QUANTUM COMMODITY INTELLIGENCE

SPECIFICATION AND ASSESSMENT GUIDE FOR THE VOLUNTARY CARBON MARKET

1. Background

QCI's assessments of carbon offsets reflect a range of projects and project types designed to bring price transparency to this burgeoning market. Carbon offsets are typically demarcated into three types – those that reduce emissions, those that avoid them and those that remove them.

With thousands of companies pledging net zero targets or goals to cut emissions of greenhouse gases, many plan to rely on offsetting to mitigate the climate impact of hard-to-abate sectors.

Over the past decade several standards have emerged and have been embraced by the industry. Typically these govern the methodologies that project developers must follow and outline rules for validation and verification. They also typically issue and retire credits, and operate a registry.

As there are thousands of projects with a growing number of standards, QCI has devised project-specific assessments for the largest projects that sell offsets into the market as well as baskets of projects to help its clients assess the value of what they are buying and selling.

2. Broad methodological principles

QCI adheres to a set of key principles when making its assessments. Those are:

- to reflect trades, transacted at arms-length in an open and transparent manner;
- in the absence of trade, to reflect value lying between firm bids and offers;
- in the absence of physical data, to reflect prices in relation to liquid derivatives on the last known value; and
- to ensure data is verifiable with market sources and provided by recognised buyers, sellers and intermediaries.

3. Data collection

QCI carbon credit assessments are derived from data collected in the marketplace in the form of bids, offers and trades in both the OTC and exchange market (trade information).

QCI has established relationships with a growing number of intermediaries, buyers and sellers and has signed non-disclosure agreements with several of these in order to collect more data.

This data is communicated directly to the editorial team in Paris, Dubai and London by buyers, sellers and intermediaries throughout the day via email, instant messaging and by phone.

The data submitted is in the form of outright indications, price spreads to futures contracts or price spreads to other projects or project types.

The data is then analysed against liquid futures instruments and time adjusted via static spreads on days where volatility exceeds 5%.

4. Data analysis

When assessing the data QCI follows four key principles: Verification, Normalisation, Repeatability, Prevailing value.

Prevailing value

4.1 Verification - QCI makes every effort to verify trade information to ensure it is open to the market, executable by the majority of the marketplace and transacted at an arm's length. QCI recognises the challenge of verifying information individually and undertakes to do so with all price submitters to validate the information is correct. This may be done electronically and by telephone.

4.2 Normalisation - As many indications will not be heard at exactly the time in question, QCI uses three key principles to normalise market information heard prior to the timestamp in question. Information heard after the timestamp will not be used. Those principles are time of trade information, specification of the product, and volume.

4.2.1 Time – On days where there is excess volatility in the marketplace (>5% from the time of trade to the assessment stamp at 1500-1530 London time) trade information may be normalised to price movement in a more liquid asset class, such as futures on an exchange.

4.2.2 Specification - Each assessment published by QCI has its own list of standard specifications to reflect a project type, a project type in a geographical location, a project type according to a specific standard and individual projects. QCI may use trade information outside the scope of these parameters to adjust the price of assessments. This includes using price information for certain vintages to determine the price of other vintages of the same project or project type, or the same vintage of similar projects.

4.2.3 Quantity - Each assessment has a defined minimum and maximum quantity that QCI considers as reflective of market size. QCI reserves the right to normalise smaller or larger deals outside of this range to within the specified range in consultation with the marketplace.

4.3 Repeatability - Where market data is conflicting, QCI applies a test of repeatability to determine fair value. As such, firm and transparent bids and offers closer to the timestamp will be considered ahead of trades executed earlier in the day. Where two trades for the same volume are executed at the same time, QCI may use a test of repeatability to determine which one reflects better fair value in consultation with the marketplace.

4.4 Prevailing value - QCI uses a concept called "prevailing market value" to determine whether trades reported represent fair value. Conceptually, the prevailing value is the theoretical value of the commodity in the absence of any market information. In some cases, it will be the same flat price as per the previous day, while in others it will be in relation to a more liquid exchange-contract in the event that the assessment has a close relationship to the futures contract.

5. Clip size

Each assessment has a typical clip size to reflect where liquidity is pooled and this is displayed both on the assessment page and in this document. Deal sizes often have a significant impact on price in the wholesale carbon offsets market.

