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BALOCHISTAN CARBON OFFSET PROJECT

Carbon Pricing Feasibility and Market Assessment Report

JUNE 29, 2025

EXECUTIVE SUMMARY

As part of the Balochistan Carbon Offset Project, initiated by the province to improve environmental resilience and inculcate socio-economic upliftment, Balochistan province aims to regenerate and conserve its mangroves and leverage the global carbon markets to generate revenue and multiple co-benefits. To ensure regeneration, conservation and environmental resilience, action is required to sustain the services of this ecosystem and also enhance carbon sequestration leading to carbon offset markets through Nature-based Solution (NbS), a leading category in the global carbon markets. To inform project development, the aim of this report is to deliver a comprehensive Carbon Pricing Feasibility and Market Assessment Report by assessing the global, and national, institutional and regulatory carbon market landscape within which this proposed intervention will be strategically positioned. The report then aims to assess key factors such as pricing trends, key players, demand patterns, and more, across key carbon market forest credits such as Afforestation, Reafforestation, and Revegetation (ARR), Reducing Emissions from Deforestation and Forest Degradation (REDD+), and Improved Forest Management (IFM). It then situates the critical significance of blue carbon credits within this landscape, assessing their current landscape, demand and pricing. To further deepen this analysis, the report also draws upon global carbon market projects, ensuring a strategic and informed way forward, along with scoping key challenges and opportunities.

Another key component of this report is to critically assess carbon market standards and associated methodologies, identifying the alignment and suitability to the proposed project. This report also contains the analysis of major crediting entities with a comparative analysis of their registration process, market share, tentative timelines, dedication to community welfare and methodologies for crediting blue carbon projects. The aim is to pave a path for mangrove restoration projects by leveraging the opportunities offered by the global carbon markets to not only achieve socio-economic well-being but also unlock avenues of climate finance for revenue generation to support the execution of these projects.

Finally, the report concludes with critical recommendations for the proposed project, informed through the outlined assessment and analysis, and aiming to design a deliver a mangrove-based carbon market project that is uniquely and strategically positioned to harness the potential offered by the global carbon markets.

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GLOSSARY

Term	Meaning
Additionality	An emission reduction in the voluntary carbon market is considered "additional" if it wouldn't have happened without the financial incentive provided by the market. This means the reduction wouldn't have occurred through natural progression or existing regulations. Increased additionality strengthens the value and credibility of a carbon offset.
Avoidance Projects	These projects are one of the two main types that generate carbon credits or offsets. They prevent the release of greenhouse gases (GHGs) into the atmosphere by either reducing activities known for high emissions or by protecting natural resources that act as carbon sinks. Examples include investing in renewable energy sources or preserving forests.
Blue Carbon	Projects that reduce/remove carbon dioxide from marine and coastal environments by restoring, conserving, or managing ecosystems, including wetland, mangrove, and seagrass habitats.
Carbon Credits	These are tradable permits, each representing the right to emit one metric ton of carbon dioxide or other greenhouse gases. They primarily function within compliance carbon markets, where regulated entities like companies must purchase the permits to meet their mandated emission reduction targets.
Carbon Offsets	These are units that quantify the amount of carbon avoided or permanently removed from the atmosphere. Each offset represents one metric ton of carbon dioxide or equivalent greenhouse gases neutralized. They primarily function within voluntary carbon markets, where entities can purchase them to compensate for their own emissions, even if they're not subject to regulations
Corresponding Adjustments	A mechanism adopted under Article 6 of the Paris Agreement to prevent double counting of carbon offsets. When a host country sells an offset, it deducts that amount from its own nationally determined contributions (NDCs), while the buyer country can count it towards its own NDCs. This ensures the offset represents only one actual emission reduction.
Double Counting	The scenario where multiple entities claim credit for the same carbon reduction. Corresponding adjustments aim to address this issue in international offset trading.
Greenhouse Gas (GHG) Emissions	The release of gases that trap heat in the atmosphere, contributing to climate change. Carbon dioxide (CO2) is the primary GHG targeted by carbon offsetting initiatives
Leakage	The unexpected loss of carbon benefits due to displacement of activities in or outside project area.

Nationally Determined Contributions (NDCs)	National plans outlining each country's climate action goals and intended contributions to global emission reduction under the Paris Agreement. NDCs are set and updated every five years.
Removal Projects	Projects that capture and store existing greenhouse gases from the atmosphere through nature-based methods like forestation or technological means like direct air capture. These projects play a crucial role in achieving net-zero emissions.
Retirement	The process of permanently removing a carbon offset from circulation after it has been used to compensate for emissions. This ensures that the emission reduction represented by the offset is not counted multiple times.
Paris Agreement	A global agreement adopted in 2015 aiming to limit global warming and combat climate change. It sets a long-term goal of achieving net-zero emissions and establishes a framework for international cooperation on climate action.
Permanence	Longevity of carbon storage or reduction achieved by a project.
Validation and Verification Body (VVB)	An independent third-party auditor approved by a carbon offset registry. VVBs assess the design and implementation of offset projects to ensure they meet all necessary standards and requirements.
Voluntary Carbon Markets	Unregulated markets where entities can buy and sell carbon offsets to compensate for their emissions, even if they are not subject to mandatory reduction requirements.

ACRONYMS

ARR	Afforestation, Reforestation and Revegetation
CADT	Carbon Asset Data Template
CCB	Climate, Community and Biodiversity
CCP	Core Carbon Principles
CDM	Clean Development Mechanism
CFSM	Climate Finance and Stakeholder Management
COP	Conference of Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DBC	Delta Blue Carbon
EEU	Eligible Emission Units
GCC	Global Carbon Council
GHG	Greenhouse Gas
GIS	Geographic Information System
GSC	Global Stakeholder Consultation
GS4GG	Gold Standard for Global Goals
CCP	Core Carbon Principle
Ha	Hectares
ICPs	Independent Crediting Programs
ICROA	International Carbon Reduction and Offset Alliance
ICVCM	Integrity Council for the Voluntary Carbon Market
IFM	Improved Forest Management
LOI	Letter of Intent
MoU	Memorandum of Understanding
MRV	Monitoring, Reporting and Verification
NbS	Nature-based Solutions
NDC	Nationally Determined Contributions
PDT	Peat Depleting Time
PIN	Project Idea Note
PVC	Plan Vivo Certificates
REDD	Reducing Emissions from Deforestation and Forest Degradation

SDG	Sustainable Development Goals
SD VISta	Sustainable Development Verified Impact Standards
SDT	Soil-Carbon Depletion Time
SGX	Singapore Exchange
VCM	Voluntary Carbon Markets
VCS	Verified Carbon Standard
VCU	Verified Carbon Unit
VVB	Validation and Verification Body

1. INTRODUCTION

Balochistan, Pakistan's largest province, is endowed with vast and diverse natural resources, landscapes and ecosystems, including rangelands, juniper forests, and mangrove areas. However, they are significantly under threat due to climate change and anthropogenic factors. The province is also experiencing declining socio-economic indicators and challenges such as poverty and inflation. Environmental degradation has exacerbated the vulnerability of the province.

To enhance environmental resilience and inculcate socio-economic upliftment, Balochistan province aims to regenerate and conserve its mangroves and leverage the global carbon markets to generate revenue and multiple co-benefits. Mangroves are a critical ecosystem that not only provide natural resources, but also protects the coastal communities from natural disasters. This proposed project aims to ensure afforestation, regeneration and revegetation (ARR) for mangrove ecosystems in Balochistan by leveraging the opportunities offered through the global carbon markets.

1.1 OBJECTIVES

The aim of this report is to deliver a comprehensive Carbon Pricing Feasibility and Market Assessment Report, assessing the global institutional and regulatory carbon market landscape within which this proposed intervention will be positioned. The report aims to assess key factors such as pricing trends, key players, demand patterns, and more. To further deepen this analysis, the report also draws upon global carbon market projects, ensuring a strategic and informed way forward. A key component of this report is to critically assess carbon market standards and associated methodologies, identifying the alignment and suitability to the proposed project. This report also contains the analysis of major crediting entities with a comparative analysis of their registration process, market share, dedication to community welfare and methodologies for crediting blue carbon projects.

The aim is to provide the Government of Balochistan with a comprehensive and cohesive assessment of the carbon market landscape and the potential for NbS, and pave a path for mangrove restoration projects by leveraging the opportunities offered by the global carbon markets to not only achieve socio-economic well-being but also unlock avenues of climate finance for revenue generation to support the execution of these projects. This document will guide the Government of Balochistan in understanding, and eventually identifying, a suitable standard and methodology with which the project will be aligned and submitted to for listing, registration and implementation.

2. UNDERSTANDING THE GLOBAL CARBON MARKETS

Article 6 of the Paris Agreement recognizes that some Parties choose to pursue voluntary cooperation in the implementation of their nationally determined contributions to allow for higher ambition in their mitigation and adaptation actions and to promote sustainable development and environmental integrity. In this regard, Carbon Markets have emerged as a crucial tool in the global fight against climate change. They provide a mechanism for reducing greenhouse gas emissions by allowing for the trading of carbon credits, which represent the right to emit a certain amount of carbon dioxide or other greenhouse gases. These markets have gained significant traction in recent years, with the global carbon market reaching a value of over $272[1] billion in 2020. Developing countries are looking to leverage the benefits of carbon market to improve environmental resilience and sustainable development.

The global carbon market landscape contains a number of players, such as standards and registries which develop methodologies to govern and validate whether a project attains the stated goal of emission reductions. For example, Verra is a registry and its associated standard is the Verified Carbon Standards (VCS). Other players include project developers and proponents who design and implement the project as per a standard and methodology. To ensure integrity, initiatives exist to ensure transparency, such as the Integrity Council for VCM (ICVCM). Other players such as industry groups are also critical That bring together parties with similar interests to engage in VCM.

In recent times, global carbon markets have demonstrated tremendous potential as seen in the market growth which is estimated to reach $7 billion to $35 billion by 2030. A market projection of $250 million is expected in 2050.[2] Within the carbon market landscape, credits generated through Nature based Solutions (NbS) are have demonstrated critical growth and success globally. NbS is the largest category of carbon credits available in the VCM, accounting for the largest volume of credits. [3] Carbon credits, especially those generated through nature-based interventions, protect, sustainably manage, and restore natural ecosystems. The overarching aim is to not only ensure the preservation of naturally existing carbon sinks and reservoirs, but to also ensure that this conservation is conducted in lieu of reaping a plethora of benefits from the environment we live in. Nature based Solutions have the ability to provide 37% of our mitigation efforts needed by 2030.[4] In 2022, about 30% of all carbon offset credits for forestry projects came from voluntary registries.[5] Additionally, carbon credits issued through nature-based interventions

1 S&P Global. (2021, January 27). Global carbon market grows 20% to $272 billion in 2020: Refinitiv. https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/coal/012721-global-carbon-market-grows-20-to-272-billion-in-2020-refinitiv

2 CarbonCredits.com. . (2024). *Carbon credits in 2024: What to expect in 2025 and beyond – $250B by 2050*. CarbonCredits.com. . https://carboncredits.com/carbon-credits-in-2024-what-to-expect-in-2025-and-beyond-250b-by-2050/

3 Sylvera. (2023). *The State of Carbon Credits 2023*. Sylvera. https://www.sylvera.com/reports/the-state-of-carbon-credits-report

4 https://www.sylvera.com/blog/nature-based-solutions-and-biodiversity

5 https://carboncredits.com/forest-carbon-offsets-everything-you-need-to-know/

accounted for 37%-or 53 million credits- of all issuances in 2023.[6] As of 2025, NbS projects account for the majority of credit issuances across registries, especially Verra.[7]

Forest based carbon credits involve 3 major categories: Afforestation, Reforestation and Revegetation (ARR), Improved Forest Management (IFM), Reducing Emissions from Deforestation and Forest Degradation (REDD+). Reducing Emissions from Deforestation and Forest Degradation (REDD+) is a type of avoidance credit that finances activities that focus on the sustainable management and conservation of at-risk mature forests. Within NbS, REDD+ projects hold the highest significance as they account for 86% of total projects.[8] Improved Forest Management (IFM) can be considered both removals and avoidance projects depending on the activity being funded. The activities could include refraining from logging or implementing improved practices to promote enhanced forest growth (i.e. extension of harvesting rotation length, or the use of thinning.) IFM is the smallest project type in Nature-based solutions with the least amount of carbon credit issuances (only 3% of all NbS issuances) and retirements. Afforestation, Reforestation & Revegetation (ARR) is a type of removals project that utilizes carbon financing to restore forests and woodland via replantation.[9] ARR projects are rapidly growing while credits have notably doubled in price in the period between 2021-23 and are projected to further grow. As of 2025, ARR projects dominate the total registered projects on Verra (151 projects) and Gold Standard (52 projects) Registries in the NbS category.[10]

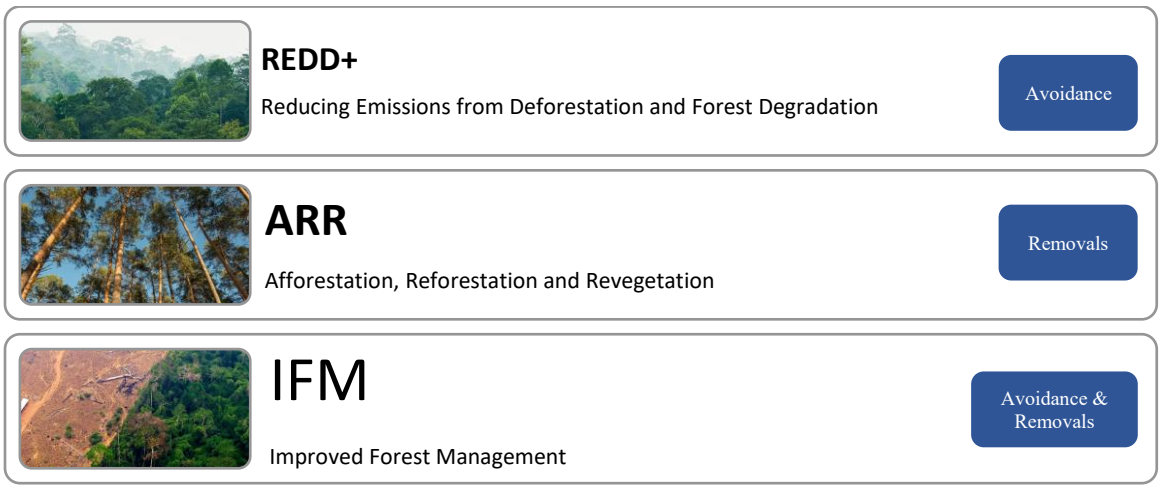

Figure 1 NbS Categories

These projects vary from protecting our forests to restoring them, all of which are key to achieving sustainable development and climate resilience. Recent data from 2024 suggests that

6 Agri Investor. (2023, August 31). Nature-based solutions dominate H1 carbon credits issuance. https://www.agriinvestor.com/nature-based-solutions-dominate-h1-carbon-credits-issuance/

7 Climate Focus. (n.d.). VCM dashboard. Retrieved July 1, 2025, from https://app.powerbi.com/view?r=eyJrIjoiMTQwMTBkZWEtOWVmZS00Y2I1LWE1OTktMDQ1MzFjMjU2MzVjIiwidCI6IjUzYTRjNzZkLWI2MjUtNGFhNi1hMTAzLWQ0M2MyYzIxYTMxMiIsImMiOjI9

8 Sylvera. (2023). *The State of Carbon Credits 2023*. Sylvera. https://www.sylvera.com/reports/the-state-of-carbon-credits-report

9 Sylvera. (2023). *The State of Carbon Credits 2023*. Sylvera. https://www.sylvera.com/reports/the-state-of-carbon-credits-report

10 Climate Focus. (n.d.). VCM dashboard. Retrieved July 1, 2025, from https://app.powerbi.com/view?r=eyJrIjoiMTQwMTBkZWEtOWVmZS00Y2I1LWE1OTktMDQ1MzFjMjU2MzVjIiwidCI6IjUzYTRjNzZkLWI2MjUtNGFhNi1hMTAzLWQ0M2MyYzIxYTMxMiIsImMiOjI9

REDD+, ARR and IFM credits made a cumulative 667 million credits, with 43% of the total credits being issued on the market, resulting in an aggregate of 1,540 million credits.[11] Hence, these projects are integral to our climate and development goals. They are increasingly gaining traction, further boosted by innovations and improvements in the global carbon market landscape ranging from robust policies to stringent accountability measures.

2.1 CREDIT PRICE OVERVIEW

Across all project types, prices have dropped to where they were in 2021 before peaking in 2022, due to the prevalent price volatility in the carbon markets. However, as of 2024, NbS credits have not witnessed a low as they held more offtake deals than ever in 2024, and prices consistently higher than in the secondary market, demonstrating a rare bright spot in the VCM.[12] Despite the market-wide price decrease, nature-based projects are priced at a premium compared to technology-based projects (Renewable Energy Sources and Improved Cookstoves).[13]

For ARR projects, Figure 2[14] notes the pricing dynamics of credits generated through ARR projects. In 2021 the cost per credit stood at 7.97$, experiencing a rise to 11.79$ by 2022 and a further increase to 15.60$ in 2023. ARR credits have notably doubled in price in the period between 2021-23 and are projected to further grow. This is also demonstrated through projects such as DBC. In 2023, credits from Pakistan's Delta Blue Carbon Project were auctioned at 29.72$ per tonne. The exchange reflected that more than 60% of successful bid volumes were priced at over $30 a ton, with some bid prices as high as $50 a ton. Nonetheless, all the credits were sold at $29.72 a ton.[15] Demand is set to grow further, driving prices up to $70 per tonne of CO2 equivalent (tCO2e), especially as tech giants such as Microsoft and Google demonstrate interest. A notable transaction includes Microsoft's procurement of credits from a Panamian project, reportedly fetching close to 70$/tCO2e.[16]

Prices vary and price volatility is common, as a highly-rated Latin American REDD+ project fluctuated between $8/mt and $13.45/mt for Tier 3 volumes since December 2023, denoting the market's sensitivity to factors beyond project quality.[17] Figure 2[18] notes the pricing dynamics of credits generated through REDD+ projects. In 2021 the cost per credit stood at 5.15$, experiencing a rise to 10.26$ by 2022 which has persisted till 2023.

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11 Lemongello, J. (2024, February 1). January 2024 sees surging voluntary carbon credit market retirements. https://carboncredits.com/january-2024-sees-surging-voluntary-carbon-credit-market-retirements/

12 Allied Offsets. (2025). VCM 2024 recap: Emerging trends for 2025. https://alliedoffsets.com/wp-content/uploads/2025/01/VCM-2024-Recap-Emerging-Trends-for-2025.pdf

13 Sylvera. (2023). *The State of Carbon Credits 2023*. Sylvera. https://www.sylvera.com/reports/the-state-of-carbon-credits-report

14 New Private Markets. (2024, January 31). *Data snapshot: Pricing on the voluntary carbon market*. New Private Markets. https://www.newprivatemarkets.com/data-snapshot-pricing-on-the-voluntary-carbon-market/

15 Reuters. (2023, June 16). *Carbon credits auction for Pakistan mangrove project oversubscribed*. The Express Tribune. https://tribune.com.pk/story/2422073/carbon-credits-auction-for-pakistan-mangrove-project-oversubscribed

16 DGB Group. (2025, May 22). *Tech giants drive up demand and prices for ARR carbon credits*. Green.earth. https://www.green.earth/news/tech-giants-drive-up-demand-and-prices-for-arr-carbon-credits

17 Kronk, H. (2024, March 6). *In opaque REDD+ markets, identical credits can fetch diverse prices*. OPIS. https://www.opisnet.com/blog/in-opaque-redd-markets-identical-credits-can-fetch-diverse-prices/

18 New Private Markets. (2024, January 31). *Data snapshot: Pricing on the voluntary carbon market*. New Private Markets. https://www.newprivatemarkets.com/data-snapshot-pricing-on-the-voluntary-carbon-market/

Recent information on IFM notes the sale of 34$ per credit by Chestnut Carbon, a leading developer of nature-based carbon removal solutions[19]. Another project known as the Kibby Skinner IFM project recently sold 32,000 credits to Weyerhaeuser Company at $29 a tonne carbon dioxide equivalent (tCO2e)[20].

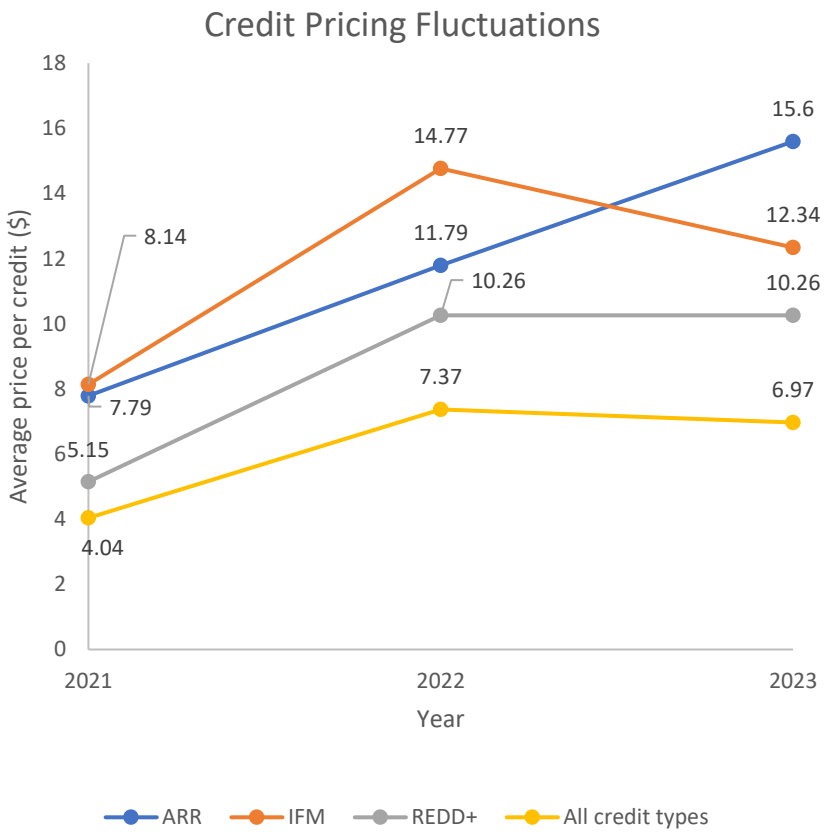


Figure 2 Credit Pricing Trend 2021-2023[1]

Figure 2 notes the pricing dynamics of credits generated through IFM projects. Overall, ARR projects have demonstrated a rapid increase in prices, projected to further grow. Additionally, co-certifications and labels demonstrating positive community and environmental impacts are key drivers of credit pricing.

