Opinion piece by Eddie Listorti and Geoff Clear, respectively the CEO and COO of Viridios Capital in response to the final report by the Taskforce to Scale the Voluntary Carbon Market [TSVCM]

14 February 2021

"Artificial Intelligence Paves Way For Valuing Impact"

Firstly, we at Viridios Capital wish to acknowledge and commend all those who actively contributed to the Taskforce to Scale the Voluntary Carbon Markets. If nothing else was achieved, the final report represents a great summary of what needs to happen in order for the voluntary carbon markets to achieve scale and fulfill the definition of a bankable asset class.

Background

The voluntary carbon markets today have largely developed out of necessity. They are best characterised as an emerging commodity market as they provide the mechanism for the transfer of title claim from a seller to a buyer of the underlying asset, being in this case, a digitised carbon credit representing 1 tCO_2e of avoided, reduced or removed from the biosphere.

At their core, voluntary carbon markets have evolved as a market-based approach to controlling greenhouse gas [GHG] emissions and will continue to play a crucial role as they mature in achieving the goals of the 2015 Paris Agreement to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

Further, no discussion about the Voluntary Carbon Markets is complete without referring to the U.N. Sustainable Development Goals, as they form an integral part of determining the value of the underlying asset, both in the context of the baseline value, as well as co-benefits. The co-benefits, when priced correctly, can add substantially to the relevant carbon credit. We discuss this in more detail later in this piece.

As seasoned financial markets professionals with approximately 70-yrs of relevant experience between us, we can point to countless examples of viable, liquid and transparent commodity trade having successfully emerged as strongly intermediated markets from what were otherwise quite opaque B-2-B dealings, usually following long drawn negotiations around non-standard contracts. Not least of which was the inevitable arm-wrestle to determine a fair value for the transaction.

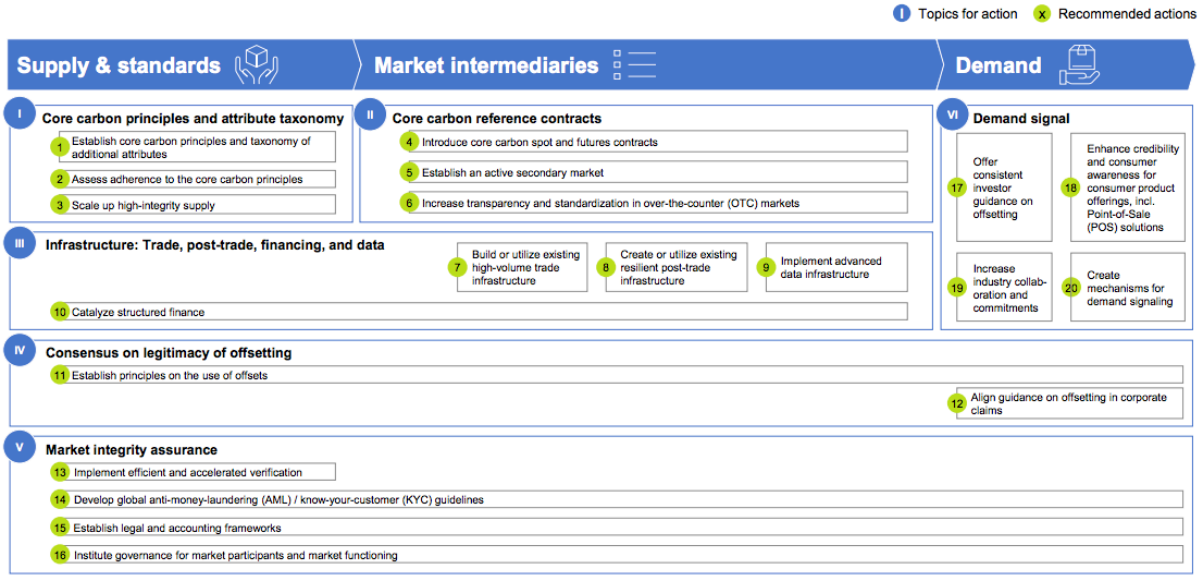
That's why we formed our company, Viridios Capital, to catalyse this transformation. Whilst we agree that companies must explore every option at their disposal in the first instance to reduce their absolute emissions, be they Scope 1, 2 or 3, there will inevitably be an annual residual of surplus emissions unless steps are proactively taken to commit resources to their negation to achieve net zero.

