediaries[50] • Auctioning or selling into an open market exchange[51]. While transactions in voluntary carbon markets are primarily exchange-traded or take place over the counter, auctions are used to help scale the market by driving pricing transparency, value discovery and accessibility to high quality credits.[52]
xvii.	Secondary Market Trading	Once carbon credits have been issued and added to a registry, the issued credits may be purchased, traded, and sold to buyers, either OTC through brokers or through exchanges on secondary markets, both spot and derivatives.[53] Secondary markets include all subsequent trading of emission allowances and offset credits. Market participants can trade both spot and derivatives contracts based on emissions allowances and offsets (in the case of derivatives, primarily through standardized contracts like futures and options).[54] This takes place over exchanges and OTC markets.
xviii.	Post-trade Infrastructure: Settlement	There are two critical elements of any post-trade settlement infrastructure. Firstly it is essential that the buyer receives the relevant asset and the seller receives payment. Secondly, it is essential that each party receives good legal title and legal and beneficial ownership of the relevant asset or payment amount[55]
xix.	Money Settlement	The obligations of buyers and sellers to a trade are discharged. An act between two or more parties for the discharge of monetary obligations.[56] The traded instrument is delivered to the new owner and cash flows the other way[57].
xx.	Physical Settlement/ Delivery	Transfer of the credit, delivery of an asset, such as an instrument or commodity, in physical form. [58] Unlike what happens with commodities that can be sampled or measured on delivery, a credit buyer cannot consistently and easily ascertain quality through examination of physically delivered emissions reductions or removals. While the credits themselves can be delivered to the buyer, the underlying asset (emissions reduction or removal) may not typically transfer to the buyer's possession and use.[59] There is a potential regulatory/licensing requirement in some jurisdictions for these functions. In some cases, however, the credit is a physically delivered product whereby contracts held to expiry result in physical delivery. [60]
xxi.	Post-trade Infrastructure: Clearing	The process of transmitting, reconciling and, in some cases, confirming transactions prior to settlement, potentially including the netting of transactions and the establishment of final positions for settlement. Sometimes this term is also used (imprecisely) to cover settlement. For the clearing of futures and options, this term also refers to the daily balancing of profits and losses and the daily calculation of collateral requirements[61]
xxii.	Post-trade Infrastructure: Carbon Credit Insurance	Carbon insurance protects the purchase of carbon credits. Carbon credits are purchased from carbon projects which can be directly affected by a multitude of external factors. These risks can contribute to the reversal, invalidation or non-delivery of carbon credits, which leaves the carbon credit buyer exposed. The consequences go on to include reputational harm if a buyer is associated with a project deemed inefficient, unethical or fraudulent; and those in certain industries where offsetting is a regulated activity (e.g. airlines buying CORSIA eligible credits) may face compliance repercussions. Carbon insurance protects against all of these exposures. [62]
xxiii.	Post-trade Infrastructure: Carbon Credit Rating	Carbon credit ratings are an evaluation of a particular claim. These can be produced for different aspects of carbon credits. Carbon credit ratings are most commonly given for the risk that a carbon credit isn't delivering the greenhouse gas (GHG) mitigation it claims.[63]
xxiv.	Post Trade Infrastructure: Data aggregation and analytics	Leveraging available data on carbon-markets and combining with modelling to generate insights into trends in the carbon markets. [64]
xxv.	Retirement	To retire or to offset a carbon credit refers to actions performed in a registry to formally and transparently remove a credit from circulation such that it cannot be further transferred or otherwise transacted[65]. Retirement ensures that carbon credits represent real and verifiable emissions reductions or removals that are not double-counted or used to offset emissions more than once[66]. It is the total volume of offsets for which the impact has been claimed by the end buyer; once an offset has been retired it can no longer be traded[67].
xxvi.	Cancellation	Cancellation refers to the process of permanently removing a carbon credit from circulation, for other purposes than offsetting, e.g. due to over issuance, expiry, etc.[68]. It can also be defined as a unit being "cancelled" or removed from one standard/program and being "recognized" in another standard/program.
xxvii.	Reporting	Under the Paris Agreement, parties participating in cooperative approach(es) are required to report relevant information for the purpose of transparency, robust accounting, and to ensure consistency with the Article 6.2 guidance.[69] In post-trade reporting, Trades are reported to regulators or to trade repositories where applicable[70].

Table 2: Key Entities/ Market Players in the Carbon Market Infrastructure Ecosystem

#	Key entity/ market player	Description	Indicative Examples
1.	Project developer	These are entities that manage and operate the project (may be a private company, a non-profit, or other non-government organization[71]), a project which reduces or removes GHG emissions. They select a methodology, or protocol, and draft a Project Design Document[72]. Project developers design projects, obtain funding and physically create the project[73]. Prior to any project launch, the project developer should identify the source of funds to execute the project. Advance financing can come directly from prospective buyers of the offsets. In other cases, the developer may have a business model and enough reserves for self-financing. A more common approach is an Emission Reduction Purchase Agreement (ERPA) that contracts for future delivery (see xv) of offset credits (or in some cases, options[74]) as they are issued[75].	ReNew Power, Honeywell, Klik, Wildlife Works[76]
2.	Register/ accounting and tracking registry	A register is a database that records unit-level information as required by the market mechanism. This could include the vintage of the carbon unit, the serial number and location of the project for which the carbon unit was issued, the project funder, or verification details[77]. It tracks and records the issuance, ownership, transfer, and retirement of carbon credits and associated project information and documentation. [78] These can also be understood as non-transactional registries which are those that enable the pulling and viewing of information from underlying cooperative approach registries[79]. They may include information from other registries, but they may also include information from designated authorities and others. A registry recording a detailed plan for a Nationally Determined Contribution would be one example of this.	S&P, Xpansiv, Ecoregistry, UNFCCC Article 6.4 Mechanism (Paris Agreement Crediting Mechanism) Registry
3.	Registry with Transaction Functionality	These are registries that enable the transfer of carbon credits between registry accounts[80]. More broadly, transaction registry is a database that has all the features of a register, plus the capability to transact carbon units between multiple account holders on the transaction registry (internal transfer), and/or the capability to transfer carbon units to another transaction registry (external transfer). The more complex the market mechanism, the more features the transaction registry will require[81].	Verra, Gold Standard, American Carbon Registry, Plan Vivo, Bio Carbon, Climate Action Reserve[82]. UNFCCC Article 6.4 Mechanism (Paris Agreement Crediting Mechanism) Registry
4.	Infrastructure providers/ operators	Carbon market infrastructure provider is an entity that offers the necessary systems, platforms, and services to facilitate the trading of carbon credits. These providers ensure that the carbon market operates smoothly, transparently, and efficiently. This includes developing registries, designing MRV mechanisms, setting up secondary markets and post-trade infrastructure . These also include provision of services like registry, exchanges, financial intermediaries, credit rating agencies etc.[83]	S&P Global, Xpansiv, Puro Earth, CIX, B3
5.	Multilateral Organisations	Multilateral organisations such as World Bank, ADB, UN bodies, support countries in building technical capacity for developing and usage of carbon market infrastructure, policy frameworks, MRV systems, and infrastructure providers in prototyping. Leveraging their collective convening power, these entities also support in guidance towards, standardisation, widespread adoption of international good practices, and providing capacity and technical support to developing countries.[84]	MDBs- World Bank EBRD, United Nations- UNDP, UNFCCC, UNEP, Climate Action Platform Africa, Africa Carbon Markets Initiative,