From 2021 to 2024, projects that contributed to Sustainable Development Goals (SDG) had average per-credit prices that were 31% higher than those without SDG claims.[21] Buyers could expect, on average, to pay a higher price for credits that come from projects with lower risks (i.e., over crediting, additionality and permanence risks).[22] Additionally, credits holding Core Carbon Principles (CCP) tag say a retirement rate of over 6% in 2024, denoting buyer demand for high-quality credits.[23]

In terms of ARR, REDD+ and IFM projects, credits prices vary. For REDD+, Since October 2023, credits of various vintages from an Africa-based REDD+ project have cleared between $1.70/mt

19 https://www.prnewswire.com/news-releases/chestnut-carbon-completes-sale-of-first-ifm-carbon-removal-credits-at-34-per-credit-302118820.html

20 https://www.qcintel.com/carbon/article/us-forestry-company-agrees-sale-of-ifm-credits-at-29-tco2e-19976.html

21 BeZero Carbon

22 Ecosystem Marketplace. (2024). State of the voluntary carbon markets 2024. https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202024/State_of_the_Voluntary_Carbon_Markets_20240529%201.pdf

23 Allied Offsets. (2025). VCM 2024 recap: Emerging trends for 2025. https://alliedoffsets.com/wp-content/uploads/2025/01/VCM-2024-Recap-Emerging-Trends-for-2025.pdf

and $5/mt.[24] Majority of REDD+ projects, priced highest at $16.17, are in Brazil; while ARR, with a $24.66 highest price, are dominant in China. [25] Vintage 2021 credits from an Asia-based REDD+ project traded in February 2024 at $16/metric ton[26]. In 2024, within the Forestry and Land Use credit category, REDD+ credits, the most popular nature-based project type, lost 62% of their value year-over-year, with transaction volume falling 51% and price falling 23%, while prices for ARR and IFM credits both increased.[27] This decline in the popularity of REDD+ credits is attributed mainly to issues pertaining to credibility and integrity.[28] [29]

Hence, ARR demonstrates the strongest growth in terms of project issuance and pricing trends.

To further explore pricing trends, some of the following projects are outlined along with associated credit pricing across registries:

Type	Project	Description	Credit Price
ARR	Reforestation and Restoration of Degraded Mangrove Lands, Sustainable Livelihoods and Community Development in Myanmar	Implemented over an area of 2265.47 hectares, the project activities include restoration of mangroves involving villages. The project is expected to achieve an estimated annual emission reduction of 184,006 over a crediting period of 30 years.	$39.40 per ton
ARR	Delta Blue Carbon	Aiming to restore 300,000 hectares of degraded mangrove forests in the south eastern coast on Pakistan in Sindh Province, replantation is already completed on 86,409 hectares. The project is expected to generate 250 million credits in total over a period of 60 years.[30]	Sold for $27.80 to $35 per ton.[31] Vintage 2022 credits are currently

24 OPIS. (2024, March 21). *In opaque REDD+ markets, identical credits can fetch diverse prices*. https://www.opis.com/blog/in-opaque-redd-markets-identical-credits-can-fetch-diverse-prices/

25 L, J. (2024, January 26). *January 2024 sees surging voluntary carbon credit market retirements*. CarbonCredits.com. https://carboncredits.com/january-2024-sees-surging-voluntary-carbon-credit-market-retirements/

26 Kronk, H. (2024, March 6). *In opaque REDD+ markets, identical credits can fetch diverse prices*. OPIS. https://www.opisnet.com/blog/in-opaque-redd-markets-identical-credits-can-fetch-diverse-prices/

27 Ecosystem Marketplace. (2024). State of the voluntary carbon markets 2024. https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202024/State_of_the_Voluntary_Carbon_Markets_20240529%201.pdf

28 Ecosystem Marketplace. (2024, February 22). *Report: The voluntary carbon market contracted in 2023, driven by drop-off in transactions for REDD+ and renewable energy*. https://www.ecosystemmarketplace.com/articles/report-the-voluntary-carbon-market-contracted-in-2023-driven-by-drop-off-in-transactions-for-redd-and-renewable-energy/

29 The Guardian. (2023, January 18). *Revealed: Forest carbon offsets used by major companies worthless, analysis shows*. https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe

30 Carbon Market Institute. (n.d.). *Delta Blue Carbon Project, Sindh*. Retrieved March 18, 2025, from https://carbonmarketinstitute.org/projects/delta-blue-carbon-project-sindh/

31 Respira International. (n.d.). *Climate Impact X and Respira's landmark auction for blue carbon credits oversubscribed with global demand*. Respira International. Retrieved from https://www.respira-international.com/press-release-climate-impact-x-and-respiras-landmark-auction-for-blue-carbon-credits-oversubscribed-with-global-demand/?form=MG0AV3

			priced at $45.[32]
ARR	Regenerative Development of Anlo Wetlands (ReDAW)[33]	Located in Ghana, the project will restore 1,536 hectares of mangroves on degraded wetlands and bring significant community benefits. The project will sequester an estimated more than one million tCO2e by 2064.	Average price just below $50 (USD) per tonne
REDD+	Rimba Raya	The Rimba Raya Biodiversity Reserve Project, an initiative by InfiniteEARTH, aims to reduce Indonesia's emissions by preserving 91,215 hectares of tropical peat swamp forest on the southern coast of Borneo in the province of Central Kalimantan, Indonesia.	$5.60 per tCO2e for vintage 2018 credits[34]
ARR	Vichada Climate Reforestation, Colombia[35]	The project aims utilize afforestation and plant timber species such as *Eucalyptus (Eucalyptus pellita) and Acacia (Acacia mangium)* to restore land degraded by cattle raising[36]. The project spans a land of 84,310 ha and offers emission reduction potential of 4,040,545 tCO2.[37]	$40/tonne
ARR	Nicaforest High Impact Reforestation Program[38]	The Nicaforest Program encapsulates 365 ha of land under management and aims to contribute to the creation of a sustainable value-chain by working with landowners in a shared benefit scheme.[58] As of the end of 2021, this program sequestered 86,478 tCO2e (Ex Post). Total expected sequestration is expected to be 98,000 tCO2e.[58]	$52/tonne
REDD+	Katinagan Project	The Katingan Mentaya Project (KMP) is a tropical peatland forest protection and restoration project in Central Kalimantan Province of Indonesia, on the island of Borneo. The protected forest area covers 157,875 hectares (of which the project carbon accounting area is 149,800ha), where it generates an average of 6 million verified carbon units (VCUs) or carbon credits per year.	$6.00-6.05 per tonne of CO2 equivalent (tCO2e)[39]
ARR	Planting Biodiverse Forests in Panama	The project aims to protect and restore the degraded ecosystems, generate sustainable timber practices, and protect biodiversity in the project area of about 13,000ha, while a quarter of the area is designated as a reserve with high biological value.[40] More than 3.3	$38/tonne[41]

32 South Pole. (n.d.). *Indus Delta Blue Carbon - 1*. South Pole. Retrieved June 3, 2025, from https://shop.southpole.com/indus-delta-blue-carbon.html

33 ESG Today. (2024, June 18). *First carbon credit sale from Terraformation's Seed to Carbon Forest Accelerator*. ESG Today. https://www.esgtoday.com/first-carbon-credit-sale-from-terraformations-seed-to-carbon-forest-accelerator/

34 Yadav, K. (2025, April 3). REDD+ market participants show some optimism for 2025 despite current lack of trading. *Fastmarkets*. https://www.fastmarkets.com/insights/redd-market-participants-show-some-optimism-for-2025-despite-current-lack-of-trading/

35 https://marketplace.goldstandard.org/collections/projects/products/forest-finest-colombia-vichada-climate-reforestation-colombia

36 https://www.climateimpact.com/global-projects/vichada-afforestation-colombia/

37 https://forliance.com/wp-content/uploads/2016/08/Vichada_factsheet_EN.pdf

38 https://marketplace.goldstandard.org/collections/projects/products/nicaforest-high-impact-reforestation-program

39 Yadav, K. (2025, April 3). REDD+ market participants show some optimism for 2025 despite current lack of trading. *Fastmarkets*. https://www.fastmarkets.com/insights/redd-market-participants-show-some-optimism-for-2025-despite-current-lack-of-trading/

40 https://circularecology.com/online-store/carbon-offsets-gold-standard-project-panama-reforestation#:~:text=The%20Panama%20Forestry%20Programme%20is,carbon%20storage%20and%20habitat%20creation.

41 https://marketplace.goldstandard.org/collections/projects/products/planting-biodiverse-forests-panama

		mtCO2e emissions are to be reduced along worth the plantation of 7.5 million trees.[79]	
ARR	Chuddu Afforestation Project in China[42]	The project aims to reforest 36,500 ha of degraded barren mountains land in Xichuan County, aiming to absorb 753,000 tco2e, promote biodiversity, and work with locals.[81] The implementation of the project is expected to reduce the GHG emissions amounting to 15,066,243 tCO2e in 20 years, with an average annual GHG emission removal of 753,312 tCO2e.[80]	$20.39/tonne[43]
ARR	Liugui Afforestation	Located in South China's Karst Region and aiming to combat widespread desertification, this project includes afforestation using pine, China fir and cypress; they are fast-growing, shallow rooting and adaptable to the local soil.[44] Led by locals, the afforestation covers 33,000 ha of degraded land and employment of 30,000+ people, among which 19,000 are women. The project offers a sequestration potential of 878,000 tCO2e on average each year.[84]	$10.54/tonne[45]

2.2 CARBON MARKETS: BLUE CARBON

Within NbS, blue carbon credits are crucial for countries looking to improve environmental resilience and sequester emissions. Blue Carbon is the term coined for carbon dioxide (CO2) stored in the world's coastal and marine ecosystems such as mangroves, saltmarshes, and seagrasses. It is termed "Blue" Carbon because of its proximity to the ocean: it is stored mostly in the soil and silt up to 6 meters under the seabed.[46] Blue carbon interventions are significant as they provide multi-faceted benefits in the forms of restoration and conservation of ecosystems, climate mitigation and adaptation through emission sequestration, protection of coastlines and environmental resilience.[47]

Blue carbon resources are not only critical ecosystems, but significant carbon pools. Coastal habitats cover less than 2% of the world's surface but account for 50% of the ocean's carbon sequestration.[48] Mangroves alone store, or sequester, more carbon than any other ecosystem – up to 1,000 tonnes of carbon per hectare. This is 4-5 times more carbon than land-based forests, including rainforests. Mangroves, tidal marshes and seagrasses ecosystems are known to be

42 Verra. (n.d.). *Project 2087: Delta Blue Carbon – 1 (DBC-1)*. Retrieved July 1, 2025, from https://registry.verra.org/app/projectDetail/VCS/2087

43 South Pole. (n.d.). *Chudu forestry*. Retrieved July 1, 2025, from https://clickstore.southpole.com/catalog/product/view/id/48/s/chudu-forestry/category/9/

44 South Pole. (n.d.). *Liugui afforestation*. Retrieved July 1, 2025, from https://clickstore.southpole.com/catalog/product/view/id/40/s/liugui-afforestation/category/9/

45 South Pole. (n.d.). *Liugui afforestation*. Retrieved July 1, 2025, from https://clickstore.southpole.com/catalog/product/view/id/40/s/liugui-afforestation/category/9/

46 The World Bank

47 World Bank. (2023, November 21). *What you need to know about blue carbon* [Feature]. World Bank. https://www.worldbank.org/en/news/feature/2023/11/21/what-you-need-to-know-about-blue-carbon

48 World Bank. (2023, November 21). *What you need to know about blue carbon* [Feature]. World Bank. https://www.worldbank.org/en/news/feature/2023/11/21/what-you-need-to-know-about-blue-carbon

capable of removing ~3% of emissions globally per annum.[49] One of the most efficient blue carbon sinks, mangroves store carbon in their biomass, soil and sediments. Although natural mangrove forests have a much higher sequestering potential due to their vast biodiversity, rehabilitated trees also contribute to mitigation and adaptation action through restoration of canopy cover, revived biodiversity and improved ecosystem functioning. Social benefits come following these advantages by enhancing livelihoods and blue economy development. Conservation and restoration of coastal ecosystems particularly can provide cost-effective and socially beneficial contributions to mitigation of climate change.[50] These ecosystems are noted to have the ability to absorb and store 190 billion USD annually for a long period of time.[51][52]

Blue carbon credits comprise of less than one percent of overall credit transactions per year, but fetch higher prices per credit.[53] Blue carbon projects have gained substantial momentum driven by their high value and relatively higher project costs compared to forest-based credit alternatives. The Ecosystem Marketplace shows that between 2020 to 2023, the prices of blue carbon credits have ranged between $5.7 per ton to $13 per ton. While, blue carbon credits for the vintage of 2022 have been assessed at a premium, ranging from $25/mt to $29/mt by OPIS.[54] Overall, 10.9MtCO2 e (million tons carbon dioxide equivalent) in credit volumes have been traded in the 2020- 2023 period.[55] In 2023, credits from Pakistan's Delta Blue Carbon Project were auctioned at 29.72$ per tonne. The exchange reflected that more than 60% of successful bid volumes were priced at over $30 a ton, with some bid prices as high as $50 a ton. Nonetheless, all the credits were sold at $29.72 a ton.[56] At present, 2022 vintage credits from DBC are priced at $45.[57] As of 2025, credits from nature-based projects providing removal credits grew in value within the category, with the average price of ARR and Blue Carbon credits increasing by 19 percent and 257 percent, respectively.[58]

2.3 CARBON MARKET TRENDS: OPPORTUNITIES AND CHALLENGES

In recent years, the carbon market landscape has witnessed significant developments and momentum. However, in recent times, the momentum and ambition for carbon markets has significantly progressed due to improved accountability, transparency and verification that ensures high-quality credits.[59] This momentum has been prompted by developments in the carbon

49 Macreadie, P. I., Robertson, A. I., Spinks, B., Adams, M. P., Atchison, J. M., Bell-James, J., ... & Rogers, K. (2022). Operationalizing marketable blue carbon. *One Earth*, *5*(5), 485-492.

50 Ellis, P. W., Page, A. M., Wood, S., Fargione, J., Masuda, Y. J., Carrasco Denney, V., ... & Cook-Patton, S. C. (2024). The principles of natural climate solutions. *Nature Communications*, *15*(1), 547.

51 Ewane, E. B., Selvam, P. P., AlMealla, R., Watt, M. S., Arachchige, P. S. P., Bomfim, B., ... & Mohan, M. (2025). Mangrove-based carbon market projects: What stakeholders need to address during pre-feasibility assessment. *Journal of Environmental Management*, *374*, 124074.

52 Bertram, C., Quaas, M., Reusch, T. B., Vafeidis, A. T., Wolff, C., & Rickels, W. (2021). The blue carbon wealth of nations. *Nature Climate Change*, *11*(8), 704-709.

53 Agardy, T. (2024). *State of the blue carbon market: An ocean of potential*. Ecosystem Marketplace. https://www.ecosystemmarketplace.com/publications/state-of-the-blue-carbon-market/

54 https://www.opisnet.com/blog/high-costs-geopolitical-risks-blue-carbon/#:~:text=OPIS%20since%20late%20March%20has,between%20the%20two%20at%20%2413.

55 Agardy, T. (2024). *State of the blue carbon market: An ocean of potential*. Ecosystem Marketplace. https://www.ecosystemmarketplace.com/publications/state-of-the-blue-carbon-market/

56 Reuters. (2023, June 16). *Carbon credits auction for Pakistan mangrove project oversubscribed*. The Express Tribune. https://tribune.com.pk/story/2422073/carbon-credits-auction-for-pakistan-mangrove-project-oversubscribed

57 South Pole. (n.d.). *Indus Delta Blue Carbon - 1*. South Pole. Retrieved June 3, 2025, from https://shop.southpole.com/indus-delta-blue-carbon.html

58 Ecosystem Marketplace. (2025). *State of the voluntary carbon market 2025*. https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202025/Ecosystem%20Marketplace%20State%20of%20the%20Voluntary%20Carbon%20Market%202025.pdf

59 ORBIFY. (2025, MARCH 3). ***The voluntary carbon market in transition: A look at 2025 amid upheaval***. ORBIFY. LAST EDITED APRIL 11, 2025. RETRIEVED FROM **https://orbify.com/blog/the-voluntary-carbon-market-in-transition-a-look-at-2025-amid-upheaval**

market landscape, ranging from improved methodologies, such as Gold Standard's methodology for mangroves and VM0033 by Verra, both of which have improved market confidence in nature-based projects. With the introduction of the Core Carbon Principles (CCP), the Integrity Council for Voluntary Carbon market (ICVCM) has further improved standards and due-diligence to ensure credit quality and boosted investor confidence. Buyers of carbon credits demonstrate the progress as the pool contains notable entities such as Shell, which retained 14.5 million carbon credits in 2024, with a large amount of its credits coming from NbS projects. Other buyers such as Microsoft have also participated and has notably invested in carbon removal technologies.[60] Tech giants such as Google, Meta, Microsoft and Salesforce, as part of the Symbiosis Coalition, are working towards securing 20 million NbS removals by 2030.[61] In 2024, more companies than every before engaged in the buying of carbon credits, highlighting its growing significance.[62]

Improved regulatory and political landscape, along with ambition in countries has increased, leading to development of transparent and high-quality projects that reap emission mitigation and co-benefits, one such being the DBC. In recent times, the market is projected to further grow and estimated to reach $7 billion to $35 billion by 2030. A market projection of $250 million is expected in 2050.[63]

The carbon market landscape for blue carbon credits remains in a dynamic and evolving state, witnessing potential challenges and opportunities. Challenges include ensuring ecological considerations are met, strict and adequate MRV is adopted, especially pertaining to habitats, and climate vulnerability of coastal areas is considered.[64] Often, legal and regulatory challenges are also a concern when dealing with blue carbon. The complexities and hurdles associated with blue carbon projects may result in a delayed development of carbon markets for blue carbon credits.[65] Additional challenges are the political complications and social distrust that arise due to weak governance structures and lack of transparency that leads to absence of integrity. Some of the key aspects that need to be considered in the pre-field analysis are the capacity of the project on permanence and additionality. A clear understanding of the baseline is required ensuring that the MRV will be credible and feasible and that the social aspects catering to the indigenous people will be considered and protected. All these aspects are currently difficult to address especially in developing economies like Pakistan.

The biggest challenge in the field of blue carbon projects is the MRV. Additionally, often determining and ensuring aspects such as additionality presents unique challenges for certain blue

60 Jennifer, L. (2025, January 16). *Shell and Microsoft are the biggest carbon credit buyers in 2024: What projects do they support?* CarbonCredits.com. Retrieved June 23, 2025, from https://carboncredits.com/shell-and-microsoft-are-the-biggest-carbon-credit-buyers-in-2024-what-projects-do-they-support/

61 DGB. (2025, May 22). *Tech giants drive up demand and prices for ARR carbon credits.* DGB Group. https://www.green.earth/news/tech-giants-drive-up-demand-and-prices-for-arr-carbon-credits

62 AlliedOffsets. (2025, January). *VCM 2024 recap: Emerging trends for 2025* [PDF]. AlliedOffsets. Retrieved June 23, 2025, from https://alliedoffsets.com/wp-content/uploads/2025/01/VCM-2024-Recap-Emerging-Trends-for-2025.pdf

63 CarbonCredits.com. . (2024). *Carbon credits in 2024: What to expect in 2025 and beyond – $250B by 2050.* CarbonCredits.com. . https://carboncredits.com/carbon-credits-in-2024-what-to-expect-in-2025-and-beyond-250b-by-2050/

64 Ecosystem Marketplace. (2024, October). *State of the blue carbon market.* https://www.ecosystemmarketplace.com/wp-content/uploads/2024/10/State_of_the_Blue_Carbon_Market_FINAL-with-box.pdf

65 International Finance Corporation. (2023). Deep blue: Opportunities for blue carbon finance in coastal ecosystems. International Finance Corporation. Retrieved from https://www.ifc.org/content/dam/ifc/doc/2023-delta/deep-blue-opportunities-for-blue-carbon-finance-in-coastal-ecosystems-optimized.pdf

carbon conservation projects, particularly because of the overlap between blue carbon ecosystems and declared marine protected areas, national conservation priorities, and sustainable coastal wetland management (where protections may focus on fisheries management rather than maintaining blue carbon ecosystems).[66] Standard setting bodies have taken into account such challenges as they devise and update methodologies for blue carbon projects. Verra's VM0033 is a key example as it replaces Clean Development Mechanism (CDM) methodologies and draws upon up-to-date science, data, and technology for blue carbon ecosystems. Verra, in collaboration with Silvestrum Climate Associates, chose to make VM0033 the all-encompassing blue carbon methodology, covering both restoration and conservation practices. The updated VM0033 adopts the new REDD baseline principles and procedures in the all-new VCS afforestation, reforestation, and revegetation methodology.[67] In 2023, it was further revised to add tidal wetland conservation activities.

