



# Carbon Market Outlook 2025

**A TALE OF FOUR MARKETS**

**February 2025**

### **Introduction and executive summary: The VCM - a tale of four markets**

The Voluntary Carbon Market (VCM) remains in transition from a largely indiscriminate commodity towards a more nuanced and differentiated dynamic driven by quality, credibility and targeted interventions. This is driven in large part by the significant reputational issues arising from investment in substandard and in some cases potentially fraudulent projects and the use of over-crediting projects to make firm compensation claims.

The transition is also influenced by an increasing understanding of co-benefits, and in Pinwheel's experience, particularly in biodiversity and ecological co-benefits alongside human co-benefits. Buyers are increasingly selecting such projects outside of the VCM structure.

Whilst it is therefore possible to pursue VCM strategies with diminishing budgets in the short term, the reality is that corporates operating in the VCM are generally sophisticated and reputationally aware and are moving away from the lower-quality end of the market. For this reason, we expect budgets to increase over the next five years, albeit less than may have previously been expected.

### **Executive summary:**

- **Market Performance & Trends (2024):** Whilst, on the face of it, the VCM saw flat growth and continued dominance of lower-quality first-generation avoidance credits (e.g., cookstoves, REDD, renewables) the residual volumes of this 'old market' approach mask a clear trend amongst corporate buyers towards high-quality removals and nature-based solutions (NbS).
- **2025 Market Outlook:** The market is expected to remain divided into four key submarkets: first-generation avoidance credits (oversupply & price decline); second-generation avoidance credits (higher integrity, price stability); nature-based solutions (growing demand, price premiums); and novel carbon removals (high price, limited supply). We expect demand to be overwhelmingly driven in the latter three categories. Where first-generation avoidance credits are used, corporate buyers will (rightly) be very selective of the best quality.
- **2025 Market Pricing:** We present our expected average prices across the four key submarkets below. *NB these market average prices are below the price that corporates can usually expect to pay, for reasons explained in the paper. Our corporate benchmarks are based on our analysis of our partners and others, who typically prioritise integrity, vintage and location. These submarkets are later defined and further analysed in the section titled Unlocking Market Complexity as a Theme for 2025.*
  - First generation avoidance: market average \$3-3.5; corporate benchmark \$6-8
  - Second generation avoidance: market average \$10-20; corporate benchmark \$15-25
  - NbS: market average \$15-25; corporate benchmark: \$20-35
  - Novel CDR: \$150-\$500
- **Pricing & Supply:** Overall, carbon credit prices are expected to remain flat due to oversupply of avoidance credits dominating the current market, but high-quality avoidance and removals will see sustained annual price increases (<10% for high-impact avoidance and

<20% for NbS removals). As a result, NbS removal credits may rise to \$50+ per tonne by 2030, while novel CDR remains above \$100 per tonne (in many cases multiples of). Higher quality/second-generation avoidance credits trading at \$10-20 today can be expected to be trading at \$15-30 as we approach 2030.

- **Future Risks & Opportunities:** Political factors (e.g. the Trump presidency) may impact market stability, particularly for U.S.-backed Direct Air Capture (DAC). Quasi-regulatory developments, such as Science Based Target Initiative (SBTi) mandates, could drive demand for removals, requiring corporates to secure credits via forward agreements.

