Climate Solutions

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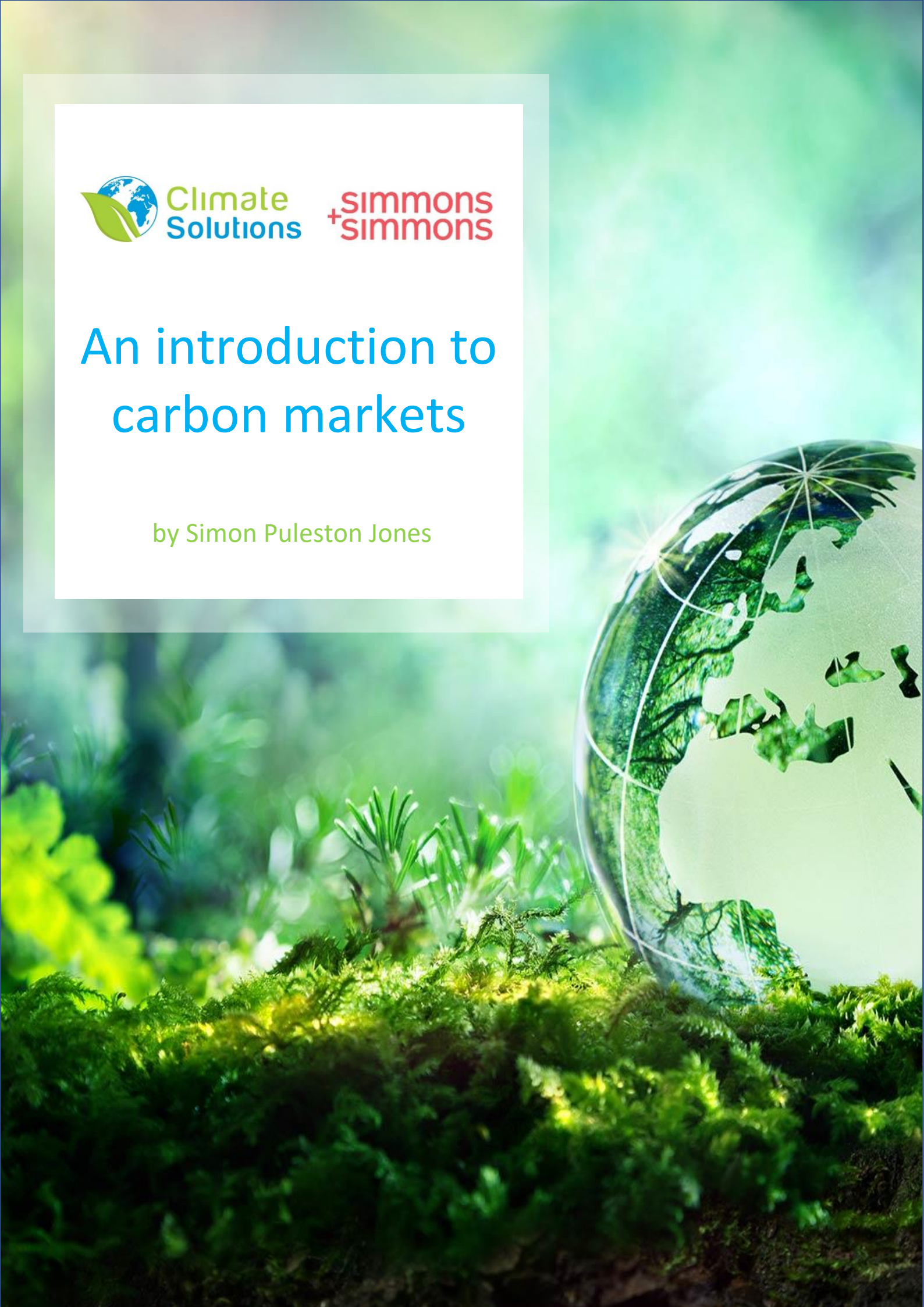
An introduction to carbon markets

by Simon Puleston Jones



About Climate Solutions

Climate Solutions is a climate-focused capital raising, advisory and carbon business, established in the United Kingdom. Operating globally, we are the only business in the world of our type that bridges financial markets, industry, carbon markets, professional services *and* Web 3.0 to empower you to:

- raise equity, debt and/or project finance from institutional investors in private markets, within our five climate-focused investment themes of energy transition, sustainable agriculture, net zero real estate, water solutions and the circular economy;
- source feedstock providers, offtakers, customers, technology and equipment, EPC and O&M contractors, talent and more for your business or project;
- source project developers, financiers, buyers and sellers of carbon offsets in voluntary carbon markets and sovereign carbon markets;
- solve your decarbonisation challenges through our cross-sector advisory services;
- discover ClimateTech and Web 3.0 companies that can support the more efficient execution of your business objectives; and
- benefit from our warm introductions to our global network of relationships across financial markets, climate-focused industry, tech, carbon markets and professional services.

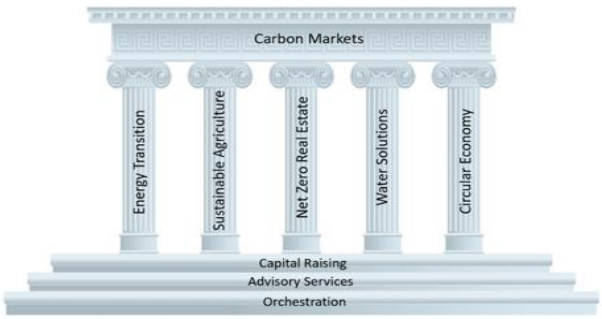
Our clients are located in the United Kingdom, European Union and United States of America. On the capital-raising side, they are typically raising from US$50m to over US$1bn.

We are the structuring advisor and bookrunner for hundreds of millions of tonnes of sovereign carbon offsets (including internationally transferred mitigation outcomes ('**ITMOs**')) offered by five countries that are a party to the Paris Agreement. We are also currently offering tens of millions of tonnes of carbon offsets for sale in the voluntary carbon market on behalf of various clients, some of which offsets are available for financing via pre-payment in return for a reduced price per tonne.

The leadership team of Climate Solutions comprises:

- Simon Puleston Jones (CEO), previously CEO of one of Europe's leading financial services trade associations, FIA Europe, and a structured finance and derivatives lawyer;
- Bob MacDonald (COO), previously CEO of FTSE-listed Wood's Specialist Technical Solutions businesses, with three decades of engineering and industrial experience; and
- Will Howard Davies (CIO), previously head of green finance for the UK government, a portfolio manager at PIMCO and a Deutsche Bank, Merrill Lynch and EY alumnus.

Our global institutional investor network comprises family offices, venture capital firms, private equity firms, asset/fund/investment managers, wealth managers, investment banks, pension funds, sovereign wealth funds and governmental agencies.



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About Simmons & Simmons

Simmons & Simmons is a leading international law firm, offering access to more than 1,000 legal staff in key business and financial centres across Europe, the Middle East, and Asia.

We believe that the smartest business solutions come when we work together – internationally, but operating as one integrated team. We're collaborative, agile and partner-led. A law firm that challenges, creates new possibilities and offers opinion not just option. A law firm that acts as a business partner and works with our clients, not for them.

We have a growing renewables and carbon practice, driven by specialist energy lawyers and fuelled by the sustainability concerns of clients in all of our sectors, including asset management and investment funds, financial institutions, healthcare and life sciences and technology, media and telecommunications.

As the first international law firm to become Carbon Neutral in 2006, we are also committed to our own environmental sustainability, and proactively identify opportunities for controlling and reducing our carbon footprint. We are working with environmental consultants to develop a new set of ambitious GHG emissions reduction targets and recently submitted a letter to the Science Based Targets initiative (SBTi) committing the firm to setting science based targets to reduce emissions in line with the Paris Agreement goals.

We have an internal environment network called "The green room", which explores environmental initiatives and collaboration with clients to achieve greater impact.

We hold the ISO 14001:2015 certification and are founding signatories of the Greener Litigation Pledge and an Executive Firm Member of the Legal Sustainability Alliance.

We use technology to assist our clients to develop and finance renewables, work towards 'net zero' targets, and meet Environmental, Social and Governance ('**ESG**') requirements, including through online products such as our Clean Energy Tool, Trading Venue Reviewer and new Carbon Reviewer.

About this guide

This guide was created by Climate Solutions out of sheer frustration – in seeking to get up the curve on carbon markets and their regulation, it rapidly became apparent that too often, the answer to each question relating to the carbon markets is found across numerous disparate locations on the internet and that in many cases commentators cannot agree the answers to seemingly simple questions such as "*What is a carbon credit and how does it differ from a carbon offset*?"

Despite the helpful work of sites such as carbonmarkets.com and the exemplary work of The International Swaps and Derivatives Association (ISDA) in analysing applicable law and regulation, no one has *brought together and summarised* the current market evolution, legal analysis and regulatory analysis in a format that could take you from zero knowledge of carbon markets to a solid working knowledge in an afternoon…until now.

This guide has been prepared to assist interested stakeholders in rapidly gaining a decent working understanding of carbon products, carbon markets and their regulation.

It references numerous publicly available sources, which are cited in the endnotes at the back of this guide in case you wish to explore further.

There is no "Who's Who" of carbon markets…for that reason, **we have set out a directory of leading participants in the voluntary carbon markets at the back of this guide**. If you're active in the market and would like to be considered for inclusion in the directory, please contact the Climate Solutions team at info@climatesolutions.global.

We intend for this guide to be a living document that is regularly updated and available through Climate Solutions' web site at https://climatesolutions.global/

Please contact Climate Solutions via info@climatesolutions.global if you:

- would like to help us correct material errors and omissions in this guide;
- are launching a new product, standard, exchange or other business focused on carbon markets;
- are publishing a new paper relating to carbon markets;
- are a project developer of projects that enable the creation of high-quality verified carbon offsets and would like to be added to our confidential register of projects developers;
- are a buyer of quality carbon credits and would like to be added to our confidential register of buyers; or
- wish to request inclusion in our public directory of leading participants in the voluntary carbon markets (see Appendix 1).

You can also contact Simmons & Simmons via alex.blomfield@simmons-simmons.com or learn more about the firm at www.simmons-simmons.com

Attribution and acknowledgements

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What we mean by 'carbon credits'

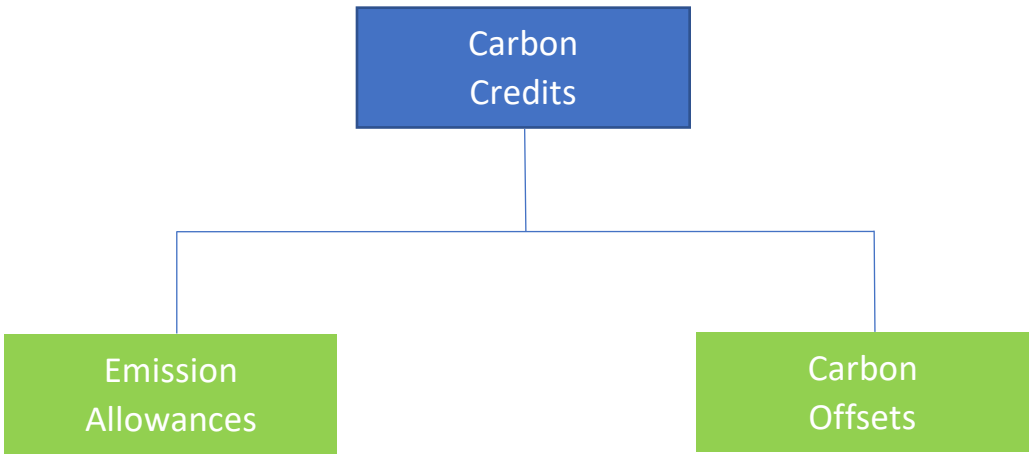
As detailed further in Part I, there are no industry standard definitions of 'carbon credits', 'carbon offsets', 'emission allowances' or numerous other terms used in the context of carbon markets. Many such terms are often used interchangeably, which can make it difficult for new participants to navigate the markets.

Publications such as the 2022 ISDA Verified Carbon Credit Transaction Definitions[1] will help develop an industry-wide standardised taxonomy.

We have suggested some fuller definitions below. Typically, in this document when we refer to:

- **carbon offsets**, we are referring to instruments that are traded in the voluntary and/or sovereign carbon markets, which represent the avoidance, reduction or removal of carbon emissions;
- **emission allowances**, we are referring to instruments that are traded in a mandatory compliance market, which represent the right to emit carbon; and
- **carbon credits**, we are referring to carbon offsets and/or emission allowances, as the context requires.

This distinction between carbon offsets, emission allowances and carbon credits is neither right nor wrong...it's just how we have chosen to differentiate between the different instruments in this guide, for the sake of clarity.



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Part I – glossary

A note on use of carbon market terminology:

No nationally or internationally agreed definition of 'carbon credit' or 'carbon offset' exists, nor are such terms currently defined in regulation. In market parlance, the term 'carbon credit' sometimes refers to what others would call a 'carbon offset' and/or an emission allowance, and *vice versa*.

Other key definitions such as 'avoidance', 'reduction' and 'removal' are expected to be agreed in the future by the Supervisory Board, pursuant to Article 6.4 of the Paris Agreement.

To promote standardisation, deepen liquidity, strengthen investor confidence, improve legal certainty and accelerate positive climate action, Climate Solutions and Simmons & Simmons each encourages policymakers to agree on a definition for each such term and to evolve a taxonomy for carbon markets over time.

As used in this guide:

'**abate**', in relation to greenhouse gas emissions, means to avoid emitting such gases in the first place and/or to reduce the amount of such emissions that cannot be so avoided (and '**abated**', '**abatable**', '**unabated**' and '**unabatable**' are construed accordingly);

'**additional**', in relation to a project or an activity being carried out in the context of the carbon markets, means that the avoidance/reduction/removal of greenhouse gas emissions achieved by the project to which such credit or offset relates is 'additional' to what would have happened if the project or activity had not been carried out and such project or activity would not have occurred in the absence of the incentives from the market mechanism (and '**additionality**' is construed accordingly);

'**Africa Carbon Market Initiative**' or '**ACMI**' refers to the voluntary carbon market launched by Kenya, Malawi, Nigeria and others in November 2022;

'**Article 6.2 Rulebook**' means decision 2/CMA3 (Guidance on cooperative approaches referred to in Article 6, paragraph 2, of the Paris Agreement);

'**Article 6.4 Rulebook**' means decision 3/CMA3 (Rules, modalities and procedures for the mechanism established by Article 6, paragraph 4, of the Paris Agreement);

'**biochar**' refers to a type of black carbon that can be produced from sequestered carbon dioxide emissions - it is typically produced and stored in the shape of bricks;

'**burn**' means the process of destroying a tokenised carbon offset by sending it to a "burn address" from where the token cannot be removed, whether for the purpose of de-tokenising the offset, retiring a tokenised carbon offset or otherwise;

'**carbon credit**', when such term is used in this guide, refers to a carbon offset and/or emission allowance, as the context requires;

'**carbon leakage**' occurs when:

- there is an increase in greenhouse gas emissions in one country (that typically does not have a carbon price) as a result of an emissions reduction by a second country that has a strict climate policy; and/or

- when the gross carbon savings resulting from a project are counter-balanced by carbon emissions elsewhere, e.g. a reforestation project located next to a coal-fired power station would result in leakage;

'**carbon offset**' means an instrument representing the avoidance, reduction or removal of one tonne of carbon dioxide or other greenhouse gas equivalent that:

- represents the avoidance of greenhouse gases being emitted into the atmosphere, the reduction of greenhouse gases being emitted into the atmosphere or a removal of greenhouse gasses from the atmosphere;
- is capable of being traded on a voluntary carbon market or sovereign carbon market; and
- is not subject to regulation requiring such instrument to be traded on a compliance carbon market.

'**CarbonTech**' means technology companies whose technology is deployed in relation to carbon markets, including Internet of Things technology, tokenisation companies and satellite verification companies;

'**carbon sequestration**' refers to a process that results in greenhouse gas emissions being extracted from the atmosphere and stored in a permanent medium;

'**cash-settled**' means, in relation to transaction relating to a carbon offset, that no carbon offset is required to be physically delivered in order to settle a party's obligations: settlement results from a cash payment by one party to the other;

'**carbon dioxide equivalent**' or '**CO_2e**', as officially defined by Eurostat, is a metric measure that is used to compare emissions from various greenhouse gases on the basis of their global warming potential by converting amounts of other gases to the equivalent amount of CO_2;

'**clean development mechanism**' or '**CDM**' refers to the clean development mechanism under Article 12 of the Kyoto Protocol;

'**CMA**' refers to the Conference of the Parties serving as a meeting of the Parties to the Paris Agreement – it is the abbreviation used to describe the 194 countries that have signed and ratified the Paris Agreement.

'**co-benefits**' refers to the benefits of a given project beyond its mere carbon savings, e.g. improved biodiversity, employment opportunities for the local communities in which the project is based, etc.;

'**compliance carbon market**' refers to a market for emission allowances that exists to enable participants in that market to comply with their regulatory obligations in relation to such emission allowances;

'**CO_2**' means carbon dioxide;

'**Conference of the Parties**' or '**COP**' refers to the annual global climate summit convened by the United Nations, in furtherance of the 1992 United Nations Framework Convention on Climate Change;

'**Cross Border Adjustment Mechanism**' or '**CBAM**' is an import levy, first introduced by the European Commission on imports of electricity, cement, aluminium, fertilizer, iron and steel products, depending on emission content of production and the difference between the EU Emissions Trading System ('**EU ETS**') price and any carbon price paid in the production country. The purpose is to create a level playing field for EU producers (other countries are considering equivalent mechanisms);[2]

'**double counting**' means the intended or unintended counting of the same physical carbon emission avoidance, reduction or removal by two or more different entities and/or countries and/or sub-national government bodies;

'**emission allowance**' or '**EA**' means a certificate issued by a government or regulatory authority that:

- is a permit that allows the registered holder thereof to emit one tonne of carbon dioxide or other greenhouse gas equivalent (tCO_2e); and
- is capable of being traded on a compliance carbon market;

'**Emissions Trading System**' or '**ETS**' means market-based instruments that incentivise the reduction of emissions as further detailed in Part III;

'**exchange**' refers to a regulated multilateral trading venue that hosts a compliance carbon market and/or voluntary carbon market on which carbon credits are permitted to be traded;

'**Forest Reference Emission Level**' or '**FREL**' refers to forest reference emission levels referenced in the Warsaw Framework for REDD-plus;

'**Forest Reference Level**' or '**FRL**' refers to forest reference levels referenced in the Warsaw Framework for REDD-plus;[3]

'**futures contract**' means a standardised legal contract to buy or sell a carbon credit at a predetermined price for delivery at a specified time in the future, which is traded on an exchange;

'**greenhouse effect**' means the trapping of the sun's warmth in Earth's lower atmosphere;

'**Greenhouse gas**' or '**GHG**' means any of the following six gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_20), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6);

'**greenwashing**' refers to actions, inactions and/or the dissemination of information that present an organisation or project as being more environmentally sustainable than is actually verified as being the case;

'**Internal Rate of Return**' or '**IRR**' refers to the method used to estimate the profitability of potential investments, by applying a discount rate that makes the net present value of all cash flows equal to zero in a discounted cash flow analysis;

'**internationally transferred mitigation outcomes**' or '**ITMO**' refers to an internationally transferred mitigation outcome having some or all of the features set out in paragraph 1 of Ch. 1 (Internationally transferred mitigation outcomes) of the Article 6.2 Rulebook pursuant to the Paris Agreement;

'**IOSCO**' means the International Organization of Securities Commissions, the international body that brings together the world's securities regulators and is recognised as the global standard setter for the securities sector;

'**Kyoto Protocol**' means the international protocol on climate change adopted on 11 December 1997;

'**mandatory carbon market**' is another term for a compliance carbon market;

'**marketplace**' refers to a multi-lateral trading venue on which carbon offsets may be traded through that marketplace's voluntary carbon market, in circumstances where the operator of that marketplace is not required to obtain regulatory approval to perform its functions relating to that marketplace;

'**Measurement, Reporting and third-party Verification**' or '**MRV**' refers to the multi-step process:

- to *measure* the amount of greenhouse gas emissions avoided, reduced or removed by the project;
- *report* these findings to an accredited third party;
- who then *verifies* the report so that the results can be certified and thereby enables the carbon offsets to be issued;

'**methodology**' is a framework document and criteria, published by a standard, which defines the quantification and parameters against which a project is verified by such standard, as a condition precent to the issuance of carbon offsets by such standard pursuant to such methodology;

'**Nationally Determined Contribution**' or '**NDC**' is a concept contained in the Paris Agreement that, in relation to a country that is a signatory to the Paris Agreement, represents that country's plans to reduce emissions and adapt to climate impacts. NDCs are submitted by such countries to the UNFCCC every five years;

'**Net Zero**' refers to a state in which the total tCO_2e of greenhouse gases emitted into the atmosphere at a given time is less than or equal to the total tCO_2e of greenhouse gases removed from the atmosphere at such time (it being noted that various "Net Zero" standards exist that require that state to be reached in a certain way, e.g. that emissions reductions are achieved prior to the purchase of carbon offsets);

'**Nonfungible Token**' or '**NFT**' are a type of unique cryptographic token that exists on a blockchain and cannot be replicated;

'**over the counter**' or '**OTC**' refers a transaction between a buyer and a seller that does not take place on an exchange or marketplace;

'**OTC derivative**' refers to swaps, options, OTC forwards, repurchase agreements and other derivative contracts that are traded over the counter;

'**OTC forward**' refers to a non-standardised contract to buy or sell a carbon credit at a predetermined price for delivery at a specified date in the future, which is traded over the counter;

'**Paris Agreement**' or '**The Paris Accords**' is an international treaty on climate change, adopted in 2015;

'**Paris Rulebooks**' means, together, the Article 6.2 Rulebook and the Article 6.4 Rulebook and '**Paris Rulebook**' means any one of them, as the context requires;

'**physically-settled**', in relation to a carbon credit, refers to the process of delivering or transferring such credit to a counterparty in return for a specified payment;

'**primary markets**' involve the distribution of carbon credits to:

- parties in compliance carbon schemes that must comply with an ETS;
- entities in compliance carbon markets and voluntary carbon markets that purchase carbon offsets generated by emissions avoidance, reduction and/or removal projects; and/or
- other governments and entities in sovereign carbon markets by the sovereign issuer of sovereign carbon offsets – primary markets comprise any and all markets on which the trading of carbon credits first occur;

'**project**' refers to a project that is executed by a country or a company with the intention of avoiding, reducing or removing a significant amount of greenhouse gas emissions, which thereby permits the developer of such project to create carbon offsets;

'**project proponent**', in relation to a project, is the person that is responsible for carrying out such project and has the legal right to do so;[4]

'**REDD**' refers to reducing emissions from deforestation and forest degradation;[5]

'**REDD+'** refers to a framework adopted at COP19 in Warsaw, and recognised in Article 5.2 of the Paris Agreement, for REDD that result from activities supporting the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries; and alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, while reaffirming the importance of incentivising, as appropriate, non-carbon benefits associated with such approaches;

'**register**' refers to the register of projects, emission allowances and/or carbon offsets that enables the registrar to track which entity holds how may credits or offsets in relation to which projects;

'**registrar**' refers to the company responsible for maintaining the register relating to a compliance carbon market, voluntary carbon market or sovereign carbon market;

'**regulated carbon market**' means a compliance carbon market;

'**retire**' and '**retirement**' refers to the removal of an emission allowance or carbon offset from a register, with the result that such emission allowance or offset is permanently taken out of circulation and can no longer be held, traded or retired by anyone else;

'**secondary markets**' comprise any and all markets on which the trading of carbon credits occur, subsequent to the trading thereof on a primary market;

'**sequestration**' refers to carbon sequestration, i.e. its removal from the atmosphere and its permanent storage;

'**sovereign**' refers to a country or its government;

'**sovereign carbon offsets**' refers to carbon offsets issued by, on behalf of or in relation to a sovereign, pursuant to the Paris Agreement;

'**standard**', in relation to carbon credit, refers to the entity that sets and operates the methodology applicable to such carbon credit;

'**standards**' has the same meaning as '**methodology**' (see above);

'**Supervisory Body**' refers to the Supervisory Body established pursuant to Article 6.4 of the Paris Agreement;

'**tCO_2e**' means tonnes of carbon dioxide equivalent;

'**token**' means a digital representation of value or rights;

'**tokenised**', in relation to a carbon credit, refers to a carbon credit that has been exchanged, converted or otherwise transformed into a token and '**tokenisation**' refers to the process of exchanging, converting or otherwise transforming a carbon credit into a token (and '**detokenisation**' refers to the reverse of the tokenisation process);

'**tokenised carbon credit**' refers to a carbon credit that has been tokenised;

'**Verified Carbon Unit**' or '**VCU**' refers to a carbon offset issued by Verra in relation to a project – each VCU represents a reduction or removal of one tCO_2e achieved by a project;

'**Verifier**' refers to the third-party auditor that verifies the amount of greenhouse gases avoided, reduced or removed by a project, in accordance with the applicable standard, and otherwise checks that a project is performing as anticipated;

'**vintage**', in relation to a carbon credit, typically refers to the calendar year in which greenhouse gas emissions relating to such credit were avoided, reduced or removed;

'**voluntary carbon market**' or '**VCM**' refers to a market (other than a mandatory compliance market or sovereign carbon market) on which carbon offsets can be traded, whether on an OTC basis, on an exchange or on a marketplace; and

'**Web 3**' or '**Web 3.0**' refers to an idea for a new iteration of the world wide web that incorporates concepts such as decentralisation, decentralised finance ('**DeFi**'), distributed ledger technology and tokenisation.