6.	Carbon Crediting Program/ Standard Setters	Carbon Crediting Program is a standard-setting program that usually registers mitigation activities and issues carbon credits[85]. However, in some cases the 'standard' or 'methodology' is legislatively driven and the issuance is done by a separate body. Carbon crediting program (also known as "standard setters" and "certification bodies") set standards for carbon credit quality, register validated projects, identify or directly accredit eligible validation and verification bodies, issue carbon credits for verified emissions reductions or removals, and have or designate a registry to track projects and the issuance and retirement of carbon credits[86]. They issue the rules and requirements for greenhouse gas crediting programs. They review and run public consultations for these rules and methodologies and ultimately approve them. They also review initial project design documents, and review and approve the verification of carbon credits[87]. Both, either or neither of these functions could also be nationally driven. Several "Industry Associations such as Korea Chamber of Commerce, which introduced its own standard & registry. Similarly, the Airport Carbon Accreditation put forth its list of eligible carbon credits for Airport-level decarbonization strategy implementation guideline. These entities also set up their guidelines on methodology, validation, registration, issuance and accreditation procedures.	Verified Carbon Standard (VCS), Gold Standard, American Carbon Registry (ACR), Climate Action Reserve, Architecture for REDD+ Transactions (ART), Plan Vivo, Climate, Community and Biodiversity Standards (CCB Standards), Puro.Earth, UNFCCC Article 6.4 Supervisory Body[88].
7.	Validation and Verification Body (VVB)/ Certification Bodies/ Third Party Auditors	An independent third-party entity that is accredited for performing validation and/or verification audits. Validation and verification bodies are often also referred to as auditors[89]. They undertake validation of the project design document, i.e., assesses whether the project design meets the standard's criteria and is designed according to the methodology. [90] VVBs are critical to ensuring the integrity of the projects registered with the standard's program. After a project implements its activities and monitors progress – documented in monitoring reports – a VVB undertakes verification, i.e., confirms that all emission reductions or removals are quantified according to the standard's requirements. The emission reductions and removals are then issued as carbon credits and released for trading. Each credit is assigned a serial number in a registry.[91] Additionally, they: • Evaluate specific projects to determine whether they fulfil the Standard's methodology protocol • Evaluate specific projects to determine whether they fulfil requirements to be tagged with additional attributes[92]	GS[93], TÜV Süd, DNV, EU CRCF, UNFCCC[94]
8.	Methodology Validator	Validation of methodologies is the process of evaluating the proposed new methodology and its reasonableness of assumption, limitations, and methods included with its application and how it will support a statement of the outcome of the implementation of a project and its activities based on its application.[95] Validators subject methodologies to technical review to determine that the methodology used will actually accomplish the carbon sequestration claimed.[96]	UNFCCC, ISO, National Governments, crediting programs (Verra, Gold Standard, ACR)

9.	Verification Accreditation Agency	Accrediting verification bodies that issue certificates attesting that they comply with a specified standard[97] (eg to ISO 14065) [98]. An existing system for accreditation already exists with national accreditation bodies (ABs) accrediting VVBs to ISO 14065. This process is reinforced by a system of peer assessment undertaken by ABs to evaluate the effectiveness of other ABs acting within their geographic regions[99]. The International Accreditation Forum (IAF) exists to provide guidance on the application of ISO standards used in accreditation[100]. Accreditation is a pivotal process within the framework of the Article 6.4 mechanism (known as the Paris Agreement Crediting Mechanism) under the UNFCCC. It is a formal recognition by the mechanism's Supervisory Body to an organization, confirming they have the institutional capacity, competence, and impartiality needed to perform validation or verification/certification functions in accordance with the Article 6.4 rules and regulations. Once accredited, the organization, known as a Designated Operational Entity (DOE), plays two important roles: • It validates and seeks registration for new activities or renews existing ones under the Article 6.4 mechanism; and • It verifies and certifies emissions reductions of registered activities.[101] National governments and crediting programs also set up their respective guidelines on accreditation of VVBs.	International Accreditation Forum (IAF), CDM EB, carbon crediting standards, UNFCCC, national governments[102]
10.	Data Aggregation	It refers to the aggregation of data from external data generators in a single, open location.[103]	CPI, Net Zero Finance Tracker, CAD-T[104]
11.	Data Reconciliation/ Mapping	In a data transfer or data migration process, data reconciliation verifies whether the migration of data from the source database to the target database transferred the data correctly. The data in the target database are compared with the data in the source database to detect errors.[105]Data mapping is the mapping of data from multiple providers or direct upload to sustainability/climate related frameworks to allow for facilitated disclosure. [106]	Hong Kong Stock Exchange, GSF Data Repository, CAD-T[107]
12.	Data Analytics	These entities undertake carbon-market analysis, combining data collection with data science, geospatial and modelling to generate insights into trends in the carbon markets and insights into carbon pricing.[108]	Trove Research, Global Berkley Carbon Trading Project, AlliedOffsets, ClearBlue Markets
13.	Traders	Individuals or entities can purchase offsets either for their own internal use or for re-sale to another buyer (called "*intermediaries*"). Intermediaries, such as retail traders, purchase offsets with the intention to resell. .	
14.	*Primary Market Trading Infrastructure:* Auction Platforms	In an auction the seller would provide its ERCs to an auction provider who would hold such ERCs in trust in the seller's account and put such ERCs up for auction under specific conditions to be agreed with the seller (e.g., auction duration, certain floor price per auctioned ERC). Other information required from the seller may include proof of carbon credit issuance from an accredited carbon standard, information on significant co-benefits as well as 3rd party ratings of project leakage and permanence risks. During the auction process, multiple potential buyers would compete and out-bid each other. The ERCs would be awarded by the auction provider to the highest bidder, and this would require a contract with the auction provider. Auctions do not require signing ERPAs with individual buyers but offer multiple potential buyers the opportunity to purchase carbon credits through a sealed bid competitive process. When sellers list their credits on an auction platform, there is an obligation to sell, as opposed to listing credits on an exchange, where the seller would have a choice to opt-out.	Provided by auction platforms or big exchanges such as CME Group, Intercontinental Exchange (ICE), and Xpansiv CBL. WB Pilot Auction Facility Climate Impact X (CIX) (marketplace, auctions house and exchange for carbon credit).
15.	End User	An entity (individual, company, organization, etc.) that purchases carbon credits, either directly from the project developer or from an intermediary, with the intention of retiring the credits to claim as offsets against emissions[109]. End-users purchase offsets to count against their emissions and typically retire any purchased offsets to signal that those offsets are no longer available for sale.[110] End buyers that need to purchase credits to offset their emissions tend to prefer non-standardized products as this allows them to look into the specific characteristic of each underlying project, ensure the quality of the credit being purchased and therefore protect themselves from potential accusations of greenwashing.[111] The downstream market is made up of end buyers: companies – or even individual consumers – that have committed to offset part or all of their GHG emissions. [112]	
Till here broadly covers the primary market entities, what follows is particularly for secondary market entities.			