Gold Standard also released its methodology on Sustainable Management of Mangroves in 2024, incorporating remote sensing techniques to ensure efficient monitoring and verification of mangrove projects.[68] Gold Standard also specifically prioritizes community well-being and acceleration of the achievement of Sustainable Development Goals (SGDs) across its projects, ensuring community considerations and any associated risks are mitigated.

In alignment with the updated methodologies and guidance for development of blue carbon projects, Pakistan's development of its first Policy Guidelines for Trading in Carbon Markets has provided not only stringent and comprehensive guidelines to develop carbon market projects, but also boosted confidence and ambition. Furthermore, the tremendous success of DBC has also played a pivotal role in developing the country's carbon market landscape. Hence, the country itself is well-equipped with the necessary knowledge and skills required to deliver high-quality projects and navigate any potential challenges that may arise.

Additionally, It is important to note that as carbon markets progress and gain further momentum, there are several pivotal opportunities and developments that are arising. COP29 in Baku, Azerbaijan, witnessed a significant event as finally after nine years of negotiations the rules for Article 6 were finalized. This is critical for improved investor confidence and market activity as the regulatory landscape becomes much clearer and transparent.

Moreover, as methodologies improve and additional certifications such as ABACUS label and the Climate, Community and Biodiversity Standards (CCBS) are adopted, quality of credits improves and ensures high-quality. A key example of progress is Verra's VM0033 which adopts the new REDD baseline principles and procedures in the all-new VCS afforestation, reforestation, and

66 Ocean Risk and Resilience Action Alliance. (2022). *High quality blue carbon: Principles and guidance*. https://oceanriskalliance.org/wp-content/uploads/High-Quality-Blue-Carbon-PG_FINAL_11.9.2022.pdf

67 International Finance Corporation. (2023). *Deep blue: Opportunities for blue carbon finance in coastal ecosystems*. https://www.ifc.org/content/dam/ifc/doc/2023-delta/deep-blue-opportunities-for-blue-carbon-finance-in-coastal-ecosystems-optimized.pdf

68 ClearBlue Markets. (2024, August 27). *Gold Standard releases new mangrove methodology*. ClearBlue Markets. Retrieved June 23, 2025, from https://www.clearbluemarkets.com/knowledge-base/gold-standard-releases-new-mangrove-methodology

revegetation methodology.[69] Through such improvements, quality of projects and generated credits are set to improve. Hence, buyers could expect, on average, to pay a higher price for credits that come from projects with lower risks (i.e., over crediting, additionality and permanence risks).[70] This trend partly reflects the higher costs of developing high-quality projects, as well as the increased willingness-to-pay from buyers for better projects. Blue carbon credits are also sold at a significant premium over current carbon market rates, a reflection of high upfront capital costs and its unique appeal to buyers attracted to the multiple environmental and social benefits of blue carbon habitat conservation and restoration.[71] NbS projects are expected to dominate as further improvements and developments continue in terms of methodologies and pivotal projects that demonstrate success, one such being the DBC project. Furthermore, as supply for blue carbon credits is constrained at the moment, innovative projects in this field will be welcomed by potential buyers in both the private and public sectors.

This traction is expected to further grow, as research backs the critical importance of credits in achieving sustainability goals as companies who buy credits are able to decarbonize twice as fast as those that do not.[72] Companies and private entities are targeting decarbonization and net zero in the coming future, as countries set their targets through their NDCs. In recent times, we have witnessed a growing demand from various key players. Tech giants such as Google, Meta, Microsoft and Salesforce, as part of the Symbiosis Coalition, are reportedly paying $50-$55 per credit on average as they work towards securing 20 million NbS removals by 2030.[73] In 2025, Microsoft's engagement with ARR projects also led to a spike in prices.[74]

69 International Finance Corporation. (2023). *Deep blue: Opportunities for blue carbon finance in coastal ecosystems*. https://www.ifc.org/content/dam/ifc/doc/2023-delta/deep-blue-opportunities-for-blue-carbon-finance-in-coastal-ecosystems-optimized.pdf

70 Sylvera. (2024). *The state of carbon credits 2024 report*. https://7608351.fs1.hubspotusercontent-na1.net/hubfs/7608351/%5BSylvera%5D%20The%20State%20of%20Carbon%20Credits%202024%20Report.pdf

71 Ecosystem Marketplace. (2024, October). *State of the blue carbon market*. https://www.ecosystemmarketplace.com/wp-content/uploads/2024/10/State_of_the_Blue_Carbon_Market_FINAL-with-box.pdf

72 Sylvera. (2023). *The State of Carbon Credits 2023*. Sylvera. https://www.sylvera.com/reports/the-state-of-carbon-credits-report

73 DGB. (2025, May 22). *Tech giants drive up demand and prices for ARR carbon credits*. DGB Group. https://www.green.earth/news/tech-giants-drive-up-demand-and-prices-for-arr-carbon-credits

74 Gourlay, P. (2025, May 19). VCM Report: ARR carbon credit prices rally as Microsoft steps in with mega-deal. *Carbon Pulse*. https://carbon-pulse.com/398854/

3. CARBON MARKETS IN PAKISTAN

The accelerated functioning of carbon markets after the guidelines approved by the federal cabinet seeks to utilize components of Article 6 of the Paris Agreement that allows inter-governmental cooperative approaches and trade of carbon credits in voluntary carbon markets. Pakistan has aligned with the global momentum aiming to leverage carbon markets and Article 6 through its Policy Guidelines for Trading in Carbon Markets.

3.1 PAKISTAN POLICY GUIDELINES FOR TRADING IN CARBON MARKETS

The carbon market project landscape in Pakistan has witnessed significant development and progress Recently, the Pakistan Policy Guidelines for Trading in Carbon Markets have been developed to provide a framework and pathway for project development and implementation, if project developers opt to generate authorized credits under Article 6. In the carbon market landscape, if generated credits go through a process by which the government and/or National Designated Authority of the host country formally approves the use or transfer of credits, particularly under Article 6 of the Paris Agreement, it is known as 'authorization'. Through this process, credits are converted into Internationally Transferred Mitigation Outcomes (ITMOs). This ensures that the credits generated are valid and legitimate, align with the host country's Nationally Determined Contributions (NDCs), and with the national and international rules and contribute to achieving climate goals. Additionally, this validation also ensures that credits do not possess the risk over double-counting. On the other hand, developers also have the choice to enter Voluntary Carbon Markets without opting for Article 6 and Corresponding Adjustments (CA) of credits.

The Government of Pakistan has issued policy guidelines for engagement in carbon markets, laying the foundation for the development of national carbon trading systems. These guidelines outline a strategic roadmap to harness carbon market finance as a critical tool for advancing both climate mitigation goals and broader economic development objectives. The Government of Pakistan, and the Nationally Designated Entity (NDA) Ministry of Climate Change & Environmental Coordination (MoCC&EC), are dedicated to fostering a supportive policy and institutional framework to promote carbon mitigation initiatives that contribute to reducing greenhouse gas (GHG) emissions, in line with its Nationally Determined Contributions (NDCs). Priority is given to projects that deliver not only emission reductions but also significant co-benefits aligned with sustainable development goals. These include positive impacts on local communities through interventions in sectors such as waste management, forestry, land use, wetlands, agriculture, industry, transport, and energy.

In this context, the Government of Pakistan aims to leverage carbon markets to support the implementation of large-scale mitigation initiatives through development of the Voluntary Carbon Market (VCM) and a compliance-based carbon market. These markets are expected to act as catalysts for mobilizing private sector finance, attracting investment in sustainable and climate-

resilient projects, and accelerating the country's transition towards a low-carbon and ultimately net-zero economy.

To be eligible for registration under Article 6 of the Paris Agreement, a carbon market project must align with the principles outlined in Article 6, paragraph 2, which governs cooperative approaches involving the transfer of internationally transferred mitigation outcomes (ITMOs). Pakistan has committed to reduce the absolute 801.2 MtCO2eq by 2030 contributed by 240.15 MtCO2eq of unconditional target and 561.05 MtCO2eq of conditional target. The remaining 50% are outside the scope of Pakistan's Updated NDC 2021. The trading will occur for projects within the ceiling of 50% or 280.5 MtCO2eq of the committed conditional target in periodically updated NDC, covering all the sectors listed under the categories of conditional reductions. Additionally, the policy specifically notes the prioritization of NbS projects. The proposed project should demonstrate measurable, long-term mitigation and adaptation co-benefits, incorporate robust environmental and social safeguards, and ensure a low risk of non-performance across multiple NDC implementation periods.

Steps for Project Development and Registration:

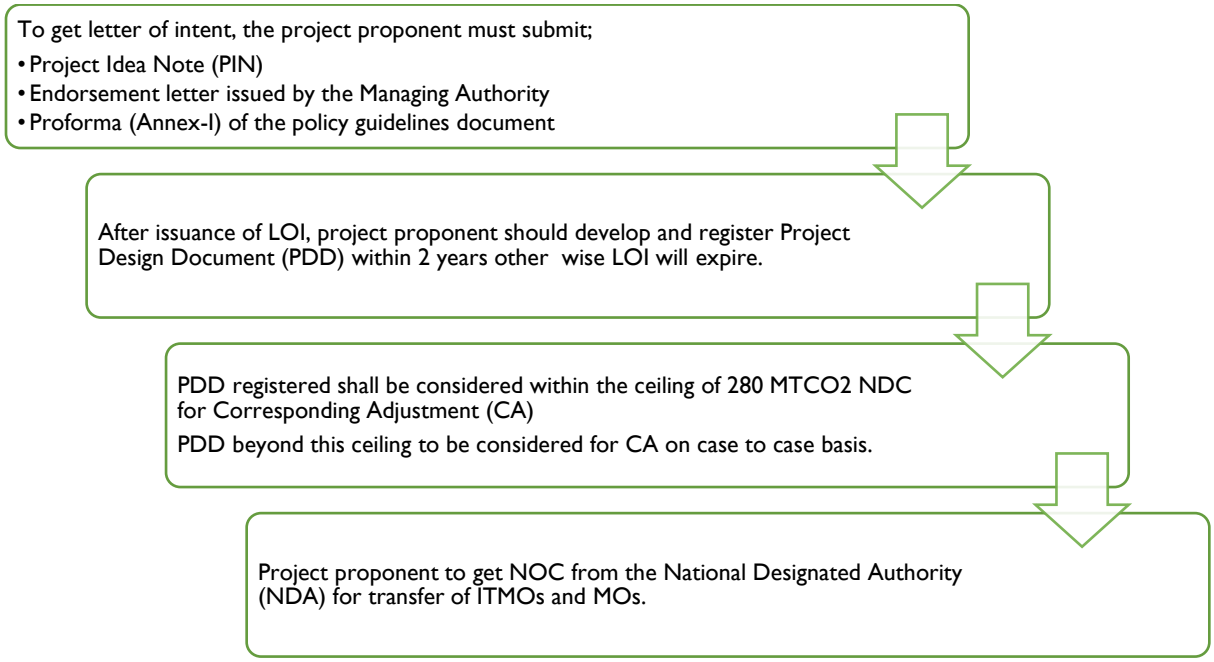


Figure 3 Steps for Project Development and Registration

3.2 CARBON MARKET PROJECTS IN PAKISTAN

In Pakistan, various carbon market projects are in various stages of registration for the voluntary markets, additionally some have also began development under Article 6 as per Pakistan's Policy Guidelines for Carbon Markets. At present, projects across various sectors are listed and in

various stages of development across registries such as Verra, Gold Standard and Global Carbon Council. About 18 projects across sectors such as water, energy-efficient cookstoves, NbS, renewable energy, AFOLU are registered and active (See Annex A)

With the launch of the official policy, further action and project development has begun by project proponents. In May 2025, ministry issued a letter of intent (LOI) and host country approval to two firms for separate projects likely to generate millions of carbon credits over the next 10 years. The LOI was issued to the Ravi Urban Development Authority (Ruda) to develop a 'sustainable' city outside Lahore along the Ravi River. The approval was granted under Article 6.2 (cooperative approach) for Ruda's proposal to rehabilitate the Mahmood Booti dumpsite into an urban forest and also reduce methane emissions. Furthermore, Pakistan issued its first host country approval to a Korean firm, which has proposed 'Punjab Clean Water and Carbon Solutions in Pakistan' under Article 6.4 of the Paris Agreement that establishes the international carbon crediting mechanism. Under the project, the firm ATR Inc. will install 250 water treatment plants in Lahore and Faisalabad and is likely to prevent 1,500,000 tonnes of CO2e emissions in 10 years — from 2026 to 2035. Hence, the country is demonstrating significant potential for further development, prompted by an improved regulatory landscape and enhanced ambition.

3.3 DELTA BLUE CARBON IN PAKISTAN

The Delta Blue Carbon (DBC) Project is a key carbon market project in Pakistan that has earned tremendous success. It is a 60-year project initiated in 2015 and will run until 2075, restoring 350,000 hectares of mangroves and resulting in an estimated 142 million tCO2e over the project lifetime.[75] Over two phases the project will restore degraded mangroves across 600,000 hectares of the Indus River Delta in Pakistan's Sindh Province, resulting in over 250 million tonnes of CO2 sequestered over the project's lifetime. The project has already restored 73,000 hectares of degraded mangrove forests and tidal wetlands. DBC is registered in Verra's Verified Carbon Standard (VCS) Program and the Climate, Community & Biodiversity Standards (CCBS) Program.

The project has demonstrated significant success as the first tranche of carbon credits were issued in late 2022 and buyers expressed immense ambition for this initiative. Notable buyers included Microsoft, Carbon growth Partners, Respira and more. In 2023, credits from Pakistan's Delta Blue Carbon Project were auctioned at 29.72$ per tonne. The exchange reflected that more than 60% of successful bid volumes were priced at over $30 a ton, with some bid prices as high as $50 a ton. Nonetheless, all the credits were sold at $29.72 a ton.[76] DBC reflected the ambition and potential for nature-based initiatives as the demand for carbon-removal credits generated and issued exceeded available supply by more than 50%[11], signaling to the country to harness this momentum.

75 Delta Blue Carbon

76 https://tribune.com.pk/story/2422073/carbon-credits-auction-for-pakistan-mangrove-project-oversubscribed

This initiative has worked for protection and restoration of species that are threatened in the coastal region of Sindh. Covering about 60 villages and 42,000 residents, the project has a significant focus on community development along with environmental resilience, interventions that are also needed in the Balochistan province. Some of the activities that have been designed in the project are replanting mangroves, nursery maintenance, survey and data collection and access to schooling educating about sustainable fish and crab farming. The Mangrove Stewardship Agreements (MSAs) have assigned local people as custodians for the regions degraded areas. However, the most important information that this project can provide for the assistance of pilot project is on carbon accounting. The project noted the effectiveness of the project viable only in the case where the blue carbon initiative achieves a good carbon credit price.

3.3.1. MARKET LANDSCAPE AND KEY BUYERS

Currently, the project has fetched a price of US$ 27.80 per ton and about 250,000 metric tons of carbon credits have been sold.[77] About 30% of the credits were also sold for $35 or more. The blue carbon projects specific to mangrove reforestation have been found to achieve relatively more ambitious targets accomplishing an increase in forest covers, countering floods, maintaining biodiversity leading to food security and removing pollutants. The additionality and permanence of the initiative was also found credible where various buyers were willing to pay premium due to their perception of these credits as high-quality. It has further been noted that the demand of credits generated by DBC exceed by the supply by 50% Singapore Exchange (SGX Group), revealing in addition the value of 60% of the credits to be between $30-$50 per ton.[78] These high integrity carbon credits are labelled as 'Triple Gold Level' owing to their great contribution to improving the climate and social dynamics.[79] The main buyers of carbon credits from Pakistan are Trafigura, Respira International, DBS Bank, Microsoft and Singapore Exchange (SGX Group).[80] At present, 2022 vintage credits from DBC are priced at $45.[81]

77 International Growth Centre. (n.d.). Climate priorities for developing countries: Market-based solutions for sustainable development. International Growth Centre. Retrieved from https://www.theigc.org/blogs/climate-priorities-developing-countries/market-based-solutions-sustainable-development

78 Yahoo Finance. (2023). *Carbon credits auction for Pakistan mangrove project sees demand exceed supply by 50%*. Retrieved March 18, 2025, from https://sg.finance.yahoo.com/news/carbon-credits-auction-pakistan-mangrove-073817421.html

79 Delta Blue Carbon. (2023, June 17). *[Title of the article]*. Retrieved March 18, 2025, from https://deltabluecarbon.com/2023/06/17/https-www-brecorder-com-news-40248329/

80 International Growth Centre. (n.d.). Climate priorities for developing countries: Market-based solutions for sustainable development. International Growth Centre. Retrieved from https://www.theigc.org/blogs/climate-priorities-developing-countries/market-based-solutions-sustainable-development

81 South Pole. (n.d.). *Indus Delta Blue Carbon - 1*. South Pole. Retrieved June 3, 2025, from https://shop.southpole.com/indus-delta-blue-carbon.html

4. STANDARDS AND METHODOLOGIES

Within the voluntary carbon market landscape, standards (e.g. Verra, Gold Standard) are key entities that define the rules and requirements for project development, validation, verification, and registration, setting out stringent guidelines in the form of methodologies to ensure critical factors such as emission reduction, additionality, permanence, transparency, and more (Figure 5).

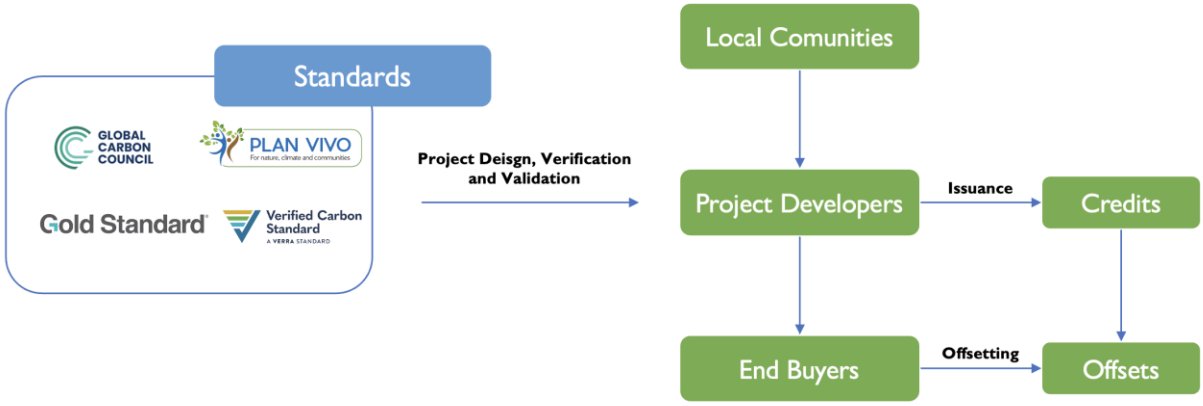


Figure 4 Importance of Standards in Carbon Markets

The participants of the VCM operate in a privately regulated environment where private entities design and implement climate change project activities within defined standards approved by the Integrity Council for the Voluntary Carbon Market (ICVCM), a key player ensuring the market's reliability. In parallel, Internationally Transferred Mitigation Outcomes (ITMOs), established under Article 6.2 of the Paris Agreement, play a complementary role in carbon markets. ITMOs enable countries to collaborate by transferring emission reduction outcomes across borders, ensuring robust accounting to prevent double counting. In Pakistan, the Policy Guidelines for Trading in Carbon Markets govern projects that aim to attain ITMOs (See Section 3.1).

The primary goal of carbon market standards is to ensure that the generated credits are high-quality, transparent and verifiable. It is important to note that the carbon market landscape for mangroves and other types of projects is rapidly evolving, methodologies are often developed and/or updated to ensure alignment with sound and best practices. Methodologies determine the project design, especially providing guidance on mitigating risks such as leakage emissions, non-permanence and ensuring additionality. The development of VM0033 by Verra and Sustainable Management of Mangroves in recent years is a key example of evolving and developing methodologies aimed to ensure data-driven, transparent, and verifiable approaches, as will be

discussed in this section. This section identifies potential standards and methodologies the project may opt for.

4.1 VERIFIED CARBON STANDARDS

The Verified Carbon Standard (VCS) Program is the world's most widely used greenhouse gas (GHG) crediting program developed by Verra, a non-profit organization. It drives finance toward activities that reduce and remove emissions, improve livelihoods, and protect nature. VCS projects have reduced or removed more than one billion tons of carbon and other GHG emissions from the atmosphere.

4.1.1 REGISTRATION PROCESS[82]

The registration process of carbon crediting projects with Verra consists of 5 main phases that have been described below. The 6th and 7th phase can be visited if the projects need to retire or cancel or proceed with project maintenance.