Part II - emission allowances and carbon offsets

The transition to a low carbon economy will require significant long-term funding, estimated at US$110 trillion by 2050.[6] Effective and liquid carbon markets can help provide the investment required, by channelling financing into projects that aim to avoid or reduce carbon emissions or that remove and sequester carbon dioxide from the atmosphere.[7]

Emission allowances versus carbon offsets

As used in this guide, we differentiate between emission allowances and carbon offsets as follows:

Emission allowances	Carbon offsets
A **permit** that allows the registered holder to emit one tonne of carbon dioxide or other greenhouse gas equivalent	An **instrument** representing the avoidance, reduction or removal of one tonne of carbon dioxide or other greenhouse gas equivalent
Issued by **governmental** or **regulatory organisations**	Typically issued by a **standard** in the voluntary carbon market or a **government** in the sovereign carbon market
Buyers and sellers typically have a **legal obligation** to buy or sell emission allowances	Buyers and sellers typically trade carbon offsets on an entirely **voluntary** basis
Sold on **compliance carbon markets** – these types of markets are typically established on regulated exchanges	Can be sold on certain compliance carbon markets, but mostly sold on **voluntary carbon markets** or **sovereign carbon markets** – such voluntary carbon markets and sovereign carbon markets can operate bilaterally in OTC markets, on regulated exchanges and/or unregulated marketplaces
Trades are typically **reported publicly** to/by the exchange on which the sale happens, enabling a transparent current price for such emission allowances	Generated by either avoidance/reduction projects or via removal/sequestration projects (in the case of sovereign carbon offsets, only reductions and removals are currently permitted). Trades may be **reported publicly** or **go unreported**, with the prices paid not typically being made public. The price for an 'avoidance' offset is typically much lower than the price for a 'removal' offset.
Highly regulated	Broadly speaking, **not specifically regulated**

As mentioned at the start of this guide, the distinction between carbon offsets and emission allowances is not that black and white: some carbon offsets traded in voluntary carbon markets are also capable of being traded on certain compliance carbon markets.

To further confuse things, compliance carbon markets and voluntary carbon markets are increasingly showing signs of coming together in some countries, such as Singapore.

A new sovereign market is also starting to develop, pursuant to the Paris Agreement.

What are emission allowances?

Emission allowances (alternatively known as '**EAs**') are tradable certificates, issued by governmental or regulatory organisations.

One emission allowance represents the right to emit into the atmosphere one metric tonne of carbon dioxide (or, depending upon the market, the equivalent amount of a different greenhouse gas such as methane, nitrous oxide or hydrofluorocarbons). In effect, EAs are permits or licences.

Emission allowances are usually traded on compliance carbon markets. The participants in such compliance carbon markets are typically mandatorily required by law to purchase emission allowances and to participate in such markets. They may also be able to trade some of those emission allowances, for example pursuant to 'cap and trade' mechanisms. We explore compliance carbon markets and cap and trade mechanisms in more detail in Part II of this guide below.

What are carbon offsets?

Rather than *permitting* emissions, one carbon offset represents one metric tonne of carbon dioxide (or, depending upon the market, the equivalent amount of a different greenhouse gas such as methane, nitrous oxide or hydrofluorocarbons):

- that *avoided* entering the atmosphere;
- of *reduction* in emissions; or
- that was permanently *removed* from the atmosphere.

In contrast to emission allowances, carbon offsets sold in the voluntary carbon market are typically created by a project proponent submitting details of the carbon avoidance, reduction or removal to a 'standard' in accordance with a 'methodology', which standard in turn verifies the information and issues carbon offsets. They may be represented in a variety of formats, from certificates to tokens.

Approaches differ in sovereign carbon markets – some sovereign carbon offsets (e.g. those arranged by REDD+ Capital) entirely rely on the methodologies, mechanisms and results contained in the Paris Agreement and the decisions relating thereto, whilst others (e.g. ART Trees and Verra JNR) add their own commercial requirements and mechanisms over and above those contained in the Paris Agreement.

Buyers may voluntarily choose to purchase and retire a carbon offset to 'offset' their own greenhouse gas emissions against the emissions avoidance, reduction or removal represented by such carbon offset.

Typically, carbon offsets are traded in voluntary carbon markets or sovereign carbon markets and are then retired by an ultimate buyer against an emissions target or claim (it being noted that claims of carbon neutrality are subject to significant scrutiny). Some carbon offsets can be traded on mandatory carbon markets, to satisfy participants' regulatory obligations.

In Singapore, carbon offsets can be used to offset an emitter's carbon tax bill, provided that such credits meet certain criteria.[8]

What is a tokenised carbon credit?

Typically, the term 'tokenised carbon credit' is used to refer to a token (a form of digital asset) that was created as a result of a process through which a carbon credit has been 'tokenised'.

A tokenised carbon credit is therefore a *token*, not a carbon credit.

This distinction is critical: the law and regulation applicable to tokens is very different to the law and regulation applicable to carbon credits. The regulation of tokens and other digital assets is significantly more advanced than the regulation of voluntary carbon markets.

Tokenisation affects every aspect of the asset being sold by a buyer to a seller, including the legal nature of the asset, its value, the manner in which such asset is held, its transferability, the way in which security interests are granted and more.

Tokenisation is not without issues. For some, the creation of further CO_2 emissions that result from the tokenisation process runs completely contrary to, and therefore undermines, the whole *raison d'être* of carbon credits. For others, the complexity of blockchain or the perceived anonymisation of specific carbon credits behind a token dilutes the integrity of the product.

The relationship between the token and the carbon credit to which it relates is also critical – historically, the carbon credit would be retired prior to the creation of the token relating to such offset. Some standards, including Verra and Gold Standard, have temporarily imposed a moratorium on the tokenisation of offsets that they have issued, pending completion of a review of the tokenisation process. Indeed, Gold Standard is now considering issuing its own tokenised carbon offsets.[9]

What's the difference between avoidance of emissions, reduction of emissions and offsetting?

They comprise three parts of the process of a corporate decarbonisation strategy:

- *avoid* creating greenhouse gas emissions in the first place, wherever possible;
- *reduce* abatable emissions that cannot be avoided; and
- *offset* emissions through the purchase and retirement of carbon offsets.

Market participants' views are split on whether best practice is to only purchase carbon offsets to offset *unabatable* emissions that cannot be avoided or reduced to zero.

Some participants purchase carbon offsets to also offset against some of their abatable emissions, whilst the technologies needed to deliver the necessary carbon reductions are commercialised, scaled up and/or more cost-effective.

How are emission allowances created?

Emission allowances are issued by a governmental or regulatory organisation to participants in the 'compliance carbon market' relating to that emission allowance.

Compliance carbon markets are so-called because the countries and/or companies that participate in such markets are mandatorily required to do so to *comply* with applicable laws. Those participants may be permitted to sell some or all of such emission allowances.

The number of credits issued each year is typically based on emissions targets. The issuing organisation determines how many certificates may be issued to each participant. Under 'cap and trade' schemes, regulators set a limit on carbon emissions (the 'cap').

To incentivise innovation, improved business practices and a reduction in emissions, the cap typically decreases over time. Australia's 'safeguard mechanism' has been an exception, as its cap has been allowed to grow over time. There is a perception that this has sanctioned 'business as usual' activities by large emitters. As part of its suite of measures to deliver on Australia's current Nationally Determined Contribution under the Paris Agreement, industries that are safeguard facilities will be required to cut their emissions intensity – emissions per unit of product – by 4.9% per annum below

their site-specific baseline from 1 July 2023 until 2030, to enable Australia to achieve a 43% reduction in emissions by 2030 (compared to 2005 levels) and achieve Net Zero by 2050.[10]

How are carbon offsets created?

See the section of this guide below relating to 'the lifecycle of a carbon offset' for further detail.

Carbon offsets work somewhat differently to emission allowances. As noted above, there are three main ways to generate a carbon offset: avoidance projects, reduction projects or removal projects.

Examples of carbon avoidance projects include electric vehicle charging, solar/wind power generation, hydrogen production and reforestation projects.

Examples of a carbon reduction project include carbon offsets that derive from a reduction in fuel usage in the transportation sector.

Broadly speaking, removal projects are either natured-based carbon removal projects (e.g., involving trees, peat bogs or mangrove swamps sequestering carbon) or technical carbon removal projects (e.g., direct air capture projects).

In their recent report, Shell and Boston Consulting Group have ascertained that from 2015-2021, avoidance credits drove voluntary carbon market activity, comprising over 80% of credits issued. Their research indicates that carbon removal credits may comprise 35% of the voluntary carbon market in 2030.[11]

How are tokenised carbon credits created?

There are a variety of methods. Some standards have banned the use of the 'retirement' method and may transition shortly to an 'immobilisation' method.

In its August 2022 consultation on the creation of tokenised carbon offsets that resulted from VCUs held in the Verra Registry, Verra noted that "*one method previously used to tokenise VCUs was the use of the retirement function in the Verra Registry, whereby VCUs were retired, an alphanumeric code was assigned and crypto instruments were issued based on these codes. It is Verra's view that this resulted in market confusion: the concept of retirement is intended to represent the consumption of a VCU's environmental benefit and, in so doing, permanently withdrawing that VCU from the market.*

Retiring VCUs to create crypto instruments or tokens…redefines the concept of retirement away from the consumption of an environmental benefit and toward what is effectively a conversion of a VCU into another instrument whose environmental benefit remains unconsumed." [12]

For that reason and others, Verra has now prohibited the use of the 'retirement' method to create tokenised carbon offsets from offsets held on Verra's registry.

It is proposing to replace such mechanism with an 'immobilisation' method, pursuant to which, rather than retiring carbon offsets that are converted into tokens, such carbon offsets are *immobilised* in the Verra Registry (and there continue to exist post-tokenisation) while their associated token remain on the market.

What happens once a token is burned should depend upon the purpose for which it has been burned:

- if the intent is to de-tokenise, then the carbon offset held in the Verra Registry should cease to be immobilised and (subject to the terms of the carbon offset) be capable of being traded on the secondary market; or

- if the intent is to retire the token such that the token ceases to exist, then the related carbon offset held on the Verra Registry should also be immediately retired.

In September 2022, Gold Standard also launched a consultation in connection with its proposal to introduce a new process to provide consent to organisations seeking to create tokenised carbon offsets.[13]

What are the features of a high-quality carbon offset?

- **Additionality**: the carbon offset results in the avoidance, reduction or removal of greenhouse gas emissions that would not have occurred but for the project or activity that generated such avoidance, reduction or removal;
- **Permanence**: the carbon offset results in the *permanent* avoidance, reduction or removal of CO_2 emissions;
- **No double-counting**: the carbon offset is not/cannot be claimed by another entity;
- **Limited/no leakage**: emissions avoidance, reduction or removal relating to the carbon offset is not materially counter-balanced by emissions elsewhere (e.g. a reforestation project located next to a coal-fired power station would result in significant leakage);
- **Do no harm**: the carbon offset is not associated with significant social or environmental harms;
- **Detailed and transparent**: the project developer provides comprehensive and transparent information on all credited mitigation activities;
- **Strong governance**: the project has effective program governance to ensure transparency, accountability and the overall quality of carbon offsets;
- **Registered**: the carbon offset makes use of a registry to uniquely identify, record and track mitigation activities, carbon credits issuance and retirement of carbon offsets;
- **Strong baseline**: for carbon offsets that are quantified by reference to a baseline, such as those relating to REDD+, and/or that heavily rely on modelled data, an appropriate, conservative, baseline against which avoidance, reduction or removal is measured is imperative;
- **Accurate quantification and verification**: the carbon offset accurately represents the volume of greenhouse gas emissions that have been avoided, reduced or removed by the project to which such carbon offset relates and the standard has verified compliance with the methodology pursuant to which such carbon offset is issued;
- **Third party verification**: the amount of carbon avoided, reduced or removed has been verified by an independent third party; and
- **Paris-aligned**: the project to which such carbon offset relates is aligned with keeping global warming to no greater than 1.5 degrees Celsius above pre-industrial levels, in line with the commitments of the Paris Agreement.

What factors do buyers take into consideration when selecting a carbon offset?

Shell and Boston Consulting Group 's recent report "*The voluntary carbon market: 2022 insights and trends*" observed that Measuring, Reporting and third-party Verification (as explained further below) is currently the leading focus of among buyers:

Source: Shell/Boston Consulting Group[14]

There is also an increasing focus among buyers of so-called "co-benefits", i.e. the benefits of a given project beyond its mere carbon savings. Examples of co-benefits include improved biodiversity, community and employment benefits and improvements in the quality of air, water and soil.

Climate Solutions' experience is that improved biodiversity is rapidly shooting up buyers' considerations as a key co-benefit, particular for nature-based solutions such as REDD+. Given recent negative headlines in leading newspapers in the UK and Europe regarding carbon offsets, reputational considerations are also front of mind for large emitters.

Buyers of carbon offsets can look at carbon offsets in terms of risk and return:

- **Risk**: in this context, risk is typically referring to compliance risk and reputational risk, i.e., does the carbon offset that I have purchased do what I want it to do with respect to my balance sheet? What risk do I run of being accused of malpractice, nature arbitrage or greenwashing with this action?
- **Return**: assuming the carbon offset is to be retired, we can ignore anticipated future price performance. Instead, buyers might consider carbon performance – moving to 5-year cycles (e.g.to coincide with the Paris Agreement stocktake cycle), evaluating return-on-CO_2e removal (some projects could remove 20 times more CO_2e than others, for the same amount of investment), etc.

Carbon offsets are not a static instrument: even when retired, the program with which they are associated has been part funded by the purchase of the carbon offset. There are a finite amount of 'climate dollars' available to spend. Should they be directed to the most carbon-leveraged programs?

In March 2023, the Integrity Council for the Voluntary Carbon Market will publish its Core Carbon Principles ('**CCPs**') and Assessment Framework ('**AF**'), which together seek to set new threshold standards for high-quality carbon offsets, provide guidance on how to apply the CCPs and define which carbon-crediting programmes and methodology types are CCP-eligible.[15] These include principles such as additionality, no double-counting, permanence, programme governance, robust independent third-party validation and verification, and robust quantification of emission reductions and removals, among others.

Opinions are divided on how high the bar should be set – some market participants have expressed concerns that the draft standards propose too high a bar and risk hindering adoption.[16]

What types of activities can lead to the valid creation of a carbon offset?

Ecosystem Marketplace has identified that there are over 170 types of carbon offsets, comprised within 8 categories:

- forestry and land use;
- renewable energy;
- household and community;
- chemical/industrial;
- energy efficiency;
- waste disposal;
- agriculture; and
- transportation.[17]

Source: Ecosystem Marketplace[18]

The United Nations' CDM registry alone has nearly 8,000 registered projects.[19]

Illustrative examples include:

REDD and **REDD+**: *reduced emissions from deforestation and degradation* ('**REDD'**). This was later extended under Article 5.2 of the Paris Agreement to also cover the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries; and alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests, while reaffirming the importance of incentivising, as appropriate, non-carbon benefits associated with such approaches (such extended approach known as '**REDD+'**).

Regenerative Agriculture: a conservation and rehabilitation approach to food and farming systems that focuses on topsoil regeneration, increasing biodiversity, improving the water cycle, enhancing ecosystem services, supporting bio-sequestration, increasing resilience to climate change and strengthening the health of farm soil.[20]

Nature-based Solutions: actions to protect, sustainably manage and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting both people and nature.[21]

Renewable Energy: the creation and/or distribution of energy through less carbon-intensive processes, such as solar, electric vehicle charging, wind, waste-to-hydrogen, hydrogen refuelling stations. We note that grid-connected projects in now-mature technologies (e.g. wind/solar) are generally no longer eligible for accreditation as carbon offsets, principally as they are no longer considered additional, on the basis that carbon finance is not required to make those projects commercially viable.[22] Verra and Gold Standard make exceptions for LDCs (least developed countries) and where a particular technology has less than five per cent penetration in a particular jurisdiction. The Global Carbon Council has a somewhat broader approach. South Pole is working on developing a methodology for Hydrogen. Three Chinese companies have also submitted a methodology to the CDM.

Carbon Capture, Utilisation and Storage ('CCUS'): processes that directly remove greenhouse gases from the atmosphere, e.g. (i) modifying existing power plants to enable them to capture at source emissions that would otherwise be released directly into the atmosphere from such plant and then inject such emissions underground for long-term storage and (ii) direct air capture ('**DAC**'), a process that directly sucks carbon dioxide out of the atmosphere and stores it.

Energy Efficiency Improvements: for example, retrofitting of residential and commercial property to make them more sustainable.[23]

Sustainable Aviation Fuels ('SAF'): Carbon Offsetting and Reduction Scheme for International Aviation ('**CORSIA**') allows aircraft operators to meet their offsetting requirements through the use of CORSIA-eligible fuels, including sustainable aviation fuels and lower-carbon aviation fuels.

Who verifies by how much emissions of carbon dioxide equivalent has been avoided, reduced or removed…?

A high-quality carbon offset will only be issued if the project to which it relates complies with the applicable methodology published by a recognised standard. That being said, methodologies have not yet been created for each and every type of activity that can lead to avoidance, reduction or removal of carbon dioxide equivalent – in those cases, marketplaces such as Abatable may carry out their own quality assessment in accordance with their own frameworks before making such carbon offsets

available for sale or buyers may prepay for such carbon offsets to achieve a lower purchase price, pending the applicable standard publishing a new methodology in relation to such offset.

In Climate Solutions' experience, sophisticated buyers in the voluntary carbon market may also carry out independent verification exercises, over and above the measurement, reporting and verification conducted by the standard that published the applicable methodology and issued the carbon offset.

In compliance carbon markets, the regulations relating to such markets define the applicable standards with which participants must comply. Agencies are then appointed to ensure compliance with such standards.

Certain sovereign REDD+ markets use the UNFCCC verification framework (through its Roster of Experts) to validate the amount of greenhouse gas emissions that have been reduced or removed.

With respect to carbon offsets issued by sovereigns under the Paris Agreement, for ITMOs entered into under:

- Article 6.2 of the Paris Agreement, the Party creating the ITMO must submit an Initial Article 6.2 Report that is then reviewed by technical experts who then produce an Article 6.2 Technical Expert Report; or
- Article 6.4 of the Paris Agreement, the Supervisory Body is responsible for supervising the mechanism established by such Article, under the authority and guidance of the CMA and is fully accountable to the CMA.

Currently, regulation does not specify which standards apply to which parts of the voluntary carbon markets. This is anticipated to change in future, as IOSCO and financial services policymakers consider whether and how to regulate carbon markets.[24]

To date, it has been left to market participants to create their own methodologies and governance. Over time, the voluntary carbon market has established a number of entities that:

- **Eligibility**: create methodologies for projects that are subject to its rules;
- **Validation**: validate that projects are real and meet their eligibility criteria;
- **Register**: maintain a register to record how many carbon offsets have been issued pursuant to their rules, who holds such offsets and whether such carbon assets have been retired – this helps avoid double counting;
- **Measure**: measure how much greenhouse gas emissions have been avoided or removed over a period of time;
- **Report**: report to third-party verifiers their findings regarding how much greenhouse gas emissions have been avoided or removed over time;
- **Verification**: periodically verify the amount of greenhouse gas emissions avoided or removed;
- **Market Data**: promote transparency and integrity of, and access to, market data; and
- **Rate**: assess projects, companies and/or countries against their criteria, including the probability that any given carbon credit delivers a tonne of avoided, reduced or removed carbon.[25]

…according to which standards?

Carbon offsets are issued by entities (each, a 'standard'), in accordance with the methodologies that they set. Confusingly, both the entity and the methodology may be referred to as 'standards'.

The leading standards in the voluntary carbon markets that have published methodologies include:

- **Verra**, previously known as **Verified Carbon Standards**, was founded in 2009 by a group of U.S. environmental and business leaders to improve the governance of voluntary carbon markets. Today, Verra is the industry-leading standard, accounting for nearly 70% of all carbon offset issuances in the voluntary carbon market.[26] Verra's Climate, Community and Biodiversity ('**CCB**') standards identify projects that simultaneously address climate change, support local communities and smallholders, and conserve biodiversity;
- Since its launch in 2003, Swiss-based **Gold Standard's** standards have governed 2,300 projects in nearly 100 countries, resulting in 191 million tonnes of CO_2 emissions being reduced and US$28 billion of shared value being created. Gold Standard helped develop the voluntary carbon markets by providing access to pricing data. This data empowered buyers and project developers alike to determine prevailing market prices. Gold Standard for the Global Goals allows quantification of all project impacts towards the United Nations Sustainable Development Goals in order to provide new sources of funding for high-impact projects;[27]
- **The American Carbon Registry ('ACR')**, founded in 1996 in the U.S., developed the world's first standard to (i) publicly administer the registration and verification of carbon offset projects that follow approved carbon accounting protocols or methodologies and (ii) issue offsets on a transparent registry system; [28]
- **The Climate Action Reserve ('CAR')** was founded in the U.S. in 2001. They established standards, oversee the third-party verification process, issue carbon offsets and maintain a register to record the trading of such offsets via a publicly accessible system. Climate Reserve Tons ('**CRTs**') are the units of offset credits used by the CAR;
- The **Plan Vivo Standard** provides a support framework for smallholders and rural communities, principally in the developing world; [29] and
- **Puro.earth**, claim to be the world's first B2B voluntary carbon marketplace, standard and registry focused that is solely on carbon removals.[30]

As evidenced by the launch of Amazon's new ABACUS carbon credit label in December 2022, large corporate buyers are also starting to create their own labels and methodologies.[31] In that instance, Amazon seeks to go above and beyond Verra's methodology with respect to ABACUS Verified Carbon Units, focusing in particular on additionality, leakage and durability.

Each standard has published different methodologies for measuring, reporting and verifying emissions reductions,[32] eligibility criteria for projects that it registers, as well as for entities that can obtain access to the registry and thus trade in carbon offsets issued by that standard: Verra does not accept individuals, Plan Vivo focuses on smallholders and community groups, The American Carbon Registry is dedicated to projects in the U.S. and Gold Standard focuses more on projects in emerging markets.

The naming of carbon offsets is also unstandardised: Gold Standard refers to them as 'VERs', Verra calls its carbon offsets 'Verified Carbon Units' or 'VCUs', the CAR's carbon offsets are known as 'Climate Reserve Tons' or 'CRTs', Plan Vivo creates 'Plan Vivo Certificates' and Puro.earth uses 'CORCs'. In the sovereign carbon market, the offsets issued by REDD+ Capital on behalf of its sovereign clients are called 'REDD+ Results Units' or 'RRUs'.

Both Verra and UNFCCC recruit, train and maintain a broad network of experts who audit projects that are the subject of their rules.

What is 'MRV', why does it matter and how does it operate?

'MRV' is short-hand for 'Measuring, Reporting and third-party Verification'.

A recent survey established that 91% of buyers surveyed identified MRV as one of the top three most important quality criteria for their purchase of carbon offsets.[33]

As shown in the "lifecycle of a carbon offset" infographic on the next page, MRV is a critical part of the process of creating carbon offsets: **it is the process through which an activity that avoids, reduces or removes greenhouse gas emissions from the atmosphere is converted into carbon offsets with a monetary value**.