Taskforce

Set the task of challenging the status quo, the purpose of the Taskforce was to design a roadmap to scale up voluntary carbon markets and ensure they are credible, transparent, verifiable and robust.

The Taskforce came up with 6 topics resulting in 20 underlying recommendations, all of which have their own level of importance. However, for the purpose of this article,

we wish to focus our contribution on topic ii. Core carbon reference contracts, Recommendation 6. Increase transparency and standardization in over-the-counter (OTC) markets.



Taxonomy

Taxonomy refers to the attributes or inputs that determine the value of something. The physical commodity markets have an almost infinite number of examples that we could draw on that underpin physical prices paid as either a premium or discount to a liquid reference benchmark price. The differential between the reference price and the adjusted price after accounting for all the premiums and discounts is sometimes referred to as the 'Basis'.

The attributes that determine the value of a voluntary carbon credit by virtue of a premium or discount are:

1. The Standard Administrator - e.g. Verra (VCS), Gold Standard, CDM, etc	• Under which the project originating the carbon credits is registered. • Issues the carbon credits upon verification of the activity and maintains the registry that tracks the carbon credits through to retirement	
2. Project Type	Example Categories: • Energy Efficiency • Forestry & Land Use • Abatement Gases • Renewable Energy	Sub-types: • Cookstoves, Fuel Switching • REDD+, Soil Carbon, Reforestation • Agricultural, Mining, Industrial • Solar, Wind, Geothermal, Hydro
3. Host Country	• Geographic location of the project undertaking the GHG avoidance, reduction or removal	
4. Vintage	• The calendar year of the action to avoid, reduce or remove the GHGs	
5. Sustainable Development Goals	• Any combination of the 17 SDGs that the project undertaking the actions contributes to.	

Reference Price Benchmark

The introduction of core carbon spot and futures contracts is by no means inconceivable. The challenge will almost certainly lay in defining the specifications such that it meets the broader market's expectations.

In our experience commodity prices tend to mean revert over the cycle to the lowest marginal cost of production. However, in voluntary carbon markets we have quite varied (carbon) creditable technologies and/or nature-based solutions with very different cost structures.

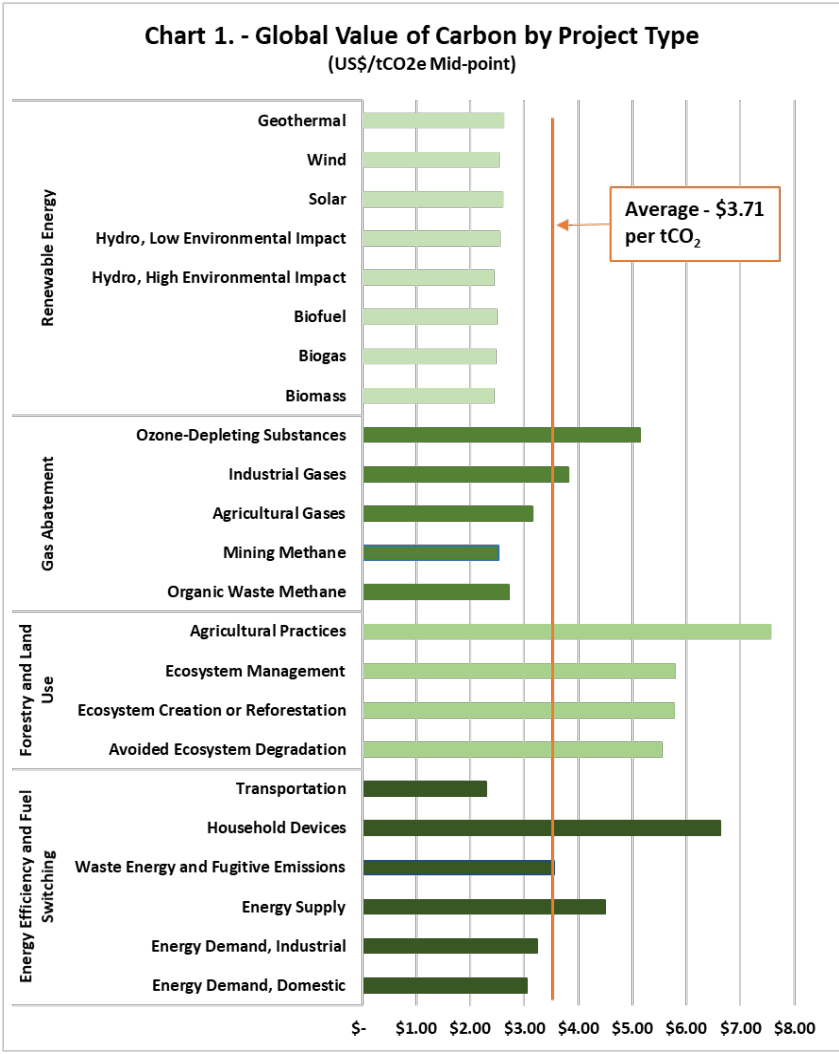
At Viridios Capital, we have been developing our hypotheses on this subject for some considerable period of time. We have developed AI-based technology to simulate fair value based on the attributes of the taxonomy. Through this process, we have built a considerable database of historic transactions and we extend our thanks again to all those who have contributed to the cause.