6. Timestamp

All assessments are timestamped at 1500-1530 London time.

ASSESSMENTS

1. Introduction

Quantum publishes 12 types of carbon offsets designed to aid price discovery in a market that has a plethora of standards, schemes and project types.

The value of offsets is often determined by the project or the project type, the volume bought and sold, the geography of the project, the standard issuing the credit, the period in which the reduction or avoidance occurred (vintage) and even the project developer.

Therefore, unlike other commodities or asset classes, the voluntary offset market cannot be defined in a handful of assessments.

As QCI assesses baskets of projects, or project types, in each case the cheapest project or project type sets the price.

QCI acknowledges this has limited use and to provide greater transparency, QCI has broadened its assessment suite to include more specific criteria to improve price transparency.

2. Classifications of offsets assessed

The classifications applied by QCI include:
Exchange Based
Primary REDD+
Secondary REDD+
Nature-based Removals
Improved Forest Management
Biochar
Renewable Energy
Clean Cookstoves
Industrial Gas
Kyoto Markets
Quantity Premiums
Crypto Assets
Below is a summary of each classification

Exchange Based

These comprise of the most common spot and futures contracts traded in the market and the assessment reflects the value at 1500-1530 London time each day. Data is taken from a host of sources, including exchanges and the OTC market. Typical clip sizes of 5,000 t are reflected.

They include:

Corsia Eligible Offsets (CEO) that reflect carbon credits eligible for the International Civil Aviation Organization's Corsia programme. Under ICAO, airlines have pledged to halt the growth of emissions in the sector. This is a major source of demand for offsets and the full eligibility criteria can be found at https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx.

Nature Based Offsets (NBO) that originate from reducing or avoiding emissions from the Agriculture, Forestry and Other Land Use (AFOLU) sector with additional Climate, Community and Biodiversity (CCB) accreditation from the Verra emissions registry. AFOLU requirements cover a wide range of project types, from Improved Forest Management and Avoided Deforestation (also known as REDD) to Wetlands Restoration and Conservation as well as the Avoided Conversion of Grasslands and Shrublands. All eligible AFOLU project types are considered such as REDD/REDD+, no till farming, wetland management, soil sequestration (including biochar), reforestation and afforestation projects.

Tech Based Offsets (TBO) that represent emissions avoided or reduced from the technology- based sector that are ineligible for Corsia registration. Such projects include renewable energy and landfill gas.

Clean Cookstoves Offset (CCO) that represent the value of a voluntary carbon credit produced by clean cookstove projects under the Verified Carbon Standard (VCS) or the Gold Standard (GS), with at least five UN Sustainable Development Goals (SDGs).

Primary REDD+

These represent five-year emission reduction purchase agreements (ERPAs) for avoided deforestation (REDD+) projects from Brazil, Africa and Southeast Asia, covering different deal sizes (100,000 tonnes over five years; 500,000 t; 1 million t).

They are based on a survey of the primary market, where project developers negotiate deals directly with buyers before emissions vintages are issued or projects are officially registered.

Each assessment reflects an average of vintages from year minus one (eg, in 2023, this corresponds to 2022) up to and including year plus three (eg, in 2023, this is 2026), and roll every year at the start of January. Verified Carbon Standard (VCS) credits with expected Climate, Community & Biodiversity (CCB) Gold eligibility are reflected.

List of assessments:

Brazil REDD+ 5-year ERPA 100kt
Africa REDD+ 5-year ERPA 100kt
Asia REDD+ 5-year ERPA 100kt
Brazil REDD+ 5-year ERPA 500kt
Africa REDD+ 5-year ERPA 500kt
Asia REDD+ 5-year ERPA 500kt

Brazil REDD+ 5-year ERPA 1 mt
Africa REDD+ 5-year ERPA 1 mt
Asia REDD+ 5-year ERPA 1 mt

Secondary REDD+

These assessments reflect the price of projects that protect standing forests and are issued by the Verified Carbon Standard (Verra), the dominant standard in the space, and that are traded over-the-counter. Quantum currently assesses the value of ten well-known REDD+ projects situated in Brazil, Cambodia, the Democratic Republic of Congo, Indonesia, Peru and Zimbabwe. They are:

Rimba Raya (VCS674)
Kariba (VCS902)
Mai Ndombe (VCS934)
Cordillera Azul (VCS985)
Tambopata (VCS1067)
Envira Amazonia (VCS1382)
Katingan (VCS1477)
Keo Seima (VCS1650)
Southern Cardamom (VCS1748)
Rio Anapu (VCS2252)

For each project, we assess a range of emissions vintages, ranging from the period before 2016 all the way to the year 2021. The range will be progressively extended as new vintages start trading. Typical clip sizes of 20,000 t are reflected.