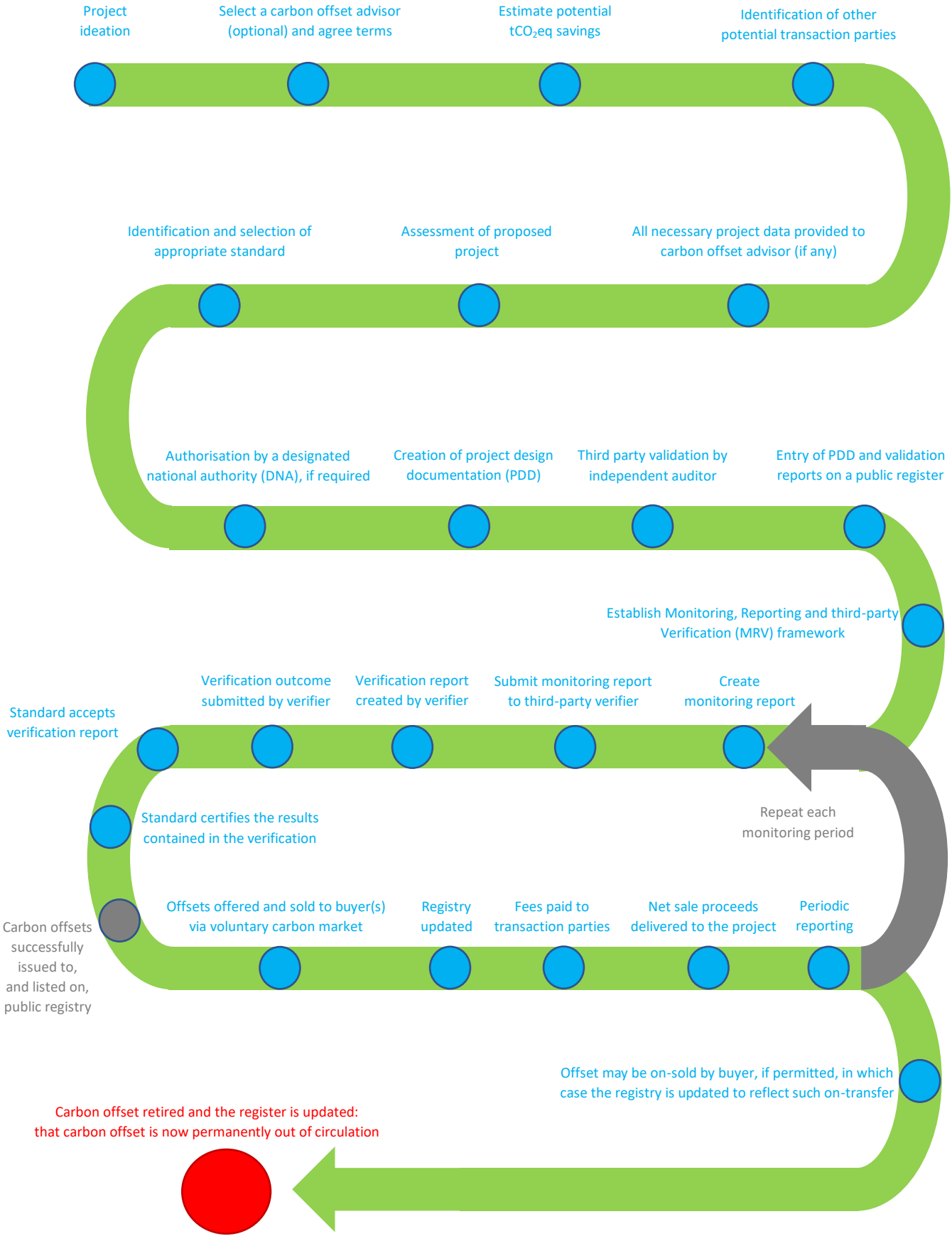
The MRV process operates as follows:

1. **Determine a baseline**: at the outset, a baseline needs to be determined by the project proponent in accordance with the applicable standard, against which performance is to be measured from time to time;
2. **Collect and analyse data**: once a project or activity has commenced, data is then collected to calculate the greenhouse gas emissions that have been avoided, reduced or removed during the relevant calculation period. It is worth noting that such data does not necessarily solely relate to the weight of carbon dioxide equivalent (tCO_2e) avoided, reduced or removed. By way of illustration, it is not currently a particularly easy task to determine precisely how much tCO_2e is sequestered in a field by a farmer that is practising regenerative agriculture techniques, because the amount of sequestration varies from one part of a field to another. There are various solutions that the industry has evolved to address that issue – one solution, pioneered by companies such as Hummingbird, is to estimate the tCO_2e that a hectare of open field would sequester over a given period of time if specified agricultural practises are followed and to then use satellite technology to verify that during the calculation period, the field in question has been managed in accordance with those agricultural practises. *In that example, what is being measure is not tCO2e, but human behaviour*. In remote areas that are hard to reach (e.g., in the context of tracking the operation of clean cookstoves in Africa), a project proponent might rely on local communities to conduct the data collection exercise;
3. **Report**: a detailed report is then compiled by the project proponent, confirming the results of the applicable emissions avoidance/reduction/removal activity during the calculation period. Once complete, the report is sent to a verifier;
4. **Verify**: an accredited third-party verifier then audits the report, pursuant to the standards pertaining to the relevant carbon offset. If the verifier is satisfied that the report accurately determines the tCO_2e avoided, reduced or removed during the calculation period, and that the applicable standards have been complied with by the project or in relation to the activity during the calculation period, it will then inform the standard accordingly;
5. **Certify**: the standard will then certify the results documented in the verified report;
6. **Issue**: following certification, the standard will then issue one carbon offset for each tCO_2e avoided, reduced or removed during such calculation period.

In November 2022, the European Commission adopted a proposal for a first EU-wide voluntary framework to reliably quantify, monitor and verify high-quality carbon removals, which established four core criteria: quantification, additionality, long-term storage and sustainability.[34]

The lifecycle of a carbon offset

Note: several additional steps (not shown below) are required in relation to tokenised carbon offsets.



Part III – compliance carbon markets and voluntary carbon markets

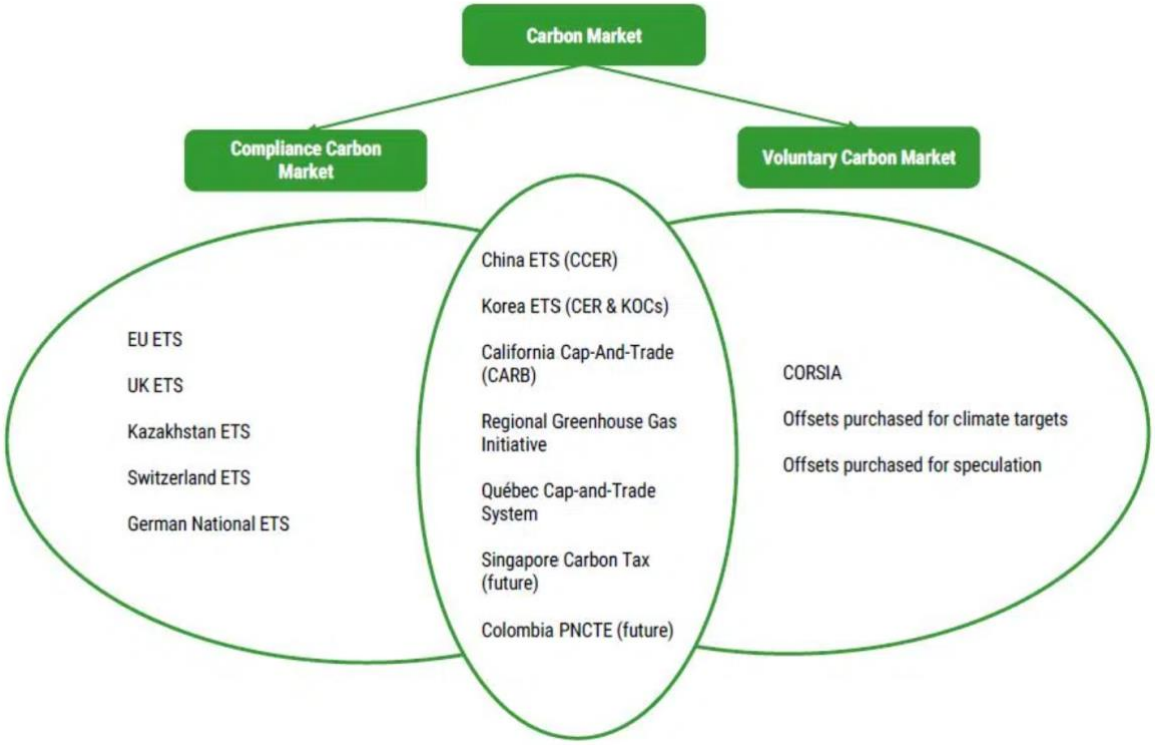
Historically, there have been two primary types of carbon markets: compliance carbon markets and voluntary carbon markets. A third, sovereign, carbon market is now emerging.

Compliance carbon markets	Voluntary carbon markets	Sovereign carbon markets
Markets for **emission allowances** that exist to enable participants to comply with their **regulatory obligations** in relation to such emission allowances	Markets through which participants can **voluntarily** trade **carbon offsets** with one another	Markets established further to the Paris Agreement through which participants can **voluntarily** trade **carbon offsets** and ITMOs with one another
Trading usually occurs on a highly regulated **exchange**	Trading may occur bilaterally in **OTC markets, on a regulated exchange or a marketplace**	Trading currently occurs bilaterally between market participants, in **OTC markets**
Typically structured as **cap-and-trade programs**	**Wide range** of business models	**Small** number of methodologies and issuers
Credits **freely allocated or auctioned** to participants. issued by governmental or regulatory authorities	Buyers **pay** to acquire carbon offsets	Offsets issued by **governments** or by **sub-national government bodies**
Participants may include **governments** and/or **companies**	Participants may include **companies** and/or **individuals**	Participants may include **governments** and/or **companies**
Rules governing the market are **established by regulation**	Rules governing the market are **created by market participants**, not by regulation	Rules governing the market are the **Paris Agreement** and may be supplemented by additional methodologies created by a **commercial standard**
Traded under both spot and futures contracts	Traded under spot, OTC forward contracts, other OTC derivatives contracts and futures contracts	Traded under spot and OTC forward contracts
Emission allowances are **not tokenised**	Carbon offsets **may have been tokenised** prior to being offered for sale on the applicable voluntary carbon market	Sovereign carbon offsets are **not tokenised**
Iterate slowly as applicable regulatory requirements change over time	**Constantly innovating** new models	A new **government-to-government** and **government-to-corporate** market is emerging
Very limited range of project types and market participants are in scope	An almost **unlimited number of project types and participants** in scope	A **small number issuers** are currently offering carbon offsets and ITMOs
Trades are **physically-settled**	Trades may be **physically-settled or cash-settled**, according to the terms of the transaction	Trades are **physically-settled**
Highly regulated	**Not subject to specific regulatory requirements**	Not subject to specific regulatory requirements, but have **the Paris Agreement** as their foundation

Participation in each type of market is not mutually exclusive - many companies participate in both compliance markets and voluntary markets. Australia and other jurisdictions have recently seen public calls to combine their mandatory and voluntary carbon markets.

Other carbon markets that are developing that share some of the characteristics of the compliance and/or voluntary markets, but seem to us to be sufficiently distinct that they merit specific mention in this note: the first REDD+ sovereign carbon offsets have now been offered in the market (derived from results under Article 5.2 of the Paris Agreement) and the so-called ITMO sovereign carbon market is also starting to get going, pursuant to Article 6 of the Paris Agreement.

The compliance carbon markets and voluntary carbon markets sometimes already overlap to some extent:



Source: Carboncredits.com[35]

In addition to compliance and voluntary markets, one should distinguish between primary carbon markets and secondary carbon markets, and between 'analogue' carbon markets (on which carbon credits are traded) and digital carbon markets (on which *tokenised* carbon credits are traded).

What are compliance carbon markets?

Compliance carbon markets, also referred to as 'regulated carbon markets' or 'mandatory carbon markets', are comprised of exchanges and marketplaces through which regulated entities and countries obtain, surrender and/or trade emission allowances (and/or in some markets, carbon offsets) to meet their regulatory obligations.

About a decade ago, the most important compliance carbon market was the United Nations Clean Development Mechanism, a source of offsets for Kyoto Protocol Signatory Counties. There are now compliance carbon schemes in nearly 70 other jurisdictions around the world, including the U.S., the U.K., China, Japan, South Korea and Mexico, with many more countries and states considering implementation.

On 9 November 2022, coinciding with the COP27 meeting in Egypt, IOSCO published Consultation Report CR/07/22[36] with recommendations for establishing sound Compliance Carbon Markets. The

consultation draws on experience with established emissions trading schemes and commodities markets to make 12 recommendations for the smooth functioning of both primary and secondary emission allowances in spot and derivatives markets.

The consultation touches on the key features of the main schemes and discusses past and current weaknesses in the design of these markets, including:

- concern that free allocation of emission allowances can result in those operators having no incentive to participate in the compliance carbon market;
- oversupply of emission allowances – either by local over-allocation or through allowing interoperability with offset markets – leading to low carbon prices;
- lack of consistent and accurate calculation of emissions, leading to failure of demand and supply dynamics; and
- policy decisions on issuances and allocations impact on price.

IOSCO's first 7 recommendations focus on the primary market, including ways to improve price formation and transparency. Recommendations include auctions being preferred to free allocation and for predictable market intervention mechanisms.

Recently, there has been much debate on the participation of financial market participants in the compliance markets. IOSCO points to several positive features of the secondary market, observing that it:

- provides the ability for non-compliance firms (i.e. those companies not subject to mandatory participation in such compliance carbon market) to access emission allowances;
- provides a hedging mechanism for firms and energy generators against future price volatility;
- aids in the depending of market liquidity in such products, by enabling the hedging of risks; and
- signals a price that allows for firms to make more informed investment decisions on their carbon output.

IOSCO also proposes that non-compliance firms should participate in primary markets to facilitate market making, access to the markets, carbon financing, the provision of liquidity and price formation mechanisms.

The remaining 5 recommendations relate to the strengthening of secondary markets, including management controls, transaction reporting and regulation/supervision of trading venues.

Consultation questions include whether and how to link compliance carbon frameworks (given the Article 6 negotiations under the Paris Agreement) and whether certain IOSCO principles for secondary markets and for commodity derivatives markets, such as those on transparency, position limits, market abuse and market surveillance, are appropriate and should be extended to compliance carbon markets. Responses will be used to further refine IOSCO's recommendations for compliance carbon markets.

No national compliance carbon market exists in the U.S. and, so far, only one state – California – has a formal cap-and-trade program. California claims that its program is the fourth largest in the world after the EU ETS, South Korea, and the Chinese province of Guangdong.[37]

The U.S. has been regulating airborne emissions since the passage of the U.S. Clean Air Act of 1990, which is credited as the world's first cap-and-trade program. It calls the caps 'allowances'.[38]

The Regional Greenhouse Gas Initiative ('**RGGI**') was the first cap-and-trade program established in the U.S., in 2005. The California Cap and Trade Program ('**CCaTP**') was launched in 2013.[39] RGGI only covers the power sector at present while California is much broader in scope and requires mandatory reporting of any entity with significant greenhouse gas emissions.[40]

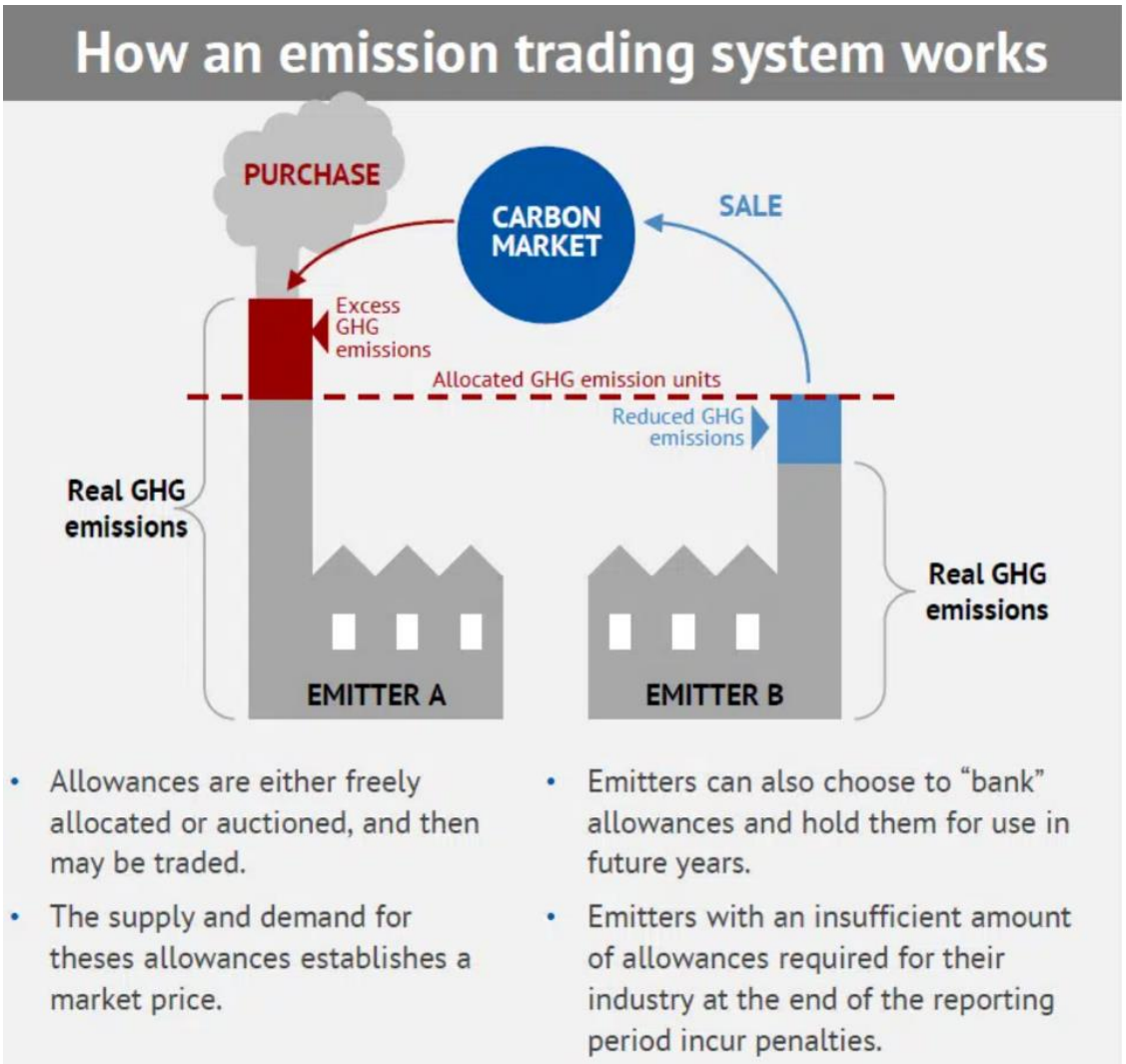
How do 'cap and trade' compliance carbon markets work?

One type of compliance carbon market is a 'cap and trade' market.

Under cap and trade programs, often referred to in Europe as '**Emissions Trading Systems**' or '**ETS**':

- governmental agencies or regulators set a limit (the 'cap') on the number of emission allowances allotted to companies and nations participating in the program; [41]
- the cap slowly decreases over time, to incentivise governments and companies to reduce their greenhouse gas emissions in absolute terms and through innovation; and
- participants - often including both emitters and financial intermediaries - are allowed to trade emission allowances to generate revenue from their 'excess' allowances and/or to enable them to meet their regulatory requirements.

According to Refinitiv, the total compliance market size in 2020 was US$261bn, representing the equivalent of 10.3Gt CO_2 traded on the compliance markets in 2020. [42]



Source: Carboncredits.com[43]

Here's an example:

Let's say that in our hypothetical compliance carbon market:

- companies are only allowed to emit 300 tonnes of carbon dioxide per annum;
- Company 1 is on track to emit 400 tonnes of carbon dioxide this year; and
- Company 2 anticipates only emitting 200 tonnes during the same period.

To avoid a penalty (typically fines and additional taxes), Company 1 can make up for emitting 100 extra tonnes of carbon dioxide this year by purchasing 100 emission allowances from Company 2. Company 2 is willing to sell such emission allowances to Company 1 because it anticipates emitting 100 tonnes less than the 300 tonnes of carbon that it is permitted to emit this year. The price paid by Company 1 to Company 2 will be driven by supply and demand for such emission allowances, which in turn will be driven by the amount of carbon dioxide emissions of market participants.

What is a Carbon Border Adjustment Mechanism (CBAM)?

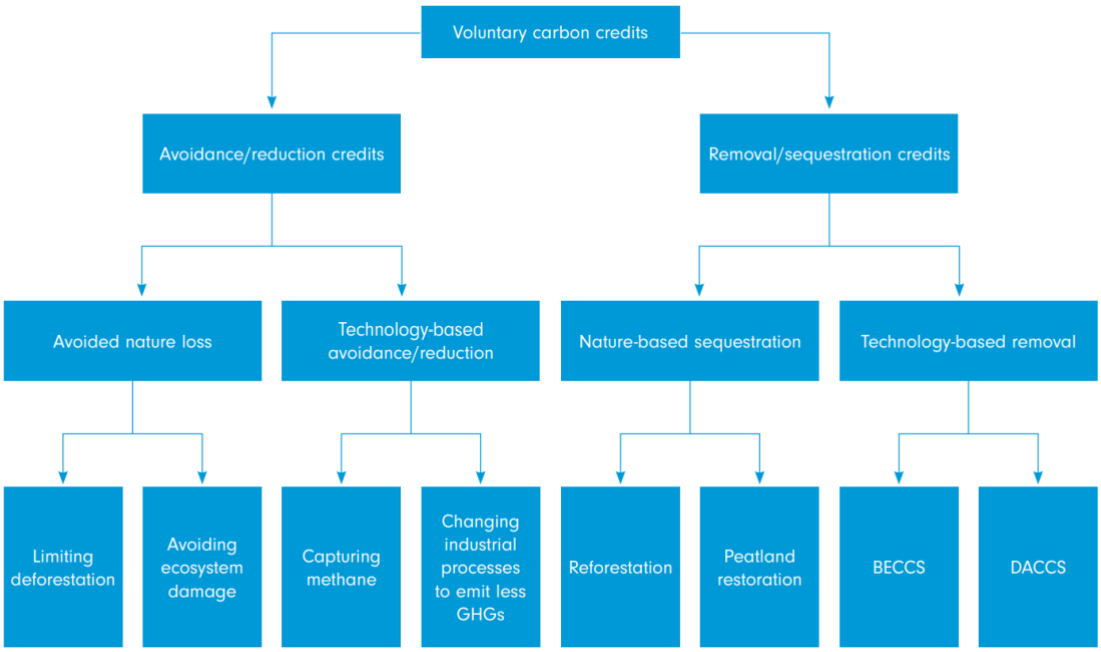
CBAM is a proposed carbon tariff on carbon intensive products (iron and steel, cement, electricity, fertilisers, aluminium, hydrogen, some precursors and downstream products) that are imported into the jurisdiction that imposes such tariff. The European Union and the United Kingdom are both considering imposing such tariffs, as may some United Nations member countries. In Europe, the CBAM comprises part of the European Green Deal. It is anticipated to take effect in 2026, with reporting starting in 2023.

The mechanism is designed to reduce carbon leakage from countries without a carbon price. In this context, carbon leakage occurs when there is an increase in greenhouse gas emissions in one country (that typically does not have a carbon price) as a result of an emissions reduction by a second country that has a strict climate policy.

In Europe, it is proposed that the price of CBAM certificates be linked to the price of EU allowances under the EU ETS. Under the agreement, 'free allowances' - also known as 'free allocation', whereby allowances are provided to EU businesses in certain industries to discourage moving operations to jurisdictions with less substantive carbon pricing regimes – will be phased out gradually from 2026 to 2034. Importers will be required to purchase CBAM certificates to cover the cost of emissions from 2027. CBAM certificates cannot be traded on the EU ETS. Where products have been subject to a robust regime of carbon pricing in the country of origin (i.e. a national carbon tax) prior to import, and documentary evidence is available, the price already paid can be deducted from the EU CBAM charges.[44]

What types of voluntary carbon markets exist?

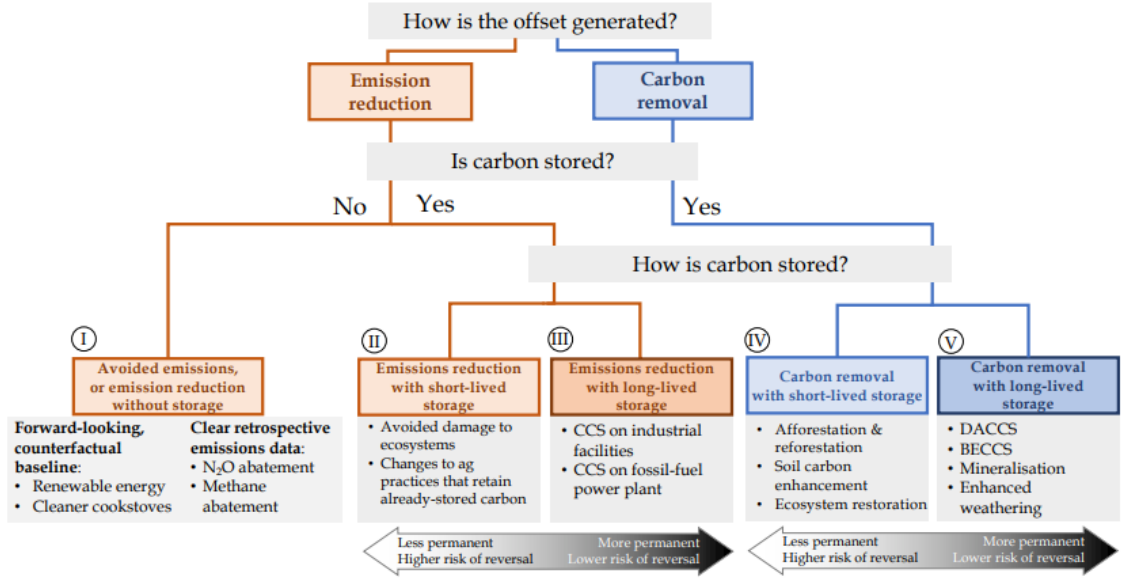
ISDA, the financial services trade association, recently published this excellent visual overview:



Source: ISDA[45]

Like ISDA, the Oxford Principles for Net Zero Aligned Carbon Offsetting[46] also distinguish between avoidance, reduction, removal and sequestration. However, for more detailed classification, the Oxford Principles look not at the source of the avoidance, reduction, removal or sequestration but whether and for how long carbon will be stored. Principle 2 calls for firms to shift to carbon removal offsetting on the grounds that emissions reductions, although necessary, will be insufficient to attain Net Zero in the long run.