Chart 1. depicts a study of the mid-point of vintage 2020, as at a valuation date of 1st February 2021, carbon value by project type as represented by SDG#13 – Climate Action in our model.

This is a global perspective in that we have selected all countries and all standards.

To keep things really simple, let's assume for the sake of the exercise that the market accepts the simple unweighted average of all project types as the starting core spot price reference.

Day 1 Reference Price benchmark = US$3.71 per tCO_2.



Fair Value

Asset prices underpin economies, no matter what the asset class. Carbon reduction credits are no exception, however the attributes that determine the value of each unique carbon credit are quite opaque, making the regularization of the approach to valuation somewhat challenging. In fact, the possible combinations of price outcomes run into the billions, which means it's not something that can be readily derived by plugging a few numbers into a simple spreadsheet.

Therefore, we asked ourselves some basic questions:

- How would an entity mark-to-market its trading book in the absence of transparent and liquid benchmarks?
- How do reporting entities go about determining the fair value of these instruments? Moreover, how do their auditors' statements reflect the correctness of the outcome?
- How do reporting entities go about measuring risk for these instruments (Value at Risk, Expected Shortfall)? What is the variability in terms of price for these instruments?
- What premium should be paid over and above the price of carbon for offsets with attributable co-benefits, including impact on Sustainable Development Goals [SDGs] which address environmental and social outcomes, as well as economic ones?

From our perspective, the answer was to be found by applying artificial intelligence [AI] and machine learning to the problem, vis-à-vis, how one readily determines fair value when transparent benchmarks aren't readily available.