## **2024 Market overview**

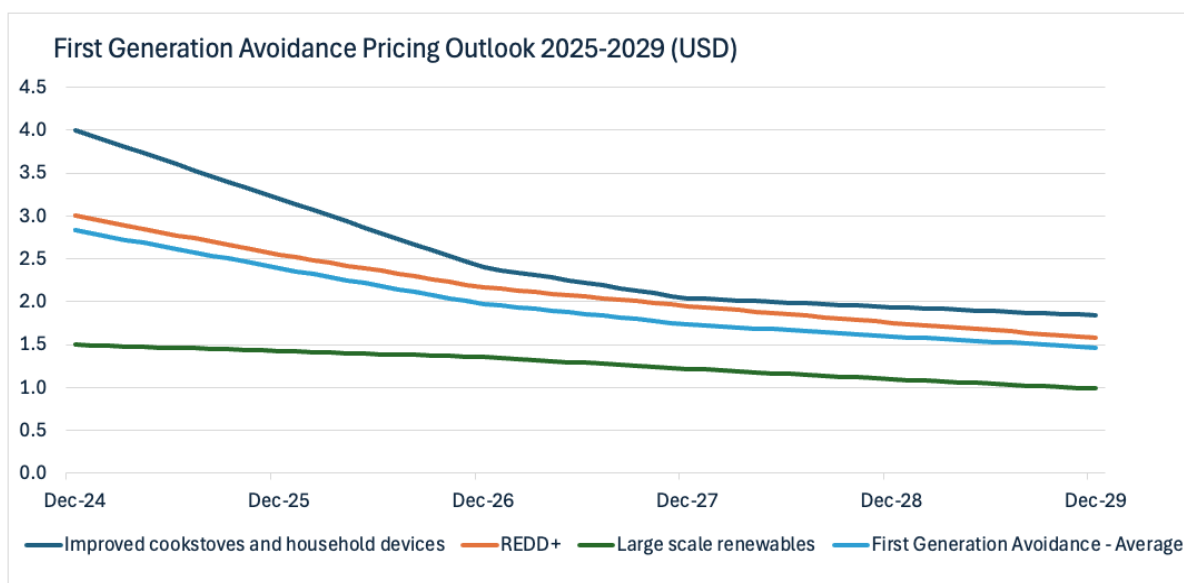
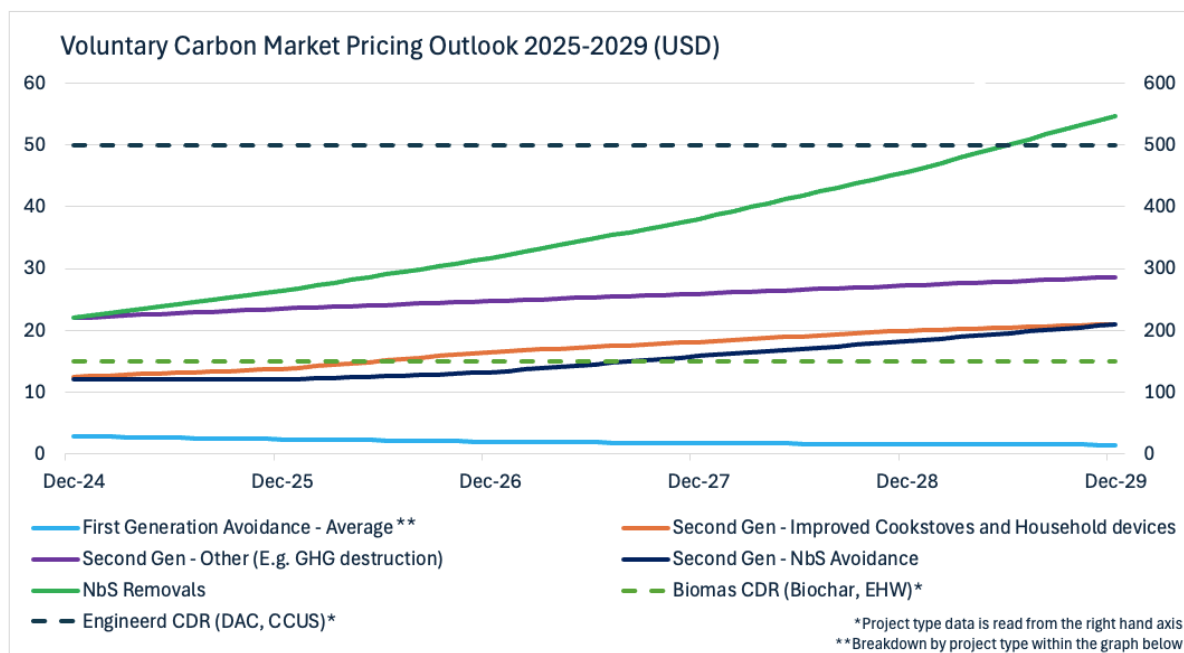
The market-wide view in 2024 was disappointing for the Voluntary Carbon Market (VCM) which saw flat growth across both retirements and total transaction value, in line with performance in 2023. However, the narrative at a project level reveals significant trends emerging that will define the market's trajectory into 2025.