Figure 1: *Taxonomy of Carbon Offsets*



Source: Oxford Principles for Net Zero Aligned Carbon Offsetting[47]

We're starting to see countries collaborate to co-create voluntary carbon markets.

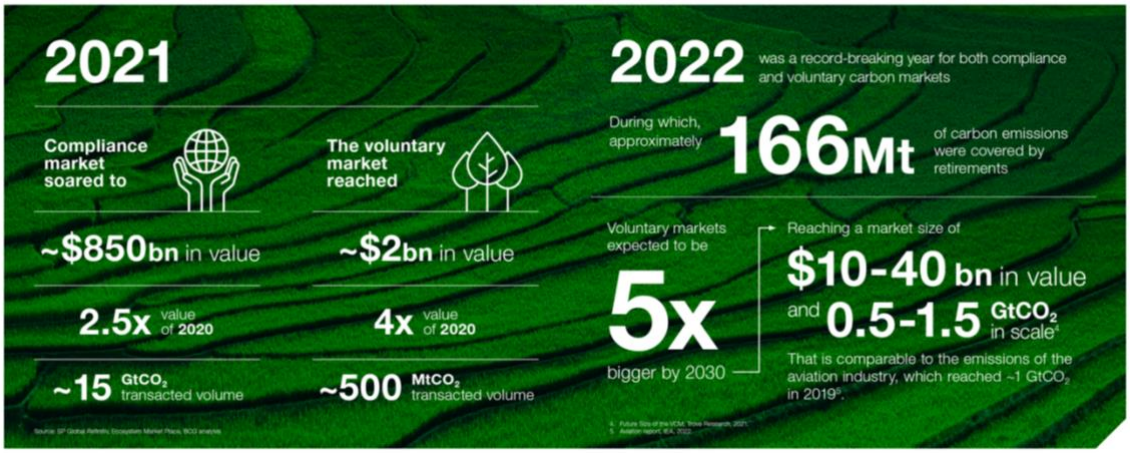
In September 2022, the United Nations announcements the launch of the United Nations Carbon Offset Platform, an e-commerce platform through which a company, organisation or individual can calculate its carbon footprint and purchase carbon offsets.[48]

In November 2022, COP27 saw the launch of:

- the Africa Carbon Market Initiative ('**ACMI**') by Kenya, Malawi, Nigeria and others, which aims to support the growth of carbon credit production and create jobs in Africa, targeting up to 300m tonnes per annum and 30m jobs by 2030;[49] and
- the Energy Transition Accelerator, a new platform for carbon credit trading launched by US climate envoy John Kerry and others to facilitate US companies purchasing certified carbon offsets derived from clean energy projects in developing countries.[50]

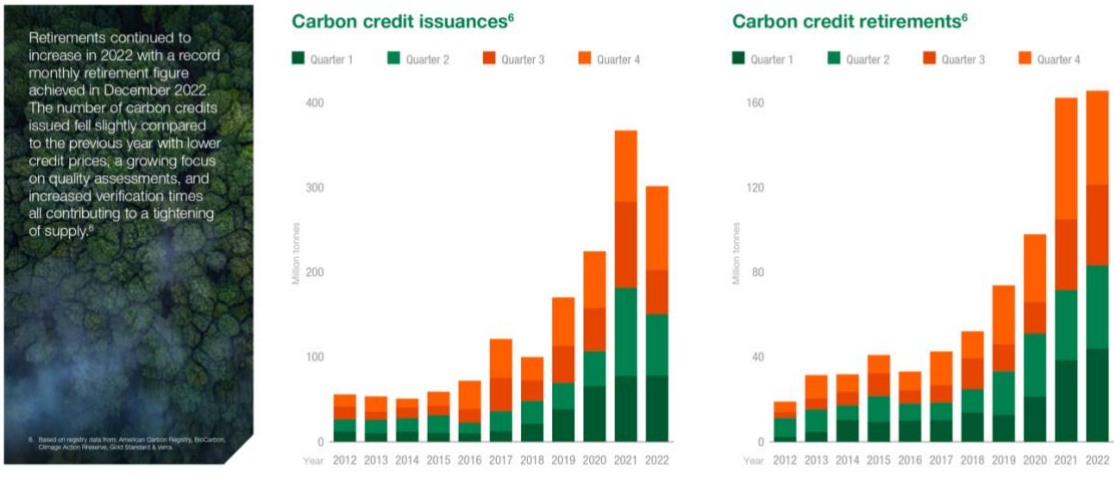
How big are the voluntary carbon markets?

The most recent figures were published in Shell and Boston Consulting Group's recent report "*The voluntary carbon market: 2022 insights and trends*":



Source: Shell/Boston Consulting Group[51]

As noted in that report , 2022 saw a sharp drop in issuance, albeit a continuing increase in retirements.



Source: Shell/Boston Consulting Group[52]

In 2021, the voluntary carbon market almost quadrupled in a year, to just shy of US$2bn.[53]

Source: Ecosystem Marketplace, a Forest Trends Initiative[54]

In conversation with Climate Solutions, buyers and brokers have identified a range of causes for the drop in issuance in 2022, including:

- an imbalance between supply and demand, with more supply that demand by the end of 2022;
- lack of price transparency (perceived to be improving, but still an issue);
- lack of a clear demand signal;
- uncertainty regarding the impact of the sovereign carbon markets on voluntary carbon markets;
- pending publication in 2023 of final guidelines by the Integrity Council for the Voluntary Carbon Markets ('**ICVCM**'), Voluntary Carbon Markets Integrity Initiative ('**VCMI**') and the SBTi initiative; and
- uncertainty regarding whether markets are at risk of collapse.

Publication of those guidelines may not immediately unleash demand, as the market may need time to digest the guidelines and incorporate them into their strategy.

Nonetheless, the market is anticipated to grow heavily in the following years, depending on how aggressively countries and corporates pursue their climate goals.[55] McKinsey has suggested the market could be worth more than US$50 billion by 2030.[56] Mark Carney, the ex-Governor of the Bank of England, has called for the carbon offset market to reach US$100 billion per annum by 2030.[57] Having previously indicated that the carbon offset market could exceed US$500 billion by 2050,[58] Bloomberg NEF's latest assessment is that the carbon offset market could reach US$1 trillion by 2037 'with the right rules'.[59]

The path to that growth may not be smooth – leading spot markets experienced a greater than 50% reduction in trading volumes in Q2 2022.[60] Average prices dropped between 65% to 80% in 2022[61] and dropped a further 30% to 40% in January 2023.[62]

On 6 December 2022, the VCM experienced one of its worst trading days in history, in which the spot price of:

- nature-based offsets dropped 37%, wiping out all the gains seen in the preceding 18 months;[63]
- CORSIA-eligible credits for the aviation sector dropped 8%; and

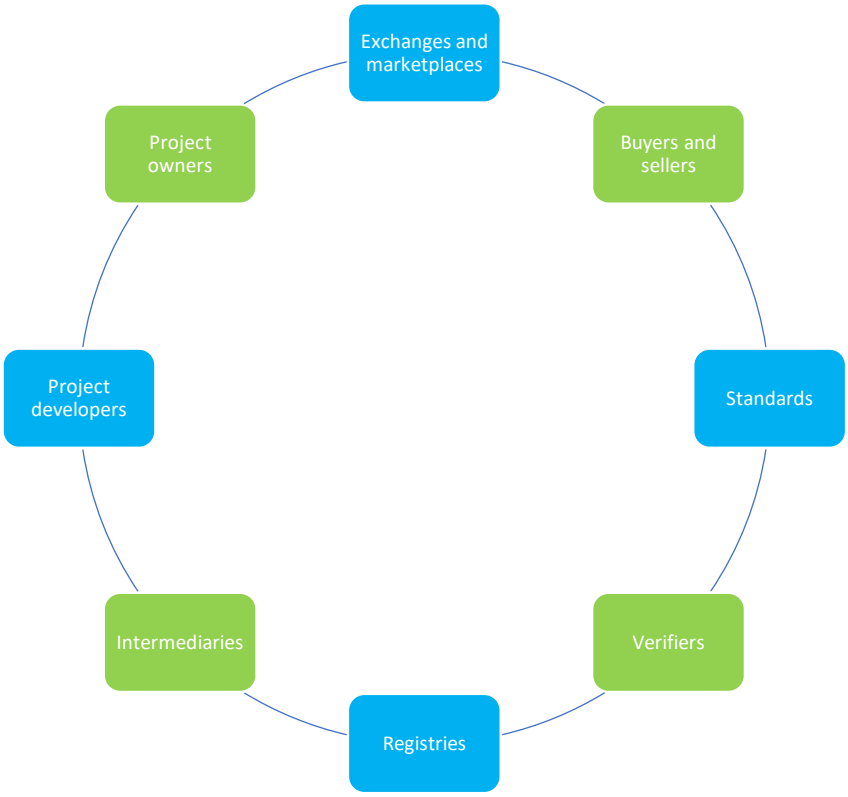
- tech-based offsets dropped 22%.

All of these point to a market that remains highly volatile, illiquid and immature.

Who participates in voluntary carbon markets?

There are several key participants in voluntary carbon markets, as well as other intermediaries with a more indirect role – for example, marketing agents for a project or for specific carbon offsets.

Key participants include:



Who buys emission allowances and carbon offsets?

Emission allowances are bought through compliance carbon markets by countries and companies that are required by law to participate in such markets.

Carbon offsets are bought on a voluntary basis by any country, company or individual interested in lowering their carbon footprint. Some of the world's largest brands, energy companies, metal and mining companies, shipping businesses, tech companies and other publicly traded corporates are big buyers of credits, as they seek to accelerate their attainment of Net Zero.

The SBTi seeks to establish a clearly defined pathway for companies to reduce greenhouse gas emissions, helping to prevent the worst impacts of climate change. More than 600 companies worldwide have committed to reach science-based net-zero before 2050 through the SBTi's 'Business Ambition for 1.5 degrees Celsius' campaign. The SBTi is more focused on the "zero" than the "net" in "net zero". They require that companies set targets based on emission reductions through direct action within their own boundaries or their value chains. Carbon offsets are only considered to be an option for companies wanting to finance additional emission reductions beyond their science-based target ('**SBT**') or net zero target, or to neutralise unabated emissions once their long-term targets have been achieved.[64]

Regarding sovereign carbon markets, the Paris Agreement's new ITMO process, established in and pursuant to Article 6 of the Paris Agreement, enables the international trading of mitigation outcomes between countries, and by countries to public or private buyers in third countries.

Countries predominantly buy such ITMOs from the selling country under Article 6.2 in order to better meet the buying country's Nationally Determined Contribution under the Paris Agreement.

What motivates buyers to voluntarily choose to purchase a carbon offsets?

There are a host of reasons that vary from buyer to buyer. Read this excellent summary here, but in summary key rationale include:

- rising climate/Net Zero/ESG targets;
- growing regulatory (compliance) and industry association requirements;
- social pressures for customers, employees and other stakeholders; and
- increasing participation in the speculation market.

Pursuant to their corporate social responsibility policies, ESG policies and/or in furtherance of their Net Zero commitments, major corporates may purchase carbon offsets to offset those emissions that they are currently unable to abate.

Alternatively, they may be motivated by a desire to fund certain types of projects via the purchase of carbon offsets, to support the development and scale up of new technologies such as direct air capture.

55% of respondents to a recent survey indicated that their spend on carbon offsets is non-discretionary. 41% of respondents to that survey comments that they are being influenced by industry groups to focus on absolute reductions in emissions.[65]

The SBTi and soon to be published VCMI code are both directly relevant to the kinds of targets that corporates set and the role that the voluntary carbon market is permitted to play in corporates meeting those targets. VCMI will also be highly relevant to the kinds of claims that corporates make with respect to their participation in the voluntary carbon market.

Some market participants are only interested in buying carbon offsets on a spot basis, i.e., purchasing carbon offsets that are immediately available for delivery. Others, particularly those with large demand for carbon offsets and others who are seeking to speculate on and/or hedge future price movements, are more interested in pre-paying for carbon offsets or entering into OTC forward or exchange-traded futures contracts.

Yet another way to gain exposure to carbon offsets may be to invest in the shares of a company that generates carbon offsets: in October 2022, the London Stock Exchange published new Admission and Disclosure standards for listed companies and funds that would like a Voluntary Carbon Market designation. For the designation, companies/funds must invest primarily in Qualifying Projects and Proposed Projects that qualify for carbon offsets verified by a standard unconditionally endorsed by The International Carbon Reduction & Offset Alliance (ICROA), being Verra, Gold Standard, American Carbon Registry, Climate Action Reserve and Plan Vivo; and/or the ICVCM, once its Core Carbon Principles are issued.

Corporations' PR and marketing teams are very alive to the opportunities for some good press coverage as a result of supporting various projects that create carbon offsets, especially around November time when that year's COP event takes place.

Some corporates choose to purchase pre-compliance offsets before emissions reductions are required by regulation, at a price that may be substantially lower than the prevailing market price once the compliance program commences.

In Singapore, emitters can reduce their carbon tax bill from 2024 by purchasing carbon offsets that meet certain criteria.[66]

Some industry participants have expressed the view that corporate demand for corporate offsets is likely to surge from 2023, as mandatory requirements for climate disclosure for listed companies kick in.[67]

As with crypto, some investors will be inclined to buy-and-hold, convinced that the market price will rise steeply to US$50, US$100 and beyond in future.

Individuals may choose to purchase carbon offsets to offset the greenhouse gas emissions associated with their flights.

As noted by ISDA, a significant share of the projects that generate carbon offsets are located in the Global South - the voluntary carbon market provides an opportunity to increase capital flow to emerging market economies and provide funding to projects that may not otherwise receive it.[68]

Where can you buy emission allowances and carbon offsets?

Emission allowances

The regulations applicable to such emission allowance will specify through which trading venues and markets such emission allowances can be traded. The market operators typically require regulatory approval before they are permitted to bring together buyers and sellers (or are agencies defined in the applicable regulations).

Compliance carbon markets are typically established on exchanges, rather than trading via bilateral OTC markets.

Carbon offsets

Carbon offsets may be sold either bilaterally, through a broker, via an exchange or a marketplace.

A list of leading exchanges, marketplaces and brokers operating in the voluntary and sovereign carbon markets is set out at the end of this guide. Climate Solutions, publisher of this guide, is one such broker, with unique access to the sovereign carbon market.

For carbon offsets bought OTC, institutional buyers will often approach project developers directly to purchase the carbon offsets relating to those projects, in order to achieve a cheaper purchase price.

In other cases, the project developers will approach brokers and/or directly contact well-known corporate buyers in the OTC markets.

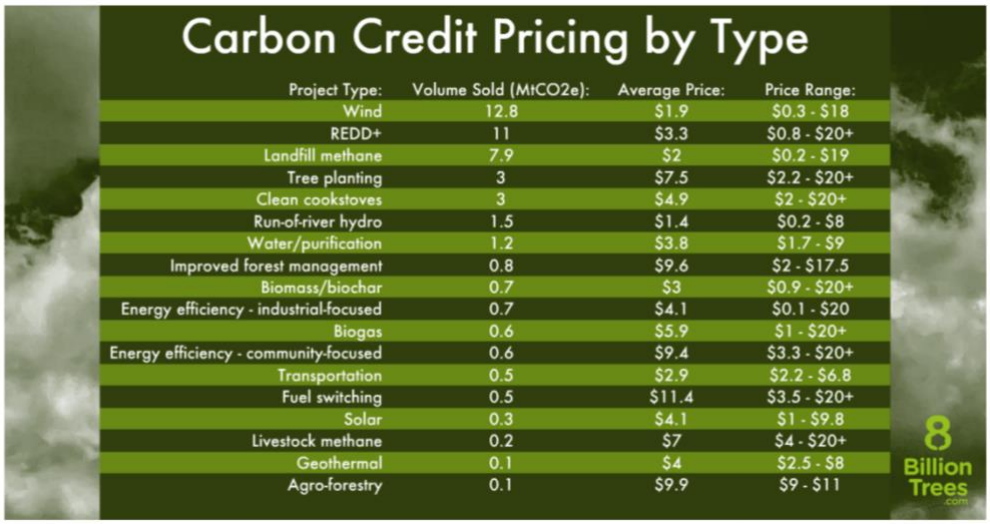
A number of voluntary carbon markets are now established as exchanges, which bring together buyers and sellers just like a stock exchange or a derivatives exchange. Examples include New-York based Xpansiv CBL, Singapore's AirCarbon Exchange and the Chicago Mercantile Exchange. These markets may or may not be regulated, depending on local law and regulation.

Sites like Nori and Gold Standard, where buyers can buy individual credits, leave much of the verification process to the consumer. Other offset markets provide offsets on a portfolio basis: by

bundling offsets from different projects together, companies like Native can sell a wide range of offsets in a single package.

What is the price of carbon?

There is no one answer. In 2020, the average price for a carbon offset was under US$2 a tonne, increasing by 60% to US$4 a tonne in 2021.[69]



Carbon Credit Pricing by Type

Project Type:	Volume Sold (MtCO2e):	Average Price:	Price Range:
Wind	12.8	$1.9	$0.3 - $18
REDD+	11	$3.3	$0.8 - $20+
Landfill methane	7.9	$2	$0.2 - $19
Tree planting	3	$7.5	$2.2 - $20+
Clean cookstoves	3	$4.9	$2 - $20+
Run-of-river hydro	1.5	$1.4	$0.2 - $8
Water/purification	1.2	$3.8	$1.7 - $9
Improved forest management	0.8	$9.6	$2 - $17.5
Biomass/biochar	0.7	$3	$0.9 - $20+
Energy efficiency - industrial-focused	0.7	$4.1	$0.1 - $20
Biogas	0.6	$5.9	$1 - $20+
Energy efficiency - community-focused	0.6	$9.4	$3.3 - $20+
Transportation	0.5	$2.9	$2.2 - $6.8
Fuel switching	0.5	$11.4	$3.5 - $20+
Solar	0.3	$4.1	$1 - $9.8
Livestock methane	0.2	$7	$4 - $20+
Geothermal	0.1	$4	$2.5 - $8
Agro-forestry	0.1	$9.9	$9 - $11

8 Billion Trees .com

Source: 8 Billion Trees[70]

There is a difference in prices in compliance carbon markets vs voluntary carbon markets vs sovereign carbon markets, and between emission allowances, avoidance carbon offsets and removal carbon offsets. We've seen carbon offsets offered for sale at under US$1 and over US$500…

Source: Ember[71]

Within the patchwork of frameworks and national regulations, the cost of a unit of carbon emissions can vary significantly and, as shown immediately above, can be highly volatile.

The introduction of CBAM represents a significant step towards levelling up carbon prices. However, as regulators take a greater role in supervising carbon trading frameworks, it will be important that the compliance markets set suitably ambitious prices to encourage the transition away from carbon-intense operations.[72]

In the voluntary carbon market, the price of one carbon offset may be very different to the price of another. In particular, the price of avoidance offsets is often significantly lower than the price for removal offsets. There is an expectation that ITMOs (whether they qualify as Article 6.4ERs or not) under the Paris Agreement are likely to attract a premium.

The price of carbon offsets from technology-based carbon removal projects such as direct air capture has consistently traded at a significant premium compared with other types of removal credits.

What about blockchain and digital assets?

Distributed ledger technology may yet play an important role in the maturing carbon markets. Particularly attractive is its ability to create unique data sets which can be traced and audited. Which of the current technologies will prove most appropriate remains to be seen, and there are currently several proposals in the voluntary carbon market sector.

There are now several different types of cryptographic tokens on different blockchains. Regulators and others have been at pains to try to classify them. Some crypto tokens, generally called cryptocurrencies, are not backed by any physical or financial assets. This class includes Bitcoin and Ethereum. Others are backed by assets, such as fiat currencies or securities. Those backed by fiat currencies are generally called stablecoins; those by assets like securities (shares, bonds, etc.) are treated like the asset they embody. Cryptocurrencies, stablecoins and security tokens are interchangeable, fungible and therefore capable of use in liquid markets, similar to traditional financial assets. However, non-fungible tokens represent unique underlying assets. They are widely used in the art market and also have application in other sectors such as supply chain management and ticketing. Currently, the estimated current value of the NFT Market is US$4.6 billion.[73] Given that voluntary carbon credits are often linked to unique projects, using NFTs is something several international bodies and marketplaces are seriously considering.

With the aim of improving transparency of carbon offset markets and their attractiveness for speculative investment, the World Bank's International Finance Corporation ('**IFC**') division has joined with sustainability finance company Aspiration, blockchain technology firm Chia Network and biodiversity investor Cultivo to launch the Carbon Opportunities Fund, which will use blockchain technology to register carbon offsets linked to specific carbon removal projects and create NFTs linked to those carbon offsets.[74]

On 3 August 2022, Verra launched a public consultation on whether to permit other organisations to create crypto instruments and tokens linked to underlying Verra-issued carbon offsets.[75] Verra notes several concerns with the practice of tokenising carbon offsets, including:

- fraud;
- environmental integrity;
- regulatory uncertainty;
- anonymity of entities; and
- legal uncertainty.

Verra noted that it had previously banned the process of tokenising retired VCUs. A retired carbon credit should be just that; it should not be given a second life through tokenisation; such a token has no clear environmental benefit.

To improve transparency and traceability, whilst mitigating against the risk of double counting and double use, Verra now proposes that any VCUs used to create tokenised carbon offsets should be immobilised in its registry, rather than retired, until such time as the token is burned (in the cryptographic sphere, tokens are "minted" (or created) and "burned" (or redeemed)). This, as well as close cooperation with tokenisation platforms such as Toucan and KlimaDAO, should assist Verra in retaining control over VCUs.

Toucan Protocol builds infrastructure for carbon markets to finance climate crisis solutions. In essence, it turns verified carbon credits into crypto tokens called '**Base Carbon Tokens**' or '**BCTs**' via its own proprietary Toucan Bridge by retiring VCUs on Verra's registry and marking the retirement 'beneficiary' listing with a cryptographic key that identifies the blockchain wallet that seeks BCTs from Toucan. It is the first generalised bridge to tokenise carbon credits.[76]

Other organisations have also created tokenised carbon offsets linked to Verra. Moss' MCO2 tokens are listed on some of the largest Web 3.0 exchanges, including Coinbase, Gemini (which has just gone into administration) and Uniswap, and are linked to Verra registry supported projects.

Gold Standard is also currently seeking feedback on its proposals to allow the creation of digital tokens for carbon offsets.[77]

Rather than link to Verra or Gold Standard, another approach being adopted is to create NFTs linked to specific projects for which the token platform is responsible. For instance, besides their MCO2 tokens, Moss has also created an NFT linked to land in the Amazon rainforest. The exact legal nature of these NFTs is unclear.[78]

Is there a role for insurance?

Fraud is a material risk in the voluntary carbon markets. In September 2022, the insurance broker Howden Group announced the world's first insurance against fraud and negligence in the voluntary carbon market.[79]

Greenwashing…

'Greenwashing' refers to actions, inactions and/or the dissemination of information that present an organisation as being more environmentally sustainable than is the case.

Buyers typically require substantial comfort and transparency over the quality of the carbon offsets they purchase, given public concerns about greenwashing and the use of offsets to meet GHG targets generally.

In the weeks prior to publication of this guide, The Guardian newspaper in the United Kingdom and others raised a number of concerns about greenwashing, most notably by asserting in relation to Verra-verified REDD+ carbon offsets that "94% of rainforest carbon offsets by the biggest provider are worthless" and do not represent real carbon emission reductions.[80] This assertion received significant pushback from voluntary carbon market participants, especially for its use of so-called "synthetic baselines" in reaching its conclusion.

In its response, Verra observed that "*Certifying REDD activities is not easy, in part because one has to quantify the risk of forest loss that would occur without the carbon project (i.e. the baseline)*" and accused the authors of cherry picking and "*simplistic extrapolations of research that uses old, outlier statistical models*."[81] Verra further noted that it is undertaking a number of improvements including the adoption of shorter baseline periods, allocating robust jurisdictional baselines, consolidating methodologies and digitalising MRV. For all its potential failings, Verra is right to comment that "*The urgency of the climate and biodiversity crises is too great to ignore this vital tool.*"

Sylvera observed that its research into REDD+ projects in the voluntary carbon market shows "*30% are high quality*". [82] As it acknowledged itself, "*To be clear: 31% isn't great, but it's a lot better than 6%…the remaining two-thirds of projects we've rated are of mixed quality, with 25% being effectively junk*." The industry still has a long way to go in addressing greenwashing concerns.