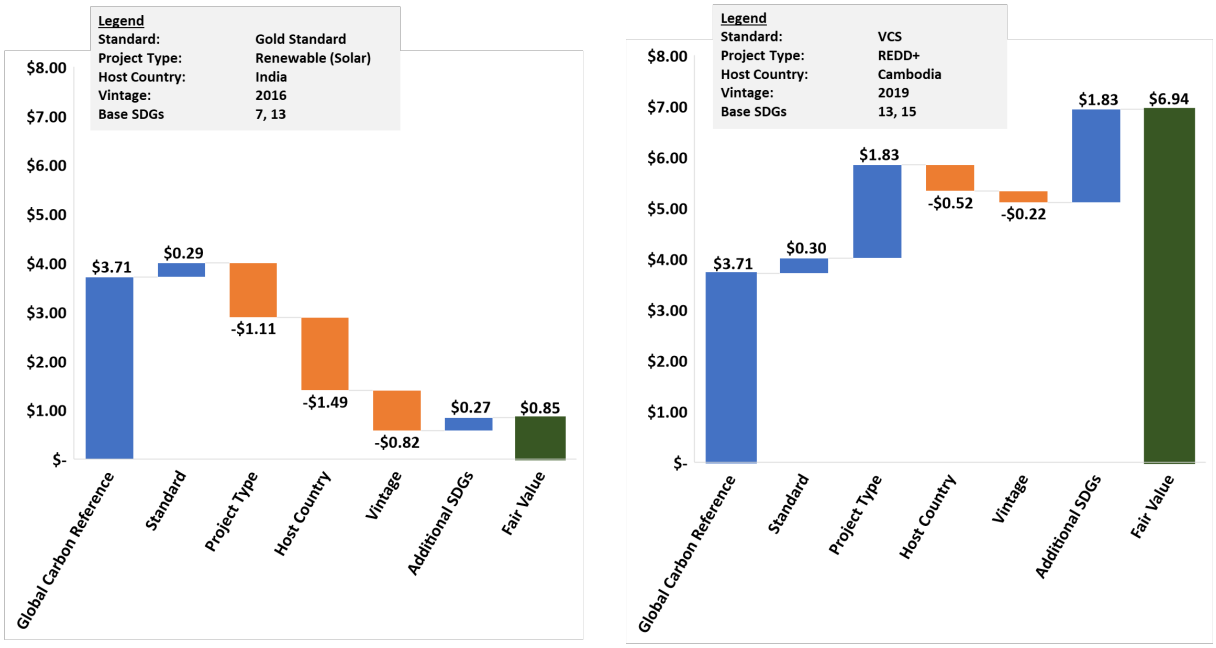
Put simply, AI models take data in whatever prescribed form and process it through a neural network. The machine learns the pattern of pricing behaviour on available combinations of attributes that define the taxonomy. Once the pricing pattern is learned as per the iterative training of the neural network parameters, the model is capable of working out price distribution on any possible combination within the parameters as defined. The prescribed form in this case is a large database of actual historic transactions dating back multiple years, simultaneously valued against liquid instruments used as benchmarks in what financial markets define as a factor model.

Fair value equals the assumed Global Carbon Reference [GCR] benchmark of US$3.71 tCO_2 +/- the attributes of the taxonomy expressed as premiums and/or discounts as at 1st February 2021.

Note the difference in the fair valuations depicted in the study in Chart 2 (overleaf). Of particular note is the Project Type differential with the renewable project (LHS) valued at a discount to the GCR, while the REDD+ project (RHS) values at a premium. This is explained by each project's relevant cost of production and 'additionality'. In general, a renewable project such as a solar farm is expected to earn most of its revenues from electricity sales, while the carbon sales are only incremental. Whereas a REDD+ project (Reduced Emissions from Deforestation Avoidance and Forest Degradation) would typically have little to no revenues generated apart from the sales of the carbon credits it generates.

It's also noteworthy to mention the additional SDGs in these examples. As previously discussed, the Global Carbon Reference includes SDG #13 – Climate Action. However, the baseline of any renewable project needs to include SDG #7 – Affordable and Clean Energy, while the baseline for any REDD+ project should always include SDG#15 – Life on Land, which is a reference to biodiversity impact.

Chart 2.