Whilst 2024 was a flat year for market growth, we saw an increased focus on quality among corporate buyers, with preference for removals emerging as a key trend. Whilst there was growth in both nature-based solutions (NbS) and novel carbon removal (CDR) this was heavily driven by NbS with relatively low ability or willingness to pay \$100/tonne+ for novel CDR. There was some shift in corporate behaviour towards forward purchases and offtake agreements, within the NbS space.

Market share continued to be dominated by "First-Generation" lower-quality avoidance credits across Cookstoves, REDD and large-scale Renewables. Supply of First-Generation avoidance credits increased significantly during the year following bumper issuances by developers registered on Verra and Gold Standard. First-Generation avoidance credits experienced a significant price decrease throughout 2024; as new market participants and existing corporates began to favour higher-impact credits.

## Pinwheel's 2025 Market outlook by project category

Our current market outlook is reflected in the graph below.



## Unlocking market complexity as a theme for 2025

Our view on the key instrument to unlock carbon market projections in 2025 is to address the increasing levels of market complexity which impact the VCM. This is driven by the widening gap, and mix of project quality, project type and VCM stakeholder involvement. To combat this, heading into 2025, Pinwheel defines our view on the four-key submarkets within the VCM which are pivotal for sustainability-focussed corporates to analyse against their own strategy.

- 1) First generation avoidance credits** Pinwheel defines these as a mix of project types across: Improved Cookstoves, Reduced Emissions from Deforestation and Forest Degradation (REDD) and Large-Scale Renewables. Sustained negative views on project

quality and integrity will continue to hamper these projects throughout our 5-year outlook projection. This is due, in large, to over-crediting methodologies which has caused significant oversupply in this segment of the market. Project developer issuances of these project types will continue to peak throughout 2025 and increase credit inventories and the pool of non-retired credits in the market. As a result, with weakening demand signals in this segment of the market, we can expect a continued theme of supplier-led race to the bottom on price, which the market has experienced since mid-2023.

Material amounts of supply in this segment can be linked to specific methodologies which have now been materially revised, or in certain cases, replaced under recognised registries such as Verra and Gold Standard. These key methodologies include: VCS VMR0006, earlier iterations of GS TPDDTEC and AMS.II.G. The ongoing Federal investigation in the USA into wrongdoings of senior management at the largest corporate supplier of Cookstove credits, C-Quest Capital, continues to cast a shadow over the segment and in particular, projects under VMR0006.

- 2) **Second generation avoidance credits** Pinwheel defines these as a mix of project types across: Improved Cookstoves and GHG Destruction / Methane avoidance in this field. There was significant market activity in this segment throughout 2024 by corporates seeking a higher-impact route to carbon avoidance crediting. Performance of credits in this segment is driven in turn by:
- A convergence of voluntary markets with compliance-based mechanisms under Article 6 / CORSIA (in turn setting an elevated bar for project quality)
  - Other high-impact avoidance project types such as chlorofluorocarbon and hydrofluorocarbon destruction projects, methane well capping and other methane-emission avoiding projects.
  - An ongoing transition of revised/improved Cookstove methodologies:
  - New Cookstove methodologies create stronger criteria for project additionality and carbon integrity which is redefining the price benchmark for a community avoidance project. Proven examples delivered in volume throughout 2024 include projects on GS Methodology for Metered and Measured Cooking Devices (MMECD) which transacted at >\$30/tonne as a result of project capabilities to track and monitor energy consumption – a key weakness in Cookstove methodologies within the First Generation of avoidance projects.
  - The Cookstove market continues to monitor closely the adoption of updated fraction of non-renewable biomass (fNRB) assumptions on project emission reduction calculations. Revised fNRB rates under the new Modelling Fuelwood Savings Scenarios model (MoFuSS) would reduce issuance of cookstove credits by between 40-60% in most project scenarios if formally recognised as the default method of calculation by the United Nations Framework Convention on Climate Change (UNFCCC). The outcome of this decision, which was initially expected in late 2024 but has been further delayed, may therefore drive price increases downstream where supply is limited.