16.	Brokers	Brokers buy carbon credits from a retailer trader and market them to an end buyer, usually with some commission. [113] Professional emission reduction traders purchase and sell emission reductions by taking advantage of market price distortions and arbitrage possibilities[114]. In the offset credit wholesale market, emission offset buyers and sellers can have transactions facilitated by brokers or exchanges. Exchanges are usually preferred for frequent trades or large volumes of products with standardized contracts or products, while brokers typically arrange transactions for non-standardized products, occasional trades, and small volume[115].	South Pole, Cool Effect[116]
17.	Retail Aggregators/ Traders	Retail aggregators/ traders purchase large amounts of credits directly from the supplier, bundle those credits into portfolios, ranging from hundreds to thousands of equivalent tons of CO_2, and sell those bundles to the end buyers, typically with some commission[117].	
18.	*Secondary Market Trading Infrastructure*: Exchange	Trading platforms (for example, *Exchanges*) enable carbon credit holders to buy and sell carbon assets in environmental markets. Key benefits of an Exchange include providing a centralized pool of liquidity, electronic clearing and settlement; same-day settlement of products and funds; real-time price transparency; anonymous trading; and a transparent web-based marketplace[118]. Exchanges promote more liquidity, provide price transparency and act as financial intermediaries for a trade. An exchange also reduces counterparty risk through its clearing mechanism, as it serves as the buyer for every seller and the seller for every buyer[119]. In contrast to OTC transactions, exchanges provide a central meeting place for buyers and sellers to meet and buy and sell. Exchanges are useful because the identities of market participants are confirmed to become a member of, and trade on the exchange, their transactions are cleared, and they regularly report price and volume information that gives the market transparency[120]. A spot exchange can become a venue where contract terms become standardized, information can be shared equally among all market participants, and counterparty risks can be managed in a cost and time-efficient manner. Several carbon exchanges have emerged to optimize the price discovery process and the management of counterparty risks[121]. *A spot trade is a trade in which commodities are traded for immediate delivery; settlement for these usually happens within two working days*[122] *A Futures trade is trade wherein the participants agree on a sale at a predetermined price with delivery happening in a specified time in the future*[123]. In a futures contract, counterparties agree to trade allowances/offsets at a certain price on a certain date in the future (the contract's expiration date). The price is locked in on the date at which the futures contract is traded, but the change in ownership of the actual allowance only occurs after the contract expiration date[124].	Xpansiv, Climate Impact X in Singapore, Carbon Trade Exchange in London and Sydney, and AirCarbon Exchange in Singapore.
19.	*Secondary Market Trading Infrastructure*: OTC Market	OTC or over the counter means a method of trading that does not involve an exchange. In over-the-counter markets, participants trade directly with each other[125]. OTC is more suitable for buyers with complex needs not covered by standardized additional attributes (e.g. specific project locations, methodology types, point of sale claims) or for players who do not have access to an exchange[126]. It includes trade outside of 'trading platforms', 'exchanges' etc.	Pachama[127].
20.	*Post trade Infrastructure:* Clearing House	Financial institution standing between two firms to facilitate the exchange of payments, securities or derivatives transactions; Its aim is to reduce the risk of one participant of a trade not honouring their settlement obligations[128]. Clearinghouses are needed to enable a futures market and provide counterparty default protection[129]. The clearing house, interposes itself between the counterparties to the contracts traded, becoming the buyer to every seller and the seller to every buyer. Thereby, the clearing house reduces the counterparty risk for trading participants on the markets, including financial and physical fulfilment (non-payment or non-delivery of emission credits in due time)[130].	ACX Clearing Corporation
21.	*Post trade Infrastructure*: Securities Settlement System	An entity that enables securities to be transferred and settled by book entry according to a set of predetermined multilateral rules. Such systems allow transfers of securities either free of payment or against payment[131]	

22.	*Post Trade Infrastructure*: Central Securities Depository (CSD)	An entity that provides securities accounts, central safekeeping services, and asset services, which may include the administration of corporate actions and redemptions, and plays an important role in helping to ensure the integrity of securities issues (that is, ensure that securities are not accidentally or fraudulently created or destroyed or their details changed).[132] CSDs can manage the counterparty risk involved in the transfer of ownership of financial assets risk by offering settlement services to ensure that the exchange of assets and cash happens simultaneously and efficiently (through a process known as delivery versus payment[133]	
23.	*Post trade Infrastructure: Payment System*	A set of instruments, procedures, and rules for the transfer of funds between or among participants; the system includes the participants and the entity operating the arrangement[134]	
24.	Trade repository (TR)	Centralized electronic record (database) of transaction data provided by an entity authorized by its regulators. [135] Centralisation and quality of the data that a TR maintains, can improve market transparency, and provision of this data to relevant authorities and the public in line with their respective information needs. Timely and reliable access to data stored in a TR has the potential to improve significantly the ability of relevant authorities and the public to identify and evaluate the potential risks posed to the broader financial system.[136] Taskforce on Scaling Voluntary carbon Markets, lists Word Bank, EDF, IETA, Ecosystem Marketplace as market and reference data providers.[137]	Word Bank, EDF, IETA, Ecosystem Marketplace[138]
25.	Settlement Bank	The entity that maintains accounts with the settlement agent in order to settle payment obligations arising from securities transfers, both on its own behalf and for other market participants[139]Either a central bank or a commercial bank can be used to effect funds settlements. A financial market infrastructure (FMI) typically maintains an account at one or more settlement banks in order to conduct funds settlements between or among its participants[140]	
26.	Standardised contract hosts	Hosting standard contract templates for over the counter (OTC) and exchanges[141].	International Swaps and Derivatives Association (ISDA), IETA, European Federation of Energy Traders (EFET)[142]
27.	Demand-side integrity standards	These entities define how carbon credits are recognized for corporate claims[143]	E.g., Science Based Targets Initiative (SBTi), International Organization for Standardization (ISO) and Voluntary Carbon Market Integrity Initiative (VCMII)[144]
28.	Supply-side integrity Standards	Independent governance body that sets standards and rules for better oversight of the supply of credits (eg ICVCM)[145]. Setting and complying to integrity standards for quality of credits. Companies/ buyers define criteria for carbon credit portfolio based on these guidance and standards. These entities evaluate certification standards (eg VERRA) [146].	ICVCM[147], CCQI, ICROA, TFCI [148], UNFCCC Article 6.4 Supervisory Body
29.	Carbon Credit Rating	The lack of a universally accepted and in-depth definition of carbon credit quality is a fundamental issue for the carbon market, as market actors increasingly treat carbon credits with caution.[149] Carbon credit rating agencies aim to address the lack of standardisation by distinguishing between robust carbon credits and those not delivering on their promises. The agencies claim to increase transparency, mitigate reputational risk and enable fair pricing. [150]	BeZero, Calyx, Renoster and Sylvera[151]
30.	Carbon Insurance	Carbon insurance companies offer insurance products carbon credit insurance to help de-risks carbon credits, protecting against loss of carbon credits due to risks such as natural catastrophes; fraud and negligence; insolvency and abandonment; political risks; and changing carbon standards.[152]	Oka, CFC, Howden, Swiss RE, Goodcarbon, Kita[153],[154]
31.	Disclosure Regulation	Regulation of public disclosures made on carbon credit usage. These define legal requirements for disclosures by buyers especially corporations[155].	ASA, CMA, European commission[156].