Other assessments in this category include:

VCS REDD+ CCB Gold project and vintage-specific assessments. This assessment represents a numerical average of the ten REDD+ projects listed above. The projects all meet Verra's Climate, Community & Biodiversity Standards, the highest possible distinction for social and biodiversity co-benefits in forest projects. Prior to 26 July 2023, only five projects were considered in the average: Rimba Raya (VCS674), Kariba (VCS902), Envira Amazonia (VCS1382), Katingan (VCS1477) and Southern Cardamom (VCS1748).

VCS Blue carbon represents the value of VCS credits created from mangrove restoration and reforestation and blue carbon projects, where emission reductions took place from 2016 onwards.

Nature-based Removals

These assessments reflect the value of carbon removals in the forestry sector from three different standards: Verified Carbon Standard (VCS), Gold Standard (GS) and American Carbon Registry (ACR).

We assess the following categories of prices:

Afforestation, Reforestation and Restoration (ARR) projects in China and Uruguay, registered under the VCS. Typical projects in China use local species planted on barren lands such as spruce, pine, cypress, savin and fir, while in Uruguay projects tend to be eucalyptus monocultures on degraded lands. Other types of ARR projects and reforestation projects within other Latin American countries are taken into account but may be normalised. A typical deal size of 20,000 tonnes is reflected.

ARR projects situated in the US and registered under the American Carbon Registry. A typical deal size of 10,000 tonnes is reflected.

ARR projects situated in Central or South America and meeting either VCS Climate, Community & Biodiversity (CCB) standards or Gold Standard (GS). A typical deal size of 20,000 tonnes is reflected.

Peatland conservation. From 2 October 2023, Quantum started assessing peatland conservation carbon projects situated in Indonesia, the home of more than a third of the world's remaining tropical peatlands. The indices represent combined avoided planned deforestation (APD) and ARR projects that use VCS methodology VM0007 and meet Verra's Climate, Community & Biodiversity (CCB) standard. Two assessments have been launched: one with a weight of 10% ARR and 90% REDD, and a second with two-thirds ARR and one third REDD.

Improved Forest Management

These assessments reflect the value of forest carbon avoidance and removal credits registered under the American Carbon Registry (ACR) that are common in North America. We assess the following categories of prices:

Improved forest management (IFM) projects situated in the US and registered under the ACR. A typical deal size of 20,000 tonnes is reflected.

Tagged removal credit produced by an improved forest management (IFM) project situated in the US and registered under the ACR. A typical deal size of 5,000 tonnes is reflected.

Biochar

From 2 October 2023, Quantum started assessing biochar carbon removal (BCR) credits in four different regions of the world (US, Asia, Latin America, Africa), and based on several standards and volume definitions.

Delivery terms range from spot all the way to 2027, with each delivery term commanding a different price. Forward deliveries, which are very common in the biochar market right now, assume maximum pre-payment of 25% by the buyer.

While market liquidity in the BCR market remains limited, more and more transactions have been heard in recent months and supply is set to expand. For each category, the assessments are based on the most competitive prices available over the counter. The assessments reflect standards developed by Puro.earth as well as C-Sink/the European Biochar Certification.

New biochar indices:

Puro	US	biochar	10-100kt	Spot	(PUU100-SPO)
Puro	US	biochar	10-100kt	2024	(PUU100-F24)
Puro	US	biochar	10-100kt	2025	(PUU100-F25)
Puro	US	biochar	10-100kt	2026	(PUU100-F26)
Puro	US	biochar	10-100kt	2027	(PUU100-F27)
Puro	US	biochar	1-10kt	Spot	(PUU010-SPO)
Puro	US	biochar	1-10kt	2024	(PUU010-F24)
Puro	US	biochar	1-10kt	2025	(PUU010-F25)
Puro	US	biochar	1-10kt	2026	(PUU010-F26)
Puro	US	biochar	1-10kt	2027	(PUU010-F27)