- Other avoidance credits, such as chlorofluorocarbon and hydrofluorocarbon destruction projects and methane well capping, and their respective methodologies, have been identified as higher quality in the avoidance market and demand a higher price from \$15-20. In 2024 price was temporarily boosted by some project types being among the first to be approved under the ICVCM's Core Carbon Principles (CCP). CCP-tagged credits have seen an increase from under 1% to over 6% in their share of the overall retirements (AlliedOffsets, 2025<sup>1</sup>).

**3) Nature-based Solutions** Pinwheel defines these as a mix of project types including afforestation, reforestation and restoration/revegetation (ARR) in Blue Carbon and Agriculture, Forestry and Other Land Uses (AFOLU), improved grassland and peatland projects. We also consider a second generation of REDD+ and Improved Forest Management projects (IFM) on updated methodologies, reflecting demand-led project improvements made across the market.

The market for Nature-based Solutions removals was favoured by buyers, leading to price premiums significantly above avoidance credits and, in many jurisdictions, scarcity. For buyers looking to purchase in specific geographies, accessing NbS credits was unlikely to be achievable in the spot market. Prices for recent vintage nature-based credits tended to be around \$20-35, with some project types (such as mangrove reforestation projects) attracting around \$50. It is in this segment that forward purchasing became a relatively common way for buyers to secure supply.

The market awaits to see the impact of revised REDD+ methodologies on pricing and perception of NbS avoidance credits. With the IC-VCM announcing that 3 REDD+ methodologies have been awarded a CCP label, including VCS VM0047, project suppliers and investors alike will be hoping that efforts to improve project quality and carbon integrity is reflected in pricing. We can expect material supply of these newer methodologies to hit the market in late 2025 where prices are expected to begin at between \$10-15 and have significant potential to increase at rate alongside NbS removals, if quality can be proven. Significant developments in the accessibility of digital monitoring, reporting and verification (dMRV) technology within project design is a key factor which separates this market from previously REDD credits in the market.

**4) Novel CDR** Pinwheel defines these as a mix of project types across a range of project and technology types, including: biochar, enhanced rock weathering, terrestrial storage of biomass, carbonated materials, direct air capture and storage (DACCS) and bioenergy with carbon capture and storage (BECCS), and marine carbon removal.

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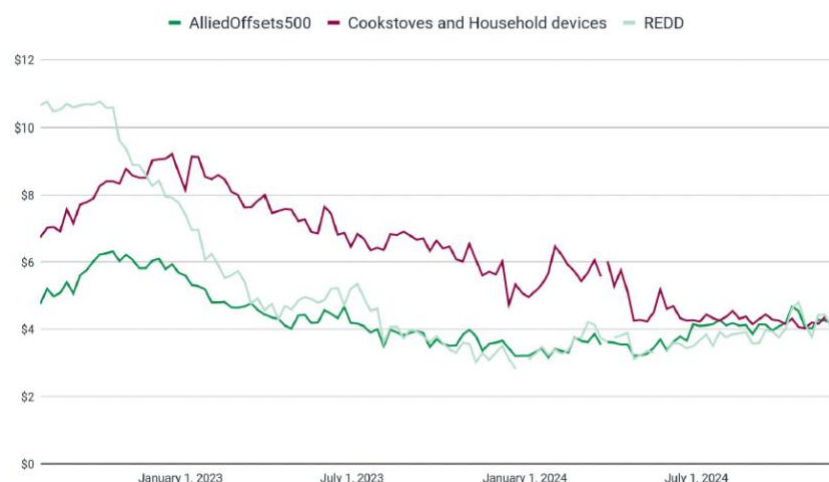
<sup>1</sup> AlliedOffsets. "2024 End of Year Report: VCM 2024 Review and Emerging Trends for 2025". 2025