Phase 1: Project Validation and Verification

1. Documents including project description, evidence of ownership along with other documents are submitted to the validation/verification body
2. After review of the project by the VVB, validation/verification report is prepared for proponent for representation for registry
3. Project proponent submits the report including the monitoring report and other documents to VVB
4. VVB body further assesses the GHG emissions and removals for verification process
5. A report for verification is prepared and submitted to the proponent for representation

82 Verra. (2024). Registration and Issuance Process (v4.5). Verra. https://stg.verra.org/wp-content/uploads/2024/04/Registration-and-Issuance-Process-v4.5-FINAL-4.15.2024.pdf

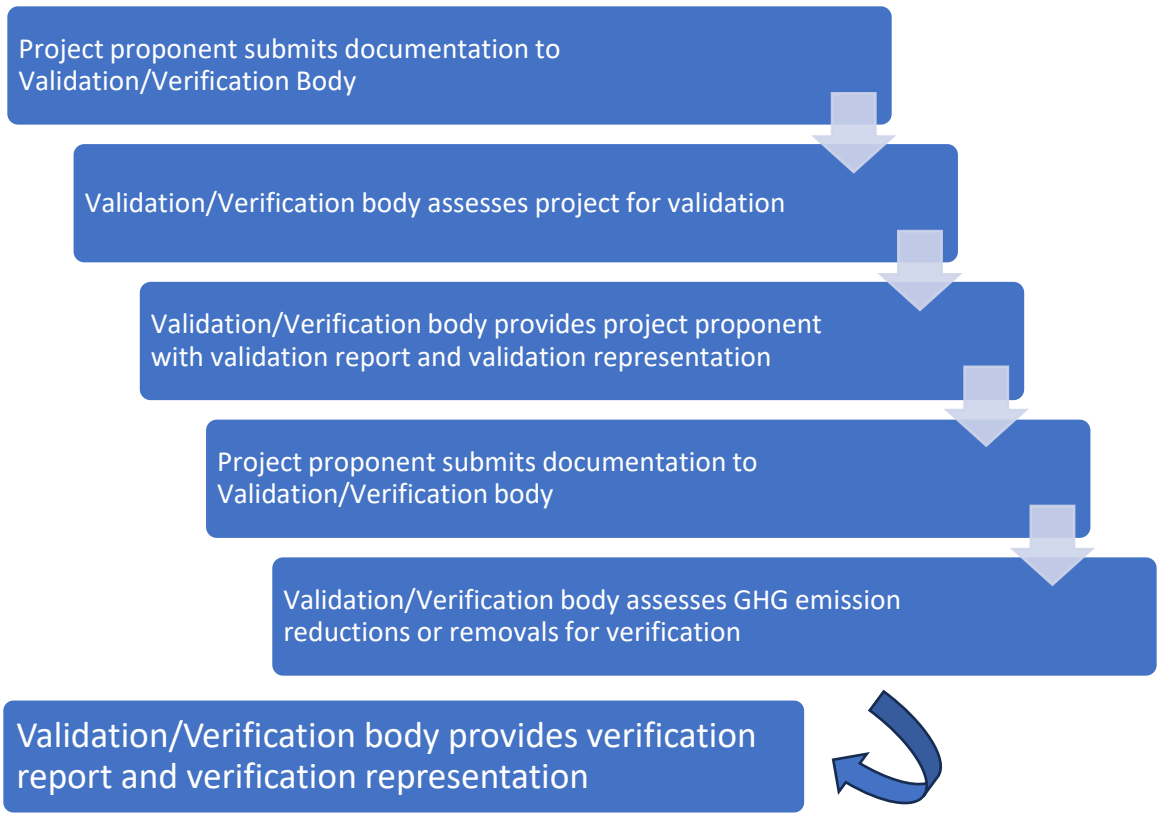


Figure 5 Registration Process Phase I for Verra

Phase 2: Registration and verification approval

Verra receives project documents with the 11 components as mentioned below:

Figure 6 Registration Process Phase II for Verra

Phase 3: Project review

After submission to Verra, a review is conducted, and findings of this assessment are sent back to VVB. Necessary changes are made and reviewed again for eligibility. At this point either the project registration request is processed or denied.

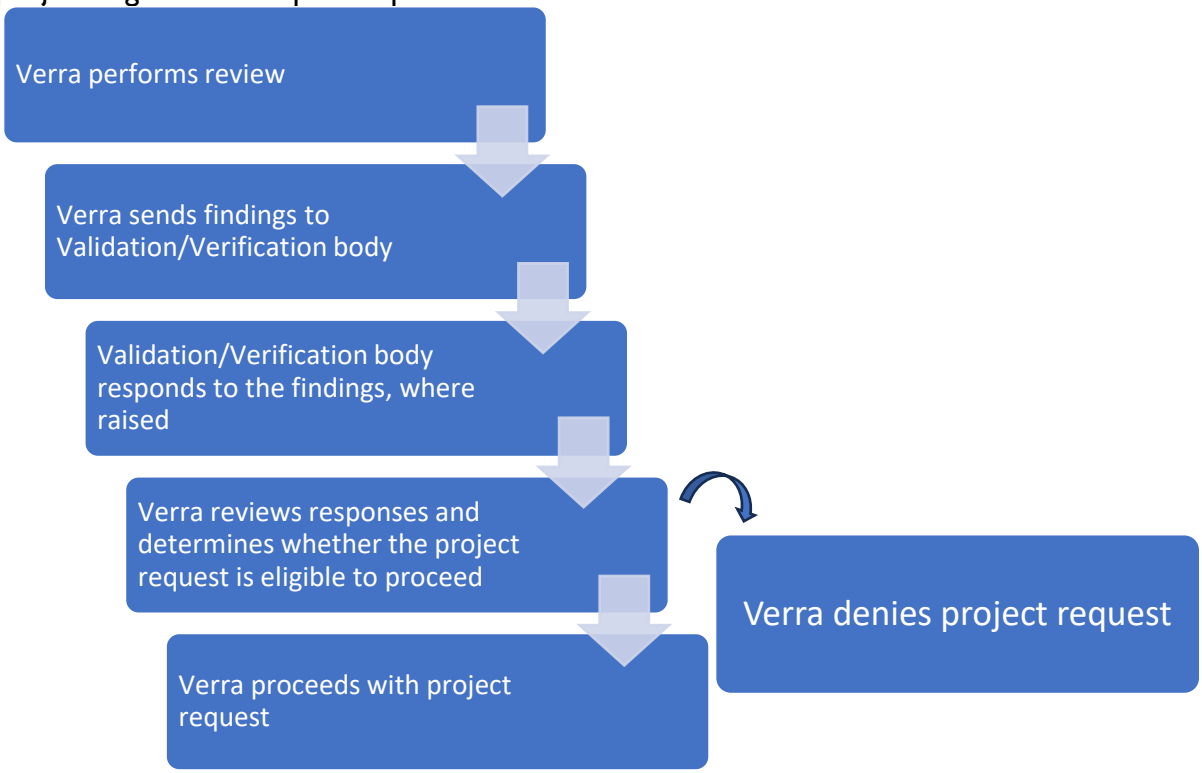


Figure 7 Registration Process

Phase 3 for Verra on project approval and denial

If the project is denied, the following process is followed where the proponent can submit a new request.

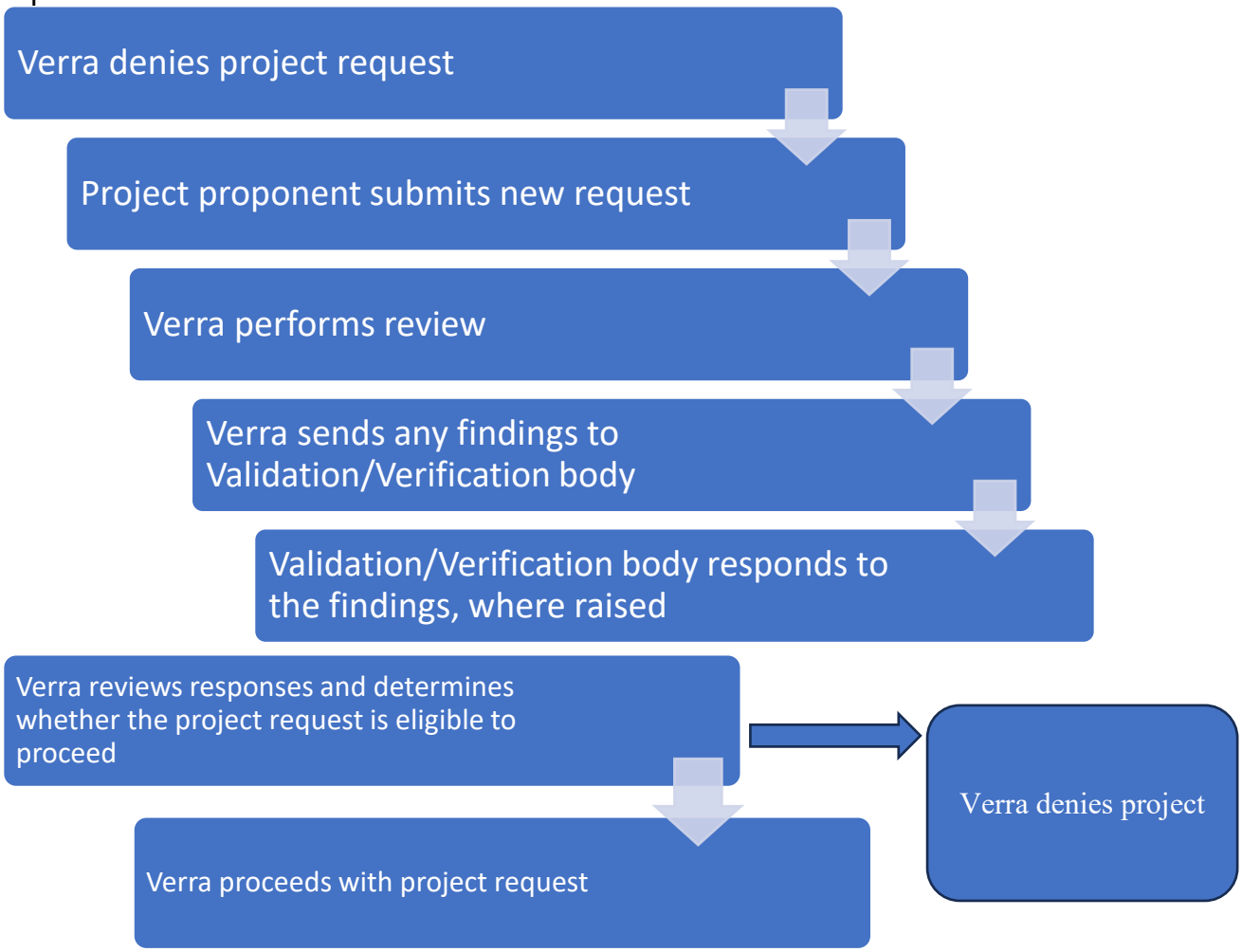


Figure 8 Registration Process if Project Denied

Phase 4: Project registration and initial VCU issuance

If the project proceeds to this level, Verra Registry creates project and VCU records and the Registry performs checks to generate serial numbers. VCUs levy are issued which the project proponent pays after which VCUs are deposited in propone

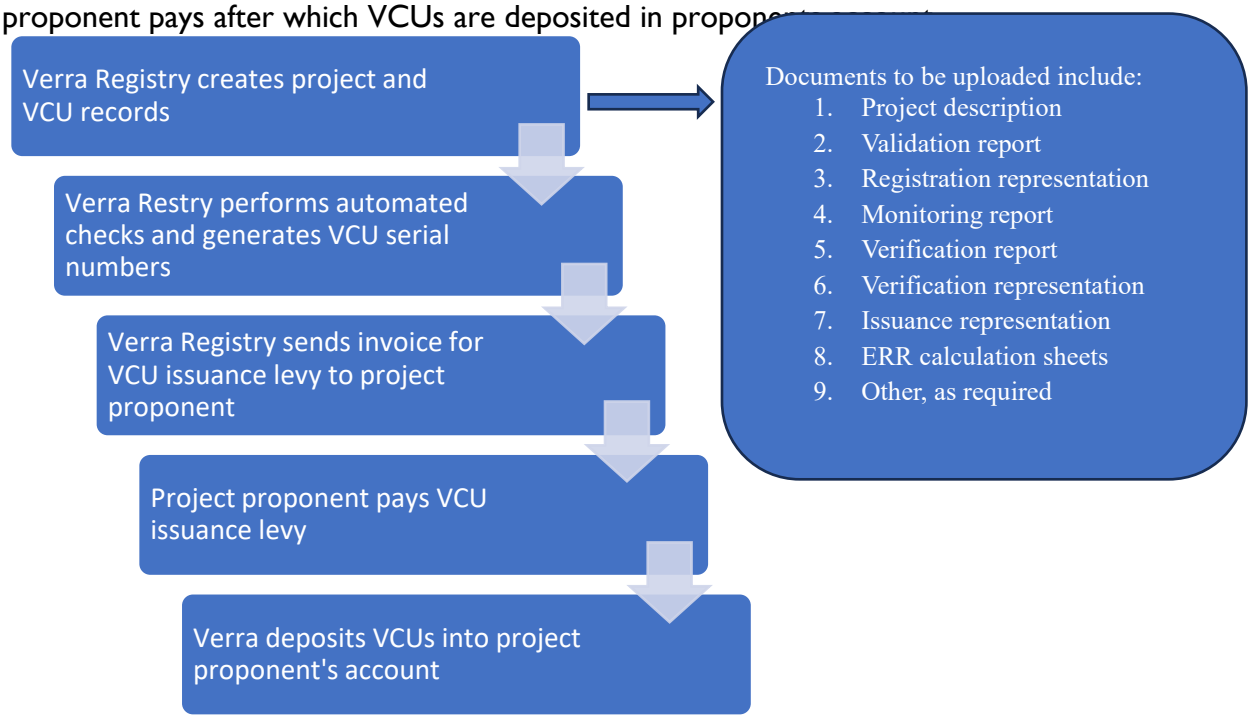


Figure 9 Registration Process Phase IV for Verra

Phase 5: Periodic VCU issuance

Phase 4 processes are repeated for periodic issuance with an addition of two steps at the beginning where proponent submits document again and Verra reviews the verification request.

Phase 6: VCU retirements and cancelations

In this phase, projects execute retirement and Verra records the retirement. For cancellation, a request is submitted and the account holder confirms the accuracy of this request. Cancellation is executed by Verra and recorded in the Registry.

Phase 7: Project maintenance

Any changes that are made to the project are regularly notified to Verra and recorded on Verra Registry

4.1.2 COST AND FEES

Table 2: Cost and fees of Verra[83]

Fee	Rate
Account opening fee	USD 750 for each account opened with the Verra Registry, payable in full at account approval
Annual account maintenance fee	USD 750 for each account, payable in full at account approval and subsequently on the anniversary date of account approval each year
Account reactivation fee	USD 2000 for each account
VCS Projects	
Pipeline listing fee	USD 1500 for each pipeline listing request
Registration review fee	USD 3750 for each project registration request
Project activity data allocation fee for projects using VMD0055	USD 10 000 per request plus USD 0.25 per hectare included in a submitted KML amounting to a maximum total cost4 of USD 150 000 per project, payable at the time of the request. Changes to project areas already allocated incur a USD 500 fee per request plus USD 0.25 per previously unallocated hectare (with a maximum 20% change in total area). Jurisdictional scale data is available on request. Contact registry@verra.org for fee details.
Verification review fee	USD 5000 for each verification review request, comprising the following: • USD 2500 verification review request fee5 • USD 2500 prepayment fee which is credited against future issuances
Requantification review fee	USD 10 000 per request
Levy	USD 0.23 per claimed t CO2e of reductions or removals
Validation/verification body annual fee	1 program: USD 5000/y 2 programs: USD 7250/y 3 or more programs: USD 9000/y
Validation/verification body reinstatement assessment fee	USD 10 000 payable upon application for reinstatement by a validation/verification body that has been suspended or inactivated

4.1.3 METHODOLOGIES

i. VM0033 Methodology for Tidal Wetland and Seagrass Restoration [84]

VM0033 outlines procedures to estimate net greenhouse gas emission reductions and removals resulting from project activities implemented to restore tidal wetlands. VM0033 identifies that restoration of tidal wetlands may include activities such as creating, restoring and managing

83 Verra. (2024). Verra Program Fee Schedule v1.0. Verra. https://verra.org/wp-content/uploads/2024/10/Verra-Program-Fee-Schedule-v1.0.pdf

84 Verra. (2023). Methodology for Tidal Wetland and Seagrass Restoration v2.1. Verra. https://verra.org/wp-content/uploads/2023/09/VM0033-Methodology-for-Tidal-Wetland-and-Seagrass-Restoration-v2.1.pdf

hydrological conditions, increasing vegetative cover, ensuring sediment supply, addressing salinity issues and reviving water quality and native plant communities. Emission reductions from all these wide range of activities that bring about ecological changes. The main aspects that would play a part in carbon sequestration are:

- Increased biomass
- Increased soil organic carbon
- Restoration of saline lands or lands that cause emissions due to land use change
- Reduced emission due to control of degrading soil

In 2023, it was revised to include conservation activities and to ensure that the methodology reflects the most up-to-date science, data, and technology for blue carbon ecosystems. This methodology is applicable to projects located globally, and to all tidal wetland systems (i.e., tidal forests (such as mangroves), tidal marshes and seagrass meadows).

This methodology has replaced AR-AM0014 and AR-AMS0003 by the Clean Development Mechanism (CDM).[85] For strata with organic soil, this methodology sets out procedures for the estimation of peat depletion time (PDT). Likewise, for strata with mineral soils and sediments, this methodology provides procedures for the estimation of soil organic carbon depletion time (SDT). This methodology also includes an assessment of the maximum quantity of GHG emission reductions which may be claimed from the soil organic carbon (SOC) pool (either based on the difference between the remaining soil organic carbon stock in the project and baseline scenarios after 100 years (total stock approach), or the difference in cumulative carbon loss in both scenarios since the project start date (stock loss approach)). To estimate carbon stock changes in tree and shrub biomass, this methodology uses procedures from CDM tool AR-Tool14 Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities. This methodology also provides a method to account for carbon stock changes in herbaceous vegetation. Since biomass may be lost due to subsidence following sea level rise, restoration projects involving afforestation or reforestation may account for long-term carbon storage in wood products where trees are harvested before dieback. GHG emissions from the SOC pool are estimated by assessing emissions of CO2, CH4 and N2O, which may be estimated via several methods (e.g., proxies, modeling, default factors, local published values).

The methodology also addresses anthropogenic peat fires, prescribed burning and seal level rise considerations. Registered projects include the Delta Blue Carbon[86][87] registered in 2021 and the Regenerative Development of Anglo Wetlands in Ghana[88] operational since 2020. In alignment with VM0033, Verra also developed the VCS Agriculture, Forestry and Other Land Use (AFOLU)

85 Verra. (2022). *Verra replaces CDM AR-AM0014 and AR-AMS0003 methodologies with VM0033 Methodology for Tidal Wetland and Seagrass Restoration v2.0*. Retrieved March 18, 2025, from https://verra.org/verra-replaces-cdm-ar-am0014-and-ar-ams0003-methodologies-with-vm0033-methodology-for-tidal-wetland-and-seagrass-restoration-v2-0/

86 Carbon Market Institute. (n.d.). Delta Blue Carbon Project, Sindh. Carbon Market Institute. https://carbonmarketinstitute.org/projects/delta-blue-carbon-project-sindh/?form=MG0AV3

87 Verra. (2021). DELTA BLUE CARBON - 1. THE INDUS DELTA MANGROVE RESTORATION PROJECT PHASE 1. https://registry.verra.org/app/projectDetail/VCS/2250

88 ReDAW. (n.d.). Regenerative Development of Anlo Wetlands (ReDAW). ReDAW. https://www.redaw.org/?form=MG0AV3

Non-Permanence Risk Tool, assessing internal, external and natural risks that threaten projects and issuing a duffer calculation based on permanence.

ii. VM0007 REDD Methodology Framework (REDD+MF)[89]

This methodology provides a set of modules for various components of a methodology for reducing emissions from deforestation and forest degradation (REDD). The modules, when used together, quantify GHG emission reductions and removals from avoiding unplanned and planned deforestation and forest degradation. This methodology is applicable to forest lands, forested wetlands, forested peatlands and tidal wetlands that would be deforested or degraded in the absence of the project activity. The methodology includes a module for activities to reduce emissions from forest degradation caused by extraction of wood for fuel. No modules are included for activities to reduce emissions from forest degradation caused by illegal harvesting of trees for timber; such a module may be included in the future. The methodology also includes a module for activities that include forest regeneration and specific modules for project activities located on peatlands and tidal wetlands.

4.2 GOLD STANDARD

Gold Standard was established in 2003 by WWF and other international NGOs as a best practice standard to ensure projects that reduced carbon emissions featured the highest levels of environmental integrity and contributed to sustainable development. All Gold Standard-certified projects and programmes accelerate progress toward the Net-Zero ambition of the Paris Climate Agreement while catalyzing impact toward the broader Sustainable Development Goals.

4.2.1 REGISTRATION PROCESS[90]:

The certification process is divided into 8 steps that involve some phases to be addressed by project developers and others in coordination with validation and verification bodies. The review of documents at various stages is done by reviewers of Gold Standard. All steps have been depicted in Figure 5 followed by the description.