32.	Carbon accounting standard setters	Developing rules on how offsets enter corporate emissions accounting[157]	Greenhouse Gas Protocol, ISO, Partnership for Carbon Accounting Financials (PCAF), ISSB[158,159]
33.	Web3 Platform	Web3 is the idea of a new, decentralized internet built on blockchains, which are distributed ledgers controlled communally by participants.[160] Web3 platforms can facilitate the tracking and verification of carbon credits, helping to ensure integrity and accountability throughout the supply chain. These high-quality carbon credits and business cases can be monetized.[161]	
34.	Financial Regulators	Financial regulation concerns rule setting, that is, establishing the legal framework governing market entry and market activities in the financial sector. The main objectives of financial regulation are (1) to safeguard systemic stability, (2) to maintain the safety and soundness of financial institutions, (3) to protect consumers, and (4) to promote competition and efficiency. For example, in the context of carbon markets, financial regulators may issue guidance regarding the listing of Voluntary Carbon Credit Derivative Contracts[162], with the overarching objective of preventing potential systemic problems related to negative externalities, and correcting market imperfections and failures.[163]	CFTC[164], Financial Conduct Authority (FCA)[165]
35.	Market Regulators	These include financial jurisdictional regulators, in that they regulate and create standards for trading on carbon credit markets[166]. These enhance investor protection and promote investor confidence in the integrity of financial markets, by strengthening information exchange and cooperation in enforcement against misconduct, and in supervision of markets and market intermediaries.[167]	CFTC, IOSCO[168], ISDA
36.	Financial Accounting Standard Setters	Standardised guidance on financial reporting.	IFRS (parent co of ISSB), GAAP[169]
37.	UNFCCC	Some infrastructural requirements under Article 6 of the Paris Agreement, are also under the purview of the UNFCCC. These include an international registry, and Article 6 Database and a Centralized Accounting and Reporting Platform. • The text stipulates that the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat will implement a centralized accounting and reporting platform (CARP) to publish information submitted by the participating parties on cooperative approaches. This platform will include public information on internationally transferred mitigation outcomes (ITMOs), link to publicly available data submitted by participating parties on cooperative approaches, and provide annual reports to the CMA. • UNFCCC the secretariat will develop and maintain an international registry which participants can use in place of developing their own registry. Participants are not obligated to use the UNFCCC Registry or formally link their own registry to it. Under the same platform, the secretariat will also manage an Article 6 database to ensure transparency of cooperative approaches by the participating Parties.[170]	

38.	National Governments	In accordance with Article 6 requirements, countries should have access to a registry; for this they could choose to use the UNFCCC international registry platform, create their own national registry, or use the registry of an existing independent or international crediting program. The host country should report these arrangements to the UNFCCC. Host countries are also required to establish institutional arrangements and processes for authorizing mitigation outcomes for use as ITMOs. Under these processes, the host country would define which body or institution, official or position would have the final decision to authorize and transfer ITMOs. These arrangements must be reported to the UNFCCC.[171] Under Article 6.4, Parties are required to assign and Designated National Authority (DNA who will be responsible for Approval of activity by the host Party, Authorization of activity participants, and Authorization of A6.4ERs. [172] They may set their respective guidelines on procedures around issuance	

[1] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[2] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[3] Commodity Futures Trading Commission Guidance Regarding the Listing of Voluntary Carbon Credit Derivative Contracts, RIN 3038-AF40
[4] Gold Standard. (2024, July 3). *A practitioner's guide: Aligning the Voluntary Carbon Market with the Paris Agreement test*. Retrieved from Gold Standard: https://www.goldstandard.org/publications/a-practitioners-guide-aligning-the-voluntary-carbon
[5] Gold Standard. (2024, July 3). *A practitioner's guide: Aligning the Voluntary Carbon Market with the Paris Agreement test*. Retrieved from Gold Standard: https://www.goldstandard.org/publications/a-practitioners-guide-aligning-the-voluntary-carbon
[6] Gold Standard. (2024, July 3). *A practitioner's guide: Aligning the Voluntary Carbon Market with the Paris Agreement test*. Retrieved from Gold Standard: https://www.goldstandard.org/publications/a-practitioners-guide-aligning-the-voluntary-carbon
[7] Broekhoff, D., Gillenwater, M., Colbert-Sangree, T., and Cage, P. 2019. "Securing Climate Benefit: A Guide to Using Carbon Offsets." Stockholm Environment Institute & Greenhouse Gas Management Institute. Offsetguide.org/pdf-download/. Available at: https://offsetguide.org/understanding-carbon-offsets/carbon-offset-projects/offset-project-implementation/
[8] Broekhoff, D., Gillenwater, M., Colbert-Sangree, T., and Cage, P. 2019. "Securing Climate Benefit: A Guide to Using Carbon Offsets." Stockholm Environment Institute & Greenhouse Gas Management Institute. Offsetguide.org/pdf-download/. Available at: https://offsetguide.org/understanding-carbon-offsets/carbon-offset-projects/offset-project-implementation/
[9] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[10] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[11] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[12] International Carbon Registry, FAQs. Available at: https://www.carbonregistry.com/faq
[13] UNFCCC Article 6.4 validation and verification standard for projects (A6.4-SB08-A05). Accessible at: https://unfccc.int/sites/default/files/resource/a64-sb008-a05.pdf
[14] Moody's. (2021, December 15). *What's the difference between KYC and AML*. Retrieved from https://www.moodys.com/web/en/us/kyc/resources/insights/whats-difference-between-kyc-aml.html
[15] Swift. (n.d.). *The KYC process explained*. Retrieved from Swift: https://www.swift.com/your-needs/financial-crime-cyber-security/know-your-customer-kyc/kyc-process
[16] Moody's. (2021, December 15). *What's the difference between KYC and AML*. Retrieved from https://www.moodys.com/web/en/us/kyc/resources/insights/whats-difference-between-kyc-aml.html
[17] York, I., Kerschner, S., & Crowley, N. (2021). *Scaling Voluntary Carbon Markets: The Final Report.* White & Case LLP. Accessible at: https://www.whitecase.com/insight-alert/scaling-voluntary-carbon-markets-final-report
[18] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[19] IBM. (2024, July 26). *What is information security (InfoSec)?* Retrieved from IBM: https://www.ibm.com/topics/information-security
[20] IBM. (2024, July 26). *What is information security (InfoSec)?* Retrieved from IBM: https://www.ibm.com/topics/information-security
[21] Neumetric. (n.d.). *Glossary: Information Security, Data Privacy, Governance, Risk, Compliance, Vulnerability Assessment & Penetration Testing*. Retrieved from Neumetric: https://www.neumetric.com/glossary/
[22] Forest Trends' Ecosystem Marketplace. 2024. State of the Voluntary Carbon Market 2024. Washington DC: Forest Trends Association. Available at: https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202024/State_of_the_Voluntary_Carbon_Markets_20240529%201.pdf
[23] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[24]World Bank Group. (2022, July 27). What You Need to Know About the Measurement, Reporting, and Verification (MRV) of Carbon Credits. Retrieved from World Bank Group: https://www.worldbank.org/en/news/feature/2022/07/27/what-you-need-to-know-about-the-measurement-reporting-and-verification-mrv-of-carbon-credits#:%7E:text=MRV%20seeks%20to%20prove%20that,of%20CO2%20equivalent%20(tCO2eq)
[25] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[26] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[27] Principles for Best-Practice Digital Verification, SustainCERT, 2022'. Accessible at: https://www.sustain-cert.com/documents/principles-for-best-practice-digital-verification
[28] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf

[29] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[30] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[31] Principles for Best-Practice Digital Verification, SustainCERT, 2022'. Accessible at: https://www.sustain-cert.com/documents/principles-for-best-practice-digital-verification
[32] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[33] UNFCCC. (n.d.). *Glossary CDM Terms.* UNFCCC (CDM-EB07-A04-GLOS). Accessible at: https://cdm.unfccc.int/Reference/Guidclarif/glos_CDM.pdf
[34] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[35] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[36] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[37] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[38] Forest Trends' Ecosystem Marketplace. 2024. State of the Voluntary Carbon Market 2024. Washington DC: Forest Trends Association. Available at: https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202024/State_of_the_Voluntary_Carbon_Markets_20240529%201.pdf
[39] VirdiosAI. (N.D.). What is Carbon Credit Retirement? An Overview of the Carbon Credit Lifecycle. Retrieved from VirdiosAI: https://viridios.ai/insights/carbon-credit-retirement-lifecycle/
[40] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[41] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[42] For CCP-compliant credits and additional attributes such as specific project locations, methodology types, point of sale claims, eg Removals vs. reductions / avoidance credits and other attributes. Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets. Phase II Report. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Phase_2_Report.pdf
[43] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[44] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[45]Fattouh, B., & Maino, A. (2022). OIES Energy Insight: 114: Article 6 and Voluntary Carbon Markets. . Oxford Institute for Energy Studies (OIES). Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2022/05/Insight-114-Article-6-and-Voluntary-Carbon-Markets.pdf
[46] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[47] Ecosystem Marketplace. (2021). Commonly Used Definitions and Acronyms in the Voluntary Carbon Markets. Ecosystem Marketplace. Available at: https://www.ecosystemmarketplace.com/wp-content/uploads/2021/10/EM-Voluntary-Carbon-Market-Definitions-and-Acronyms.pdf
[48] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[49] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[50] Sipthorpe et al., 2022, One Earth 5, 779–791 July 15, 2022 ª 2022 The Authors. Published by Elsevier Inc. https://doi.org/10.1016/j.oneear.2022.06.004
[51] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[52] The Straits Times. (2022, November 04). *First major carbon credit auction by Singapore-based Climate Impact X oversubscribed*. Retrieved from The Straits Times: https://www.straitstimes.com/business/first-major-carbon-credit-auction-by-singapore-based-climate-impact-x-oversubscribed
[53] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[54] ISDA. (2021). *Role of Derivatives in Carbon Markets.* ISDA. Accessible at: https://www.isda.org/a/soigE/Role-of-Derivatives-in-Carbon-Markets.pdf
[55]European Commission, Directorate-General for Climate Action, Interplay between EU ETS registry and post trade infrastructure – Consolidated report, Publications Office, 2015, https://data.europa.eu/doi/10.2834/600139 . Also available at: https://climate.ec.europa.eu/document/download/ceed9d66-e1c7-4e68-bf00-8f71ca35b928_en?filename=interplay_report_en.pdf
[56] BIS (Bank of International Settlement) Glossary: https://www.bis.org/cpmi/publ/d00b.htm?=71&scope=CPMI&c=a&base=term&selection=80, 2016
[57]European Commission, Directorate-General for Climate Action, Interplay between EU ETS registry and post trade infrastructure – Consolidated report, Publications Office, 2015, https://data.europa.eu/doi/10.2834/600139 . Also available at: https://climate.ec.europa.eu/document/download/ceed9d66-e1c7-4e68-bf00-8f71ca35b928_en?filename=interplay_report_en.pdf
[58]European Commission, Directorate-General for Climate Action, Interplay between EU ETS registry and post trade infrastructure – Consolidated report, Publications Office, 2015, https://data.europa.eu/doi/10.2834/600139 . Also available at: https://climate.ec.europa.eu/document/download/ceed9d66-e1c7-4e68-bf00-8f71ca35b928_en?filename=interplay_report_en.pdf
[59] White House. (2024). Voluntary Carbon Markets Joint Policy Statement and Principles. White House. Accessible at: https://www.whitehouse.gov/wp-content/uploads/2024/05/VCM-Joint-Policy-Statement-and-Principles.pdf
[60] Intercontinental Exchange (ICE). (n.d.). FAQs - Carbon Markets & Indices. Retrieved from Intercontinental Exchange (ICE): https://www.ice.com/carbon-terminology-and-product-faq#:~:text=An%20ICE%20Certified%20Emission%20Reduction%20futures%20contract%20is%20a%20futures,overview%20from%20the%20European%20Commission
61 BIS (Bank of International Settlement) Glossary: https://www.bis.org/cpmi/glossary_030301.pdf, Also available at: CPMI-IOSCO: Principles for Financial Market Infrastructures: https://www.bis.org/cpmi/publ/d101a.pdf.
[62] CFC. (n.d.). *Carbon Insurance*. Retrieved from CFC: https://www.cfc.com/en-gb/products/class/carbon-insurance/
[63] Calyx Global. (2023, November 15). *What is a carbon credit rating and how does it mitigate risk?* Retrieved from Calyx Global: https://calyxglobal.com/blog-post?q=64