Some brokers responded by commencing a review of all of their REDD+ projects.[83]

Carbon credits are often described in the media as "a licence to pollute", which is only true to a point. Such comments fail to recognise the distinctions between the compliance carbon markets and voluntary carbon markets, including that:

- emission allowances are indeed a permit or licence to pollute, but only up to the cap . If an in-scope company pollutes over and above the cap, then it is required by law to purchase emission allowances via the cap-and-trade scheme to which it is mandatorily subject; and
- every dollar spent in the voluntary carbon market has been spent voluntarily. Buyers are not required to purchase carbon offsets in the voluntary carbon market. Instead, they choose to do so in recognition of the fact that their business generates carbon emissions. Every company generates carbon emissions that are impossible to abate. A primary purpose of the voluntary carbon market is not to provide a convenient short-cut to Net Zero, but to give buyers of carbon offsets a mechanism to contribute back to the climate and the economy in relation to such unabatable emissions.

To address greenwashing concerns in the context of the Paris Agreement, the international community took significant steps at COP26 in November 2021 to bolster the integrity of credits, by setting out detailed requirements in the Article 6.2 Rulebook and the Article 6.4 Rulebook. They produced new rules on both procedures and benchmarks for credits (e.g., on government approvals; methods for measuring emission reductions; and monitoring, reporting, and verification). Such rules aim to ensure that carbon offset projects genuinely lead to a measurable reduction in global emissions, and they add transparency to the process. Given the nature and scale of the challenge, the rules are complex and difficult to navigate in practice.

The CDM have formed a Supervisory Body under the Article 6.4 Rulebook to supervise the Article 6.4 mechanism. Much of the detail of how the Article 6.4 mechanism is expected to operate remains to be decided.

At Climate Solutions, our perspective is that carbon credits, in and of themselves, do not constitute greenwashing. They:

- often result in environmental projects getting started and/or funded that would not otherwise do so;
- can provide a material increase in IRR for clean energy projects that generate and sell carbon offsets;
- in the compliance carbon market, act as a meaningful, and enforceable, tool to ensure that governments and companies alike are taking climate action at scale and with sufficient pace;
- like crypto (but with a more tangible underlying asset – avoidance or removal of CO_2e), offer the opportunity of a new, highly liquid, asset class;
- can operate in a manner akin to a mandatory or voluntary carbon tax: if people have to, or choose to, pay to purchase carbon offsets as a result of their unsustainable business practices and personal choices, the cost of doing so may positively influence their behaviour such that they make more sustainable choices in future; and
- are often bought by corporates with Net Zero targets only once such corporates have avoided and significantly reduced emissions .

Other challenges with the voluntary carbon markets

Quality

See the start of this guide for an overview of the various factors that lead to the creation of a high-quality carbon offset. Carbon offsets are not homogenous. Perceived and actual quality and climate impact can and do have a material impact on price. Quality concerns may relate to methodology, lack of/insufficient verification, the age of the carbon offset (like a bottle of wine, carbon offsets are typically referred to by the year of their vintage, rather than their age). Concerns typically include the particular project methodology used to generate the carbon offsets and the environmental and social impact of projects. This makes the standardisation of primary market contracts challenging given the diversity of issues raised by individual projects.[84]

Whilst carbon offset ratings seek to provide a quality assessment to help buyers discern a high-quality project from others, the role played by credit ratings and credit ratings agencies in the 2008 financial crisis offers a cautionary tale of over-reliance on such ratings. Buyers must look behind the label to the rating itself and ensure they understand the applicable ratings methodology. In contrast to credit rating agencies, carbon rating agencies are not currently regulated.

Double Counting

Double counting describes the scenario where the benefit of a reduction, avoidance or removal of greenhouse gas emissions is claimed by one or more organisations and/or under one or more regimes. This could occur when a tonne of GHG reduced is used to create a carbon offset that is sold to a third party for the purpose of carbon offset offsetting and is also included in an account or inventory to avoid the requirement to purchase emission allowances under a mandatory carbon regime or where parallel schemes cover the same activities, such as renewable energy certificates and carbon offsets.[85]

The Paris Agreement addresses this concern for ITMOs by requiring parties to make a corresponding adjustment to their NDC once they have transferred an ITMO to a buyer.

Lack of transparency

This breaks down further into:

Price discovery: this enables buyers and sellers to set the market prices of tradable assets and promote liquidity. The dearth of reliable, transparent, available price discovery in the voluntary carbon market to date, whether on a free or subscription basis, has hindered both buyers and sellers alike. Tools like Quantum Commodity Intelligence and Allied Offsets make certain prices data available in return for a subscription fee, but the range of emission allowances and carbon offsets to which such data relates can be limited.

Market participants: as a largely OTC market up to now, it can be extremely hard to identify fellow participants that operate in the voluntary carbon markets. Companies rely on brokers like Climate Solutions to help them navigate the space. There's a huge amount of innovation happening in voluntary carbon markets – especially in relation to Web 3.0 – yet it is challenging to discover these potentially impactful new businesses and to support their scale. It can also be hard for project developers and buyers alike to find the service providers they need – lawyers, offset developers and more – to manage their risk and monetise their opportunities in the voluntary carbon markets.

There is no "Who's Who" of carbon markets…for that reason, we have set out a directory of leading participants in the voluntary carbon markets at the back of this guide. If you're active in the market and would like to be considered for inclusion in the directory, please contact the Climate Solutions team at info@climatesolutions.global.

Interaction with Article 6 of the Paris Agreement

Article 6 of the Paris Agreement aims to establish a new international carbon market, in which countries (and potentially third country public and private sector buyers) participate.

Some have argued that "*Given most developing countries currently lack the technical infrastructure to implement these adjustments, whether carbon offsets should be treated as ITMOs is a medium-term issue. However, as the Article 6 rules have clarified that an adjustment is required under the accounting rules of the Paris Agreement, this complexity will likely reduce the voluntary carbon market and adversely affect the supply of carbon offsets, ease of transacting and liquidity.*"[86]

Fragmented Market

The fragmented nature of the voluntary carbon market (across geographies, schemes (both mandatory and voluntary), registries, carbon standards and methodologies, and the heterogeneity of carbon offsets themselves) adds significant complexity to the process for standardisation and the development of an effective, liquid voluntary carbon market more generally.

Lack of interoperability

Carbon offsets issued by a given standard and stored in a registry managed or retained by such standard cannot be transferred to a registry maintained by a different standard. This lack of interoperability further exacerbates the fragmentation issue referred to immediately above.

For example, a carbon offset issued by Verra is stored at Verra Registry and cannot be transferred to the Impact Registry operated by The Gold Standard.

This is reminiscent of the early days of crypto, when cryptocurrencies were unable to be transferred across different blockchains. It remains to be seen whether the carbon markets will develop the carbon-equivalent of a 'cross-chain bridge' or 'Atomic swap' that solved this problem for crypto.

Cybersecurity

As with crypto, cyber-security is the top priority for standards – their registers can, and have been, hacked in the past, suffering large thefts of carbon offsets.

Lack of taxonomy

There are no nationally or internationally agreed definitions of even the most essential of terms, including 'carbon credit' and 'carbon offset'. If the carbon markets are to grow at the scale and pace needed for the world to achieve Net Zero by 2050, it is essential that we all speak the same common language. As demonstrated by the EU's green taxonomy regulations, standardising the meaning and use of given words is a critical step to scaling up sustainable finance markets – particularly if those markets are to become subject to regulation.

Regulatory change

Since the 2008 financial crisis, policymakers, regulators and financial market participants have been engaged in a non-stop avalanche of new regulation, designed to improve the safety and soundness of financial markets and to protect consumers.

Our expectation is that, just like crypto, regulators will want to rapidly create their own regulations to govern voluntary carbon markets and their participants.

By way of illustration: from the revised Markets in Financial Instruments Directive ('**MiFID II**')/ Markets in Financial Instruments Regulation ('**MiFIR**'), European Market Infrastructure Regulation ('**EMIR**'), Alternative Investment Fund Managers Directive ('**AIFMD**') and Anti-Money Laundering Directive ('**AMLD**') to the EU Taxonomy, the EU's 'Fit for 55', Sustainable Finance Disclosure Regulation ('**SFDR**'), Task Force of Climate-Related Financial Disclosures ('**TCFD**'), the Non-Financial Reporting Directive ('**NFRD**') and Markets in Crypto Assets ('**MiCA**'), there is a veritable smorgasbord of recent regulation that the European Commission can crib from to fairly rapidly create a new pan-European regulatory framework for *voluntary* carbon markets. That being said, it is notable that European Securities and Markets Authority ('**ESMA**') has not expressly included the regulation of voluntary carbon markets in its 2023-2028 strategy.

The approach adopted by policymakers in response to the 2008 financial crisis was to agree broad principles at global standard-setter level (including CPMI-IOSCO and the Financial Stability Board), which can then be built upon by local policymakers in their own jurisdictions.

This approach is designed to facilitate cross-border trading, on the basis that regulators (e.g. those that regulate a seller) in one jurisdiction defer to the regulators (e.g. those that regulate a buyer) in another, on the basis that the regulations in each jurisdiction are 'equivalent'. Such provisions are a legislative (although, in practice, largely political…) tool, designed to mitigate the risk of conflicting and/or duplicative regulation applying to cross-border transactions.

In November 2022, IOSCO published a discussion paper to seek public feedback on carbon markets, their vulnerabilities, the role of technology and more.

Will the U.S. be the first to regulate voluntary carbon markets? Commodity Futures Trading Commission ('**CFTC**') Chair Rostin Behnam has been extremely proactive in engaging market participants on this topic.

The costs involved in implementing regulation in carbon markets will certainly create a barrier to entry for small firms and entrench the position of regulated exchanges, brokers and investment banks with strong balance sheets. It should also, however, promote the safety and soundness of carbon markets.

Lack of education and awareness

To scale up carbon markets and thereby (at least in part) successfully address the climate crisis, it is critical that millions more people develop a working familiarity with how the carbon markets operate and are regulated.

Part IV – Sovereign carbon markets

What is the basis for the sovereign carbon markets?

"*…it ought to be possible to design a system where forested nations are financially incentivised to protect nature*", said the editorial of the UK's Guardian newspaper in January 2023.[87]

Such system has existed since 2015: Article 5.2 of the Paris Agreement enables forested nations to receive 'results-based payments' in return for the progress they make in, among other things, reducing emissions from deforestation and forest degradation ('**REDD+**').

Further to Article 5.2 and Article 6 of the Paris Agreement, sovereign carbon credits can be issued by countries following the successful completion of activities that reduce or remove greenhouse gas emissions in that country. The Paris Agreement does not currently permit the creation of sovereign carbon credits in relation to *avoidance* of carbon emissions, although this is under review.

Currently, only REDD+ sovereign carbon offsets are considered capable of being created in relation to vintages prior to 2021, it being understood that for REDD+ and all other types of sovereign carbon offsets, Article 6 applies to 2021 vintages onwards.

Depending upon the Article of the Paris Agreement in question that relates to such offsets, sovereign carbon offsets can be purchased by other governments, public or private buyers.

The iteration of sovereign carbon markets over time

The Kyoto Protocol

The United Nations' Intergovernmental Panel on Climate Change ('**IPCC**') developed a carbon credit proposal to reduce worldwide carbon emissions in a 1997 agreement known as the Kyoto Protocol. The agreement set legally binding emission reduction targets for the countries that signed it.

In 2001, at COP7, the 'Marrakesh Accords' then set out the rules for meeting such Kyoto Protocol targets. That year, the U.S. dropped out of the Kyoto Protocol.

The Kyoto Protocol divided countries into two groups: industrialised countries (collectively called 'Annex 1') and developing countries.

The CDM under the Kyoto Protocol allowed industrialized countries to earn one credit for every tonne of CO_2 emissions they reduced through emission-reduction projects in developing countries. Many commentators and countries have criticised the CDM for poorly regulating the additionality of such projects.

Industrialized countries could then use or sell those credits to meet their emission reduction targets under the Kyoto Protocol. Countries emitting less than their target amount could sell their surplus credits to countries that did not achieve their Kyoto Protocol targets, through an Emission Reduction Purchase Agreement ('**ERPA**').

The separate CDM for developing countries issued emission allowances called a Certified Emission Reductions ('**CERs**'). The trading of CERs took place in a separate market. A developing country could receive these credits for supporting sustainable development initiatives.

In 2012, the Kyoto protocol was revised in 2012 by 'the Doha Amendment', which was not ratified until 2020. 147 member countries completed such ratification.

The Paris Climate Agreement / the 'Paris Agreement'

The Paris Agreement is a legally binding international treaty on climate change, adopted by 196 countries at COP21 in Paris in 2015, that seeks to hold the increase in the global average temperature to "well below" 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels. It entered into force in November 2016. Among other things, the Paris Agreement set emission standards and allowed for emissions trading.

The U.S. dropped out of the Paris Agreement under President Donald Trump in 2017 but subsequently re-joined the agreement in January 2020 under President Joe Biden.

The Glasgow COP26 Climate Change Summit

Analysis conducted in 2021 in the run-up to COP26 suggested that current policies are expected to result in around 2.6 degrees Celsius to 2.7 degrees Celsius of warming by 2100, within a range of 2 degrees Celsius to 3.6 degrees Celsius, depending upon how the climate system responds to emissions. As Carbon Brief noted, "*the world does not end in 2100, even though many climate model simulations do…*".[88]

At COP26, held in Glasgow in 2021, 194 countries agreed the detail of much of Article 6 of the Paris Agreement. Article 6 was fleshed out by agreement of the 'Paris Rulebook', to create a successor to Kyoto's CDM.

Article 6 enables countries to more readily achieve their nationally determined contributions by buying offset credits that represent emission reductions by other countries.

Article 6 has been conceived to encourage countries to invest in initiatives and technology that can keep global heating below 2 degrees Celsius and, ideally, below 1.5 degrees Celsius. The new rules still require further development, national regulators, standards and others. When successfully implemented, the rules will enable carbon credits to deliver on their potential to reduce global emissions, encourage companies to invest in these instruments as part of their Net Zero pathway, and provide important investment opportunities for investors to finance credit-generating projects.[89]

Among the other measures, the Paris Agreement allows for the development of cooperative approaches that involve the use of ITMOs to comply with the NDCs of the countries participating in the agreement.[90] ITMOs use a carbon dioxide equivalent metric for a new set of greenhouse gas mitigation results defined in Article 6 of the Paris Agreement. [91]

The Paris Rulebook develops two new approaches for the international transfer of sovereign carbon offsets , in addition to the existing high-level provision in Article 5.2 of the Paris Agreement.

Article 5.2 of the Paris Agreement

Article 5.2 of the 2015 Paris Agreement states that "**Parties are encouraged to take action to implement and support, *including through results-based payments*, the existing framework as set out in related guidance and decisions already agreed under the Convention**" for policy approaches and positive incentives for activities relating to REDD+.

Noting the above reference to "results-based payments" in Article 5.2, some market participants are trading pre-2021 vintage REDD+ sovereign carbon offsets with private market buyers pursuant to this provision.

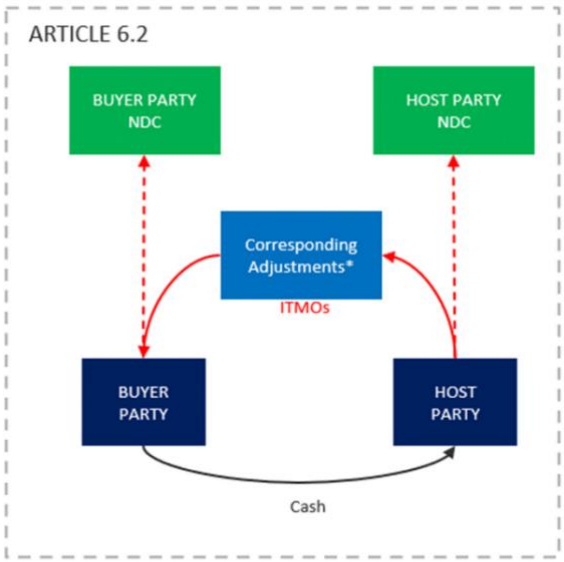
Article 6.2 of the Paris Agreement

The cooperative approach: Article 6.2 of the 2015 Paris Agreement, as supplemented by the 2021 Paris Rulebook agreed at COP26, creates a mechanism for countries that are a party to the Paris Agreement to trade sovereign carbon offsets between themselves and/or to private buyers, under a 'cooperative approach'.

Under this cooperative approach, countries that are avoiding or sequestering significant amounts of greenhouse gas emissions, typically in excess of their nationally determined contributions, can voluntarily elect to make money by selling sovereign carbon offsets to buyers through the use of ITMOs.

In contrast to the CDM under the Kyoto Protocol, the public and private sectors have a crucial role in leading negotiations under Article 6.2.

Among other examples of the cooperative approach in action, and with the goal of implementing improved cookstoves in rural communities in the Peruvian highlands, Switzerland and Peru have signed an agreement pursuant to which Switzerland agrees to finance such projects in Peru in return for Peru transferring to Switzerland carbon credits that Switzerland will use to meet its 2030 NDC target. The social organization Microsol is currently working to develop an international co-operation program that generates ITMOs between Peru and Switzerland.



* Corresponding adjustments are set out in Article 6.2 (cross-referred in Article 6.4) and comprise (Ch II B):

7 – adjustments for multi v single year NDCs

8 – adjustments for t CO_2 NDCs

9 – adjustments for non-GHG metric NDCs

10 – adjustments for non-quantified NDCs

16 – equivalent adjustments for non-NDC mitigations

Source: Simmons+Simmons[92]

To mitigate potential concerns regarding double-counting, Article 6.2:

- mandates periodic reporting, to improve integrity and consistency; and

- creates a public, centralized, registry; and
- contains an adjustment mechanism in relation to the buyer and seller's NDC, to reflect the transfer of the benefit of such carbon emission reduction or sequestration from the seller to the buyer.

Whilst paragraph 1.1 of the Article 6.2 Rulebook already specifies additionality as a mandatory condition precedent for ITMOs under Article 6, some participants in the voluntary market have identified opportunities to further strengthen such additionality by adopting practices common in the voluntary carbon market.[93]

Why would a country want to buy sovereign carbon offsets pursuant to this mechanism? The buying country typically buys such ITMO from the selling country as the ITMO counts towards the buying country's nationally determined contributions under the Paris Agreement. Paragraph 1(f) of the Article 6.2 Paris Rulebook also envisages ITMOs being use for "*international mitigation purposes other than the achievement of an NDC*" and for "*other purposes*".

Article 6.4 of the Paris Agreement

Article 6.4 of the Paris Rulebook creates a second mechanism (the Sustainable Development Mechanism') that countries can use to "contribute to the mitigation of greenhouse gas emissions and support sustainable development".

Article 6.4(b) states that a specific aim of such mechanism is "*to incentivise and facilitate the participation of public and private entities*" that are authorised by a country that is a party to the Paris Agreement. In practice, that invites private companies to contribute to the execution of successful projects carried out in host countries and to acquire sovereign carbon offsets from countries that are a party to the Paris Agreement.

No double-counting and additionality remain as two core requirements under the Paris Rulebook. Article 6.4 contained further requirements regarding how to calculate the quantity of emissions reductions.

Article 6.4 prevents double-counting by requiring host countries of projects to adjust their NDCs when authorizing the transfer of a project's sovereign carbon offsets to another country or foreign company.

Some critics have observed that "*a grandfathering of CDM credits undermines this [new mechanism] by allowing no adjustment to the national emissions tally. As there was an excess amount of CDM credits, countries lobbied to allow all CDM projects registered after January 1, 2013 to be registered as Article 6.4 activities. Given that there are around 8,000 registered CDM projects[94] in the past decade, less than 30% of which have demonstrated additionality, this highly politicized addition to Article 6.4 will impair the integrity of the mechanism*."[95] Such grandfathering ends in 2025.

Sovereign carbon offsets created pursuant to Article 6.4 can be sold to private buyers.

What are the key differences between Article 6.2 and Article 6.4 in the Paris Rulebook?

1. International approval: Under Article 6.2, the activity that generates the sovereign carbon offset must be operated with the approval of the host country but without the approval of an international supervisory body. In contrast, Article 6.4 contains extra layers of supervision: a project needs to be approved by the host country and a newly created international supervisory body (the 'Supervisory Board'), which acts on the basis of recommendations made by an independent verification body.

2. Mandatory levies: to support climate adaptation in developing countries (5% contribution to the United Nations Framework Convention on Climate Change Adaptation Fund) and to guarantee additionality (2% are cancelled), mandatory levies totalling 7% are charged on sovereign carbon offsets traded under the Article 6.4 approach. Whilst strongly encouraged, such levies are not mandatory under Article 6.2.

3. Effectiveness: Article 6.2 is already in effect, with the detail of its operation set out in the Paris Rulebooks. Article 6.4 is not yet fully operational – it will be up to the Supervisory Body to decide what type of solutions are eligible.[96]

4. Scope: The CDM did not cater for REDD. Given the lack of an internationally agreed definition of 'avoidance', there has been no outright inclusion or exclusion of REDD. Some market participants have suggested that REDD sovereign carbon offsets should be considered outside the scope of Article 6.4.[97] Other market participants[98] are firmly of the view that REDD/REDD+ sovereign carbon offsets should be considered to be the result of reductions and, in time, removals of CO_2 emissions.

The new rules give the host country a critical role in credit-generating projects. They can determine (i) which standards apply (the Cooperative Approach, SDM Approach, or an approach outside the Paris Rulebook) and (ii) whether a sovereign carbon credit is supposed to be used to meet its own NDC or not. How these decisions are made will dictate the value and possible uses for the resulting sovereign carbon offset. [99]

How do sovereign carbon markets differ from voluntary and compliance markets in practice?

There are a number of organisations now offering sovereign carbon offsets on behalf of their clients, pursuant to a range of methodologies, including REDD+ Capital, ART TREES and Verra JNR.

Sovereign carbon offsets currently offered in the market are typically REDD+, representing the reduction in emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries. They channel much-needed climate action dollars to vulnerable areas to reward actions leading to emissions reductions and removals.

The growing consensus is that there are now three types of carbon markets:

- Mandatory/Compliance markets (e.g. the EU Emissions Trading Scheme);
- Voluntary carbon markets; and
- Sovereign carbon markets (e.g. Article 6.4ERs, REDD+ Capital, ART TREES, and VERRA JNR).

The Paris Agreement is the only mechanism that has been agreed by over 190 sovereign countries as being the sole roadmap to keeping global warming below 2 degrees Celsius and ideally below 1.5 degrees Celsius, albeit that latter goal now may be beyond reach.

Sovereign carbon offsets issued pursuant to REDD+ Capital's methodology represent *net* carbon reductions and removals at *nationwide* scale, thereby (i) addressing carbon leakage more effectively than project-based offsets available in voluntary carbon markets and (ii) operating at a larger scale than any offsets available in the voluntary carbon markets.
In contrast:

- other sovereign carbon methodologies such as ART TREES permit countries to (i) deem a greater carbon saving to have been generated than such countries would be permitted under the Paris Agreement and to therefore issue additional offsets in certain circumstances (which is not a mechanic that exists in the Paris Agreement) and (ii) use a different benchmark and/or generate different results than those determined under the Paris Agreement; and
- Verra's JNR sovereign carbon offsets only represent sub-national carbon savings.

What does the Paris Agreement say about carbon offsets?

The Paris Agreement neither creates carbon offsets nor refers to carbon offsets anywhere in its text.

To issue, sell, buy, hold and retire sovereign carbon offsets pursuant to the Paris Agreement in relation to results (under Article 5.2 of the Paris Agreement) and/or internationally transferred mitigation outcomes (ITMOs, under Article 6 of the Paris Agreement) requires the overlay of additional commercial processes.

How is additionality addressed by sovereign carbon offsets?

Both additionality and verification are key, *mandatory*, requirements of Articles 5 and 6 under the Paris Agreement: the definition of ITMO in the Paris Agreement requires that ITMOs (and the carbon reductions or removals they represent) be "real, additional and verified".

How are the carbon savings represented by sovereign carbon offsets measured, reported and verified

Processes vary, depending upon the methodology used for such sovereign carbon offsets. In the case of sovereign carbon offsets using the REDD+ Capital methodology, all the carbon savings represented by s have been independent assessed by the UNFCCC by at least two experts selected by the UNFCCC from its panel of experts.

The MRV process set out in the Paris Agreement is effective: 85% of all FREL/FRL benchmarks (64 of 75), and 48% of all carbon emission results (13 of 27), were amended and re-submitted to the UNFCCC after review and assessment of the original submissions by the UNFCCC's independent technical experts.

What is the impact of on the need to make corresponding adjustments, if a sovereign carbon offset is sold to a corporate?

Only countries that are a party to the Paris Agreement (e.g. Gabon and Australia) make corresponding adjustments to their NDC. Corporates have nothing to adjust, as they are not a party to the Paris Agreement and do not have an NDC.

Corresponding adjustments are only relevant for 2021-vintage onwards ITMO transactions, under Article 6 of the Paris Agreement. Corresponding adjustments are NOT relevant for pre-2021 vintage REDD+ transactions under Article 5.2 Paris Agreement.