Puro	US	biochar	0-1kt	Spot	(PUU001-SPO)
Puro	US	biochar	0-1kt	2024	(PUU001-F24)
Puro	US	biochar	0-1kt	2025	(PUU001-F25)
Puro	US	biochar	0-1kt	2026	(PUU001-F26)
Puro	US	biochar	0-1kt	2027	(PUU001-F27)
Puro	Asia	biochar	10-100kt	Spot	(PUA100-SPO)
Puro	Asia	biochar	10-100kt	2024	(PUA100-F24)
Puro	Asia	biochar	10-100kt	2025	(PUA100-F25)
Puro	Asia	biochar	10-100kt	2026	(PUA100-F26)
Puro	Asia	biochar	10-100kt	2027	(PUA100-F27)
Puro	Asia	biochar	1-10kt	Spot	(PUA010-SPO)
Puro	Asia	biochar	1-10kt	2024	(PUA010-F24)
Puro	Asia	biochar	1-10kt	2025	(PUA010-F25)
Puro	Asia	biochar	1-10kt	2026	(PUA010-F26)
Puro	Asia	biochar	1-10kt	2027	(PUA010-F27)
Puro	Asia	biochar	0-1kt	Spot	(PUA001-SPO)
Puro	Asia	biochar	0-1kt	2024	(PUA001-F24)
Puro	Asia	biochar	0-1kt	2025	(PUA001-F25)
Puro	Asia	biochar	0-1kt	2026	(PUA001-F26)
Puro	Asia	biochar	0-1kt	2027	(PUA001-F27)
C-Sink	Asia	biochar	1-10kt	Spot	(CSA010-SPO)
C-Sink	Asia	biochar	1-10kt	2024	(CSA010-F24)
C-Sink	Asia	biochar	1-10kt	2025	(CSA010-F25)
C-Sink	Asia	biochar	1-10kt	2026	(CSA010-F26)
C-Sink	Asia	biochar	1-10kt	2027	(CSA010-F27)
C-Sink	Asia	biochar	0-1kt	Spot	(CSA001-SPO)
C-Sink	Asia	biochar	0-1kt	2024	(CSA001-F24)
C-Sink	Asia	biochar	0-1kt	2025	(CSA001-F25)
C-Sink	Asia	biochar	0-1kt	2026	(CSA001-F26)
C-Sink	Asia	biochar	0-1kt	2027	(CSA001-F27)
Puro	Latam	biochar	10-100kt	Spot	(PUL100-SPO)
Puro	Latam	biochar	10-100kt	2024	(PUL100-F24)
Puro	Latam	biochar	10-100kt	2025	(PUL100-F25)
Puro	Latam	biochar	10-100kt	2026	(PUL100-F26)
Puro	Latam	biochar	10-100kt	2027	(PUL100-F27)
Puro	Latam	biochar	1-10kt	Spot	(PUL010-SPO)
Puro	Latam	biochar	1-10kt	2024	(PUL010-F24)
Puro	Latam	biochar	1-10kt	2025	(PUL010-F25)
Puro	Latam	biochar	1-10kt	2026	(PUL010-F26)
Puro	Latam	biochar	1-10kt	2027	(PUL010-F27)
Puro	Latam	biochar	0-1kt	Spot	(PUL001-SPO)
Puro	Latam	biochar	0-1kt	2024	(PUL001-F24)
Puro	Latam	biochar	0-1kt	2025	(PUL001-F25)
Puro	Latam	biochar	0-1kt	2026	(PUL001-F26)
Puro	Latam	biochar	0-1kt	2027	(PUL001-F27)
Puro	Africa	biochar	1-10kt	Spot	(PUF010-SPO)
Puro	Africa	biochar	1-10kt	2024	(PUF010-F24)
Puro	Africa	biochar	1-10kt	2025	(PUF010-F25)
Puro	Africa	biochar	1-10kt	2026	(PUF010-F26)
Puro	Africa	biochar	1-10kt	2027	(PUF010-F27)
Puro	Africa	biochar	0-1kt	Spot	(PUF001-SPO)
Puro	Africa	biochar	0-1kt	2024	(PUF001-F24)