[64] MSCI. (n.d.). *MSCI Carbon Markets*. Retrieved from https://www.msci.com/our-solutions/climate-investing/carbon-markets

[65] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf

[66] International Carbon Registry, FAQs. Available at: https://www.carbonregistry.com/faq

[67] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf

[68] International Carbon Registry, FAQs. Available at: https://www.carbonregistry.com/faq

[69] Institute for Global Environmental Strategies (IGES). (2024, May). *Introduction of Article 6 Reporting.* Retrieved from Climate Transparency Platform: https://climate-transparency-platform.org/sites/default/files/2024-05/PPT_Reporting%20under%20Article%206%20and%20Linkage%20with%20ETF_A6IP.pdf

[70] European Commission, Directorate-General for Climate Action, Interplay between EU ETS registry and post trade infrastructure – Consolidated report, Publications Office, 2015, https://data.europa.eu/doi/10.2834/600139 . Also available at: https://climate.ec.europa.eu/document/download/ceed9d66-e1c7-4e68-bf00-8f71ca35b928_en?filename=interplay_report_en.pdf

[71] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf

[72] Verra, Frequently Asked Questions. Available at: https://verra.org/faq/

[73] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf

[74] Options Contract: the holder of an options contract has an option to either buy (a call option) or sell (a put option) allowances/offsets at the price agreed in the contract. The contract holder pays a premium for this right. The exchange may take place on the expiration date, but there is no obligation for it to happen. That's the main difference from a futures contract, which does require the exchange to happen on the expiration date. International Swaps and Derivatives Association (ISDA). (2021). Role of Derivatives in Carbon Markets. International Swaps and Derivatives Association (ISDA). Available at: https://www.isda.org/2021/09/30/role-of-derivatives-in-carbon-markets/ ; International Carbon Action Partnership (ICAP). (2013). Carbon Market Oversight Primer. International Carbon Action Partnership (ICAP). Available at: https://icapcarbonaction.com/en/publications/carbon-market-oversight-primer

[75] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf

[76] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf

[77] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf

[78] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf

[79] Informal note by the co-facilitators on SBSTA 58 agenda item 13 Guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3. Available at: https://unfccc.int/sites/default/files/resource/Art6.2_Informal_note_SBSTA58.i13.3.pdf

[80] Informal note by the co-facilitators on SBSTA 58 agenda item 13 Guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement and in decision 2/CMA.3. Available at: https://unfccc.int/sites/default/files/resource/Art6.2_Informal_note_SBSTA58.i13.3.pdf

[81] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf

[82] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf

[83] Deloitte Insights. (2023, September 22). *The world needs carbon markets. Here's how to make them work better.* Retrieved from Deloitte Insights: https://www2.deloitte.com/us/en/insights/industry/financial-services/future-of-carbon-market.html

[84] World Bank. (2023). *World Bank Engagement Roadmap for Carbon Markets.* Retrieved from World Bank: https://thedocs.worldbank.org/en/doc/12facd8b391a1eafa5dd53e7ddc5eeb5-0020012023/original/COP28-World-Bank-Engagement-Roadmap-for-Carbon-Markets.pdf

[85] The Integrity Council for the Voluntary Carbon Market. (2024). CORE CARBON PRINCIPLES, ASSESSMENT FRAMEWORK AND ASSESSMENT PROCEDURE Version 2. Available at: https://icvcm.org/wp-content/uploads/2024/02/CCP-Book-V2-FINAL-6Feb24-compressed.pdf ; https://icvcm.org/wp-content/uploads/2024/02/CCP-Section-5-V2-FINAL-6Feb24.pdf

[86] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf

[87] Verra, Frequently Asked Questions. Available at: https://verra.org/faq/

[88] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf

[89] The Integrity Council for the Voluntary Carbon Market. (2024). CORE CARBON PRINCIPLES, ASSESSMENT FRAMEWORK AND ASSESSMENT PROCEDURE Version 2. Available at: https://icvcm.org/wp-content/uploads/2024/02/CCP-Book-V2-FINAL-6Feb24-compressed.pdf ; https://icvcm.org/wp-content/uploads/2024/02/CCP-Section-5-V2-FINAL-6Feb24.pdf

[90] Verra, Frequently Asked Questions. Available at: https://verra.org/faq/

[91] Verra, Frequently Asked Questions. Available at: https://verra.org/faq/

[92] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets. Phase II Report. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Phase_2_Report.pdf

[93] The GS Mark, which stands for "Geprüfte Sicherheit" in German and means Safety Tested, is a licensed mark of the German government and may only be issued by an accredited product safety testing and certification agency. https://www.intertek.com/product-certification-marks/gs/#:~:text=The%20GS%20Mark%2C%20which%20stands,safety%20testing%20and%20certification%20agency.

[94] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf

[95] International Carbon Registry (ICR). (2022). ICR methodology requirements. Accessible at: https://2441265052-files.gitbook.io/~/files/v0/b/gitbook-x-prod.appspot.com/o/spaces%2FfIdoGcZZdvap67xjb5h1%2Fuploads%2FNbsLrKeCnBHzk9B49I9Q%2FICR%20Methodology%20Requirements%202.0.pdf?alt=media&token=954395fb-e409-4b8b-b273-ffb08c4098f8

[96] Institute for Agriculture and Trade Policy. (2012). Soil Carbon and the Offset Market: Practices, Players and Politics. Accessible at: https://www.files.ethz.ch/isn/156207/2012_09_14_SoilCarbonMarkets_DS.pdf