Accordingly, if a corporate buys:

- a pre-2021 sovereign carbon offset, corresponding adjustments are not required by any country, regardless of whether that corporate buys-to-retire, buys-to-hold, buys-to-trade or onward-sells to another country that is a party to the Paris Agreement; or

- a 2021-onwards sovereign carbon offset and:
    - retires it, no corresponding adjustment is made by Gabon (nor any other country); or
    - holds it and later sells it to another country that is a party to the Paris Agreement (e.g. France), then Gabon and France each need to make a corresponding adjustment to their NDC.

How do sovereign carbon offsets differ from one another and from REDD+ offsets offered for sale in the voluntary carbon market?

	REDD+ Capital's 'RRUs'	Other sovereign carbon offsets	VCM REDD+
Issuer	Governments	Applicable standard	Applicable standard
Scale	Nationwide net emissions	Sub-national net emissions	Local, project level, gross emissions
Standard	United Nations Framework Convention of Climate Change (UNFCCC)	ART-Trees or Verra	Verra and others
Methodology	Paris Agreement plus decisions and guidance issued pursuant thereto	REDD+ methodology published by the applicable standard*	REDD+ methodology published by the applicable standard
Type	Carbon reductions or removals	Carbon reductions or removals	Avoidance
Who conducts the MRV of reference levels and results?	Assessed by independent experts selected by the UNFCCC from its roster of accredited experts	Standard – e.g. for ART-Trees, countries can choose an alternate reference level or results from that submitted by the country to the UNFCCC under the Paris Agreement	Standard
Transparency	All data is freely and publicly available	Data is a mix of public and private	All data is typically confidential
Use of Proceeds	Typically 95% of the purchase price is retained by the government issuing the offset	No publicly available data	Less than 10% of the purchase price may be retained in the country in which the project was developed

* ART-TREES has recently launched an initiative to capture the value of jurisdictional REDD+ beyond carbon. The certification's three distinct modules will be for biodiversity benefits, non-CO_2e climate benefits and social-cultural benefits of forests to Indigenous People and Local Communities.

Part V – Applicable law and regulation

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Important: Tokenised carbon credits are *tokens* (i.e., digital assets), not carbon credits. Accordingly, if you want to understand the law and regulation applicable to tokenised carbon credits, then you need to have regard to the laws and regulations governing *tokens*, not the laws and regulations governing carbon markets. Such regulations are outside the scope of this guide. The regulation of tokens and other digital assets is significantly more advanced than the regulation of voluntary carbon markets.[100]

Introduction

This Part V considers the legal nature and regulation of carbon credits traded in the compliance and the voluntary markets.

In Europe and the UK, compliance carbon credit markets are regulated and voluntary carbon markets (at least, today) are in practice largely unregulated, adding to concerns that many available credits may lack integrity. The experience in the compliance markets is likely to inform the future development of the voluntary markets.

Regulation of the European Compliance Market

As noted in above, the largest compliance market is the EU ETS. It is a 'cap and trade' model. Under the scheme, an ever-decreasing cap is set on the total amount of greenhouse gas emissions that is permitted to be emitted each year by operators of certain installations (mainly in the energy, manufacturing and aviation sectors). Operators within scope must surrender allowances in accordance with their permit. If they emit more than their permit allows, they are required by law to purchase additional emission allowances in the market.

Emission allowances consisting of units recognised for compliance with the EU ETS Directive constitute C(11) financial instruments in Section C of Annex I of MIFID II. Units recognised for compliance include not just those issued under the EU ETS but also allowances issued under the Swiss ETS.

MiFID II covers emission allowances sold in the primary market through an auction, as well as secondary regulated and OTC markets. Derivatives on emission allowances – options, futures, swaps, forward rate agreements and other derivative contracts - are C(4) instruments under MiFID II.

This means that those who deal in or advise on emission allowances or derivatives on them need to hold a licence, unless an exemption is available. Compliance entities benefit from a specific exemption in MiFID II, provided that they do not execute client orders, provide investment services and the only activity it trading on own account not using a high frequency algorithmic trading technique.[101] Another possible exemption available to those trading emission allowances and who are not compliance entities is the ancillary business exemption in MiFID II.[102] Although the C(4) category does not expressly mention "forwards" as one of the classes of derivatives in scope, forward contracts for "delivery" of emission allowances will, in the view of Simmons & Simmons, be included in the scope of regulation, on the basis that all emission allowances are C(11) instruments.

Note that the fact that compliance entities often would not need a MiFID licence does not take away their obligations under other legislation, such as the Market Abuse Regulation ('**MAR**'). They will be

subject to the stricter rules under MAR on inside information to stop unfair advantages among market participants. MAR includes as "*inside information*" in relation to "*emission allowances or auctioned products based thereon, information of a precise nature, which has not been made public, relating, directly or indirectly, to one or more such instruments, and which, if it were made public, would be likely to have a significant effect on the prices of such instruments or on the prices of related derivative financial instruments*".

The EU ETS is divided into phases:

- Phase I: 2005-7. This was intended to encourage early action in the EU and was principally a learning phase.
- Phase II: 2008-12. Coincided with the first commitment period of the Kyoto Protocol.
- Phase III: 2013-20. Operation of the EU ETS changed significantly in Phase III.
- Phase IV: 2021-30. During Phase IV, the overall number of emission allowances will decline at an annual rate of 2.2% from 2021 onwards, compared to 1.74% in Phase III and the number of allowances held in the Market Stability Reserve will be limited to the auction volume of the previous year.

Under its July 2021 Fit for 55[103] initiative, the European Commission put forward a further comprehensive set of changes to the EU ETS that aim to drive a reduction in overall emissions to 55% of 1990 levels. This is proposed to be achieved by strengthening the current provisions (including aligning the EU ETS cap with Net Zero) and extending the scope of the scheme to include, for example, the maritime transport sector. The European Council adopted a negotiating position on this initiative in June 2022 as part of the trialogue process[104], agreeing the overall ambition of 61% of emissions reductions by 2030 in the sectors to be covered by the EU ETS and an increase to the linear reduction factor to 4.2% per year and strengthening the Market Stability Reserve by making the release of quotas to manage excessive price rises, automatic.

Significantly, the Council agreed to include maritime emissions in the scope of that EU ETS and to apply the EU ETS to intra-European flights (including the UK and Switzerland) and to EU airline operators in an effort to align the position for the airline industry to the global CORSIA scheme. Further, there is a proposal to establish a new separate emissions trading system for the buildings and road transport sectors. The new system will apply to distributors that supply fuels for consumption in the buildings and road transport sectors.

The package also introduced an EU CBAM that is more advanced in its development than the UK CBAM, having been approved by the EU Commission in March 2022 for phasing-in on a transitional basis from 2023 with charges applied from 2026.

The proposed CBAM introduces a carbon levy that will initially apply to importers of iron, steel, cement, fertilisers, aluminium and electricity. It is intended to put EU producers on a level playing field with companies from other countries where carbon pricing measures are less stringent. By the end of the transition period, the Commission's ambition is to extend the CBAM to more products and services at risk of carbon leakage. It may also cover so-called 'indirect' emissions, for example carbon emissions from the electricity used to produce the goods.[105] It also ends free allowances for certain sectors.

A provisional political agreement on the Fit for 55 package was reached by the Council and Parliament on 18 December 2022. This agreement improves the ambitions further: overall reductions of are to be increased to 62% and the linear reduction factor increased to 4.3% from 2024 to 2027 and 4.4% from 2028 to 2030. Significantly, Fit for 55 also includes a Social Climate Fund to support vulnerable households, micro-enterprises and transport users cope with the price impacts of an emissions trading

system for the buildings, road transport and fuels for additional sectors. Monies from the fund would be available to finance each EU Member State's social climate plan.

Separately, ESMA delivered its final report on the EU carbon markets in March 2022, in response to a request by the European Commission for an analysis of European emission allowances ('**EUAs**') and derivatives on EUAs. The report did not find any major deficiencies in the functioning of the EU carbon market.[106]

ESMA's policy recommendations included measures to provide more information to market participants, regulators and the public.

The legal nature of EU emission allowances

Under Article 11(5) of the EU ETS Registry Regulation, emission allowances accounts in the Union Registry are governed by the laws, and fall under the jurisdiction, of the EU Member State of their administrator. The units held in them are considered to be situated in that Member State's territory. This will not be relevant as to where the MiFID investment activity related to dealing in financial instruments is deemed to take place but would be relevant for other considerations, such as the nature of the rights in the allowances held in the Union Registry account. Each country must be considered separately.

The European Commission published a useful study in 2019 analysing the position in a select number of EU Member States.[107] Emission allowances might be property (e.g. in France, they are considered intangible property rights materialised in the registry) or intangible rights linked to administrative decisions, or a mix whereby they may be considered regulatory/administrative rights yet may also be used as security linked to private property (Germany, Poland, Bulgaria and Hungary). In some countries their nature is prescribed in legislation, while others rely on case law. Italy considers emission allowances to be commodities, but several other countries consider them to be financial instruments.

Regulation of the UK Compliance Market

After withdrawing from the EU at the end of 2020, the UK created a UK ETS on 01 January 2021. The scheme opened for trading in May 2021. The UK ETS applies to energy intensive industries, the power generation sector and aviation. Activities in scope of the UK ETS are listed in Schedule 1 (aviation) and Schedule 2 (installations) of the Greenhouse Gas Emissions Trading Scheme Order 2020.[108] The UK ETS is closely modelled on the EU ETS. Key features of the UK ETS include:

- The first trading phase of the UK ETS will run until 2030;
- Selected industries will receive a free allowance allocation, expected to be 43 percent of the total and the rest of the allowances will be auctioned periodically throughout the year;
- Businesses can then trade allowances between each other to ensure they have enough allowances to cover their annual emissions;
- At the end of the year, businesses surrender their allowances to the relevant UK ETS Authority: this will depend on where the installation is situated:
  - In England, it's the Environment Agency;
  - In Wales and Scotland, the devolved authorities; and
- When the new year begins, the cap will be reduced and the process repeats, with emissions under the system reducing over time.

Northern Irish power generators still participate in the EU ETS, under the Northern Ireland protocol.

In March 2022, the UK government launched a consultation[109] regarding the development of the UK ETS. Proposals would align the UK ETS cap with the UK's Net Zero target, extend coverage to include the domestic maritime and waste sectors, bring methane and other greenhouse gases within scope, and, like the EU, explore the introduction of a CBAM.[110] A small number of proposals originally set out in the March 2022 have now been implemented as amendments to the UK ETS so that they can take effect as of the start of the 2023 scheme year.[111] Key changes already in force are the inclusion of flights from the UK to Switzerland in the UK ETS from January 2023 and the omission of 2020 COVID year data in the calculation of change in activity level in 2022, for those operators who can demonstrate to the UK ETS Authority significant discrepancies between reductions in activity and emissions in the 2020 scheme year caused by the COVID-19 pandemic.

UK and EU emission allowances are "specified investments" under the Financial Services and Markets Act (Regulated Activities) Order 2001, and under RAO Article 82B, characterised as "securities". All regulated activities in relation securities will apply to emission allowances. Note that emission allowances under other compliance markets are not "specified investments" and fall outside the scope of regulation.

Also included in the scope of regulation are emission allowances that are auctioned as financial products or two-day emissions spots. These are referred to as *emissions auction products*. There is a separate activity of "bidding in emissions auctions", which covers the two types of emission allowances subject to the UK[112] and EU Emissions Auction Rules.[113] To participate in the auctions, firms must:

- either be MiFID firms (other than collective portfolio management firms), exempt under the MiFID ancillary business exemption or third country investment firms; and
- have FCA permission to participate or be an aircraft operator or be a group entity of an aircraft operators.

No other persons can participate in these auctions and the FCA does not have power to give them permission to participate.

As in the EU, derivatives on emission allowance are in the scope of regulation. As in the EU, compliance and other non-financial market participants may be able to rely on an exemption on the basis that the emissions trading is ancillary to their main business.

The legal nature of UK and EU emission allowances under English law

Under English law, carbon emission allowances issued under a mandatory scheme are intangible property rather than a thing in action. This was the decision in *Armstrong v. Winnington* [2012] EWHC 10 in relation to EU emission allowances. The court characterised the entitlement of a holder of emission allowances as an entitlement to a valuable, transferable exemption from a fine. As the UK scheme works in exactly the same way, it is likely that UK compliance credits would be characterised in the same way. The Law Commission, in its excellent consultation on Digital Assets, conclude that statutory emission allowances do not satisfy their proposed third category of data objects, a new type

of property classification for certain crypto assets; instead, they agree with the assessment of the court in *Armstrong*.[114]

Regulation of the US compliance markets

Climate Solutions and Simmons & Simmons are grateful for the input of Marvin Goldstein and John Pierce, partners at Stroock & Stroock & Lavan, on US law, regulation and developments.

As noted above, no national carbon market exists in the United States and only one state – California – has a formal cap-and-trade program, with another – Washington – being launched. California state claims that its programme, originally launched in 2013, is the fourth largest in the world after those of the European Union, South Korea, and the Chinese province of Guangdong.[115] Its Air Resources Board ('**CARB**') administers the auction of CO_2 emission allowances among covered entities, while the registration and verification of carbon offsets is carried out by independently operated offset project registrations and verification bodies approved by the ARB.

In January 2014, California and Quebec linked their respective emission allowance and offset programmes, the California Cap-and-Trade Programme and the Cap-and-Trade System of Quebec, with the intention of working together to reduce greenhouse gas emissions. The linkage allows for the use of compliance instruments from either program to meet the respective jurisdiction's compliance obligations. Moreover, the linkage of the two programmes provides a larger marketplace to exchange emissions credits for both allowances and offset credits to provide greater reduction in emissions than before.

Though the programs are linked, each respective jurisdiction has sovereignty over its respective affairs and the linkage is not intended to allude to a grant of jurisdictional power over the counterparty or their constituents. The governing bodies of each respective party to the linkage, the California Air Resources Board and the Government of Quebec, may work together to create policies specifically pertaining to the linkage, but an assessment of penalties or mandates outside of the linkage to constituents will only be applied by the relevant governing body.

While not the largest, the RGGI is the first mandatory market-based program to reduce greenhouse gas emissions by the United States. RGGI is a cooperative effort among several states, including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont and Virginia organised to cap and reduce CO_2 emissions from the power sector. RGGI compliance obligations apply to fossil-fuel powered plants 25MW and larger within the RGGI region. Pennsylvania's RGGI membership is subject to litigation and is delayed. Virginia is considered exiting RGGI and North Carolina is currently considering joining RGGI.

RGGI establishes a regional cap on the amount of CO_2 pollution that power plants can emit by issuing a limited number of tradable CO_2 allowances. Each allowance represents an authorisation for a regulated power plant to emit a single short tonne of CO_2. Individual CO_2 budget trading programs in each RGGI state together create a regional market for CO_2 allowances.

The RGGI states distribute over 90 per cent. of allowances through quarterly auctions. These allowance auctions generate revenues that the participating states are able to invest in strategic energy and consumer benefit programs. Programs funded through RGGI have included energy efficiency, clean and renewable energy, greenhouse gas abatement and direct bill assistance. The first pre-compliance RGGI auction took place in September 2008 and the program became effective on 1 January 2009. The RGGI program is currently in its fifth three-year compliance period, which began on 1 January 2021.

The California Cap and Trade Programme is wider than the RGGI in that it is a multi-sector cap-and-trade program rather than being focused on the power sector alone. The program covers 450 entities and about 80% of the emissions in California.

In 2021, the Washington Legislature passed the Climate Commitment Act (**CCA**), which establishes a comprehensive, market-based program to reduce carbon pollution and achieve the greenhouse gas limits set in state law. The program will start January 2023 and the first emission allowance auction will take place in the second half of February 2023.

The cap-and-invest program sets a limit, or cap, on overall carbon emissions in the state and requires businesses to obtain allowances equal to their covered greenhouse gas emissions. These allowances can be obtained through quarterly auctions hosted by Ecology, or bought and sold on a secondary market (just like stocks and bonds). The cap will be reduced over time to ensure Washington achieves its 2030, 2040 and 2050 emissions-reduction commitments, which means it will issue fewer emission allowances each year.

Given the wide definition of "commodities" in the Commodities Exchange Act (CEA), the CFTC has some jurisdiction over compliance carbon credits. In particularly, it directly regulates carbon futures contracts on exchanges such as the Chicago Mercantile Exchange, which offered futures contracts on RGGI and California emission allowances. It also regulates the markets underlying the pricing of carbon credits traded on US exchanges, so although not directly in scope for CFTC regulation, the CFTC may claim jurisdiction over spot and forward emission allowances transactions relying on carbon registries for the purposes of fraud and market manipulation cases.

As in other jurisdictions, transactions referencing compliance carbon credits might be considered derivatives – in particular, swaps. Swap dealers are subject to CFTC registration and regulation.

The legal nature of emission allowances under US law

The US Clear Air Act defines allowances as "limited authorisations to emit certain levels of pollutants." As there was concern that if allowances were given full property rights, the US constitution would restrict the government's ability to adjust emissions targets there is an express provision in the Clean Air Act which says that nothing under law will stop the Government from terminating or limiting the authorisations.[116]

Legal nature and regulation of carbon offsets

Given:

- the voluntary carbon market is estimated by McKinsey to grow in size to US$50bn+ a year by 2030;
- increasing industry engagement from the CFTC[117] and other regulators regarding regulation of voluntary carbon markets;
- calls for regulation from senior Democrats in the US[118] and the Climate Change Committee in the UK;[119]
- the de-facto monopoly of Verra as a standard; and
- the involvement of retail investors in the voluntary carbon market,

Climate Solutions, Simmons & Simmons and Stroock & Stroock & Lavan share the view that future regulation of voluntary carbon markets is surely now a given. Notably, the regulation of voluntary carbon markets does not expressly feature in the strategy of the ESMA for 2023-28.[120] The US may therefore take a lead on regulation.

As with all new regulations, key questions include:

- who will be in scope?
- what activities will become subject to regulatory obligations?
- who, if anyone, will require a licence to carry out their business activity in carbon markets?
- how will policymakers deal with cross-border issues?
- noting the 'equivalence' issues encountered in the context of the Brexit negotiations, might regulation of voluntary carbon markets fragment liquidity and result in more local markets?

Legally speaking…what *is* a carbon offset?

As ISDA, the trade association, notes in its excellent white paper on voluntary carbon markets,[121] one of the main things holding back the voluntary carbon markets is the lack of legal certainty as to the exact legal nature of carbon offsets.

ISDA's members have concluded[122] that the legal nature of a carbon offset varies from country to country.

In summary:

- **UK**: under English law, the question has not been definitively answered through case law or regulation. Unlike statutory emission allowances, voluntary carbon credit markets do not impose obligations on compliance parties. It is not as if the carbon offset is a permit or licence - an avoidance of a fine. Nor are they fungible or homogenous. Despite these differences, the prevailing view seems to be that carbon offsets are, like emission allowances under mandatory schemes, along the lines of the *Armstrong* case cited above, a form of 'intangible property' under English law. A carbon offset represents the holder's right to certify that it has avoided, reduced or removed the emission of a tonne of greenhouse gas from the atmosphere. There is an alternative argument that carbon offsets are a bundle of contract rights – that would be more complicated than them being intangible property as it would impede their transferability. The Law Commission prefers the former analysis.

- **US**: In the US, there is no overarching federal regulation that addresses the legal nature of carbon offsets. However, it is highly likely carbon offsets would be considered "commodities" given the broad definition of that term set out in Section 1a(9) of the CEA, which means carbon offsets would be subject to the jurisdiction of the CFTC.

- **Germany**: There is no specific legislation specifying the legal nature of carbon offsets under German law and the debate in German legal literature on those topics is just beginning, driven by increased demand for carbon offsets. The starting point for an attempt to specify the legal status of carbon offsets under German law would be a detailed analysis of each of the relevant carbon standard and registry rules and any complementary contractual arrangements and terms governing their creation, transfer and retirement. More than one legal regime may apply, giving rise to a conflict-of-laws analysis (for example, conflict of contract, in rem, securities or insolvency laws). This would have to be taken into account when assessing, from a German perspective, whether German or non-German law applies to a particular legal issue.

Voluntary carbon markets

The below summary does not cover in detail the regulation of exchanges that offer carbon credits for sale. If that is of interest to you, page 12 of ISDA's excellent paper on voluntary carbon markets provides a succinct summary.[123]

More broadly, IOSCO is undertaking a review of the weaknesses of voluntary carbon trading schemes and is developing an assurance framework for sustainability-related information. On 9 November 2022, coinciding with the COP27 meeting in Egypt, IOSCO published Discussion Paper CR/06/22 with key considerations for enhancing the resilience and integrity of Voluntary Carbon Markets.[124] The paper is the result of an IOSCO fact-finding exercise on voluntary carbon offsets. It puts forward considerations for the improvement of market integrity whilst acknowledging that its work is only one part of the overall change needed in voluntary carbon markets to ensure sound and well-functioning markets in which investors can trust. IOSCO also asks for comments on whether it should cooperate with private initiatives such as the Integrity Council for the Voluntary Carbon Market ('**ICVM**') and the Voluntary Carbon Credits Integrity Initiative ('**VCCII**').

Having consulted with many different market participants and commentators, IOSCO concludes that there are three obstacles to the scaling of voluntary carbon credit markets:

- the environmental integrity of the carbon credits at project level;
- the structure of the market and certain participants' behaviour; and
- greenwashing risk

As for environmental integrity, there is general concern about the lack of standardised methodologies to measure additionality of projects, to avoid double-counting and leakage of carbon, to ensure the permanence of the reduction or removal of greenhouse gas emissions or manage non-permanent reductions or removals, to assess co-benefits (like community impacts) and generally to ensure adequate verification and transparency.

IOSCO notes that there is no regulatory oversight of voluntary carbon markets and no clarity on the legal treatment of carbon offsets as yet and this, together with the dearth of information on the market and lack of standardisation of carbon credits or documentation, affects market integrity.

Indeed, voluntary markets function largely independently of compliance markets (at least, for now…). With limited exceptions, carbon offsets traded on voluntary carbon markets cannot be used to meet the legal and regulatory obligations placed on organisations by compliance carbon markets.

In contrast to the highly regulated compliance carbon market, voluntary carbon markets do not currently involve any direct government or regulatory oversight.

As noted by ISDA, "*The characterization of a carbon offset itself will be distinct from the characterization of a transaction in carbon offsets (including from a regulatory perspective). The status of an asset is a separate consideration to the status of a transaction in that asset. For example, a listed future or an OTC forward or option transaction with a carbon offset as the underlying will be a regulated product in many jurisdictions, even if carbon offsets themselves do not fall within a list of regulated financial instruments in that jurisdiction*".[125]

In some jurisdictions, an important factor in determining the regulatory characterisation of a transaction is the timing of settlement. **Longer settlement times may in certain circumstances be a factor indicating that the transaction is a regulated instrument (such as a derivative), even if the underlying asset is not.** [126]

Whether the trading of carbon credits are in scope of anti-money laundering, know-your-client and market abuse regulation is beyond the scope of this guide. Regardless, it would be good commercial practice to comply with such regulations.

Taxation

Revenue resulting from the generation and trade of carbon credits is subject to corporate income and/or indirect taxation under domestic law.

Separately, there are a host of tax rules that may apply, depending upon domestic law. The 2021 United Nations Handbook on Carbon Taxation for Developing Countries provides guidance on carbon taxes and offers many real-life examples thereof.

For corporate income tax purposes, it is relevant to ascertain that revenue resulting from carbon credits is properly allocated and taxed in the correct jurisdiction. This issue is governed by Treaties for the Avoidance of Double Taxation just as any other corporate income allocation issue.

For Generally Accepted Accounting Principles ('**GAAP**') / International Financial Reporting Standards ('**IFRS'**) purposes, it should be considered that Emission Reductions are an intangible asset under IAS 38 *Intangible Assets*, unless they are to be treated as Inventories under IAS 2 *Inventories*, and held for sale in the ordinary course of business.,

US Regulation of Voluntary Carbon Markets

We recommend to our readers ISDA's excellent overview[127] of the U.S. regulations applicable to OTC and exchange traded carbon markets for a more detailed analysis than that set out below.

Climate Solutions' current view is that developers, intermediaries, sellers and buyers do not currently need a *licence* to trade carbon offsets in the OTC spot or physically delivered OTC forward markets in the U.S. with respect to voluntary carbon markets.

However, such OTC transactions may be subject to the CEA and/or CFTC rules, even if conducted entirely outside the U.S. - especially if the counterparty is a U.S. person.[128]

There is a registration requirement in relation to the Californian compliance market. Those participating in California's auctions of mandates have to register with the Compliance Instrument Tracking System Service ('**CITSS**'), a market tracking system that supports the implementation of greenhouse gas cap-and-trade programs for California (and other jurisdictions, such as Quebec, Canada). CITSS provides accounts for market participants to hold and retire compliance instruments and to participate in transactions in compliance instruments with other account holders. CITSS is used to:

- register entities participating in the California Cap-and-Trade Program;
- track the ownership of compliance instruments;
- enable and record compliance instrument transfers;
- facilitate emissions compliance; and
- support market oversight.