89 Verra. (n.d.). VM0007 REDD+ Methodology Framework v1.2. Verra. https://verra.org/methodologies/vm0007-redd-methodology-framework-redd-mf-v1-8/

90 https://www.goldstandard.org/publications/certification-process-stepbystep

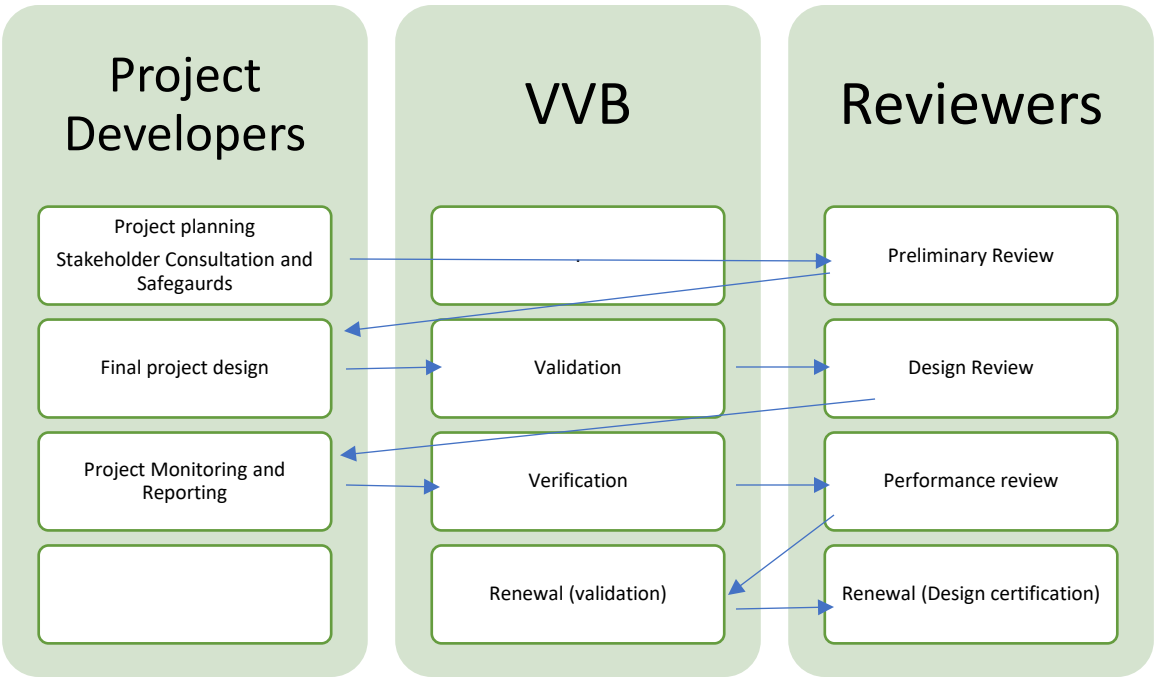


Figure 10 Registration Process

Project Planning: Before registering for a certification program with Gold Standards, proponents are encouraged to explore applicable methodologies, project eligibility, additional requirements for emission reductions and finally confirm the project design to be assessed against Gold Standard principles.

Step 1 - Stakeholder Consultation: Meaningful engagements are to be held with all stakeholders that are likely to be affected by the project. Requirements set by the Gold Standard for this process are to be followed and additional guidelines can be consulted for desired outcome.

Step 2 - Preliminary Review: This phase ensures the compatibility of the project with Gold Standard Requirements which once approved leads to the project becoming 'listed'. To achieve this Preliminary Review Request Form, Stakeholder Consultation Report, Cover Letter and signed terms and conditions need to be submitted

Step 3 - Validation: To demonstrate compliance with Gold Standard certification requirements and principles which needs to be done by a validation and verification body (VVB). The VVB conducts field visits and desk reviews to confirm compliance with two years of 'listing'. However, to appoint a VVB, project must be listed with GS, have the VVB approved by GS, submit complete estimates of impacts via SDG Digital Tool and provide VVB with Project Design Document or any other equivalent document. This phase should also submit a Safeguarding Principles Assessment, Monitoring Plan and the final validation report must be uploaded to the digital assurance Platform.

Step 4 - Design Certification Review: After the validation and checking the quality of document through an assigned expert, the project becomes 'Certified Design'. However, proponents must incorporate any changes pointed out in the review by GS. The review is conducted on the key criteria that safeguards are covered, the design is inclusive, baseline, additionality and impact are credible. All project designs are made public after this stage is completed. Monitoring and Reporting system is put in place and project is implemented under this plan that requires annual reports submission, preparing of monitoring reports and continuous stakeholder consultation.

Step 5 – Verification: An accredited VVB approved by GS moves forward with the verification process of the project with the status of 'Certified Design'. Completed monitoring report and other documents are compiled for this process and the final verification report is uploaded on the Assurance Platform. This submission initiates a review by the GS Assurance and Review Management Team for checking the completeness after which VVB is notified of the performance review.

Step 6 - Performance Review: A global consultation is conducted by GS for two to three weeks and simultaneously a performance review is also processed. Experts are hired for quality check and other compliance requirements. Review findings are submitted back to the VVB and required changes are made after which the project becomes 'Certified Project'. Certification outcomes including carbon credits are issued and

Step 7 - Design Certification Renewal (Validation): A certified Project then must go under a Renewal after five years. Methodologies, tools and standards documents must be looked at again for updates which must again go through the process of validation and verification as discussed above.

Step 8 - Design Certification Renewal (Review) – Final documents are uploaded to the Assurance Platform after which again a review and completeness check is conducted. A two-week global consultation runs parallel to renewal under experts by GS and necessary changes are made.

4.2.2 COST AND FEES

The following fee structure is followed by Gold Standard for the registration and processing of projects for carbon credits.

Table 3: Costs and fees of Gold Standard[91]

TYPE	FEE	TERMS
CORE (relevant for most projects)		
Registry account	$1000	Annual, per organization
Preliminary review (listing)	$1000 (40% discount for microscale + regular VPAs)	Per project or PoA & 1st VPA², at submission

91 Gold Standard. (n.d.). *Fees*. Retrieved from https://globalgoals.goldstandard.org/fees/

Design review (registration)	$2500 (40% discount for microscale + regular VPAs)	Per project or PoA & 1st VPA[3], at submission4
Performance review	$2000 (40% discount for microscale + regular VPAs)	Per project or VPA, at submission4
Issuance	Two options5: CASH: $0.25/credit - OR - SOP: $0.15/credit plus 2% of issuance For projects in LDCs: CASH: $0.20/credit - OR - SOP: $0.10/credit plus 2% of issuance	Per credit (VER) at issuance request
OTHER (if requested)		
Design Certification Renewal Fee	$2000	Per project, at request to renew crediting period (5 year cycle)
Design change review	$1000	Per project, at design change request
Deviation reconsideration request	$1000	For overturned decisions, discounted from next applicable fee
CER to VER conversion fee	$0.15/credit	Per credit at conversion request
VVB application review	$8000	Per organization, at request for approval
Annual VVB management	$2500	Per organization, annually
VVB re-approval	$5000	Per organization, at request for re-approval
WB training	$2000	Per training, as requested by entity

4.2.3 METHODOLOGIES

i. Methodology for Sustainable Management of Mangroves[92]

The methodology offered by the Gold Standard is specifically for the planting and sustainable management of mangrove forests that promotes sustainability. While blue carbon projects could previously be developed under Gold Standard Land Use & Forestry Activity Requirements, new methodologies for projects with unique aspects justify separate requirements. It allows multiple approaches to quantification including the application of robust remote-sensing monitoring coupled with ground data, increasing flexibility while reducing cost and time for project proponents.[93]

92 Gold Standard. (n.d.). BCFW Methodology: Sustainable Management of Mangroves. Gold Standard. https://globalgoals.goldstandard.org/443-bcfw-methodology-sustainable-management-of-mangroves/

93 Gold Standard. (2024, March 27). New mangrove methodology featuring remote sensing expands nature-based solutions from Gold Standard. https://www.goldstandard.org/news/new-mangrove-methodology-featuring-remote-sensing-expands-nature-based-solutions-from-gold-standard

It is applicable to projects that are working on the reforestation (plantation) of native mangroves, in areas that historically supported mangrove ecosystems. The methodology encourages the implementation of adaptation measures, such as measures to protect farmers and local communities from flooding, reducing coastal erosion and tidal flooding, and diversification of income streams to improve livelihoods. The geographical applicability of this methodology is global where project can be micro, small and large scale. The activity requirement is detailed in Blue Carbon and Freshwater Wetlands[94], that outlines the eligibility requirements for blue carbon and freshwater wetland activities, and is to be used in conjunction. To demonstrate additionality, the methodology uses the CDM AR-Tool02 and baseline is reflected by continuous land use over the past 10 years before start date. Carbon pools included are AGB, BGB, soil organic carbon and optional non-tree biomass.

Emission removals of less than or equal to 10,000 tCO2 eq per year are required where area of the activity can be up to 500 ha observed as a micro-scale activity. For small scale activity emission removals of up to 16,000 tCO2 eq per year. Large scale activities can reduce the number of emissions that exceed those noted in small-scale projects. The crediting period begins once the project activity has started and the maximum three years before the date of the activity design certification occurs. A crediting period of minimum 30 and maximum 50 years is emphasized. The characteristics of the project activity help proponents decide the crediting period for the mangrove management plan.

The projects registered under Gold Standard include the Ibu Bakau: Community-powered Mangrove Afforestation in Indonesia[95] and GS23213 VPA-1 Inu Bakau: Community-powered Mangrove Afforestation in Indonesia 1[96]The aim of these projects is restoration of degraded mangrove habitats with activities including plantation of native species and generating co-benefits such as income-generation, gender equality, increasing resilience of communities and market integration.[97] The crediting period of the first project is large-scale from 2021 to 2071 amounting to 50 years. VPA-1 has a period of 30 years from 2021 to 2051 whereas VPA-2 also has the same crediting period years but ranging between 2022 to 2052.

4.3 PLAN VIVO STANDARDS

The Plan Vivo Carbon Standard (PV Climate) is a set of project, methodology and validation/verification requirements used to certify smallholder and community forestry projects based on their climate, livelihood and environmental benefits. PV Climate is the longest-standing Carbon Standard in the Voluntary Carbon Market and has gone through a 25+ year evolution,

94 Gold Standard. (n.d.). Public Consultation: Blue Carbon Activity Requirements. Gold Standard. https://goldstandard.cdn.prismic.io/goldstandard/ZkNXyCol0Zci9G37_PublicConsultation-BlueCarbonActivityRequirements.pdf

95: Gold Standard. (n.d.). *Mangrove afforestation project in Senegambia and Guinea-Bissau*. Gold Standard Registry. Retrieved from https://registry.goldstandard.org/projects/details/4944

96 : Gold Standard. (n.d.). *Efficient cookstoves programme in Malawi*. Gold Standard Registry. Retrieved from https://registry.goldstandard.org/projects/details/4945

97 Gold Standard. (n.d.). *Mangrove afforestation project in Senegambia and Guinea-Bissau*. Gold Standard Registry. Retrieved from https://registry.goldstandard.org/projects/details/4944

looking back on extensive and rich experience of working with smallholder and community-led restoration and forest protection projects.

4.3.1 REGISTRATION PROCESS

The registration process is based on 4 steps which are as follows:

1. Submission of Idea: The proponent must submit Project Idea Note (PIN) which will define main elements and the contributions of the project to livelihood. PIN should comply with the eligibility criteria and should provide quantifiable ecosystem services
2. Project Design Document Submission: Document is prepared and submitted containing details such as location, activities, participants. This document is prepared using the template provided by Plan Vivo
3. Validation and Registration: On site monitoring and evaluation is conducted to ensure that project is implemented complying with the approved documents. Project validators can be from the Plan Vivo's approved list or proponent can have validator approved as well. The validator submits the report on the findings of interviewing key stakeholders after which the project will be registered if the report is satisfactory.
4. Reporting: After approvals and registration, the projects are provided with and account that enables them to enter the market. Annual reports must be submitted in order to issue Plan Vivo Certificates (PVC).

Figure 7: Flowchart of Registration Process at Plan Vivo

4.3.2 COST AND FEES

The following cost and fee structure is followed by Plan Vivo

Table 4: Costs and Fees of Plan Vivo[98]

Process	Involves	Cost
Project Idea Note (PIN) review	Desk review by the Plan Vivo Foundation	$1,000 (for all projects)
Project Design Document review (including one Technical Specification)	Desk review by the Plan Vivo Foundation; peer review by Technical Review Panel	$1,500 (for macroscale projects) $3,000 (for microscale projects)
Additional Tech Spec Review	Desk Review by the Plan Vivo Foundation; peer review by Technical Review Panel	$500 (for macroscale projects) $500 (for microscale projects)

98 Plan Vivo. (n.d.). *PV climate costs and fees*. Retrieved from https://www.planvivo.org/pv-climate-costs-and-fees

PDD / Tech Spec Updates	Desk review by the Plan Vivo Foundation	Variable based on the scope of PDD update
Validation and Verification Coordination	Desk review and finalization of project registration by Plan Vivo Foundation	Macroscale validation and verification: $1,000 Microscale validation and verification: $2,000
Late Annual Report Fee	Late fee for annual reports that are more than 12 months overdue	$100
Issuance Fees	Issuing Plan Vivo Certificates, per issuance volume band	≤50,000 PVC p.a. = $0.40/PVC >50,000 PVC p.a. = $0.35/PVC
Conversion fees	Converting PVCs between unit types	Free
Methodology Concept Note Review	Review of methodology concept notes	$350
Methodology Assessment	Review of Methodologies (not including VVB assessment)	Variable
Auditors	Review and registration of VVBs and IEs	Registration fee (once off) for VVBs: $500 Registration fee (once off) for Independent Experts: $100
Resellers	Costs associated with setting up and ongoing access to an account on the registry	Registration fee (one off): $800 Annual fee: $800

4.3.3 METHODOLOGIES

Plan Vivo does not have a methodology specific to mangrove interventions as yet, but is working on its Coastal Blue Carbon Methodology. [99] At present, mangrove-based projects are utilizing the following methodology:

i. **PM001 Agriculture and Forestry Carbon Benefit Assessment Methodology V1.0**[100]

Not specifically for coastal blue carbon projects, this methodology is focused on agriculture and forestry. The applicability conditions of this methodology require the project to make

99 Plan Vivo. (n.d.). Plan Vivo Standard. Plan Vivo. https://www.planvivo.org/Handlers/Download.ashx?IDMF=558339a4-c8cb-49bd-ba8c-f46bf3d045ae

100 Plan Vivo. (2023). *PM001 Agriculture and Forestry Carbon Benefit Assessment Methodology V1.0*. Retrieved March 18, 2025, from https://www.planvivo.org/Handlers/Download.ashx?IDMF=1dd30ea5-02b7-438d-a1d7-0874b1f6c4f1

interventions on forest land, cropland or grassland. These may include changes in the land achieved by afforestation and reforestation, forest restoration and protection and improved management. The methodology also specifically includes forested wetlands like swamps and mangroves. However, areas where activities can cause disturbance in ground water table, like areas with flood irrigation and drainage practices, cannot be utilized for the project. Registered projects include the project titled Voa Aina Madagascar.[101] [102],

The Voa Aina Madagascar project is based on three categories of activities designed for mangrove restoration and a crediting period of 30 years from 2022 to 2052 where the project implementation activities will continue for 50 years. Starting with forestry planting, the activities include establishing new nurseries where seedlings of various species are raised which are later planted for the project. Another activity includes restoring 323 ha of land that is home to biodiversity and ecosystems that have been severely degraded. Enrichment planting and direct sowing techniques are used to plant additional trees, and all these project activities are designed to encourage community participation and re-investment. The second category of the project is specifically for mangrove rehabilitation which includes establishing nurseries especially for mangrove species. Plantation of mangrove is then focused near the coast and within the intertidal zone. Following a cycle of 18 months the process starts with the first plantation at the coastline with 1000 seedlings planted in 1 ha. The chosen mangrove species is *Avicennia* which moves on to the second cycle after 6 months to include *Xylocaprus* and *Lumnitzera* species with the same density as *Avicennia*. The third phase after a total of 12 months includes the plantation of *Rhizophora* while the last phase after 18 months is for the plantation of Sonneratia at same density. After a period of 18 months, a total density of plants is 5000 seedlings/ha. The next phase begins after 2 years and majorly comprises of monitoring and enrichment planting of mangroves.

4.4 GLOBAL CARBON COUNCIL (GCC)

The Global Carbon Council (GCC) is the first international carbon credit and sustainable development program, based in the Global South. It was established (as Global Carbon Trust) by the Gulf Organisation for Research and Development (GORD) in 2016.

4.4.1 REGISTRATION PROCESS[103]

The following steps are required for the registration of a project into GCC registry:

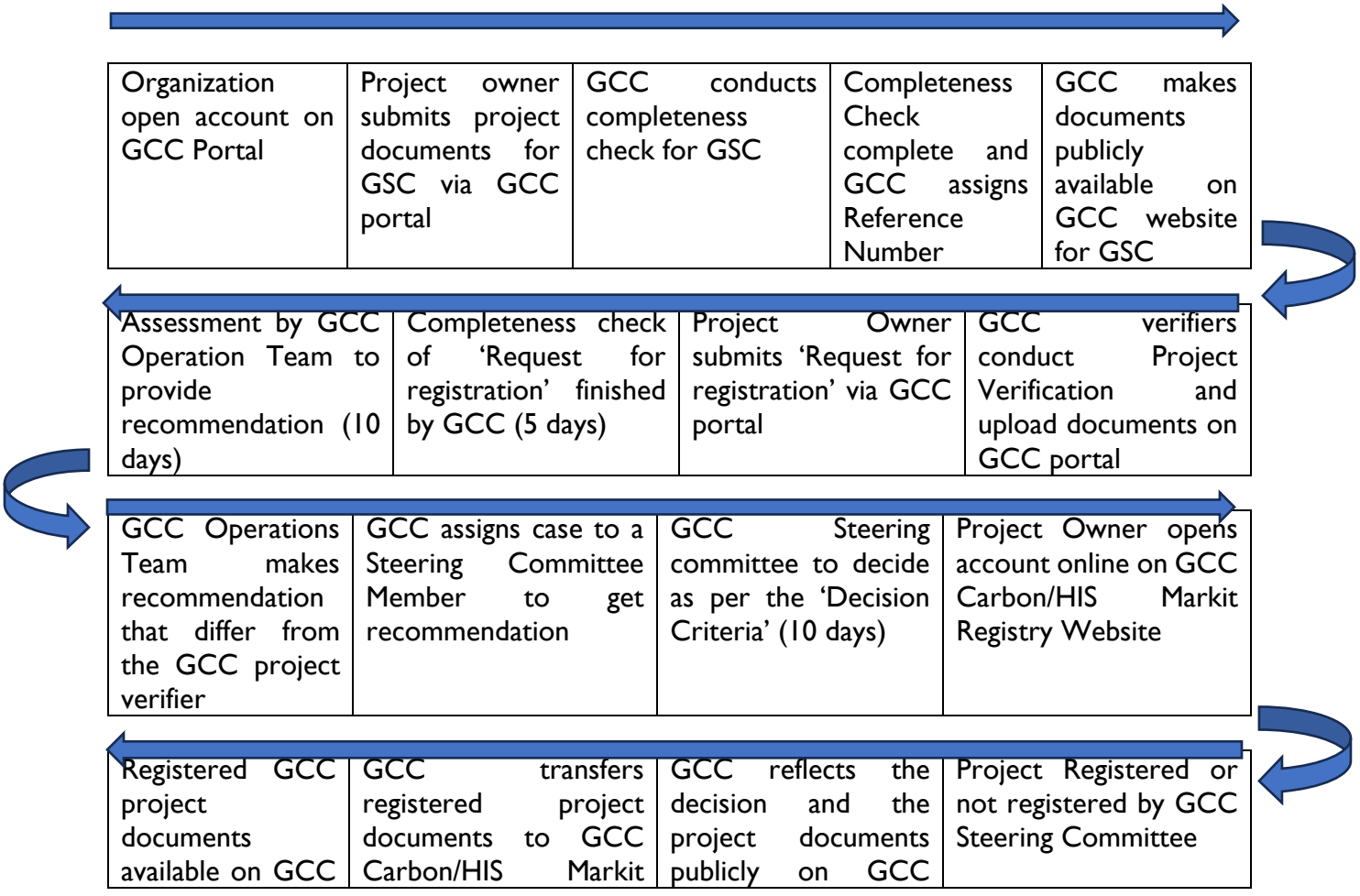
1. Opening of account on GCC portal
2. Submission of Project documents for conducting Global Stakeholder Consultation via GCC portal
3. GCC conducts completeness check within 5 days
4. Reference number is assigned after the completeness check

101 Plan Vivo. (n.d.). Voa Aina Madagascar. Plan Vivo. https://www.planvivo.org/voa-aina-madagascar

102 Plan Vivo. (n.d.). *Mikoko Pamoja: A community-led mangrove conservation and restoration project*. Plan Vivo. Retrieved from https://www.planvivo.org/Handlers/Download.ashx?IDMF=b4cec739-4974-489a-b473-01007aa56822

103 Global Carbon Council. (n.d.). Project Registration & Issuance. Global Carbon Council. https://www.globalcarboncouncil.com/projects/project-registration-issuance/

5. Documents become public on GCC website for Global Stakeholder Consultation which is carried out for 15 days
6. Verification process is conducted by experts appointed by GCC and verification documents are uploaded via the portal
7. Project proponent submits a request for registration of the project via the portal
8. Request is checked for completeness by GCC within 5 days
9. The Operations Team at GCC provides recommendation after the check within 10 days
10. If the recommendation from Operations team is different from Verifier, then the project is taken to the Steering Committee Member for recommendations. From here these project along with the projects with same recommendations from Verifier and Operations Team are taken further where Notification of Automatic Registration is issued to GCC Steering Committee which takes 10 more days.
11. Proponent receives an account on GCC Carbon, IHS Markit Registry website
12. Project is either registered or not registered with GCC however projects that are not registered may by reconsidered. Registered projects have their project documents uploaded on the GCC Carbon, IHS Markit Registry website



Carbon Registry, available on HIS Markit Website	Registry Website (3 days)	Project website (3 days)	

Figure 7: Project submission and Registration Process

4.4.2 COST AND FEES

The following cost and fees are followed by GCC for project registration and processing

Table 5: Cost and Fees of Global Carbon Council[104]

TYPE OF FEE	AMOUNT (in USD)
Account Opening	
Transaction Registry Account Opening Fees (for all account holders including Project Owners- Focal Point 2, Buyers, Retailers, Traders, Corporates & others)	1,000
Transaction Registry Annual account maintenance fees	500
Project Registration Free	
Request for Registration (all project types) - One-time Project Registration Fee	3,000
Project Resubmission fees	1,000
Project Re-Global Stakeholder Consultation fees	1,000
Request for Post registration Change - Prior approval track	1,000
Request for renewal of crediting period	2,000
F. Request for Migration to GCC 2.0, prior to Registration	-
Issuance Fee	
Issuance fee	Ranging between 0.18to0.29/ACC issued depending on the project type
VVB application and approval fee for each 3 year cycle	Ranges between 1,000 to 7,000 depending on type of VV

104 Global Carbon Council. (2025). *GCC fee schedule (Version 3.1)*. Retrieved from https://www.globalcarboncouncil.com/wp-content/uploads/2025/02/GCC-Fee-Schedule-V3.1.pdf

4.4.3 METHODOLOGIES

GCC has developed methodologies, however, currently no projects are registered with GCC for mangrove restoration and conservation. All projects are under the category of renewable energy

i. **GCC NBS Methodology for Project Activities on Degraded Mangrove Habitats**[105]

This methodology has been developed by GCC and is aimed at estimating the greenhouse gas emission reductions and improvements in carbon stocks. Activities that lead to reductions and carbon stock improvements are specifically designed for degrading mangrove ecosystems. The applicability of projects is that the land where project activities are going to be implemented must be a degraded mangrove habitat and aim for restoration of ecology. Another condition implies that more than 80% of the land areas must consist of mangrove species and project activities does not lead to non-CO2 emissions. Soil disturbances must not affect more than 10% of the land and soil organic matter should be stable or declining.