[97] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf

[98] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf

[99] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf

[100] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[101] UNFCCC. (n.d.). *Accreditation*. Retrieved from UNFCCC: https://unfccc.int/process-and-meetings/the-paris-agreement/paris-agreement-crediting-mechanism/accreditation
[102] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[103] Climate Data Steering Committee (CDSC). (2022). *RECOMMENDATIONS FOR THE DEVELOPMENT OF THE NET-ZERO DATA PUBLIC UTILITY.* Climate Data Steering Committee (CDSC). Accessible at: https://assets.bbhub.io/company/sites/71/2022/11/development-of-the-net-zero-data-public-utility-november-2022.pdf
[104] Climate Data Steering Committee (CDSC). (2022). *RECOMMENDATIONS FOR THE DEVELOPMENT OF THE NET-ZERO DATA PUBLIC UTILITY.* Climate Data Steering Committee (CDSC). Accessible at: https://assets.bbhub.io/company/sites/71/2022/11/development-of-the-net-zero-data-public-utility-november-2022.pdf
[105] Cardoso, A. (2019). *A road map for establishing information systems for climate action and support.* UNEP DTU. Accessible at: https://climateactiontransparency.org/wp-content/uploads/2021/12/ICAT-data-management-system-publication.pdf
[106] Climate Data Steering Committee (CDSC). (2022). *RECOMMENDATIONS FOR THE DEVELOPMENT OF THE NET-ZERO DATA PUBLIC UTILITY.* Climate Data Steering Committee (CDSC). Accessible at: https://assets.bbhub.io/company/sites/71/2022/11/development-of-the-net-zero-data-public-utility-november-2022.pdf
[107] Climate Data Steering Committee (CDSC). (2022). *RECOMMENDATIONS FOR THE DEVELOPMENT OF THE NET-ZERO DATA PUBLIC UTILITY.* Climate Data Steering Committee (CDSC). Accessible at: https://assets.bbhub.io/company/sites/71/2022/11/development-of-the-net-zero-data-public-utility-november-2022.pdf
[108] MSCI. (n.d.). *MSCI Carbon Markets*. Retrieved from https://www.msci.com/our-solutions/climate-investing/carbon-markets
[109] Forest Trends' Ecosystem Marketplace. 2024. State of the Voluntary Carbon Market 2024. Washington DC: Forest Trends Association. Available at: https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202024/State_of_the_Voluntary_Carbon_Markets_20240529%201.pdf
[110] Ecosystem Marketplace. (2021). Commonly Used Definitions and Acronyms in the Voluntary Carbon Markets. Ecosystem Marketplace. Available at: https://www.ecosystemmarketplace.com/wp-content/uploads/2021/10/EM-Voluntary-Carbon-Market-Definitions-and-Acronyms.pdf
[111] Ecosystem Marketplace. (2021). Commonly Used Definitions and Acronyms in the Voluntary Carbon Markets. Ecosystem Marketplace. Available at: https://www.ecosystemmarketplace.com/wp-content/uploads/2021/10/EM-Voluntary-Carbon-Market-Definitions-and-Acronyms.pdf
[112] Ecosystem Marketplace. (2021). Commonly Used Definitions and Acronyms in the Voluntary Carbon Markets. Ecosystem Marketplace. Available at: https://www.ecosystemmarketplace.com/wp-content/uploads/2021/10/EM-Voluntary-Carbon-Market-Definitions-and-Acronyms.pdf
[113] SP Global. (2021, July 10). *Voluntary carbon markets: how they work, how they're priced and who's involved*. Retrieved from https://www.spglobal.com/commodityinsights/en/market-insights/blogs/energy-transition/061021-voluntary-carbon-markets-pricing-participants-trading-corsia-credits
[114]Broekhoff, D., Gillenwater, M., Colbert-Sangree, T., and Cage, P. 2019. "Securing Climate Benefit: A Guide to Using Carbon Offsets." Stockholm Environment Institute & Greenhouse Gas Management Institute. Offsetguide.org/pdf-download/. Available at: https://offsetguide.org/understanding-carbon-offsets/carbon-offset-projects/offset-project-entities/
[115]Broekhoff, D., Gillenwater, M., Colbert-Sangree, T., and Cage, P. 2019. "Securing Climate Benefit: A Guide to Using Carbon Offsets." Stockholm Environment Institute & Greenhouse Gas Management Institute. Offsetguide.org/pdf-download/. Available at: https://offsetguide.org/understanding-carbon-offsets/carbon-offset-projects/offset-project-entities/
[116] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[117]S&P Global. (2021). *Voluntary carbon markets: how they work, how they're priced and who's involved.* SP Global. Available at: https://www.spglobal.com/commodityinsights/en/market-insights/blogs/energy-transition/061021-voluntary-carbon-markets-pricing-participants-trading-corsia-credits
[118] The World Bank. "Carbon Asset Development Process," World Bank Working Paper, Washington, DC. Available at: https://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/2023-10/Carbon%20Asset%20Development%20Process.pdf
[119]International Swaps and Derivatives Association (ISDA). (2021). Role of Derivatives in Carbon Markets. International Swaps and Derivatives Association (ISDA). Available at: https://www.isda.org/2021/09/30/role-of-derivatives-in-carbon-markets/ ; International Carbon Action Partnership (ICAP). (2013). Carbon Market Oversight Primer. International Carbon Action Partnership (ICAP). Available at: https://icapcarbonaction.com/en/publications/carbon-market-oversight-primer
[120]International Carbon Action Partnership (ICAP). (2013). Carbon Market Oversight Primer. International Carbon Action Partnership (ICAP). Available at: https://icapcarbonaction.com/en/publications/carbon-market-oversight-primer
[121] Bose, A.; Cohen, Jeff; Fattouh, Bassam; Johnson, O.; Spilker, G. (2021) : Voluntary markets for carbon offsets: Evolution and lessons for the LNG market, OIES Paper: ET, No. 03, ISBN 978-1-78467-184-6, The Oxford Institute for Energy Studies, Oxford. Available at: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2021/10/Voluntary-markets-for-carbon-offsets-Evolution-features-and-lessons-for-the-LNG-market-ET03.pdf
[122] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[123] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[124]International Swaps and Derivatives Association (ISDA). (2021). Role of Derivatives in Carbon Markets. International Swaps and Derivatives Association (ISDA). Available at: https://www.isda.org/2021/09/30/role-of-derivatives-in-carbon-markets/ ; International Carbon Action Partnership (ICAP). (2013). Carbon Market Oversight Primer. International Carbon Action Partnership (ICAP). Available at: https://icapcarbonaction.com/en/publications/carbon-market-oversight-primer
[125]European Commission, Directorate-General for Climate Action, Interplay between EU ETS registry and post trade infrastructure – Consolidated report, Publications Office, 2015, https://data.europa.eu/doi/10.2834/600139 . Also available at: https://climate.ec.europa.eu/document/download/ceed9d66-e1c7-4e68-bf00-8f71ca35b928_en?filename=interplay_report_en.pdf
[126] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets. Phase II Report. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Phase_2_Report.pdf
[127] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[128] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[129] Institute Of International Finance. (2021). Taskforce On Scaling Voluntary Carbon Markets. Institute Of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
[130]Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets: Technical Appendix for public consultation. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_Technical_Appendix.pdf
[131] CPMI-IOSCO Principles for Financial Market Infrastructures. Glossary: https://www.bis.org/cpmi/publ/d101a.pdf.
[132] CPMI-IOSCO Principles for Financial Market Infrastructures. Glossary: https://www.bis.org/cpmi/publ/d101a.pdf. also available at: European Commission, Directorate-General for Climate Action, Interplay between EU ETS registry and post trade infrastructure – Consolidated report, Publications Office, 2015, https://data.europa.eu/doi/10.2834/600139 .
[133] Directorate-General for Climate Action, Interplay between EU ETS registry and post trade infrastructure – Consolidated report, Publications Office, 2015, https://data.europa.eu/doi/10.2834/600139
[134] CPMI-IOSCO Principles for Financial Market Infrastructures. Glossary: https://www.bis.org/cpmi/publ/d101a.pdf.
[135] BIS (Bank of International Settlement) Glossary: https://www.bis.org/cpmi/publ/d00b.htm?=71&scope=CPMI&c=a&base=term&selection=80, 2016