The novel CDR market continued to grow in 2024, with prices primarily between \$125-600, depending on project type and delivery timeframe. The weighted average price per tonne sold, of publicly disclosed order pricing, decreased from \$490 in 2023 to \$320 in 2024, but with such variance of project types and input costs and a thin market, this change should be treated with caution. Durable CDR purchases grew 78% to nearly 8 million tonnes from 2023. Only biochar credits were available in volume on the spot market, with almost all deals for novel CDR being forward purchases/offtake agreements. 86% of deliveries in 2024 were for biochar. Continued growth in this segment on the market is reliant on new buyers, with the significant majority of credits purchased to date being from a single buyer – Microsoft. In 2024 80% of purchases coming from Microsoft, Google, Stripe, and Frontier buyers, with only around 200 buyers in the market (CDR. fyi, 2025<sup>2</sup>).

### **Market average 2024 price data**

Whilst our four sub-market analysis provides a stronger guide to the market dynamics corporates will experience purchasing carbon credits, both in terms of pricing and availability, there is value in seeing the raw data on price trends.

Prices in the VCM have trended down over the last two years, with averages at \$4, with the credit types available at high volume – renewables, REDD+ and cookstove – driving the average price.



*Average price of avoidance credits, 2022-2024*  
*AlliedOffsets. "2024 End of Year Report: VCM 2024 Review and Emerging Trends for 2025"*

<sup>2</sup> CDR.fyi, "Keep Calm and Remove On - CDR.fyi 2024 Year in Review". 2025

The average price for nature-based removals is trading significantly above the overall average market price, at between \$10-15.



*Average price of nature based removals, 2022-2024*  
*AlliedOffsets. "2024 End of Year Report: VCM 2024 Review and Emerging Trends for 2025"*

These market average prices are below the price that corporates can usually expect to pay, with prices driven down by energy (oil and gas and wider energy sector) volume buyers and owing to corporates usually having additional criteria (primarily recent vintage) which leads to higher market prices.

### **Future projections**

The significant overall oversupply in the market means that our overall expectation is that prices remain relatively flat in the next two to three years, driven by the price of first-generation avoidance credits where we expect prices to fall in the short term. The election of Donald Trump is likely to accelerate trends already seen in the market. Should there be a significant pullback from the voluntary carbon market among US corporates, oversupply in the first-generation avoidance space will be exacerbated. We expect global demand for NbS credits to remain strong and do not foresee politically driven oversupply in that sub-sector, albeit price increases may become less pronounced. Given the significant support provided to DACC carbon removal by the Biden Government, the impact of the Trump presidency may be particularly acutely felt for US-based DACC providers. There is a risk that the global policy push for state-led mandates for CDR purchasing slows if the US approach to the climate crisis is repeated in other jurisdictions but as these were unlikely to come into place before 2030 the impact of this on short term pricing is likely to be negligible, but could impact pricing significantly as we approach 2030.

Our expectations over the longer term are that there will be growth within the market, driven by compliance markets, improvements on integrity, reduced supply from new projects under more robust methodologies and new buyers. If the existing stock of older avoidance credits are cancelled we will see the majority of the oversupply, by volume, leave the market raising average prices significantly. This may not have significant impact on most corporates budgets as the lower end of the market has been shunned by many integrity and reputation conscious buyers.



For higher quality/second-generation avoidance credits we expect to see relatively modest price inflation year-on-year, based on market trends over the last few years. Over the period we expect credit types trading at \$10-20 today, to be trading at \$15-30 as we approach 2030. We expect significant price inflation in the NbS segment of the market given low market volumes. Equivalent projects to those that are trading at \$20-35 today may be trading at \$50+ towards 2030.

There is less certainty about prices in the novel CDR space. The extremely thin market to date makes projections challenging as market forces are weak. There is some reason to believe that the near-term trend will be of price competition and reductions, as a second wave of early CDR purchasers is likely to be more price sensitive than the first. There has been some stability in the price of biochar credits over the recent period which suggests that \$100-150 for these credits is a reasonable benchmark for the rest of this decade. For other project types, particularly engineered removals, pricing may be driven as much by learning rates' impact on cost inputs than by market forces.