Puro	Africa	biochar	0-1kt	2025	(PUF001-F25)
Puro	Africa	biochar	0-1kt	2026	(PUF001-F26)
Puro	Africa	biochar	0-1kt	2027	(PUF001-F27)
C-Sink	Africa	biochar	1-10kt	Spot	(CSF010-SPO)
C-Sink	Africa	biochar	1-10kt	2024	(CSF010-F24)
C-Sink	Africa	biochar	1-10kt	2025	(CSF010-F25)
C-Sink	Africa	biochar	1-10kt	2026	(CSF010-F26)
C-Sink	Africa	biochar	1-10kt	2027	(CSF010-F27)
C-Sink	Africa	biochar	0-1kt	Spot	(CSF001-SPO)
C-Sink	Africa	biochar	0-1kt	2024	(CSF001-F24)
C-Sink	Africa	biochar	0-1kt	2025	(CSF001-F25)
C-Sink	Africa	biochar	0-1kt	2026	(CSF001-F26)
C-Sink Africa biochar 0-1kt 2027 (CSF001-F27)					

Renewable Energy

These assessments typically reflect the price of emission reduction projects that originate from the displacement of fossil fuels through the investment in renewable energy in a country's grid and issued by the two main standards – VCS (Verra) and Gold Standard. A typical deal size of 20,000 tonnes is reflected. They include:

VCS Indian solar. This assessment represents the value of a voluntary carbon credit produced by a solar energy project situated in India and registered under the Verified Carbon Standard.

GS Indian solar. This assessment represents the value of a voluntary carbon credit produced by a solar energy project situated in India and registered under the Gold Standard.

VCS Indian wind. This assessment represents the value of a voluntary carbon credit produced by a wind energy project situated in India and registered under the Verified Carbon Standard.

GS Indian wind. This assessment represents the value of a voluntary carbon credit produced by a wind energy project situated in India and registered under the Gold Standard.

Clean Cookstoves

These assessments reflect the price of credits generated from household devices, issued by VCS and Gold Standard. Emissions are typically avoided by installing more efficient cooking devices that burn less wood or use a different feedstock altogether. Investments into cookstove projects have boomed in the last few years, helped by quick return rates and as these credits typically include co-benefits, such as reduced indoor air pollution, that can be monetised.

A typical deal size of 20,000 tonnes is reflected, although some of our Gold Standard indices reflect a 100,000 tonne deal size.

Our assessments include:

VCS Clean cookstoves (Africa). This assessment represent the price of clean cookstove credits generated in Africa that meet the VCS standard. All African countries are eligible with the price typically set on the cheapest project available. We reflect two vintage types (pre- and 2016+ vintages). The 2016 cutoff was chosen to reflect prevailing buying patterns and is likely to evolve over time. All cookstove types (charcoal, biomass, LPG) are considered with the cheapest technology setting the price.

VCS Clean cookstoves (India). This assessment represents the value of a voluntary carbon credit produced by clean cookstove projects in India and registered under the VCS, where emission reductions took place from 2016 onwards. All cookstove types (charcoal, biomass, LPG) are considered with the cheapest technology setting the price.

GS Clean cookstoves Africa. This assessment represents the value of a voluntary carbon credit produced by clean cookstove projects in Africa and registered under the Gold Standard. Five countries are typically assessed at par: Kenya, Uganda, Somalia, Nigeria and Ghana. Other African countries and newly producing regions within the five mentioned countries may be normalised. Typically, the projects reflect at least four UN Sustainable Development Goals (SDGs). Several emissions vintage prices are published. All cookstove types (charcoal, biomass, LPG) are considered with the cheapest technology setting the price.

GS Water filtration Africa. This assessment represents the value of a voluntary carbon credit produced by water filtration projects in Africa and registered under the Gold Standard. Four countries are typically assessed at par: Kenya, Malawi, Togo, Burkina Faso. Other African countries and newly producing regions within the four mentioned countries may be normalised. Typically, the projects reflect at least four UN Sustainable Development Goals (SDGs). Several emissions vintage prices are published.

On 18 December 2023, Quantum started publishing new daily price assessments for clean cookstove projects that have secured a letter of authorisation (LoA) from a host country under Article 6 of the Paris climate change agreement. Please note that LoAs should not be seen as a guarantee that host countries will deliver corresponding adjustments (CAs), with pricing expected to reflect that.