4.5 TENTATIVE TIMELINE

While there is no set timeline for project development and implementation, the following tentative timeline is proposed, developed through the Pakistan ARR Playbook, Balochistan Public-Private Partnership Act 2021, Balochistan Public Private Partnership Rules 2022, and the provided tentative timelines of standard-setting bodies:

Activity	Outcome	Tentative Timeline	Standard	Tentative Timeline for Standard
Bidding Process for PPP in Balochistan (Pre-Qualification Document Development, Application Process[106], Bidding Process, Negotiations)	Final Project Partner Selected	6-12 months		
Project Design and Stakeholder	PDD, Emission Reduction Calculation, IRR	6-12 months		

105 Global Carbon Council. (2024). *GCC NBS methodology for project activities on degraded mangrove habitats (Version 2.0)*. Retrieved from https://www.globalcarboncouncil.com/wp-content/uploads/2024/09/GCCMA002-GCC-NBS-Methodology-for-Project-Activities-on-Degraded-Mangrove-Habitats.pdf?form=MG0AV3

106 As per Balochistan Public Private Partnership Rules 2022 response the Implementing Agency may decide the response time for receipt of Pre-Qualification Applications or Bids (as the case may be), keeping in view Project's nature, scope and magnitude. However, under no circumstances, shall the response time be less than [fifteen (15) days] for national competitive bidding, and [thirty (30) days] for international competitive bidding, from the date of publication of the advertisement of notice.

Consultation, Planning and Execution	Stakeholder consultation report Sustainable development matrix			
Listing/ Preliminary Review, GSC	Public listing	Standard specific deadline	Verra	20 day for review and 30-day public comment period
			Gold Standard	14 days from submission and fee payment for completeness check and further 4 weeks for review
			GCC	5 days for completeness check
			Plan Vivo	-
Site Visit	Physical site visit	30 days		
Validation	Report	8-10 months		
Registration	Registered projects and impacts	Complete cycle- 6 months		
Monitoring	Monitoring report and emission reduction report	1-2 months (duration cycle to be considered 24-36 months)		
Verification site visits	Physical site visit	15-30 days		
Verification	Report	5-6 months		
Issuance	Issued credits	2-5 months		

The global standard setting bodies do not define a set timeline for the listing and registration of projects as they depend on various factors including verification and validation by VVB of the project.

The global standard setting bodies do not define a set timeline for the listing and registration of projects as they depend on various factors including verification and validation by VVB of the project. For Verra, it is estimated that 20 days are taken for review while a 30-day public comment period is conducted for listing requests[107], however, there may be delays and further reviews. For Gold Standard, a completeness check review takes14 days from submission and fee payment and further 4 weeks for extensive review, for project design review, 4 weeks are taken at minimum, while for project performance review up to 3 weeks minimum may be taken.[108] For Plan Vivo, the entire process of registration starting from PIN submission to registration usually takes 1-2 years. However, this timeline is subjected changes depending upon obstructions, speed of feedback resolution, availability of auditors etc.[109]

For the Global Carbon Council[110], the completeness check of the submission (including completeness and consistency of documents as well as project´s preliminary eligibility under GCC program) by GCC Operations Team is conducted within 5 days. After listing and VVB audit and submission of documents for registration, the completeness check of the submission is conducted within 5 days and the submission is assessed by GCC Operations Team to check completeness, consistency of documents, and project´s eligibility under GCC program. After the submission is deemed complete, the GCC Operations team shall conduct detailed assessment of the project activity within 10 days. Here, members of GCC steering committee might pose an objection within 10 days which may halt registration. The decision to Register the project or not shall be made available transparently by the GCC Operations Team on GCC website within 3 days. GCC team takes 5 days for all completeness checks, from listing, to registration, to issuance, with additional days as per specific scenarios.

107 Verra. (n.d.). Timelines for Verra Project Reviews. Verra. https://verra.org/timelines-for-verra-project-reviews/?form=MG0AV3

108 Gold Standard. (2024). *Step-by-step certification process.* https://globalgoals.goldstandard.org/standards/Step-by-step_certification_process_Dec24.pdf

109 Plan Vivo. (n.d.). *How long does registration take?* https://www.planvivo.org/faqs/how-long-does-registration-take

110 Global Carbon Council. (2024). GCC program processes (Version 2). https://www.globalcarboncouncil.com/wp-content/uploads/2024/02/GCC-program-processes-v2.pdf

5. COMPARATIVE ANALYSIS OF STANDARDS

Verra, Gold Standard, Plan Vivo and GCC are credible entities operating in the global carbon market landscape, ensuring that carbon market projects are designed and implemented successfully. They have established robust standards and methodological frameworks inclusive of rigorous verification protocols, and compliance mechanisms that govern the credible development, monitoring, reporting, and verification (MRV) of carbon offset projects to ensure environmental integrity and market confidence.

5.1 VERIFIED CARBON STANDARDS (VCS)

Verra, developer of the Verified Carbon Standards (VCS), is considered one of the most reliable crediting entity that has brought leadership, transparency, trust and vigilance to carbon markets.[111] At present, 63% of the credits retired in 2024 are from Verra, and it retains the majority share of registered carbon market projects, denoting its significance in developing and implementing carbon market projects.[112] The methodologies, rules and requirements are updated regularly incorporating new technologies and research-based findings. VM0033, Verra's methodology for tidal wetland restoration, including mangrove is a key example of the standard's progress as the methodology takes a step further from CDM methodologies and adopts updated techniques to design projects.

To ensure accessibility and ease of developing and implementing a project with Verra, it has developed the digital Project Tracker will provide stakeholders who have projects listed on the Verra Registry with more visibility into the status of those projects. The Project Tracker displays the status of each project in a bar diagram, giving a visual view as the project progresses from its initial listing to registration, validation, and verification. The application is linked to Verra's customer relationship management platform, enabling automatic data synchronization.[113] Verra also provides digitalized the monitoring, reporting and verification (dMRV) tools to enable transparent tracking of project impacts, ensuring that every carbon credit issued is backed by real, measurable climate benefits. [114]

Verra also provides projects with the option to align with certifications and labels to enhance the quality and integrity of projects, especially pertaining to social, climate and environmental considerations. The Sustainable Development Verified Impact Standard (SD VISta) is the premier standard for certifying the real-world benefits of social and environmental projects, from gender equity and economic development to affordable clean energy and restoration of wildlife. Additionally, the Climate, Community and Biodiversity Standards (CCBS) also demonstrate that

111 Verra. (2025). Investing in carbon projects: What you need to know in 2025. Verra. https://verra.org/verra-views/investing-in-carbon-projects-what-you-need-to-know-in-2025/

112Sylvera. (2024). *The state of carbon credits 2024 report*. https://7608351.fs1.hubspotusercontent-na1.net/hubfs/7608351/%5BSylvera%5D%20The%20State%20of%20Carbon%20Credits%202024%20Report.pdf

113 Verra. (2024). Verra launches first step of digital platform for climate sustainability projects. https://verra.org/verra-launches-first-step-of-digital-platform-for-climate-sustainability-projects/

114 Verra. (2025). Investing in carbon projects: What you need to know in 2025. Verra. https://verra.org/verra-views/investing-in-carbon-projects-what-you-need-to-know-in-2025/

the project has specifically monitored and ensured climate, community and biodiversity considerations. Both certifications enhance a project's value, ensuring high-integrity. Additionally, it is important to note that VCS has been employed by the pivotal Delta Blue Carbon Initiative in Sindh.

Verra also places a key focus on permanence risks across NbS projects. It has introduced the digital version of its recently updated Non-Permanence Risk Tool (NPRT) for Agriculture, Forestry, and Other Land Use (AFOLU) projects. The digital AFOLU NPRT, also known as the AFOLU Non-Permanence Risk Assessment Calculator, will provide project proponents with an efficient, accurate, and user-friendly way to conduct the non-permanence risk assessment for their AFOLU projects and estimate the required buffer pool contributions of those projects.[115] The risks encompass external, internal, and natural risks, including sea-level rise, providing a holistic framework to identify potential risks to projects. The leadership of Verra extends its activities to upscaling the operational capacity of the Voluntary Carbon Markets through improvements in its tools that play a critical role in emission measurement. The dominance of Verra is further accentuated with its largest market size for emission reductions noted to be 110.8 million tCO2e amounting to $723M USD in 2023.[116]

5.2 GOLD STANDARD

The Global Standard by Gold Standard Foundation is another credible body that derives premium quality and high integrity credits which have been noted as 29 million tCO2e for 2023 which is 41% more than 2022 amounting to 10.3 billion USD.[117] Gold Standard portfolio is primarily composed of projects focused on renewable energy with NbS projects retaining a limited presence as noted in Figure 11.

115 Verra. (2024). Verra introduces digital AFOLU non-permanence risk tool. https://verra.org/verra-introduces-digital-afolu-non-permanence-risk-tool/

116 Ecosystem Marketplace. (2021). State of the Voluntary Carbon Markets 2021. Ecosystem Marketplace. https://www.ecosystemmarketplace.com/publications/state-of-the-voluntary-carbon-markets-2021/

117 Gold Standard. (2023). Gold Standard Annual Report 2023. Gold Standard. https://goldstandard.cdn.prismic.io/goldstandard/Zn6Ybh5LeNNTwn22_GoldStandardAnnualReport2023.pdf

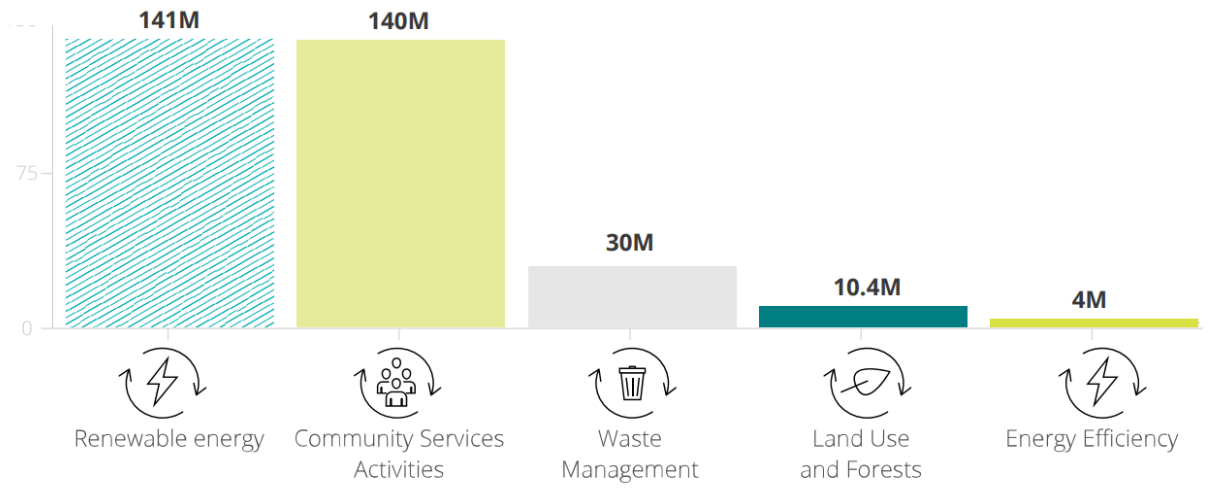


Figure 11 Carbon Credits Issues per Sector[118]

Gold Standard specifically prioritizes the contribution of Sustainable Development Goals (SDGs) through its projects. The cumulative impact of projects registered with Gold Standard can be viewed as below:

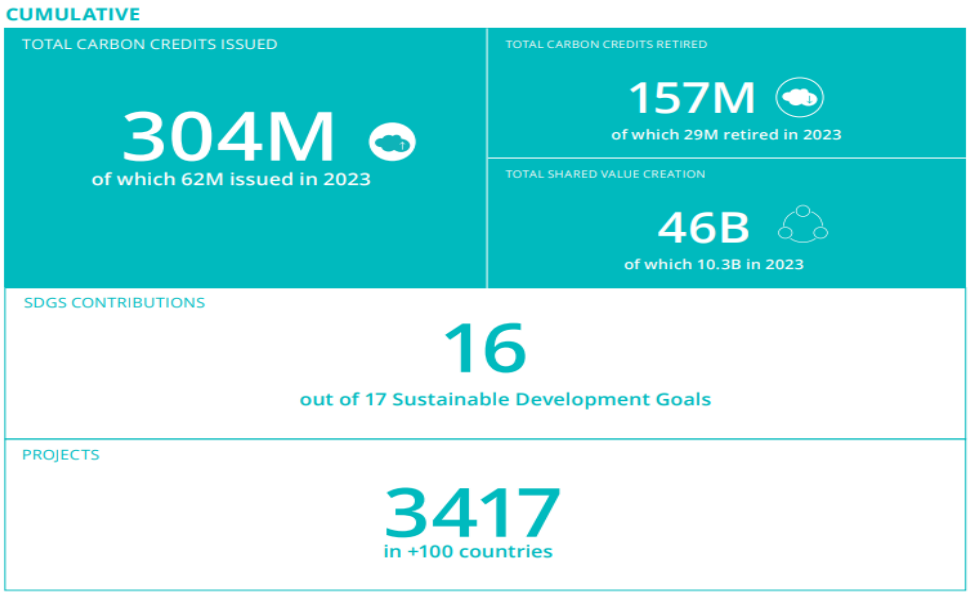


Figure 12 Cumulative Impact of Gold Standard Project Registry[119]

118 Gold Standard. (2023). Gold Standard Annual Report 2023. Gold Standard. https://goldstandard.cdn.prismic.io/goldstandard/Zn6Ybh5LeNNTwn22_GoldStandardAnnualReport2023.pdf

119 Gold Standard. (2023). Gold Standard Annual Report 2023. Gold Standard. https://goldstandard.cdn.prismic.io/goldstandard/Zn6Ybh5LeNNTwn22_GoldStandardAnnualReport2023.pdf

Gold Standard with its special focus on Sustainable Development Goals (SDGs) offers a method of quantifying impact. The Shared Value Delivered includes the quantification of generated economic value and comparing it to the SDGs impact created by the projects. Hence, it is important to note than Gold Standard primarily focuses on renewable energy projects as they hold a significant portion of its portfolio. It also specifically focuses on projects that focus on social and environmental co-benefits.[120] Gold Standard provides the Gold Standard 4 Global Goals (GS4GG) certification to projects which maximize positive impacts and align with SDGs, which is mandatory for all projects under the standard.[121] Additionally, Gold Standard requires monitoring to be held every 5 years at least once as per the 5-year renewable certification cycle, unlike other standards.

It has recently developed its methodology for mangrove focused projects, denoting a significant step in inculcating action to develop and promote NbS projects. While blue carbon projects could previously be developed under Gold Standard Land Use & Forestry Activity Requirements, new methodologies for projects with unique aspects justify separate requirements. It allows multiple approaches to quantification including the application of robust remote-sensing monitoring coupled with ground data, increasing flexibility while reducing cost and time for project proponents.[122]

To guide NbS projects and facilitate project developers, Gold Standard has launched the NbS Hub, a web page with guidance on how to navigate nature-based solutions under Gold Standard for the Global Goals. It includes a comprehensive list of all related technical resources, which will be updated over time with further resources and provides a one stop shop for both project developers and auditors interested in NbS.[123]

5.3 PLAN VIVO

Plan Vivo Standards by Plan Vivo Foundation also focuses on community led NbS projects, specifically emphasising on community participation. The registration process is divided into steps and is relatively simpler compared to other methodologies. Plan Vivo claims to have issued 10.8 million tCO2e in 2024 that has generated $60 million in USD. [124] Impact of Plan Vivo on nature, climate and communities is claimed in the annual report for 2024 as depicted in the following figure:

120 Carbonibus. (n.d.). *Verra VCS vs Gold Standard*. Retrieved June 1, 2025, from https://www.carbonibus.org/post/verra-vcs-vs-gold-standard

121 Gold Standard. (n.d.). Global Goals. Retrieved July 1, 2025, from https://globalgoals.goldstandard.org/

122 Gold Standard. (2024, March 27). New mangrove methodology featuring remote sensing expands nature-based solutions from Gold Standard. Retrieved June 30, 2025, from https://www.goldstandard.org/news/new-mangrove-methodology-featuring-remote-sensing-expands-nature-based-solutions-from-gold-standard

123 Gold Standard. (2024, March 27). New mangrove methodology featuring remote sensing expands nature-based solutions from Gold Standard. Retrieved June 30, 2025, from https://www.goldstandard.org/news/new-mangrove-methodology-featuring-remote-sensing-expands-nature-based-solutions-from-gold-standard

124 Plan Vivo. (n.d.). Plan Vivo Standard: Technical Specifications. Plan Vivo. https://www.planvivo.org/Handlers/Download.ashx?IDMF=dc5e0a3c-d229-430f-98ac-530a3ba2d643

Figure 13 Impact on Nature, Climate and Communities[125]

125 Plan Vivo. (n.d.). Plan Vivo Standard: Technical Specifications. Plan Vivo. https://www.planvivo.org/Handlers/Download.ashx?IDMF=dc5e0a3c-d229-430f-98ac-530a3ba2d643

Following the high interest of project proponents in blue carbon credits, Plan Vivo has also put an additional focus on blue carbon projects that are led by local communities. The following figure shows the details of blue carbon projects that have been registered with the entity. This is a encouraging for the pilot project as the entity already claims to have sold 29,546 blue carbon credits which is an area that is relatively new and still under the process of development.

Figure 14 Blue Carbon Projects Registered with Plan Vivo[126]

Plan Vivo also provides capacity building support to its proponents through its Plan Vivo Project Accelerator Program which helps them overcome barriers to climate finance. The support is provided for financial modelling, carbon accounting and grants through providing:

- Technical trainings
- Peer-to-peer education
- Mobilizing finance and investment
- Mentorship and guidance
- Virtual Trainings

It is important to note that at present they are in process of developing their Coastal Blue Carbon Strategy, tailored to blue carbon and ecosystems such as mangroves. Like Verra, Gold Standard and GCC, they do not yet have a methodology tailored to mangrove conservation or restoration but are in the proces sof developing it.

126 Plan Vivo. (n.d.). Plan Vivo Standard: Technical Specifications. Plan Vivo. https://www.planvivo.org/Handlers/Download.ashx?IDMF=dc5e0a3c-d229-430f-98ac-530a3ba2d643

5.4 GLOBAL CARBON COUNCIL

The Global Carbon Council processes its phases on its online portal through structured steps. It holds a market size of 3.36 million GCC credits in 2023.[127] GCC currently does not have any registered project in the ARR category which implies that there is a great potential to fill this gap with blue carbon projects, however, projects must be prepared as it would be the first time GCC methodology is activated. The operations are integrated with Carbon Asset Data Template (CADT) which helps in enhancing the data compatibility and interoperability in markets.

There is a significant focus on global partnerships, collaborations and engagements that are aimed at fostering innovation and driving change. Under the Climate Finance and Stakeholder Management (CFSM), GCC creates awareness, innovates climate finance, expands networking opportunities and increases stakeholder coordination. Some other examples of such activities held in 2023 are calibration workshops, workshops on decarbonization and participation at annual conferences under the overarching agenda for capacity building. The projects currently operational can be seen below in Figure 15.