[136] CPSS-IOSCO – Principles for financial market infrastructures – April 2012, BIS (Bureau of international Standards): https://www.bis.org/cpmi/publ/d101a.pdf
[137] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets: Approach to scaling a high-integrity carbon market. Available at: https://www.canr.msu.edu/fccp/Engagement-ORL/FCWG-Learning-Exchange-Series-Files/2020-21-FCWG-Files/211103%20FCGW%20panel.pdf
[138] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets: Approach to scaling a high-integrity carbon market. Available at: https://www.canr.msu.edu/fccp/Engagement-ORL/FCWG-Learning-Exchange-Series-Files/2020-21-FCWG-Files/211103%20FCGW%20panel.pdf
[139] BIS Glossary: https://www.bis.org/cpmi/publ/d00b.htm?selection=152
[140] BIS Glossary: https://www.bis.org/cpmi/publ/d00b.htm?selection=152
[141] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[142] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[143] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[144] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[145] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[146] World Economic Forum; Bain and Company. (2023). Scaling Voluntary Carbon Markets: A Playbook for Corporate Action. World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_Scaling_Voluntary_Carbon_Markets_2023.pdf
[147]Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[148] World Economic Forum; Bain and Company. (2023). Scaling Voluntary Carbon Markets: A Playbook for Corporate Action. World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_Scaling_Voluntary_Carbon_Markets_2023.pdf
[149] Perspectives Climate Group. (2023, September). *Assessing and comparing carbon credit rating agencies*. Retrieved from Perspectives Climate Group: https://perspectives.cc/publication/assessing-and-comparing-carbon-credit-rating-agencies/
[150] Perpectives Climate Group. (2023). *Assessment and comparison of carbon credit rating agencies*. Retrieved from Perpectives Climate Group: https://perspectives.cc/project/assessment-and-comparison-of-carbon-credit-rating-agencies/
[151] Perpectives Climate Group. (2023). *Assessment and comparison of carbon credit rating agencies*. Retrieved from Perpectives Climate Group: https://perspectives.cc/project/assessment-and-comparison-of-carbon-credit-rating-agencies/
[152] Kita Eartth. Accessible at: https://www.kita.earth/
[153] goodcarbon. (2024, July 17). *goodcarbon and Swiss Re Corporate Solutions launch first-of-its-kind insurance for carbon credit forwards*. Retrieved from goodcarbon: https://knowledge.goodcarbon.earth/launch-insured-forward-credits/
[154] Oka The Carbon Insurance Company. (n.d.). *Global Carbon Markets, Insured*. Retrieved from Oka The Carbon Insurance Company: https://carboninsurance.co/
[155] World Economic Forum; Bain and Company. (2023). Scaling Voluntary Carbon Markets: A Playbook for Corporate Action. World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_Scaling_Voluntary_Carbon_Markets_2023.pdf
[156] World Economic Forum; Bain and Company. (2023). Scaling Voluntary Carbon Markets: A Playbook for Corporate Action. World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_Scaling_Voluntary_Carbon_Markets_2023.pdf
[157] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[158] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[159] World Economic Forum; Bain and Company. (2023). Scaling Voluntary Carbon Markets: A Playbook for Corporate Action. World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_Scaling_Voluntary_Carbon_Markets_2023.pdf
[160] McKinsey & Company. (2023, October 10). *What is Web3?* Retrieved from McKinsey & Company: https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-web3
[161] Forbes. (2024, May 8). *The Climate Imperative: Embracing Carbon Credits And Web3 Technologies*. Retrieved from Forbes: https://www.forbes.com/councils/forbesbusinesscouncil/2024/05/08/the-climate-imperative-embracing-carbon-credits-and-web3-technologies/#:~:text=Web3%20platforms%20can%20facilitate%20the,business%20cases%20can%20be%20monetized
[162] COMMODITY FUTURES TRADING COMMISSION (CFTC). (2023, December 27). *Commission Guidance Regarding the Listing of Voluntary Carbon Credit Derivative Contracts; Request for Comment.* Retrieved from COMMODITY FUTURES TRADING COMMISSION (CFTC): https://www.cftc.gov/sites/default/files/2023/12/2023-28532a.pdf
[163] Quaglia, L. (2015). Financial regulation. In J. D. Wright (Ed.), *International encyclopedia of the social & behavioral sciences* (pp. 191–196). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.75016-1 ; https://www.sciencedirect.com/topics/social-sciences/financial-regulation
[164] COMMODITY FUTURES TRADING COMMISSION (CFTC). (2023, December 27). *Commission Guidance Regarding the Listing of Voluntary Carbon Credit Derivative Contracts; Request for Comment.* Retrieved from COMMODITY FUTURES TRADING COMMISSION (CFTC): https://www.cftc.gov/sites/default/files/2023/12/2023-28532a.pdf
[165] IOSCO Voluntary Carbon Markets Consultation Report, December 2023, available at https://www.iosco.org/library/pubdocs/pdf/IOSCOPD749.pdf
[166] World Economic Forum; Bain and Company. (2023). Scaling Voluntary Carbon Markets: A Playbook for Corporate Action. World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_Scaling_Voluntary_Carbon_Markets_2023.pdf
[167] IOSCO. https://www.iosco.org/v2/about/?subsection=about_iosco
[168] World Economic Forum; Bain and Company. (2023). Scaling Voluntary Carbon Markets: A Playbook for Corporate Action. World Economic Forum. Available at: https://www3.weforum.org/docs/WEF_Scaling_Voluntary_Carbon_Markets_2023.pdf
[169] Institute of International Finance. (2021). Taskforce on Scaling Voluntary Carbon Markets (TSVCM): Terms of Reference (ToR) for the new governance body. Institute of International Finance. Available at: https://www.iif.com/Portals/1/Files/TSVCM_TOR.pdf
[170] The World Bank. "Infrastructure to Meet Reporting Requirements under Article 6" World Bank Working Paper, Washington, DC. Accessible at: https://documents1.worldbank.org/curated/en/099643411182232431/pdf/IDU0555dba9c08d7f041740aeed006576c08d383.pdf
[171] UNFCCC. (2023). Regional Climate Week: Latin America and the Caribbean. Accessible at: https://unfccc.int/sites/default/files/resource/eng_Day04_Session%203_DNAs%20under%20the%20CDM%20and%20the%20Article%206.4%20mechanism.pdf
[172] UNFCCC. (2023). Regional Climate Week: Latin America and the Caribbean. Accessible at: https://unfccc.int/sites/default/files/resource/eng_Day04_Session%203_DNAs%20under%20the%20CDM%20and%20the%20Article%206.4%20mechanism.pdf