The biggest driver of uncertainty in pricing for novel CDR is the role of regulators and the upcoming consultation on the second version of the Science Based Target Initiative (SBTi) Net-Zero Standard. Should there be purchase mandates that bring forward the requirement of corporates to purchase novel CDR credits to the 2030s we can expect to see significant price inflation, given the very limited supply in the market and the long lag between investment in novel CDR start-and-scale ups and credits becoming available. There is some merit in the argument that corporates should seek soon to mitigate this risk (as well as make forward-thinking investments in the service of our global Net Zero goals) through the early purchase/use of offtake agreements for novel CDR.

### **Securing supply: spot versus forward**

Based on current market trends, we do not expect it to be necessary to utilise forward agreements to secure access to avoidance credits, but there may be narrow exceptions as new standards emerge or government action (e.g. a project attracts a corresponding adjustment) makes a particular project(s) desirable for a period. There are some high impact project types where brands may wish to make multi-year agreements for the purposes of being able to articulate their commitment to that work. Destruction of CFCs and HFCs, for example, might fall into this category, given the extremely powerful shorter-term warming effect of these greenhouse gases.

Over 20m of the NBS credits (10% of market retirements) were purchased via off-take agreements that will see credits supplied well into the future (AlliedOffsets, 2025). Pinwheel's experience in the market is that accessing NBS credits in many jurisdictions often requires forward agreements with limited or no availability for spot purchase. The trend for forward agreements is likely to grow in 2025. We recommend that corporates seeking to purchase significant volumes of NBS credits, particularly where they apply other criteria such as recent vintage or a specific jurisdiction, prepare themselves to be able to utilise forward agreements.

In novel CDR the use of off-registry forward agreements is standard, with very few spot purchases taking place. Availability is highly constrained, with only small volumes available, except for biochar where some volume of 10,000s of credits can be found. Purchases have begun to move on registry,

with procurement through providers such as Isometric and Puro.Earth forming a significant minority of the market. Whilst there may be some exceptions, buyers should expect to buy novel CDR credits through forward agreements for the foreseeable future, with delivery likely to be many years into the future.

## **Conclusion**

This note discusses the voluntary carbon market only but takes account of our expectations of convergence with compliance markets and the role of Article 6 in driving market behaviour in the voluntary market. We expect individual projects or project types to outperform the market where they benefit from a characteristic, for example a corresponding adjustment under Article 6, that leads to a perception of higher quality.

We expect that the four project type market structure we observed in 2024 will continue, with oversupply of first-generation avoidance credits depressing prices for that market segment (with a knock-on effect of anchoring overall market averages well below \$10 per tonne). Oversupply will remain in the short term (up to five years), unless there is a significant cancellation of credits currently available on registries. Steady growth in the price of higher-quality, second-generation, avoidance projects is unlikely to be matched by significant scarcity in that segment. We believe there is a good case for corporate buyers looking to high-quality second-generation avoidance credits as a prudent balance between quality and price, relative to the ultra-premium novel CDR market segment.

We expect to see scarcity and rising prices in the removals segments of the market as buyers continue to prioritise quality. The trend that emerged in 2024 of buyers making forward purchases of removals looks set to continue and grow in 2025 and beyond as access to recent vintage nature-based removals becomes increasingly scarce. Novel carbon removal projects will continue to move on registry but, except for biochar, will only be available at very small volumes for spot purchase in the short term. Prices will remain significantly over \$100 for all project types, with the possible exception of terrestrial biomass sequestration. Regulation is likely to be the biggest driver of change in this market segment, with either government action or a strengthened carbon removal mandate in the upcoming SBTi Net-Zero Standard the front-runners for significant growth of the novel CDR market. Despite price and supply pressures, we believe corporates should be looking to removals, both nature-based and novel, to form a significant part of their carbon credit portfolios. This will likely require increased use of forward purchases and multi-year offtake agreements in the next five years.

Pinwheel

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