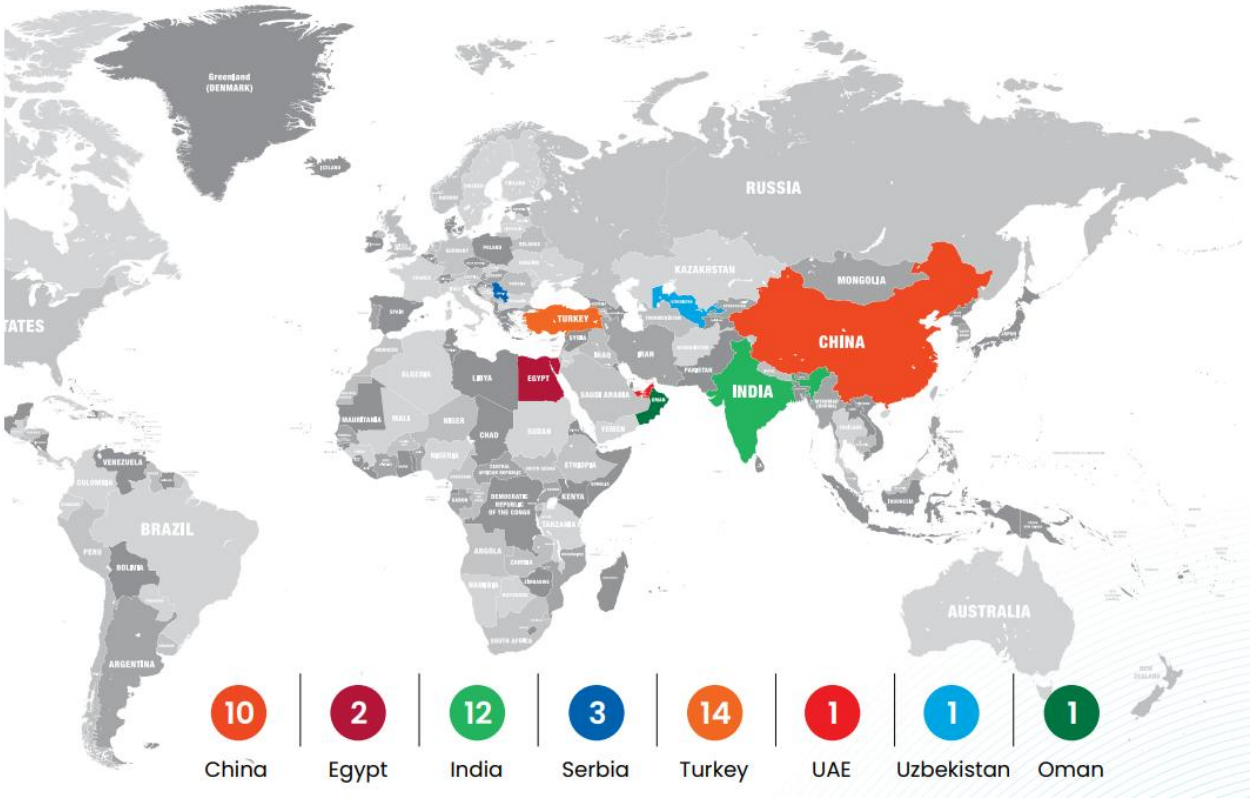


Figure 15 Projects Registered by GCC[128]

127 Global Carbon Council. (2024). *Annual report 2023*. Retrieved from https://www.globalcarboncouncil.com/wp-content/uploads/2024/10/gcc-annual-report-2023.pdf

128 Global Carbon Council. (2023). GCC Annual Report 2023. Global Carbon Council. https://www.globalcarboncouncil.com/wp-content/uploads/2024/10/gcc-annual-report-2023.pdf

The entity holds full approval from International Carbon Reduction and Offset Alliance (ICROA) and shows diversity through several MoUs signed in African and Asian stock exchanges and carbon market alliances. It has also developed several methodologies which include promotion of ARR projects, Improved Forest Management, Soil Carbon Management and Smart Agriculture. Connection of GHG credit exchanges to the GCC carbon registry facilitates registered projects and a digital MRV system further provides support to proponents. [129]

5.5 COMPARISON AND EVALUATION

It is critical to evaluate and assess available avenues, this section provides a summary of the analysis in Section 5.5.2, as noted below:

Verra is a highly credible entity that offers high quality blue carbon credits through detailed methodologies, accompanied by key MRV and assessment tools such as the AFOLU NON-Permanence Risk Tool, that address various aspects of mangrove restoration and conservation initiatives. Verra represents the majority of projects registered across registries, especially those pertaining to NbS and mangroves, denoting its leadership in the field of NbS and blue carbon. Although methodologies are extensive, they are facilitated by a digital platform, accompanied by detailed guidelines, and offer a long crediting period. A successful example of this is the Delta Blue Carbon initiative in Sindh that has successfully developed and presented itself as a harbinger of environmental resilience through mangrove regeneration (See Section 3.3). Additionally, to enhance performance of its projects in delivering community and climate benefits, it provides a number of labels such as SD vista and CCB (See Section 7. Premium Labels for Co-Certification), ensuring delivery of high-integrity credits.

Projects developed under VCS go through 02 main procedures: validation of project design (before and during implementation) followed by periodic verification of the volume of emission reduction. In terms of the verification process the verification process involves a detailed assessment of project documentation, site visits, and data review, with emphasis on additionality, permanence and leakage. The registry has the highest number of carbon market share at 110.8 million tCO2e but faced a major decrease in the value dropping from 1.9 billion USD in 2022 to only 723 million USD in 2023. According to the annual report from Verra, the price of carbon credits decreased from $7.73 in 2022 to $6.53 in 2023.[130] VCS also places a strong emphasis on preventing any negative impacts due to the project.

The Gold Standard is yet another crediting entity that offers high integrity carbon credits. It has multiple projects registered with a few specifically focused on NbS, while a majority focus on

129 Global Carbon Council. (2023). GCC Annual Report 2023. Global Carbon Council. https://www.globalcarboncouncil.com/wp-content/uploads/2024/10/gcc-annual-report-2023.pdf

130 Ecosystem Marketplace. (2024). *State of the voluntary carbon markets 2024*. Retrieved from https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202024/State_of_the_Voluntary_Carbon_Markets_20240529%201.pdf

renewable energy. However, it has taken a crucial step through the development of its methodology for Sustainable Management of Mangroves, demonstrating its ambition to upscale NbS. It allows multiple approaches to quantification including the application of robust remote-sensing monitoring coupled with ground data, increasing flexibility while reducing cost and time for project proponents.[131] Additionally, while all standards have rigorous criteria for project eligibility, Gold Standard's additional focus on social and environmental co-benefits sets it apart as it aims to advance the SDGs. Gold Standard provides the Gold Standard 4 Global Goals (GS4GG) certification to projects which maximize positive impacts and align with SDGs, which is mandatory for all projects under the standard.[132]

In terms of the verification process for projects, Gold Standard emphasizes stakeholder engagement and requires projects to demonstrate sustainable development benefits. For projects to be accepted by GS they must conduct an additional assessment of the project's communal impact to ensure local populations are benefiting. Third party VVBs are enlisted with GS that can assist proponents with validation and verification of emission reductions. This label differentiates high quality credits from project so that buyers can identify these high integrity carbon credits that have delivered contribution to SDGs. Gold Standard is an ISEAL Alliance Member which substantially increases its credibility. In its annual report, the entity has reported highest value of 10.3 billion USD for its 29 million t CO2e credits in 2023.[133]

In terms of the costing and finance aspect, Gold Standard is much pricer than Verra. Verra VCS chnarges a one-time registration fee and annual maintenance fee, which covers project validation and verification. Additionally, project developers must also pay a fee for each carbon credit issued. On the other hand, Gold Standard has a similar registration fee and annual maintenance fee structure, but also includes a fee for project certification. This fees contributes to the overall integrity and credibility of the standards.

Plan Vivo is the largest program for community-forestry projects. Ideal for creating social and environmental benefits for small holders and poor rural communities, the program is intent on creating livelihood opportunities for local population aligning with the goals on pilot project. The entity is focused on project categories dealing with wetland restoration and forest management.[134] After evaluation of Plan Vivo using the collected information on methodology, registration process and cost & fees, it can be concluded that compared to the other crediting entities, Plan Vivo is relatively simpler in its process. The registration process is shorter and projects can range from microscale to macro scale. Functional projects are specifically focused on mangrove rehabilitation but with the specification that microscale projects cost more for registering and

131 Gold Standard. (2024, March 27). New mangrove methodology featuring remote sensing expands nature-based solutions from Gold Standard. Retrieved June 30, 2025, from https://www.goldstandard.org/news/new-mangrove-methodology-featuring-remote-sensing-expands-nature-based-solutions-from-gold-standard

132 Gold Standard. (n.d.). Global Goals. Retrieved June 30, 2025, from https://globalgoals.goldstandard.org/

133 Gold Standard. (2023). Gold Standard Annual Report 2023. Gold Standard. https://goldstandard.cdn.prismic.io/goldstandard/Zn6Ybh5LeNNTwn22_GoldStandardAnnualReport2023.pdf

134 Control Union. (n.d.). *Plan Vivo – Carbon offset project validation/verification*. Retrieved from https://www.controlunion.com/certification-program/plan-vivo-carbon-offset-project-validation-verification/

processing of the project for credits. Digital platform for Plan Vivo is outsourced with Ceezer and third-party validators are also enlisted for selection by proponents. The entity has won the UN Equator Prize for a mangrove restoration project titled Mikoko Pamoja in Kenya which has generated significant social and environmental benefits.[135] Plan Vivo offers carbon credits for a long period of 30 to 50 years. Reporting $60 million USD for 10.8 MtCO2e, Plan Vivo carbon market is growing at a rapid pace.

Global Carbon Council has the most intricate registration process and is a relatively new entity of its kind established in 2016 and based in Global South. The credibility of the carbon credits is low compared to others due to the recent establishment of the entity. The price of credits, therefore, is also low. The methodology for degraded mangroves has been designed for large scale project activities aimed at restoring carbon stocks and reducing emissions. GCC currently has projects approved for renewable energy but no projects is registered for blue carbon crediting. GCC owns a digital platform to facilitate project proponents and requires third party validation and certification of project activities. It is endorsed by ICROA code of best practices which informs about the reliability of credits earned. GCC currently has a low share in carbon markets with only 3.36 million tCO2e.

5.5.1 CREDITING PERIOD AND PRICING COMPARISON

The table below outlines the comparative overview of prices per credit, crediting period and carbon market shares held by the identified standards:

Organization	Crediting Period	Price of sold credits	Carbon Market Share (M tCO2e)	Value (USD)
VERRA	30 to 60 years[136][137], up to a 100 years permitted	$ 6.53/t[138] VCM price $ 29.72/t[139] (Blue carbon)	110.8	723 million (dropped from 1.9 billion in 2022)
GOLD STANDARD	30 years[140]	13€/t viz	29	10.3 billion

135 Plan Vivo. (n.d.). *Mikoko Pamoja*. Retrieved from https://www.planvivo.org/mikoko-pamoja?form=MG0AV3

136 Verra. (n.d.). Press release: Verra has registered its first blue carbon conservation project. Verra. https://verra.org/press-release-verra-has-registered-its-first-blue-carbon-conservation-project/?form=MG0AV3

137 Carbon Market Institute. (n.d.). Delta Blue Carbon Project, Sindh. Carbon Market Institute. https://carbonmarketinstitute.org/projects/delta-blue-carbon-project-sindh/?form=MG0AV3

138 Ecosystem Marketplace. (2024). *State of the voluntary carbon markets 2024*. Retrieved from https://3298623.fs1.hubspotusercontent-na1.net/hubfs/3298623/SOVCM%202024/State_of_the_Voluntary_Carbon_Markets_20240529%201.pdf

139 Sustainable Development Policy Institute (SDPI). (n.d.). Bid to capture global carbon market: Pakistan partners with greenhouse gas crediting programme. SDPI. https://sdpi.org/bid-to-capture-global-carbon-market-pakistan-partners-with-greenhouse-gas-crediting-programme-/news_detail?form=MG0AV3&form=MG0AV3

140 REDD+ Projects Database. (n.d.). Small-scale and low-income community-based mangrove afforestation project on tidal flats of three small islands around Batam City, Riau Islands Province. REDD+ Projects Database. https://www.reddprojectsdatabase.org/533-small-scale-and-low-income-community-based-mangrove-afforestation-project-on-tidal-flats-of-three-small-islands-around-batam-city-riau-islands-province/?form=MG0AV3

		for forest management projects[141]		
PLAN VIVO	30 to 50 years[142]	-	10.8	60 million
GLOBAL CARBON COUNCIL	-	$ 4-6.70/mtCO2e[143]	3.36	-

5.5.2 ASSESSING AND ANALYSING STANDARDS

Each standard setting body has developed its specific standards to ensure adequate and informed rules and guidelines for developing and verifying carbon projects, leading up to issuance. Section 5.5 provides an overview of notable standards, based upon which table 6 outlines a comparative analysis of crediting entities utilizing the following legend:

Organization	**Relevant Methodology (Mangroves)**	**Scale**	**Third Party Involvement**	**Projects on NbS & Blue Carbon**	**Co-certification with labels**	**Honors and Awards**	**Complexity of Registration Process**
Verra	VM0033 Methodologies for Tidal Wetland and Seagrass Restoration	Small to large-scale projects	Yes VVB for Phase 1 and 3 Must be Verra approved	Both	Sustainable Development Verified Impact Standard (SD Vista) and Climate Community and Biodiversity Standards (CCBS)	Environmental Finance prestigious award for Best Registry Provider for 4 consecutive years	Required extensive documentation but has a streamlined process
Gold Standard	Sustainable Management of Mangroves	Small to large-scale projects	Yes VVB for validation, verification and renewal Must be Global Standard approved	Both	Gold Standard 4 Global Goals (GS4GG)	ISEAL Alliance Membership[144]	Required extensive documentation but has a streamlined process

141 Gold Standard. (n.d.). What is a carbon credit worth? Gold Standard. https://www.goldstandard.org/news/what-is-a-carbon-credit-worth?form=MG0AV3

142 Plan Vivo. (n.d.). Plan Vivo Certificates (PVCs). Plan Vivo. https://www.planvivo.org/Handlers/Download.ashx?IDMF=b4cec739-4974-489a-b473-01007aa56822

143 S&P Global. (2021). Anticipation builds over issuance of Global Carbon Council credits. S&P Global. https://www.spglobal.com/commodity-insights/en/news-research/latest-news/energy-transition/110221-anticipation-builds-over-issuance-of-global-carbon-council-credits?form=MG0AV3

144 Gold Standard. (n.d.). Quality carbon credits. Gold Standard. https://www.goldstandard.org/quality-carbon-credits?form=MG0AV3

Plan Vivo	SCM0008 – Methodology for the Restoration of Mangroves	Microscale to macroscale	Yes For validation and verification Must be Plan Vivo approved	Both	PV Nature	UN Equator Prize[145]	Multi-tiered process
Global Carbon Council (GCC)	NBS Methodology for Forestry Project Activities on Lands except Wetlands	Large-scale projects	Yes For validation and verification Must be GCC registered	NbS	GCC Certification Labels	Endorsed for ICROA Code of Best Practice[146]	Multi-tiered process

145 Plan Vivo. (n.d.). Plan Vivo Certificates (PVCs). Plan Vivo. https://www.planvivo.org/pvcs?form=MG0AV3

146 International Carbon Reduction and Offset Alliance (ICROA). (n.d.). Standard endorsement. ICROA. https://icroa.org/standard-endorsement/

6. COMPARISON OF METHODOLOGIES

As the carbon market landscape evolved, methodologies are rapidly evolving to ensure robust and technically sound project development that delivers high-quality credits. Hence, the report identifies potential methodologies the project proponents may consider in Section 4. Upon assessing these methodologies, it is critical to note that certain methodologies amongst those applicable are specifically developed for blue carbon and mangrove projects, this includes VM0033, GS Sustainable Management of Mangroves and GGC NBS for Degraded Mangroves. VM0033 Tidal Wetland and Seagrass Restoration is optimal for mangrove focused projects as it is designed specifically to rehabilitate degraded tidal wetlands, including mangroves, via replanting and more. VM0033 also includes a comprehensive carbon accounting pool including biomass, soil organic carbon, and a fire-management premium where relevant in case of peat. There is cap on the size and/or emission removals of the project. It has also developed a robust MRV system specified to tidal wetlands that prescribes field-based monitoring of water-table depth, land subsidence, soil carbon stocks, and CH_4/N_2O fluxes and remote sensing only to map and track changes in wetland boundaries and area. It is important to note that authorization and approval of credits through certain methodologies also opens up avenues for investment, one such being attaining CORSIA eligibility for emission units (EEUs) (See Section. 8), broadening the buyer market to include the aviation industry and boosting confidence in the project's quality.[147] At present, the potential methodology that may be opted for and falls under CORSIA eligibility is VM0033 by Verra. Hence VCUs through VM0033 are approved by the ICAO Council to supply CORSIA Eligible Emissions Units for the 2021- 2023 compliance period (pilot phase) and/or the 2024 – 2026 compliance period (first phase) to the aviation industry.[148]

The methodology by Gold Standard, known as the Sustainable Management of Mangrove methodology, focuses on afforestation and reforestation and imposes a limit. Micro-scale projects are capped at 500 ha and small-scale removals at 16 000 tCO_2 eq/yr, while there is no area cap for "large-scale," but activity must be pure planting. Plan Vivo is more inclined towards small-scale projects focused on local communities. An example is the Voa Aina project in Madagascar which focuses on restoring 337 ha, but plans to upscale later on. The methodology by GCC is solely governed and designed by them, however, as yet no projects have been activated under this methodology. The table below provides a comparative overview of the identified potential methodologies:

147 International Civil Aviation Organization. (2024, October). *CORSIA Eligible Emissions Units*. International Civil Aviation Organization. https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Emissions-Units.aspx

148 International Civil Aviation Organization. (2024, October 28). CORSIA Eligible Emissions Units (12th ed.). https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Emissions%20Units/CORSIA_EEU_Oct2024.pdf

Category	VM0033-Tidal Wetland and Seagrass Restoration	VM0007 REDD+ Framework	GS Sustainable Management of Mangroves	PM001 Agriculture and Forestry Project Carbon Benefit Assessment Methodology	GGC NBS For Degraded Mangroves
Activity Scope	Restoration of hydrology, sediment, salinity, vegetation in tidal wetlands	REDD+ activities	Mangrove planting and sustainable management	Agroforestry, farm forestry, forest restoration	Restoration/rewetting of degraded mangrove habitats (afforestation)
Target Ecosystem	Global tidal wetlands (e.g. mangrove, marshes, seagrass)	REDD+: avoiding/planned deforestation, wetland conservation/restoration, mangroves treated under wetland restoration and conservation if soil organic carbon is deemed significant	Reforestation (plantation) of native mangroves in historical mangrove areas	All forest types including mangroves and swamp forests, also cropland and grassland	Forestation of degraded forest wetlands
Applicability Conditions	Must restore tidal wetlands, must at least create/restore hydrological conditions, re-introduce native plant communities, meeting one of: abandoned	Land qualified as forest ≥10 yrs; apply WRC modules for wetlands; planned/unplanned deforestation baseline	Historic mangrove cover ≥10 yrs; must follow GS4GG safeguards; no significant CH_4/N_2O beyond thresholds	No flood irrigation/drainage; subsistence/small-scale context; must follow applied modules/tools	Degraded mangrove habitat; ≤10 % soil disturbance; non-CO_2 ≤105% baseline; SOC stable/declining baseline

	≥2 yrs, unprofitable use, or ongoing subsistence with no displacement, See Methodology				
Carbon Pools	Aboveground tree biomass, aboveground non tree biomass, below ground biomass, litter, dead wood, soil, wood products	BGB, soil	Above- and below-ground biomass, soil organic carbon, optional non-tree biomass	All significant pools: AGB, ANB, BGB, litter, deadwood, Soil organic carbon	AGB, BGB, optional dead wood & soil ; excludes litter
Baseline and Additionality	Baseline scenario using CDM tool *AR-Tool02,* additionality per VCS module VMD0052	Baseline modules, additionality per REDD+ framework	BAU land use (aquaculture, ag); additionality via CDM AR-Tool 02	Baseline & additionality via AR-Tool 02 or approved standardized baseline	Baseline via CDM AR-AM0014; additionality via AR-Tool 02 (GCC NBS Tool)
Leakage	Assumed zero if conditions met; ecological leakage	Leakage per modules, periodic re-assessments	Wood collection, timber, ag, livestock leakage quantified & deducted in Year 1	Activity-shifting leakage estimated or discount factor via AR-Tool 04	Leakage from ag displacement estimated via AR-Tool 15

	avoided by design				
Scale of Project	No explicit scale tiers; typical project sizes vary by habitat; Buffer kept as per AFOLU non permanence risk tool	No scale caps; buffer withholding % per risk classification, Buffer kept as per AFOLU non permanence risk tool	MICRO: ≤ 10 000 tCO_2 eq/yr & ≤ 500 ha; SMALL: ≤ 16 000 tCO_2 eq/yr; LARGE: no cap	No emission caps; different certificate types with claim rules	No explicit emission caps; buffer mechanism for non-permanence

7. PREMIUM LABELS FOR CO-CERTIFICATION

Along with the methodology, labels and additional certifications that add value to carbon credits can also be targeted to improve the price and quality of credits in the market. These labels are tools that help emission reduction projects fast-tracking their approach and process toward achieving Paris Agreement goals, especially ensuring environmental and social considerations. Examples of such labels are as below:

Core Carbon Principle

This label is offered by the Integrity Council for Voluntary Carbon Market and provides high integrity carbon credits to projects that fall under the designated category of credits and can submit evidence on adherence to the CCP rulebook.[149] The label gives buyers the confidence that bought credits are having a genuine impact on emission reduction and are actively working to protect and promote biodiversity and ecosystems. Some of the principles encouraged by this label are effective governance, transparency, sustainability benefits and safeguards and net zero.[150]

The Sustainable Development Verified Impact Standard (SD Vista)[151]

SD Vista is a program launched by Verra that is focused on the social and environmental benefits of the projects. This can be particularly useful for mangrove restoration and conservation projects given the numerous benefits and services offered by these ecosystems that fall under the category of social, economic and environmental well-being of communities.[152] To acquire these labels, third party auditors are consulted to verify and validate the value of projects in achieving Sustainable Development Goals by United Nations. This label increases the trust of stakeholders and safeguards against greenwashing leading to large scale investments.