ISDA notes that if carbon offsets meet the definition of a "commodity" under the CEA, then the CFTC has fraud and manipulation authority over the trading of such offsets - common violations under these provisions include false representations, fictitious sales, violating bids and offers, spoofing and front running.[129]

ISDA goes further by observing that "*bilateral carbon derivatives between eligible contract participants could potentially be subject to the CFTC's trading, clearing, reporting and recordkeeping regulations, as well as mandatory non-cleared margin requirements*". Later in the same paper, ISDA comments

that "*Carbon offsets and other environmental products are physical commodities, so transactions involving these projects are potentially eligible for the forward contract exclusion from CFTC regulations.*"[130]

As set out above, the CFTC has exclusive jurisdiction over the regulation of futures markets, including oversight of the listing of new contracts on futures exchanges. The CFTC has delegated some of its authority on futures contracts to self-regulatory organizations ('**SROs**'), including futures exchanges (designated contract markets ('**DCMs**')) and clearing houses (derivatives clearing organizations ('**DCOs**')). SROs are authorized to list and clear futures contracts based on their requirements, conduct market surveillance and enforce violations of their rules, among other things.

Carbon offset futures are accordingly subject to the CFTC's exclusive jurisdiction. Exchanges and clearing houses in the U.S. that list and clear carbon offset futures and options should ultimately ensure the CFTC's rules are met and that listed contracts 'are not readily susceptible to manipulation'.

KPMG notes that the SEC's proposals[131] for climate-risk disclosures include disclosures on carbon offsets.[132]

In recent years, there have been significant efforts by the CFTC to take steps to assess its potential role in supervising carbon markets. To-date, CFTC Chairman Rostin Behnam has taken a very collaborative approach with industry participants regarding the development of voluntary carbon markets: '*[w]e really want this to be a public-private partnership… But I do want to think about how we can scale this market in a productive way and how we involve the CFTC to support that growth'*.[133]

In June 2022, the CFTC convened market participants in the voluntary carbon markets with the purpose of reaching a better understanding of the markets, and "to pose the underlying question that really permeates every panel, and for which we are very eager to hear your input: what role should the CFTC play in these markets?"[134]

In a speech at that meeting, Chairman Behnam confirmed that 'Multiple carbon offset derivatives contracts are already listed on the CFTC's regulate*d exchanges today and more are expected. The CFTC must build its capacity to ensure the ongoing integrity of these markets, identify and pursue any potential fraud or other abusive practices in the underlying markets, and promote responsible innovation and fair competition. In other words,* ***we are now past the point of wondering whether our derivatives markets are implicated by the Voluntary Carbon Markets. The answer very clearly is yes****, and we as a regulator have an imperative to examine these markets to assess credibility and integrity*.'[135]

On the same day as the Voluntary Carbon Markets Convening, the CFTC also released a Request for Information ('**RFI**')[136] seeking public comment on climate-related financial risk within the derivatives and commodities markets.

According to the CFTC, the information gathered through this RFI may be used to amend existing policies or regulations. Comments were due by 08 August 2022. The CFTC therefore appears poised to expand its footprint within the regulation of carbon markets and facilitate the transition to a Net Zero economy.

Question 24 of the RFI moots a possible registration system for some or all market participants: *'Should the Commission consider creating some form of registration framework for any market participants within the voluntary carbon markets to enhance the integrity of the voluntary carbon markets? If so, what would a registration framework entail?*'.

If made publicly available, such a registration system would further raise awareness of the leading participants in the voluntary carbon markets that are subject to such registration requirement.

It is important to distinguish between any requirement to *register* as a market participant and the requirement to be *authorised* by the CFTC in order to perform certain roles in carbon markets.

Other recent U.S. regulation and tax policies are proving helpful to support the funding of projects that either generate carbon offsets or Federal tax credits (such as 45Q credits) that motivate investment in carbon abatement, sequestration and utilisation. This includes the recently passed Inflation Reduction Act, which includes subsidies and incentives. Start-ups such as Heirloom and 1PointFive, among others, are already developing technologies or investing in them to avail of the significant tax incentives. Companies such as Amazon, Microsoft, Occidental and Chevron have made substantial investments in these companies and others are expected to follow.

In the summer of 2022, several House Democrats called for stricter standards for carbon offsets,[137] though the carbon offsets are unlikely to be a priority of the new Republican majority in the House.

EU Regulation of Voluntary Carbon Markets

The proposed Corporate Sustainability Reporting Directive (CSRD), which will expand reporting requirements to almost 50,000 firms from 2024, will likely require companies to disclose their transition plans.

Derivatives on carbon offsets will be characterised as financial instruments in the EU if they meet the criteria of one or more of the categories of financial instruments set out in Section C of Annex I to the revised MIFID II, as implemented in national legislation. It is unclear whether physically settled OTC forward sales of carbon offsets (as opposed to emission allowances) would fall within scope of MiFID II. *Derivatives on emission allowances* are included alongside securities, currencies, interest rates and yields in MiFID II category C(4) and are themselves regulated under category C(11).

Carbon offsets are not emission allowances as defined in category C(11) and category C(4) refers only to "options, futures, forward rate agreements and any other derivative contracts". Forwards and OTC forwards of FX, also included in category C(4), have been confirmed as out of scope for MiFID II.[138] It might be possible to consider OTC forwards of carbon offsets similarly outside the scope of MiFID II where they are physically settled, at least one party to the trade is not a financial party and the transaction is not executed on a trading venue.

Simmons & Simmons' view is that spot and *physically-delivered* OTC forward sales of carbon offsets (as opposed to cash settled contracts)[139] are outside the scope of MiFID II, on the basis that OTC forwards are not a specified as a contract type in sub-paragraph (4) of Section C of Annex I of MiFID II[140] and carbon offsets are not "emission allowances". Our working view is that developers, intermediaries, sellers and buyers do not currently need a licence to trade spot/physically-delivered carbon offsets in the OTC spot or OTC forward markets in the European Union.

However, each EU member state regulates carbon offsets at its own discretion. **Accordingly, an EU member state by EU member state analysis of national law is required.**

On the other hand, Category C(10) is probably broad enough to take in cash-settled derivatives on voluntary carbon credits as underlyings.

Where derivatives on carbon offsets meet the MiFID II requirements, such that they constitute regulated financial instruments, regulatory requirements under MIFID II (as implemented into national legislation), the MAR and the EMIR will apply, among other regulatory requirements.[141]

UK Regulation of Voluntary Carbon Markets

In the UK, financial and listed firms will be required to report their strategies for transitioning to Net Zero from 2023. Otherwise, the regulatory position in the UK is broadly similar to that in the EU. The UK does not specifically regulate carbon offsets.

Under English law, the question would be whether *derivatives* on carbon offsets would be classified as 'specified investments' under the Financial Services and Markets Act (Regulated Activities) Order 2011 (RAO).

The better view is that spot and physically settled OTC forward sales of carbon offsets, where entered into for commercial purposes, are outside of UK regulation, on the basis of statements to that effect by the FCA[142] and an analysis of MiFID II (an onshored version of which applies in the UK) and the RAO. Carbon offsets, unlike other intangible assets, such as emission allowances, are not financial instruments or securities under the RAO. If, as has occurred in the United States, they were recharacterized as a commodity, they may then fall in scope. This is highly unlikely given the widely divergent definitions and understanding of "commodity" in EU and English law, as opposed to U.S. law.

Accordingly, Simmons & Simmons' view is that developers, intermediaries, sellers and buyers do not currently need a licence to trade spot/physically delivered carbon offsets in the OTC spot or OTC forward markets in the UK. However, OTC forward transactions between financial parties risk being considered to be for investment purposes and therefore inside the scope of regulation.

As with emission allowances, cash-settled derivative contract are likely to be in the scope of the RAO. In particular, if no delivery is contemplated, they could be considered "contracts for differences". Those trading them would need a licence, unless an exemption (such as the ancillary activities exemption) is available.

UK Climate Change Committee

The Climate Change Committee ('**CCC**')[143] is an independent, statutory body established under the Climate Change Act 2008. Its purpose is to advise the UK and devolved governments on emissions targets and to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change.

In 2020, the CCC published the Role of Business in Delivering the UK's Net Zero ambition.

The CCC is now planning to develop a more in-depth piece of work on voluntary carbon offsets, culminating in a report on offsets to be published later in 2022. This will consider the latest evidence to provide an updated view on the role of offsets in decarbonising the UK economy through to 2050. Key themes to be explored include the quality of offsetting activities, business targets and transparency, the role of policy and standards and greenhouse gas inventory considerations. We will identify recommendations for further action and consider how the CCC can monitor progress over time.

Market-led initiatives

Notwithstanding the lack of regulation, there are a number of market-led initiatives seeking to standardise the way voluntary carbon markets operate and to provide some method of comparison within the voluntary market. These standards include:

- International Carbon Reductions and Offset Alliance (ICROA)
- The Integrity Council for Voluntary Carbon Markets (ICVCM)
- Voluntary Carbon Markets Integrity Initiative (VCMI)

International Carbon Reductions and Offsets Alliance (ICROA)

ICROA has an Accreditation Programme for all organisations that provide a carbon offsetting service and has been recognised as an industry standard for promoting GHG emissions reductions and offsetting since 2008.

Members must be IETA members and will need to undergo an annual independent audit to assure compliance with the ICROA Code of Best Practice. The Code of Practice is quite detailed and requires, for example, compliance with specific standards for GHG investment measurement services, namely WRI/WBCSD GHG Protocol Corporate Accounting and Reporting Standard (including the GHG Protocol's Scope 2 Guidance and Corporate Value Chain (Scope 3) Standard) or ISO 14064-1:2018.

ICROA restricts the voluntary carbon offsets that Accredited Organisations can offset on behalf of a client to:

- American Carbon Registry (ACR)
- The British Columbia Offset Program
- Climate Action Reserve (CAR)
- Emissions Reduction Fund (ERF) of the Australian Government
- Global Carbon Council (GCC)
- Gold Standard
- Plan Vivo
- UNFCCC Mechanisms
- UK Woodland Carbon Code (UK WCC)
- Verra's Verified Carbon Standard (VCS)

Organisations can use compliance credits but only to comply with the relevant trading scheme. The Accreditation Eligibility Criteria are set out on ICROA's web site and include a requirement to have:

- been trading voluntary carbon credits for at least a year;
- minimum annual trading volume of at least 10,000 tonnes of CO2e; and
- a commitment to reducing its own GHG emissions and striving for a science-aligned reduction pathway aligned to the UNFCCC and Paris Agreement goals.

ICROA Accredited firms may use the ICROA Accreditation Label. ICROA also supports organisations through advocacy and action-oriented activities aimed at advancing best practice in the Voluntary Carbon Market.[144]

The Taskforce on Scaling Voluntary Carbon Markets

The Taskforce on Scaling Voluntary Carbon Markets, led by former Bank of England governor Mark Carney, created a blueprint of the target marketplace[145], which it published in November 2020. [146] The taskforce was looking at creating a central marketplace for emission allowances. He described it as an 'imperative'. The TSVCM observed that there are market weaknesses around definitions, standards and supply issues, with no obvious place to go for advice. But the new marketplace would:

- Connect buyers and suppliers
- Offer the official liquidity needed to achieve Net Zero
- Provide pre- and post-trade transparency and proper pricing
- Standardise contracts by introducing a taxonomy. [147]

The Integrity Council for Voluntary Carbon Markets (ICVCM)

The Taskforce on Scaling Voluntary Carbon Markets has now been superseded by the Integrity Council for Voluntary Carbon Markets (ICVCM), which will help carbon markets scale, without compromising carbon offset quality, through the development of the Core Carbon Principles (CCPs). The CCPs are expected to act as a global benchmark for a high-quality carbon offset. Any uncertainties that remain will hopefully be addressed at COP27, if not sooner. [148]

The ICVCM's purpose is to ensure the voluntary carbon market plays a legitimate role within, and accelerates, a just transition to 1.5 degrees Celsius, and it has released its draft Core Carbon Principles (CCPs), along with an accompanying Assessment Framework and Assessment Procedure (Assessment Framework) for public consultation. Following the public consultation which ends in September 2022, the Assessment Framework is intended to be used to assess carbon-crediting programmes and credit types against the CCPs, commencing in 2023.

The Core Carbon Principles relate to:[149]

- Additionality
- Mitigation activity information
- No double-counting
- Permanence
- Programme governance
- Registry
- Robust independent third-party validation and verification
- Robust quantification of emission reductions and removals
- Sustainable development impacts and safeguards
- Transition towards Net Zero emissions.

Additional attributes comprise:

- The type of mitigation activity
- Authorisation of Article 6 purposes
- Quantified UN SDG impacts
- Adaptation co-benefits

The final CCPs v1.0 together with the finalised Assessment Framework and Procedure, are targeted for March 2023. Carbon offsetting programmes will then be invited to be assessed, with assessment expected to take four to six months. [150]

The Voluntary Carbon Markets Integrity Initiative ('VCMI')

The Voluntary Carbon Markets Integrity Initiative is a multi-stakeholder platform to drive credible, Net Zero aligned participation in voluntary carbon markets.[151] It is developing a Claims Code of Practice to guide credible, voluntary use of carbon offsets and associated claims, and a Provisional Claims Code[152] was published in July 2022. A final version is expected in Q1 2023.[153] Unlike ICVCM, which is aimed at generators of carbon offsets, and ICROA that is aimed at advisers, VCMI is focused on those who generate demand for credits and how they might use credits to meet climate targets.

The UK Voluntary Carbon Markets Forum

The UK Voluntary Carbon Markets Forum was established in April 2021 to operationalise recommendations of the global Taskforce for Scaling Voluntary Carbon Markets, by providing a high integrity market ecosystem that aims to develop verifiable, and effective offset solutions.[154] The Forum is chaired by Dame Clara Furse, with City of London Corporation providing secretariat support. [155]

CONCLUSION

Carbon markets have been around for a few decades, yet ultimately remain in their infancy. Their potential to address the climate crisis and enhance financial returns is transformative.

There are over 70 compliance carbon markets globally that mandatorily require the participation of in-scope companies and governments.

The rapidly growing voluntary carbon markets are benefitting from an ever-increasing focus on corporate social responsibility and ESG. The leading regulated exchange groups have at times (by their own confession) been a little slow to identify the commercial opportunities presented by hosting voluntary carbon markets.

The nascent sovereign carbon markets represent a further opportunity to address the climate crisis at the speed and scale needed to keep global warming below 2 degrees Celsius.

At this early stage of the markets' iteration, there are perhaps more questions than answers:

- Will the billions of U.S. dollars that the regulated exchange groups have already spent on technology, and their decades of experience in building highly liquid, highly regulated, markets, see them overtake today's largely unregulated voluntary carbon marketplaces?
- What impact will the new sovereign carbon offsets established pursuant to Article 6 of the Paris Agreement have on the more market-driven, unregulated, voluntary carbon markets?
- It's surely inevitable that voluntary carbon markets and their participants (particularly the standards, verifiers, rating agencies, market data providers, sellers and exchanges) will become subject to mandatory and detailed regulatory requirements – will this be driven 'top-down' by the likes of CPMI-IOSCO (as the post-2008 financial crisis regulation was) or 'bottom-up' by the CFTC and others? When?
- How will GAAP be updated to account for carbon offsets? At the moment, IAS does not recognise carbon offsets as a financial instruments, which is inhibiting banks' participation in carbon markets.
- Will financial institutions be required to hold more regulatory capital, the more carbon dioxide that they and their supply chains emit (and/or that they finance)?
- Will large corporates become subject to a regulatory obligation to offset their unabatable carbon emissions (including Scope 3 emissions)?
- Will individual countries merge their compliance and voluntary markets? Singapore is already looking into this opportunity.
- Will those voluntary carbon markets underpinned by distributed ledger technology ultimately have any material advantage over those that don't?
- What comes next…? Biodiversity offsets are already happening and rapidly shooting up the corporate agenda.

At Climate Solutions and Simmons & Simmons, we look forward to going on the journey with you.

We welcome any contribution you would like to make to this guide to keep it current, expert and informed. Please drop us a line at info@climatesolutions.global with any suggestions.

APPENDIX 1: DIRECTORY OF LEADING PARTICIPANTS IN THE VOLUNTARY CARBON MARKETS

This directory comprises the following sub-sections:

- Academia and research
- Active regulators and policymakers
- CarbonTech
- Data and index providers
- Exchanges and marketplaces
- Intergovernmental organisations
- Market-led initiatives
- News sources
- OTC intermediaries, introducers and brokers
- Other guides
- Professional services firms and consultants
- Project developers
- Rating agencies and certifiers
- Standards and verifiers
- Trade associations

If you would like to be considered for inclusion in this public directory or included in our confidential register of project developers, sellers and buyers, please email Climate Solutions at info@climatesolutions.global

Academia, research and think-tanks

Entity	HQ country	About
BIONOVA	India	Centre for Climate Resilience
Carbon Tracker	UK	Carbon Tracker is an independent financial think tank that carries out in-depth analysis on the impact of the energy transition on capital markets and the potential investment in high-cost, carbon-intensive fossil fuels.
Kleinman Centre for Energy Policy	USA	Part of Penn University
Trove Research	UK	Specialist data and advisory firm focused on climate policy, carbon markets and the energy transition

Active regulators and policymakers

Entity	HQ country	About
Australia Climate Change Authority	Australia	The CCA is an independent statutory body established under the Climate Change Authority Act 2011 to provide expert advice to the Australian Government on climate change, by conducting regular and specifically commissioned reviews and undertaking targeted climate change research.
City of London Corporation	UK	Provides secretariat support to the UK Voluntary Carbon Markets Forum
Commodity Futures Trading Commission (CFTC)	USA	The mission of the CFTC is to promote the integrity, resilience and vibrancy of the U.S, derivatives market through sound regulation. It recently convened with industry participants to explore how best to regulate voluntary carbon markets.
European Securities and Markets Authority (ESMA)	France	ESMA is an independent EU authority that contributed to safeguarding the stability of the EU's financial system by enhancing the protection of investors and promoting stable and orderly financial markets. It recently published its financial report on the EU carbon market, finding no material issues with the EU ETS. ESMA builds out the detail of EU regulations and directives by publishing 'regulatory technical standards'
European Commission	Belgium	Together with the European Council and European Parliament, the European Commission creates European Union regulations and directives. It is the executive of the European Union.
IOSCO	Spain	The international body that brings together the world's securities regulators and is recognised as the global standard setter for the securities sector.
UK Climate Change Committee	UK	Climate Change Committee (CCC) is an independent, statutory body established under the Climate Change Act 2008. Its purpose is to advise the UK and devolved governments on emissions targets and to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change.

CarbonTech

Entity	HQ country	About
Aeroseed	Nigeria	Reforestation company that uses UAV technology, automation and ecological science to regenerate ecosystems on a global scale.
Agreena	Denmark	Tech company with a multi-sided platform, with access for farmers, farm advisors carbon certificate buyers and more
ClimaFi Foundation / Klabrate	UK	ClimaFi is a new business in development, which will be tokenising projects and creating smart contracts to facilitate the trading of carbon offsets on decentralized exchanges. Its sister organisation, Klabrate, is creating the world's first ecological metaverse.
Cloverly	USA	Our Climate-Action-as-a-Service platform connects the carbon credit infrastructure to businesses, consumers, and organizations for direct contribution to carbon removal, powered by the Cloverly API.
CollectiveCrunch	Finland	A leader in AI for the forestry industry, predicting forest inventory, wood quality and environmental risks
Coorest	Estonia	The NFTrees, Coorest CO2 tokens and DApp provide easy and accessible carbon compensation to businesses and individuals. Coorest's projects include the My Coorest Tree play to earn mobile games, the NovaTerra MMORPG play to earn Metaverse and the Wildlife tokenization project. All of Coorest's solutions are powered by blockchain technology.
Dendra Systems	UK	Environmental technology for ecosystem restoration at scale.
DroneSeed	US	Restoring resilience forests after wildfires
Flash Forest	Canada	Reforestation company that uses drones, automation and ecological science to regenerate ecosystems on a global scale.
Flowcarbon	USA	Flowcarbon will shortly launch its first tokenised carbon offset token, called GNT, for sale to corporates and individuals. It is a bundled token, meaning it is fully

		fungible and can be retired, redeemed or unwrapped. GNT only accepts nature-based carbon offsets that have a vintage no older than 5 years.
Hummingbird	UK	Just acquired by Agreena, Hummingbird uses satellite technology to verify that land is being used in a manner consistent with regenerative farming agriculture practices, to assist with the verification of regen ag carbon credits.
Land Life Company	Netherlands	Technology-driven reforestation at scale
MintCarbon	Canada	Convert your carbon offset into an NFT
Moss	Brazil	Moss provides a range of carbon offset solutions via their Ethereum-based tokenised carbon offsets, called MCO2 tokens, which are listed on some of the largest Web 3.0 exchanges, including as Coinbase, Gemini and Uniswap. Burning one MC02 token on the Moss Carbon Credit platform is equivalent to offsetting one tonne of CO2 footprint, which is made possible by purchasing and protecting land in the Amazon rainforest.
NZT	USA	USA company about to come to market that will be placing Internet-of-Things (IoT) devices on solar panels in multiple solar farms in order to measure and verify the amount of power those panels generate. For each kilowatt of power so generated, a certain amount of carbon dioxide emissions is avoided – that enables the company to create "avoidance" carbon offsets. Those carbon offsets will be tokenised in real time and then offered for sale to large institutional investors and others.
Pachama	USA	Pachama uses AI and remote sensing to verify and monitor carbon capture by forests to help finance conservation and reforestation.
Single.Earth	Estonia	Using natural sciences and blockchain technology, Single.Earth builds accessible and scalable tools to mitigate climate change and biodiversity loss.
Skylab	Germany	AI and advanced aerial data analytics to provide precise digital forest management information.
Sustaincert	Luxembourg	Founded in 2018 by Gold Standard as a standalone company, Sustaincert is a carbon impact verification organisation developing digital verification solutions to bring credibility to climate action.
Toucan Protocol	Switzerland	Toucan Protocol builds infrastructure for carbon markets to finance climate crisis solutions. Its mission is to make DeFi work by introducing a new currency: programmable carbon. In essence, it turns verified carbon credits into crypto via its own proprietary Toucan Bridge. It's the first generalised bridge to tokenise carbon credits.
Watershed	US	All-in-one carbon platform, including carbon accounting and advisory.
VerifyC	UK	Early-stage business that will measure and verify carbon sequestration in a regenerative agriculture context.

Data and index providers

Entity	HQ country	About
Albo Climate	Israel	Albo Climate applies AI to satellite imagery to precisely quantify carbon sequestration.
AlliedOffsets	UK	Data transparency for carbon offsetting. Large database of previous transactions and carbon offset buyers.
Climate Action Data Trust (CAD Trust)		Established by the World Bank, trade association IETA and the government of Singapore, CAD Trust is a carbon credit platform that seeks to integrate all of a carbon credit project's data in one place and make is publicly available for free.
Downforce Technologies	UK	Downforce Technologies seeks to bring transparency, consistency and accuracy to the measurement of natural capital assets. Its data services platform bridges the data gap between national policies and on-the-ground implementation of nature-based solutions to achieve global Net Zero and Biodiversity Net Gain goals.
Ember	UK	For the latest data on EU ETS and UK ETS carbon prices
IHS Markit	UK	HIS Markit's Global Carbon Index is the first benchmarking and liquid investable index to track carbon credit markets globally.
Quantum Commodity Intelligence	UK	Daily newsletter, 50 and growing voluntary and regulated market price assessments delivered via API feed and based on trade, charts, data insights and fundamentals.