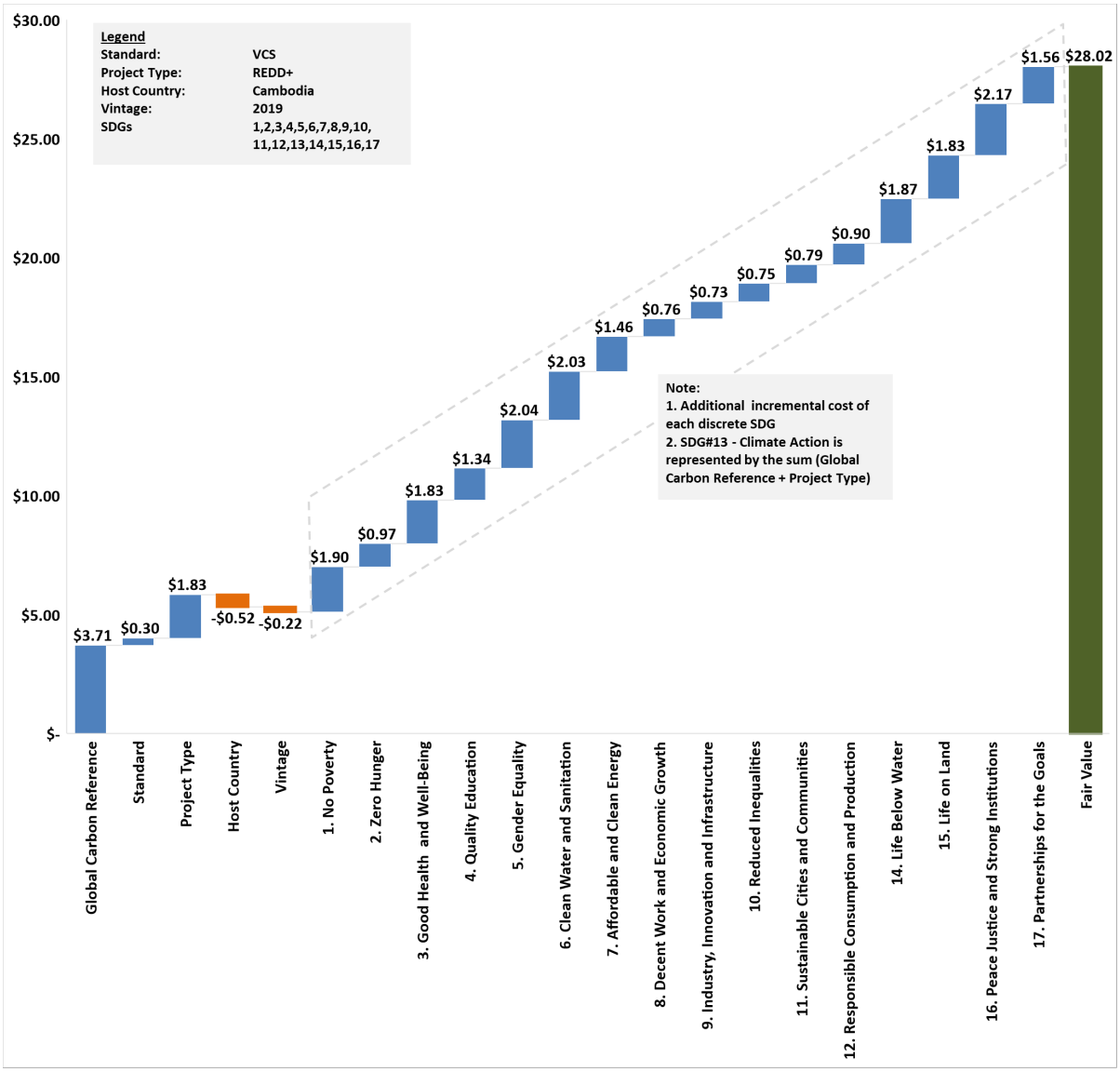
Finally, the REDD+ project depicted in the example (RHS) in Chart 2 above is actually much more impactful on sustainable development than shown. We did this just to provide examples of the base line in each of these project types.

If hypothetically we assume this particular REDD+ project had positive verified impacts on all 17 SDGs, then the mid-point at fair value increases substantially, **$28.02**– see **Chart 3**.

This is justified on the basis that all these co-benefits attribute a cost to the project, but the benefits to local communities can be life-changing. For example, installing clean water, sanitation and power systems for local communities; providing education scholarships and medical facilities to improve lives; providing paid employment and hiring rangers to protect wildlife from poaching are just a couple of examples.

For businesses seeking to engage stakeholders (customers, employees and shareholders) on the merits of their ESG objectives and performance, then carbon credits stapled with high levels of verified SDGs from highly impactful projects are a natural extension to offsetting hard-to-abate surplus emissions.

Chart 3.



In summary, while the concept of a Global Carbon Reference benchmark price/s makes considerable sense to us, in the same way that it has centralized traded liquidity and opened the door to considerably to greater intermediation in other commodity markets, there will still remain a considerable degree of complexity and opacity in the over-the-counter market in correctly valuing the attributes of the taxonomy.

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Past performance is not indicative of future results.