Quantum has started publishing the following new assessments:

- GS Clean cookstoves Africa A6 LOA V21 20kt (GSCJ21-SPO)
- GS Clean cookstoves Africa A6 LOA V22 20kt (GSCJ22-SPO)
- GS Clean cookstoves Africa A6 LOA V21 100kt (GSCB21-SPO)
- GS Clean cookstoves Africa A6 LOA V22 100kt (GSCB22-SPO)
- GS Water filtration Africa A6 LOA V21 20kt (GSFB21-SPO)
- GS Water filtration Africa A6 LOA V22 20kt (GSFB22-SPO)

Industrial Gas

These assessments represent the price of US industrial gas projects (HFC and foam gas) registered under the American Carbon Registry (ACR) or the Climate Action Reserve (CAR). These schemes typically aim to destroy high global warming potential gases, such as hydrofluorocarbons, from industrial facilities. Quantum reflects a typical 50,000 t clip size for these deals.

List of assessments:

ACR/CAR	HFC	US	2019
ACR/CAR	HFC	US	2020
ACR/CAR	HFC	US	2021
ACR/CAR	HFC	US	2022
ACR/CAR	Foam	US	2019
ACR/CAR	Foam	US	2020
ACR/CAR	Foam	US	2021
ACR/CAR	Foam	US	2022

Kyoto markets

These assessments reflect the value of offsets that have their origin in the Kyoto Protocol's Clean Development Mechanism – the UN offset scheme that commenced in the 2000s and was designed to help countries with emission reduction targets under Annex B of the Protocol to meet their goals through investing in emission reduction projects in non-Annex B nations. The carbon currency was known as certified emission reductions, or CERs.

They include:

CER CP1 20kt which reflects the value of a CER from the first commitment period (CP1) of the Kyoto Protocol (2008–2012). All eligible project types, excluding industrial gas projects, are considered. Renewable energy projects, such as wind and solar, will typically set the price of this assessment.

CER CP2 (2013+) 20kt which reflects the value of a CER from the second commitment period (CP2) of the Kyoto Protocol (2013–2020). All eligible project types, excluding industrial gas projects, are considered. Renewable energy projects, such as wind and solar, will typically set the price of this assessment.

Quantity Premiums

These assessments reflect the price premia or discount of various OTC deal sizes in relation to the 20,000 tonne standard size reflected in most of our indices. They apply to all types of credits, whether from the renewable energy, household devices or nature-based sectors.

Crypto Assets

These assessments reflect the price of different carbon-related crypto assets (Klima DAO, Toucan BCT, Toucan NCT). In the past two years, some companies have transformed carbon offsets into crypto tokens that can be traded on the blockchain.

Discontinued

As of 26 Juy 2023, Quantum has discontinued a range of historical renewable energy and nature-based assessments and replaced them with better alternatives.

The following 24 indices were impacted:

VCS CORSIA Hydro 2016+ 20kt
VCS CORSIA Solar/Wind/Waste to Energy 2016+ 20kt VCS Solar/Wind/Waste to Energy Asia pre-2016 50-100kt VCS Solar/Wind/Waste to Energy pre-2016 20kt
VCS Solar/Wind/Waste to Energy 2016+ 20kt
VCS Hydro/Energy efficiency pre-2016 20kt
VCS Hydro/Energy efficiency 2016+ 20kt
GS CORSIA Hydro 2016+ 20kt
GS CORSIA Solar/Wind/Waste to Energy 2016+ 20kt V08-13 Premium (Renewable Energy)
V14-15 Premium (Renewable Energy)
V17 Premium (Renewable Energy)
V18 Premium (Renewable Energy)
V19 Premium (Renewable Energy)
V20 Premium (Renewable Energy)

V21 Premium (Renewable Energy)
V22 Premium (Renewable Energy)
VCS Forestry Asia pre-2016 20kt
VCS Forestry Asia 2016+ 20kt
VCS Forestry Africa pre-2016 20kt
VCS Forestry Africa 2016+ 20kt
VCS Forestry Americas pre-2016 20kt
VCS Forestry Americas 2016+ 20kt
ACR/CAR CCB Forestry Americas 2016+ 20kt

All discontinued indices remain available to view, chart and download from the Quantum platform and API Feed.