Refinitiv	USA	According to Refinitiv the total compliance market size in 2020 was US$261bn, representing the equivalent of 10.3Gt CO_2 traded on the compliance markets in 2020.
Restor	Switzerland	The global hub for nature restoration. Thousands of local communities, NGOs, governments and businesses share and monitor their projects on Restor, the largest network of conservation and restoration sites across the globe.
S&P Global	USA	The S&P CARBEX indices reflect the value of different types of voluntary carbon credits and transparency in voluntary carbon credit markets. The S&P GSCI Global Voluntary Carbon Liquidity Weighted Index is the first-to-market benchmark for the current performance of global voluntary carbon futures markets. The S&P 500 Carbon Efficient Index is designed to measure the performance of companies in the S&P 500, while overweighting or underweighting those companies that have lower or higher levels of carbon emissions per unit of revenue

Exchanges and marketplaces

For a non-exhaustive list of exchange traded ESG and environmental contracts on-exchange at major regulated exchanges, see this list published by FIA, the global financial markets trade association, in September 2020.[1]

Entity	HQ country	About
Abatable	UK	Sells verified and unverified carbon offsets. When selling unverified credits (e.g. because no standard exists for that type of credit), they conduct their own quality assessment.
ADGM	Abu Dhabi	Announced on 29 March 2022, ADGM, the international financial centre in Abu Dhabi, will launch a fully regulated voluntary carbon trading exchange and clearing house. Partnering with AirCarbon Exchange (ACX) and using its DLT technology, ADGM will produce digital tokens for carbon credits, which can be spot traded. There are also plans to offer futures products in due course. ACX Clearing Corporation will settle and clear all digital tokens using blockchain smart contracts.
AEX	Hong Kong	AEX is seeking to create a transparent and neutral forward trading facility for hedging power and emissions in China, and to provide price benchmarks according to international standards.
AirCarbon Exchange (ACX)	Singapore	Launched in 2019 as a digital exchange platform for airlines to trade carbon credits. It is backed by German exchange group, Deutsche Boerse. ACX is a global carbon exchange using distributed ledger technology on a traditional trading architecture. It leverages blockchain architecture to create securitized carbon credits. ACX is a platform. It does not broker trades and does not offer consultancy services to projects.
Australian Carbon Exchange	Australia	In development.
Bursa Malaysia	Malaysia	Will be launching a voluntary carbon market on its exchange later this year, for verified carbon offsets. BM will adopt the Verra standard. There will be distinct product categories for carbon offsets derived from nature-based solutions and technologies that reduce or remove carbon emissions. The exchange will also label products to differentiate between carbon offsets sources in Malaysia and globally. Will use an auction methodology for price discovery.
carbonABLE	France	carbonABLE is a new DeFi based marketplace focused on rewilding. NFTs are created for each project and sold on their launchpad.
Carbonext	Brazil	Carbonext develops and monitors several REDD+ projects in the Amazon, and sells carbon offsets related thereto.
Carbonplace	UK	A new blockchain-based carbon credit transaction network launching in 2023, co-founded by a group of banks Comprising BBVA, BNP Paribas, CIBC, Itau Unibanco, National Australia Bank, NatWest Group, SMBC, Standard Chartered and UBS
Carbon Trade eXchange (CTX)	UK	CTX is a leading global spot trading platform for voluntary carbon credits. Launched in 2009, CTX is the world's first digital offsetting exchange for spot price voluntary carbon credit trading. Unlike other carbon exchanges, CTX is a member-based spot exchange with participants ranging from individual brokers and project developers to large corporations.
CEEZER	Germany	Rethinking the voluntary carbon market as a digital-first carbon bank
Climate Impact X (CIX)	Singapore	Climate Impact X is a joint venture from Asia's largest lender DBS Group, British bank Standard Chartered, Singapore state investor Temasek and market operator Singapore Exchange. (SGX).
Climate Trade	Spain	Climate Trade connect companies willing to offset their carbon emissions to a large number of verified environmental projects.
CME Group	USA	In 2021 and 2022, CME listed three new environmental, social and governance-related futures contracts in its capacity as a DCM: (1) CBL Global Emissions Offset

[1] See the appendix from page 16 onwards: https://www.fia.org/sites/default/files/2020-09/FIA_WP_Sustainable_Finance.pdf. Note this list is now dated, includes products other than carbon offsets and is non-exclusive. It is provided for indicative purposes only.

		(GEO) futures; (2) Naturebased Global Emissions Offset (N-GEO) futures contracts; and (3) CBL Core Global Emissions Offset (CGO) futures.
Ecologi	UK	Through their unique platform that supports Gold Standard and VCS solutions, Ecologi have funded the planting of over 50 million trees.
EEX	Germany	EEX, a subsidiary of Deutsche Boerse, enables participants to trade spot and derivative instruments in compliance and voluntary markets under one roof, with cross-listings at Nodal Exchange in North America for global availability. It also acts as settlement agent for certain sovereign carbon offsets and operates the German fuel emissions trading scheme.
Flowcarbon	USA	Raised US$70m in May 2022 from A16z and others to tokenise carbon credits and build an on-chain market. Founded by Adam Newman, co-founder of WeWork.
Good Carbon	Germany	We offer access to existing and emerging projects and related carbon streams across soil, and forest, plus high-quality, Blue Carbon-based projects in partnership with Oceans 2050.
Guangzhou Futures Exchange (GFEX)	China	GFEX will develop carbon futures products that are expected to be priced in RMB and foreign currencies and offered to qualified foreign institutional investors, domestic institutional and retail investors.
Hong Kong Exchange (HKEX)	Hong Kong	Core Climate is an international marketplace for the trading of carbon credits to support the world's net-zero transition. The platform allows participants to source, hold, trade, settle and retire credits sourced from certified carbon projects around the world.
KlimaDAO	Germany	Selling carbon-backed crypto rather than carbon offsets. Every KLIMA token is backed by a real-world carbon asset. Tokens are used to offset carbon emissions, interact with DeFi applications, and get exposure to the rapidly growing global carbon market.
IATA Aviation Carbon Exchange (ACE)	UK	ACE is a centralised marketplace for CORSIA-eligible emission units where airlines and other aviation stakeholders can trade CO2 emission reductions for compliance or voluntary offsetting purposes. It is powered by CBL, an Xpansiv market.
Intercontinental Exchange (ICE)	USA	ICE lists a number of sustainability-linked products involving carbon trading, renewables and sustainable indices47, including certified emission reduction carbon offset units. ICE also recently launched a Nature-Based Solutions carbon credit futures contract (NBS future). The NBS future physically delivers verified carbon unit credits certified under the VCS Agriculture, Forestry and Other Land Use Projects with Climate, Community and Biodiversity Certification, with vintages between January 1, 2016, to December 31, 2020.
Lidviki	British Virgin Islands	A Regenerative Finance 'ReFi' platform focused on carbon technologies that help individuals and companies to reach a net-zero carbon footprint. Their platform comprises of a primary market venue, Carbonstore, and a secondary market venue, CarbonDEX in addition to carbon offsetting services. Their core products include tokenized Carbon Credits, Carbon Forwards and Carbon-yielding NFTs, that they issue for themselves and for third parties.
London Stock Exchange Group's Voluntary Carbon Market	UK	At COP26, LSE announced the intention to develop a new marker offering to support *publicly traded carbon funds* focused on investing in climate mitigation projects. The VCM will be a designation for closed-ended investment funds that are listed or admitted to the exchange's markets. The LSE VCM was established late 2022 and enables listed companies and funds which invest in projects that generate qualifying voluntary carbon credits to apply for admission to the market. See https://docs.londonstockexchange.com/sites/default/files/documents/VCM-facsheet-october-2022.pdf.
Nasdaq	USA	Nasdaq has launched the world's first index family focused exclusively on tracking the price of carbon removal. With three new commodity reference price indexes, based on Puro.earth's Carbon Removal Certificates (CORCs), Nasdaq aims to support the growth of the voluntary carbon removal market by creating the transparency needed to encourage investment and support project financing decisions. It also provided its technology to Climate Impact X and is the parent company of Puro.earth.
NCX	USA	America's forest carbon market
Nori	USA	A marketplace for carbon removal offsets
Patch	USA	A marketplace through which companies can purchase as little as a gram or as much as giga-tonnes of carbon removal from reputable and trust carbon removal projects.
Puro.earth	Finland	The world's first B2B marketplace, standard and registry solely focused on carbon removals. A subsidiary of Nasdaq.
REDD.plus	UK	A marketplace selling REDD+ sovereign carbon offsets. REDD.plus was created by the Coalition for Rainforest Nations to provide businesses and individuals access to purchase the high-quality emissions reductions generated by the REDD+

		national programs under the Paris Agreement around the world. It manages the process to create RRUs and the platform for their purchase. REDD.plus will track the life cycle of each RRU from issuance to retirement and reports this data to the UNFCCC, making those units part of the Global Carbon Accounting system
Riverse	France	Riverse is an impact measurement, verification and monetization platform for carbon-negative circular economy projects in Europe.
Salesforce	US	Salesforce launched their Net Zero Marketplace in September 2022 together with a range of leading brokers and third-party ratings providers as inaugural partners.
Sustaim	Germany	Blockchain based carbon trading platform, focused on transparency.
Toucan	Switzerland	The world's most liquid tokenized carbon credit exchange
The Voluntary Carbon Marketplace (TVCM)	UK	Launched in 2022, TVCM is an open, independent, trading venue for project developers, brokers, corporate and institutional buyers, operated by IncubEx underpinned by technology Trayport.
Xpansiv	US	Xpansiv is the global marketplace to trade various data-driven, ESG-inclusive commodities. The exchange prices carbon, energy and water-based transactions. Xpansiv market CBL is the world's largest spot exchange for carbon offset trading.

Intergovernmental organisations

Entity	HQ country	About
The Coalition for Rainforest Nations	USA	The Coalition for Rainforest Nations (CfRN) assists tropical governments, communities and indigenous people to responsibly manage their rainforests. Healthy rainforests protect against a changing climate, generate needed biodiversity and provide safe habitats. CfRN started and led the negotiations for the REDD+ mechanism, which is now implemented by over 90% of the world's rainforest countries. The United Nation's REDD+ Mechanism was launched by Coalition members in 2005 to incentivize rainforest conservation and contribute to the battle against climate changes. After a decade of work, the REDD+ Mechanism was enshrined as a key part of the Paris Agreement.
UN Climate Change	Germany	The United Nations Framework Convention on Climate Change (UNFCCC) secretariat (UN Climate Change) is the United Nations entity tasked with supporting the global response to the threat of climate change. The UNFCCC convention has near universal membership (194 parties) as is the parent treaty of the 2015 Paris Agreement and the 1997 Kyoto Protocol.
The World Bank	USA	The World Bank is an international financial institution that provides loans and grants to the governments of low- and middle-income countries for the purpose of pursuing capital projects. The World Bank's International Finance Corporation (IFC) division has launched a project to use blockchain technology to register carbon removal projects and to turn carbon offsets into tokens that cryptocurrency investor can use for the purposes of speculative investment.

Market-led initiatives

Entity	HQ country	About
The Integrity Council for Voluntary Carbon Markets (ICVCM)	USA	Successor to the Taskforce on Scaling Voluntary Carbon Markets. The ICVCM's purpose is to ensure the voluntary carbon market plays a legitimate role within, and accelerates, a just transition to 1.5 degrees Celsius
Taskforce on Scaling Voluntary Carbon Markets (TSCVM)	USA	led by former Bank of England governor Mark Carney, created a blueprint of the target marketplace,[156] which it published in November 2020. Now superseded by the ICVCM
The Voluntary Carbon Markets Integrity Initiative (VCMI)	UK	Launched in 2021, VCMI is funded in part by the UK government and is creating a new Code of Practice that can help evaluate corporate climate goals and the use of carbon offsets to distinguish verifiable claims from greenwashing.
UK Voluntary Carbon Markets Forum	UK	The UK Voluntary Carbon Markets Forum was established in April 2021 to operationalize recommendations of the TSVCM, by providing a high integrity market ecosystem that aims to develop verifiable and effective offset solutions. The Forum is chaired by Dame Clara Furse.

News sources

Entity	HQ country	About
Abatable	UK	Abatable typically post between 1 and 3 blogs a month about carbon markets and their regulation.
CarbonBrief	UK	Covers climate science, energy and policy, with a focus on data-driven articles
Carboncredits.com		Comprehensive web site covering all things carbon credit-related
Climate and Capital Media	USA	Climate and Capital Media is a global media company that connects investors and entrepreneurs working on climate change solutions via its news service and through its professional networking platform called 'Climate & Capital Connect' that fosters bilateral conversations between participants in its climate ecosystem.

Climate Home News		Climate Home News aims to be the go-to media outlet for a global community of doers and thinkers seeking to understand the political, social and economic drivers of the climate crisis and climate action.
Climate Tech VC (CTVC)	UK	CTVC is a leading source on the new climate economy, Their data-driven perspectives power 30,000+ investors and operators to innovate on climate.
Cointelegraph		For news on digital assets, including tokenized carbon credits
Ecosystemmarketplace.com	USA	A leading global source of information on environmental finance, markets and payments for ecosystem services. A Forest Trends initiative.
ESG Investor	UK	ESG Investor aims to be the practical information hub for owners looking to invest successfully and sustainably for the long term. They share news, insights and data via their web site.
ESG Today	Israel	ESG Today dedicated to covering Environmental, Social and Governance (ESG) issues for investors
Indexologyblog.com		A blog relating to indices
Investorpedia.com		A leading global source of financial content on the web
Quantum Commodity Intelligence	UK	Daily newsletter, 50 and growing voluntary and regulated market price assessments delivered via API feed and based on trade, charts, data insights and fundamentals.

OTC intermediaries, introducers and brokers

Entity	HQ country	About
Anew	US	Element Markets and Bluesource merged to create Anew, an intermediary offering a range of carbon reduction and renewable energy credit solutions.
ClimaFi Foundation	UK	New business in development. ClimaFi secures downstream credits for corporates by direct investment in high quality verified carbon credits.
Climate Impact Partners	UK	Among other services, Climate Impact Partners build comprehensive carbon offsetting programs for clients.
Climate Neutral Group (now part of Anthemis)	Netherlands	A B Corp, focused on Gold Standard and VCS-verified projects.
Climate Solutions	UK	**Publisher of this guide.** Climate Solutions helps companies and infrastructure projects raise capital in private markets from institutional investors, within its 5 climate-focused investment themes. Numerous of its clients are creating and seeking to sell carbon offsets in the voluntary carbon market and sovereign carbon market.
Flowcarbon	USA	Flowcarbon offer a range of corporate solutions, including spot and forward credit purchases, project origination and offtake, strategic corporate services and tokenization of carbon credits
Redshaw Advisors	UK	A carbon risk management and procurement firm that provide a route to market for all carbon emissions products
Respira	UK	An impact-driven carbon finance business that offers carbon credits. Respira enters into long-term, large volume offtake contracts with carbon projects globally, in turn enabling buyers to progressively achieve emissions reductions targets.
SCB Group	Switzerland	All in one service provider, including carbon accounting, decarbonisation strategy advice and compensation of Scope 1, 2 and 3 emissions, including by way of verified carbon offsets.
Strive	USA	Strive is a brand by Vertis Environmental Finance, the oldest emissions trading firm in Europe. Strive has traded over 1 billion carbon units over more than 20 years.
STX	Netherlands	A trader of environmental commodities, including carbon offsets, Energy attribute certificates, renewable energy certificates, biofuels and renewable gas.

Other guides

Entity	HQ country	About
Carbon Offset Guide		A guide for companies and organisations seeking to understand carbon emissions. Also, an educational resource for technical experts in academia and government. An initiative of the Greenhouse Gas Management Institute and the Stockholm Environmental Institute.
Climate Trade		Climate Trade connect companies willing to offset their carbon emissions to a large number of verified environmental projects.

Professional services firms, consultants and advisors

Entity	HQ country	About
ACT Commodities	Netherlands	Since 2009, ACT has become a trusted brand in high-impact climate projects, green electricity markets, renewable energies and energy efficiency, emission allowances and carbon offsets. With a growing portfolio of over 70 products in 40 plus countries, ACT's consultants in Amsterdam, Shanghai, New York, Paris and

		Singapore deliver bespoke solutions backed up by unparalleled market knowledge.
Agendi	USA	Agendi offer a range for solutions focused on assessment, strategy, reporting and projects.
BlockC	Brazil	BlockC offer a range of solutions, from emissions inventory to support in structuring sustainable financing.
Carbon Clarity	Monaco	An ESG consultancy aiding clients track, measure and managing sustainability data
The Carbon Trust	UK	Pioneering decarbonization for over 20 years, they draw on the experience of over 300 experts internationally to accelerate progress and provide solutions to the climate crisis.
Clifford Chance	UK	One of the world's largest law firms, Clifford Chance advises clients in all aspects of regulatory and voluntary carbon market trading, regulatory requirements of trading schemes and investments into carbon reduction projects and project developers. They act for a wide variety of project developers and investors, financial participants and corporates.
ClimatEU	Germany	Job board, WhatsApp group, community directory, capital raising.
Climate Solutions	UK	**Publisher of this guide**. Climate Solutions helps companies and project developers to raise capital in private markets from institutional investors, within its 5 climate-focused investment themes. Numerous of its clients are creating and selling carbon offsets in the voluntary carbon market and sovereign carbon market through Climate Solutions.
Darcy Partners	USA	A consultancy and community platform, most focused on oil and gas
EY	UK	EY's Net Zero Centre brings together EY's strategic insight, experience, IP and deep knowledge in energy and climate change leadership to solve the big problems ahead as we move towards net zero emissions by 2050.
First Climate	Germany	With over twenty years of experience and hundreds of diverse clients, First Climate is a leading service provider of climate protection solutions and renewable energy. We support private and public sector organizations in achieving their climate and sustainability objectives.
Forest Carbon Works	USA	Supporting small landowners with technical consulting and development services for forest carbon offset projects.
Green Eco Land		Green Eco-Land is a European company that provides environmental consulting services in Europe, Latin America, Africa and Asia. Green Eco-Land designs and/or implements solutions for economically viable, socially acceptable and environmentally sustainable human development.
Iceblog	USA	A platform for transparency emissions reporting and climate disclosures.
Incubex	USA	Incubex is a unique product and business development firm in global environmental markets, climate risk and related commodities – building tomorrow's markets. IncubEx built the world's largest offering for exchange-listed environmental products.
Jones Day	USA	International law firm Jones Day has advised leading global financial services firms on the purchase of carbon offsets to meet voluntary greenhouse gas emission targets.
KPMG	UK	KPMG has published a number of guides relating to carbon markets and their regulation.
McKinsey	UK	McKinsey has published a number of guides and podcasts relating investing in carbon markets
Norton Rose Fulbright	UK	International law firm Norton Rose Fulbright's carbon markets practice has a deep understanding of the voluntary carbon market, having been advisors to both purchasers and sellers of voluntary carbon credits, as well as developers of carbon projects across a large range of jurisdictions, for almost 20 years.
Shearman & Sterling	USA	International law firm Shearman & Sterling have published a number of guides relating to global carbon credit trading, together with various regulatory updates. A member of the Net Zero Lawyers Alliance.
Sidley Austin	USA	International law firm Sidley Austin have published a number of guides relating to global carbon credit, together with various regulatory updates.
Simmons & Simmons	UK	**Publisher of this guide**. International law firm Simmons & Simmons has a cross-functional team of seven lawyers in London focused on advising clients in relation to carbon transactions, the regulation of carbon markets, as well related project development and financing matters.
South Pole	Switzerland	South Pole develops and implements comprehensive strategies that turn climate action into long-term business opportunities. Its team of 1,000+ experts have developed projects, as well as designed innovative tools across finance, climate neutral APIs, and carbon offset solutions to help clients reach their carbon mitigation and Net Zero goals.
Stroock & Stroock & Lavan	USA	**Contributor to the US regulatory sections of this guide.** With offices across the US, Stroock provides transactional and litigation guidance to multinational

		corporations, financial institutions, investment banks and private equity firms in the US and abroad.
White & Case	USA	International law firm White & Case have published extensive articles relating to carbon markets, with a strong focus on the Taskforce on Scaling Voluntary Carbon Markets.

Rating agencies and certifiers

Entity	HQ country	About
BeZero Carbon	UK	A global rating agency for the voluntary carbon markets, designed to allow all market participants to price and manage risk.
Calyx Global	USA	Calyx Global rates carbon credits. Our ratings tell you how much you can rely on a credit's claims of impact on CO2/climate, biodiversity, communities, and more.
Carbon Offset Certification	Switzerland	An independent certification standard for climate neutral commodity transactions and services, with a particular focus on the global commodity and maritime industry.
Sylvera	UK	Backed by a variety of leading UK VCs, Sylvera provides independent and in-depth carbon ratings. They do not sell carbon credits and are not paid by developers to rate projects.

Standards and verifiers

Entity	HQ country	About
American Carbon Registry (ACR)	USA	Founded in 1996 in the USA, was the first standard developer in the world. ACR oversees the registration and verification of carbon offset projects, following approved carbon accounting protocols or methodologies, and issues offsets on a transparent registry system.
Bureau Veritas	France	Bureau Veritas validates and verifies carbon offsetting and removal initiatives, proving the legitimacy of carbon credits and helping companies achieve carbon neutral and net zero operations.
Climate Action Reserve (CAR)	USA	Founded in the USA in 2001, establishes high quality standards for carbon offset projects, oversees independent third-party verification bodies, issues carbon credits generated from such projects, and tracks the transaction of credits over time in a transparent, publicly accessible system.
The Carbon Offset and Reduction Scheme for International Aviation (CORSIA)	USA	The standards adopted by the UN for aviation carbon neutrality objectives.
The Climate, Community and Biodiversity Standards (CCB Standards)	USA	The Climate, Community and Biodiversity Standards (CCB Standards) evaluate land management projects from the early stages of development through implementation. The CCB Standards were developed by the CCBA and have been managed by the Verra since November 2014.
The Gold Standard	Switzerland	Founded in Switzerland in 2003, was established as a best practice standard to ensure projects that reduced carbon emissions featured the highest levels of environmental integrity and contributed to sustainable development. More emerging markets-focussed than Verra
International Carbon Reduction and Offset Alliance (ICROA)	Switzerland	The ICROA Code of Best Practice aims to define international best practice for offset-inclusive carbon management and represents the minimum requirements that all ICROA accredited organisations must meet. The ICROA Code of Best Practice is applicable to voluntary carbon management services provided by ICROA Accredited organisations. It is a non-profit housed within the International Emission Trading Association (IETA)
Nori	USA	A carbon offset project standard for generating carbon credits from changes in soil management and crop production practices at farm-scale – US only
Plan Vivo	UK	The Plan Vivo Standard provides a support framework for smallholders and rural communities, principally in the developing world, to manage their natural resources more sustainably.
Puro.earth	Finland	The world's first B2B marketplace, standard and registry solely focused on carbon removals
UN Framework Convention on Climate Change (UNFCCC)	USA	Standards and verification for sovereign-issued carbon credits
Verra	USA	Previously known as **Verified Carbon Standards**, Verra was originally founded in 2009 by a collection of US business and environmental leaders who saw a need for greater quality assurance in voluntary carbon markets.

Trade associations

Entity	HQ country	About
FIA	USA	Leading global derivatives financial markets trade association focused on exchange-traded and centrally cleared derivatives.

International Emissions Trading Association (IETA)	Switzerland	IETA's mission is to (i) empower business to engage in climate action, advancing the objectives of the UNFCCC and the Paris Agreement as informed by IPCC science and (2) establish effective market-based trading systems for GHG emissions and removals that are environmentally robust, fair, open, efficient, accountable and consistent across national boundaries.
International Swaps and Derivatives Association (ISDA)	USA	Leading global derivatives financial markets trade association that grew out of OTC markets. Published two excellent papers on carbon markets and their regulation that are widely reproduced and referenced in this guide.

ENDNOTES

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[111] https://www.legislation.gov.uk/uksi/2022/1336/made

[112]The Greenhouse Gas Emissions Trading scheme Auctioning Regulations 2021 at https://www.legislation.gov.uk/uksi/2021/484/introduction and the Recognised Auction Platforms (Amendment and Miscellaneous Provisions) Regulations 2021 https://www.legislation.gov.uk/uksi/2021/494/regulation/2/made which gives the FCA an oversight role.

[113] Regulation (EU) No. 1031/2010 of 12 November 2010 on the timing, administration and other aspects of auctioning of greenhouse gas emission allowances pursuant to Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community. See https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02010R1031-20191128 for a consolidated text.

[114] https://www.lawcom.gov.uk/project/digital-assets/

[115] https://www.investopedia.com/terms/c/carbon_credit.asp

[116] Clean Air Act (42 USC §7651b, section 403(f))

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[138] Article 10, Commission Delegated Regulation (EU) 2017/565 of 25 April 2016 supplementing Directive 2014/65/EU of the European Parliament and of the Council as regards organisational requirements and operating conditions for investment firms and defined terms for the purposes of that Director (the MiFID Org Reg), a consolidated version of which is available at EUR – Lex – 02017R0565 – 20220802 – EN – EUR – Lex (europa.eu)
[139] Which may, just about, be caught as 'measures' within s (10) of Section C of Annex I of MiFID II – see by analogy to crypto https://service.betterregulation.com/sites/default/files/The-regulation-of-OTC-crypto-derivatives-under-MiFiD-II.pdf: 'Given the potential for them to fall under multiple Relevant Sections (of Section C) as well as the position adopted by the FCA, it appears prudent to adopt the viewpoint that at least cash-settled crypto-derivatives fall – if not squarely, then just about – within the regulatory perimeter.'
[140] '(4) Options, futures, swaps, forward rate agreements and any other derivative contracts relating to securities, currencies, interest rates or yields, emission allowances or other derivatives instruments, financial indices or financial measures which may be settled physically or in cash'
[141] https://www.isda.org/a/38ngE/Legal-Implications-of-Voluntary-Carbon-Credits.pdf
[142] 'Emission allowances are not currently regulated by the FCA' (statement as at 7 June 2022): https://www.fca.org.uk/scamsmart/carbon-credit-scams#:~:text=Because%20carbon%20credits%20are%20not,Services%20Complaints%20and%20Compensation%20Scheme
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[146] https://www.whitecase.com/insight-alert/voluntary-carbon-markets-blueprint
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[148] https://www2.deloitte.com/uk/en/focus/climate-change/zero-in-on-carbon-offsetting.html?gclid=Cj0KCQjwrs2XBhDjARIsAHVymmRFko_sJFlzqWsH4SsSHh0p3a_sW73o97pCzbLtaxiwQEeBxe-Mtu4aAhbUEALw_wcB
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