Gold Standard 4 Global Goals (GS4GG)

GS4GG is a comprehensive standard to accelerate progress towards climate security and sustainable development for all by allowing for projects to manage, measure and maximise their impact to the SDGs. GS4GG was launched in July 2017, following several other versions of the Gold Standard. . Projects can only be certified under GS4GG if they adhere to 5 principles and demonstrate compliance to the corresponding requirements: Contribution to climate security & sustainable development, that is, to minimum 3 SDGs, one of which must be SDG 13 – Climate Action, Safeguarding principles around human rights, environment, etc, including monitoring of mitigation measures if appropriate, Stakeholder inclusivity – at design stage and continuously throughout the project, Demonstration of real outcomes – by using Gold Standard-approved standardised baseline and monitoring methodologies, Additionality – that they would not be implemented without revenue generated through GS4GG certification

149 Integrity Council for the Voluntary Carbon Market. (n.d.). *Core carbon principles*. Retrieved from https://icvcm.org/core-carbon-principles/#:~:text=The%20CCP%20label%20is%20designed%20to%20set%20and,based%20on%20the%20latest%20science%20and%20best%20practices.

150 Integrity Council for the Voluntary Carbon Market. (2024). *Core carbon principles (Version 1.1)*. Retrieved from https://icvcm.org/wp-content/uploads/2024/02/CCP-Section-2-V1.1-FINAL-15May24.pdf

151 Verra. (n.d.). *Sustainable development verified impact standard (SD VISta)*. Retrieved from https://verra.org/programs/sd-verified-impact-standard/?form=MG0AV3

152 Verra. (2023). *Demonstrating real-world sustainable development benefits: SD VISta flyer*. Retrieved from https://verra.org/wp-content/uploads/2023/02/verra-sdvista-flyer-demonstrating-real-world-sd-benefits.pdf

Social Carbon

Social Carbon is another standard that is aimed at community wellbeing through Nature-based Solutions. This standard meets a critical market need and promotes the participation of local communities in project implementation. An internationally registered trademark, the emission reductions under Social Carbon are indicative of being driven from projects that improve living conditions, welfare and civic consciousness while ensuring the conservation of resources.[153]

W+ Standard

The W+ label for carbon credits is specifically for promoting women empowerment in social and economic areas. This label ensures that women are provided with benefits that can be quantified and verified to have credits against them. Focused on developing countries like Pakistan, W+ has partnered with VCS Program that allows VCUs to be labeled with W+. The co-certified credits are registered in the IHR Markit allowing their trade in approved global exchanges.[154]

Climate, Community and Biodiversity (CCB)

The CCB program provides a clear framework that enables project proponents to focus on issues that can compromise the rights of the community and survival of biodiversity. It also advises on processes that can be developed that can positively impact communities and the environment through project design and activity. After a robust development and assessment process, a project can acquire CCB label.

The tables below show the cost of certifying for some of the labels discussed above by Verra and Global Carbon Council respectively as provided in their cost and fee documents.

Table 9: Cost and fees of labels by Verra[155]

Label	
CCB	
Label fee	USD 0.07 per VCU labeled
Validation review fee	USD 2500
Verification review fee	USD 5000, comprising the following: • USD 2500 verification review request fee1 • USD 2500 prepayment fee which is credited toward future CCB label fees
SD Vista Projects	
Label fee	USD 0.07 per VCU labeled
Pipeline listing fee	USD 2500 for each pipeline listing request
Verification review fee	USD 5000, comprising the following: • USD 2500 verification review request fee1 • USD 2500 prepayment fee which is credited toward future asset/label issuance
Levy	USD 0.50 per asset issued

153 SOCIALCARBON. (n.d.). *Why SOCIALCARBON?* Retrieved from https://www.socialcarbon.org/why-socialcarbon

154 Women's Carbon Fund. (n.d.). *W+ Standard*. Retrieved from https://www.wcifund.org/w-plus-standard/

155 Verra. (2024). Verra Program Fee Schedule v1.0. Verra. https://verra.org/wp-content/uploads/2024/10/Verra-Program-Fee-Schedule-v1.0.pdf

Table 10: Cost and fees of labels by Global Carbon Council[156]

Label		
ICVCM Label (CCP)	0.02	Applicable label fees shall be payable in addition to issuance fees and payable upfront before the issuance of ACCs.
SDG	0.02	

Table 10 enlists the fee of labels by Gold Standard; however, it must be noted that these labels do not specifically upgrade the credits to premium status and also belong to other categories of projects e.g. renewable energy. Plan Vivo does not provide any cost details on premium labels.

Table 11: Cost and fees of labels by Gold Standard

TYPE	FEE	TERMS
Article 6 label (including CORSIA)	$0.05/credit	Per credit (VER) at issuance request
Renewable Energy labels (RELs)	$0.10/credit	Per unit (REL) at issuance request
Labelling of CERs	$0.10/credit	Per credit at issuances request
Impact statements without unit issuance (e.g., Scope 3 interventions)	Same as normal project review fees; $3000 for impact statement issuance	At impact statement request

156 Global Carbon Council. (2025). *GCC fee schedule (Version 3.1)*. Retrieved from https://www.globalcarboncouncil.com/wp-content/uploads/2025/02/GCC-Fee-Schedule-V3.1.pdf

8. PAKISTAN POLICY GUIDELINES FOR TRADING IN CARBON MARKETS AND AUTHORIZATION OF CREDITS

In the carbon market landscape, if generated credits go through a process by which the government and/or National Designated Authority of the host country formally approves the use or transfer of credits, particularly under Article 6 of the Paris Agreement, it is known as 'authorization'. Through this process, credits are converted into Internationally Transferred Mitigation Outcomes (ITMOs). This ensures that the credits generated are valid and legitimate, align with the host country's Nationally Determined Contributions (NDCs), and with the national and international rules and contribute to achieving climate goals. Additionally, this validation also ensures that credits do not possess the risk over double-counting.

In 2025, the Government of Pakistan (GoP) has finalized the Pakistan Policy Guidelines for Trading in Carbon Markets, establishing a clear framework to leverage carbon markets and advance its climate commitment and goals under the Paris Agreement (To be further discussed in the Legal Report). Under this Policy, the project has the option to be designed and developed as a Voluntary Carbon Market (VCM) project, and acquire authorization in upon credit issuance. Authorizing credits depends on various factors and additional guidelines that may be further gauged once standard selection has been completed. Potential benefits and opportunities include endorsement by the country's government which ensures transparency and credibility, leading to improve investor attention and confidence. Most importantly, this renews confidence and confirmation that double counting of credits has been prevented, hence, contributing to verifiable emission reductions.

It is important to note that authorization and approval of credits also opens up avenues for investment, one such being attaining CORSIA eligibility for emission units (EEUs).[157] At present, the potential methodology that may be opted for that falls under CORSIA eligibility is VM0033 by Verra. Hence VCUs through VM0033 are approved by the ICAO Council to supply CORSIA Eligible Emissions Units for the 2021- 2023 compliance period (pilot phase) and/or the 2024 – 2026 compliance period (first phase).[158]

Authorized credits are one of the key eligibility requirements to be able sell credits to aircraft operators looking to meet their compliance obligations. As the global aviation industry grows, the demand for credits is increasingly high. Cumulative needs are expected to be between 502 and 1,299 $MtCO_2e$, depending on how much international air traffic grows and how CORSIA

157 International Civil Aviation Organization. (2024, October). *CORSIA Eligible Emissions Units*. International Civil Aviation Organization. https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Emissions-Units.aspx

158 International Civil Aviation Organization. (2024, October 28). CORSIA Eligible Emissions Units (12th ed.). https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA%20Eligible%20Emissions%20Units/CORSIA_EEU_Oct2024.pdf

expands its coverage (Figure 6). This is also set to boost pricing across eligible and available credits.[159]

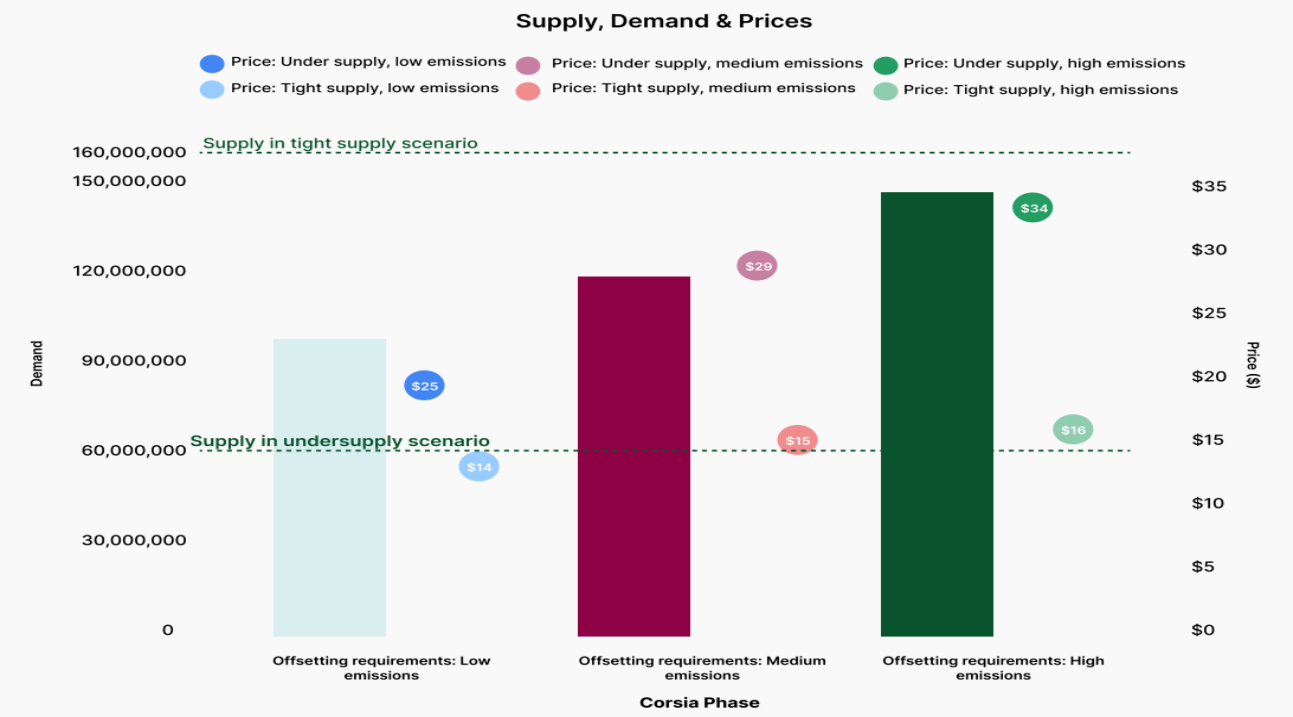


Figure 16 Credit Pricing for CORSIA EEU per Scenario

159 L, J. (2025, May 21). *CORSIA carbon credit prices, demand, and supply: What the future holds*. CarbonCredits.com. https://carboncredits.com/corsia-carbon-credit-prices-demand-and-supply-what-the-future-holds/

9. ASSESSING KEY GLOBAL PROJECTS

Key projects and potential competitors of Pakistan in the carbon markets are other countries that have entered the market as sellers. These countries include Ghana, Ethiopia and other African states. These African countries have an advantage for forest projects in carbon markets owing to the dense forest cover in the region. Similar is the case for the coastal belt of Balochistan which is a habitat for mangrove forests that hold much greater potential for carbon sequestration than terrestrial forests. Table 1 outlines projects, including those that are blue carbon based, and identifies their standard, methodology, status, region and emission reduction:

Table 1: Potentially competitive projects in carbon markets

NAME	STANDARD AND METHODOLOGY	STATUS	REGION	SIZE (HA)	ANNUAL EMISSION REDUCTIONS/ REMOVALS (IN TCO2E)
Virginia Coast Reserve Seagrass Restoration Project	VM0033	Under development	Northern America	66,452	1,349
Zhanjiang Mangrove Afforestation Project	VCS AR-AM0014/ Version 03.0	Registered	Eastern Asia	380	4,020 (6,534 verified in 2021)
Reforestation and Restoration of Degraded Mangrove Lands, Sustainable Livelihood, and Community Development in Myanmar	VCS-AR-AM0014	Registered	Southeastern Asia	2,100	184,006 (59,299 issued in 2020)
Mangrove Restoration and Sustainable Development in Myanmar	VCS AR-AM0014	Under development	Southeastern Asia	2,100 (4,500 in PD)	403,831
Delta Blue Carbon I	VM0033	Registered	Southern Asia	350,000 (224,997 in PD)	2,407,629
Livelihoods' Mangrove Restoration	VCS - AR-AM0014	Registered	Sub-Saharan Africa	10,415	30,000 (228,542 issued in 2021)

Grouped Project in Senegal					
Blue Forest & Mozambique: Building Africa's Largest Mangrove Restoration Project	VM0007	Under development	Africa	183,000	2,965,555
Senegal and West Africa Mangrove Programme	VM0007	Under development	Africa	42	2,547
The Haidar el Ali Mangrove Initiative (HEAMI)	AR-AMS0003	Under development	Africa	2,000	30,170
Mangrove Restoration and Coastal Greenbelt Protection in the East Coast of Aceh and North Sumatra Province, Indonesia	VCS-AR-AM0014	Registered	Southeastern Asia	1,000	124,706(125,391 issued in 2019)
OKI REDD+ Project	AR-AM0014. VM0007, AR-ACM0003	Registration Requested	Southeastern Asia	23,500	181,986
India Sundarbans Mangrove Restoration	VCS - AR-AM0014	Registered	Southern Asia	4,675	51,249(119,139 issued in 2018)
Mangrove Restoration Project with Sine Saloum and Casamance Communities, Senegal	VCS - AR-AM0014	Under validation	Africa	7,020	95,470
Hainan Lingshui Mangrove Blue Carbon Project	VCS - AR-AM0014	Registration requested	China	192	75,796
Carbon Sequestration in Mangroves of the	VM0007	Under development	Latin America	49,387	3,123,836

South-Central Coastal Zone of the State of Sinaloa					
Blue Carbon Project Gulf of Morrosquillo "Vida Manglar"	VM0007	Registered	Latin America	7,561	31,310
Protection of Mangroves and Community Developmental Activities in the Biodiversity Hotspot of Colombia	VM0015	Under development	Latin America	64,000	460,000
Bonos del Jaguar Azul	VM0033	Under development	Latin America	5,060	48,518
Restoring Mangroves in Mexico's Blue 2500-Carbon Ecosystems	VM0033	Under Development	Latin America	32,914	868,302
Mikoko Pamoja	Plan Vivo(project-specific calculation)	Registered	Africa	125	9,880(by 2021)
Tahiry Honko	Plan Vivo (project-specific calculation)	Registered	Africa	1,400	1,375 (none yet issued)
Vanga Blue Forest	Plan Vivo (project-specific calculation)	Registered	Africa	460	5,000 (no one yet issued)

Some of the projects mentioned above have been briefly described below:

i. Reforestation and Restoration of Degraded Mangrove Lands, Sustainable Livelihoods and Community Development in Myanmar

Implemented over an area of 2265.47 hectares, the project activities include restoration of mangroves involving Magyi, Thabawakan and Thaegone villages. The project is expected to achieve an estimated annual emission reduction of 184,006 over a crediting period of 30 years. The project has so far claimed only 1 VCU.160 The carbon credit price for mangrove restoration and reforestations projects in Myanmar is noted to be $39.40 per ton in addition to the social benefits like quality education, gender equality and decent work and economic growth.[161]

The project activities are divided into 4 main components which begin with capacity building and awareness programs for local communities. Species that are grown under this project are

160 Verra. (n.d.). *Certificate information details*. Retrieved March 18, 2025, from https://registry.verra.org/mymodule/rpt/CertificateInfo.asp?rhid=228675

161 Carbonmark. (n.d.). *Mangrove reforestation & restoration Myanmar*. Carbonmark. Retrieved from https://hub.carbonmark.com/mangrove-reforestation-restoration-myanmar?form=MG0AV3

Rhizophora mucronata Lam., Rhizophora apiculata Blume, Bruguiera gymnorhiza (L.) Lam., Bruguiera cylindrica (L.) Blume, Bruguiera sexangula (Lour.) Poir., Ceriops tagal (Perr) CB.Rob. The different phases of the project cycle start with demarcation of land and partnership with government and academia. The project will then move on to ground survey and mapping followed by initial planning and then preparation of plantation schedules. Nurseries to nourish and monitor seedlings are established after which these seedlings are planted in prepared sites. The project is then maintained through weeding and monitoring. A prominent component of the project is capacity building and awareness program for local communities.[162]

ii. Livelihoods' Mangrove Restoration Grouped Project in Senegal

In Senegal occupying an area of 10,415 hectares in the province of Casamance, this mangrove restoration project has so far had 23,063 credits issued. [163] Practicing afforestation, reforestation and revegetation activities, apart from the carbon emission reduction and restore degraded forests the main objective of the project is poverty alleviation and livelihood generation.

With a crediting period of 30 years between 2009 to 2039, the project is focused on the afforestation, reforestation and revegetation activity in degraded wetlands with the process comprising of logistics organization, training and awareness, site and species selection and seedling preparation, plantation and then maintenance. The benefits include building infrastructure and equipment provision for education, medical facilities, infrastructure with religious significant and social cohesion.[164]

iii. Indian Sundarbans Mangrove Restoration

The Indian Sundarbans Mangrove Restoration is spread over an area of 4403 hectares and a crediting period of 20 years; the location is in West Bengal.[165] The project is still under the AR-AM0014 methodology that has been replaced by the updated VM0033 by Verra. The dependency of 4.37 million people on this area for their livelihoods will be improved along with potential for about 1 million carbon credits.[166] The project activities are designed for the crediting period of 20 years and are mainly divided into 4 components starting with hydrological work where the soil conditions will be assessed for existing forests and for the areas where plantation activities have been planned. Fishbone channeling is a part of the project activity for balancing seawater and freshwater. Continuous monitoring will be practiced for optimization of forestation and replantation actions.

The second phase includes the plantation activity beginning with the establishment of nurseries for native mangrove species that will be planted in selected sites. The third phase involves the conservation actions which will be led by the local community in support of fieldwork officers

162 Verra. (2018). *Reforestation and Restoration of degraded mangrove lands, sustainable livelihood and community development in Myanmar.* Verra Registry. Retrieved from https://registry.verra.org/app/projectDetail/VCS/1764

163 Verra. (n.d.). *Issuance details*. Retrieved March 18, 2025, from https://registry.verra.org/app/search/VCS?programType=ISSUANCE&exactResId=1318

164 Verra. (2014). LIVELIHOODS' MANGROVE RESTORATION GROUPED PROJECT IN SENEGAL. Verra Registry. Retrieved from https://registry.verra.org/app/projectDetail/VCS/1318

165 Verra. (n.d.). *Project details for VCS/3360*. Retrieved March 18, 2025, from https://registry.verra.org/app/projectDetail/VCS/3360

166 REDD+ Projects Database. (n.d.). *India Sunderbans Mangrove Restoration*. Retrieved March 18, 2025, from https://www.reddprojectsdatabase.org/603-india-sunderbans-mangrove-restoration/

hired for the project. The final phase which will be operational simultaneously will continue for 3 years involving capacity building and promotion of Mangrove project activities.

iv. Zhanjiang Mangrove Afforestation Project

Located in Zhanjiang City, Guangdong Province of China, the project is a mangrove plantation initiative aimed at local sustainable development and carbon sequestration. Involving the participation of local community of plantation of native mangrove species, 380.40 hectares have been restored.[167] The project aims to remove 106,781 tCO2e in its crediting period of 40 years and so far, 5,499 VCUs have been issued where Beijing Entrepreneur Environmental Protection Foundation has been identified as a buyer.[168] It also has an additional certification named 'Biodiversity Gold'.

The project is designed for a crediting period of 30 years with activities for plantation and conservation of mangroves. [169] Providing technical training and skills development for forest management for an optimized system for establishing healthy ecosystems. The project offers numerous co-benefits through its activities starting with restoration of degraded ecosystems while simultaneously reducing resource conflict, conservation of endangered species and development of tourism.

v. Delta Blue Carbon

The Delta Blue Carbon (DBC) has initiated on 250,000 hectares as a public-private partnership with Government of Sindh. According to Carbon Market Institute the project has generated 3,100,000 VERs that have been issued and sold to confidential buyers. Aiming to restore 300,000 hectares of degraded mangrove forests in the south eastern coast on Pakistan in Sindh Province, replantation is already completed on 86,409 hectares. The project is expected to generate 250 million credits in total over a period of 60 years.[170] The price of blue carbon credits being generated from DBC ranges between $27.80 to $35 per ton.[171]

vi. Mikoko Pamoja

A community-led mangrove conservation project, Mikoko Pamoja is aimed at providing long term incentives for the project activities. Covering 8 SDGs, the project started in 2010 focused on afforestation, reforestation and avoided deforestation. The participation of the community has been quantified to 1081 households and so far 20,095 Plan Vivo certifications have been credited for the project. A leading example for other projects, the initiative has won the UN Person of the Year and sells its credits majorly to Ocean Race, Zero Mission, Earthwatch and SCB Marine Section. A complete list of buyers can be found in the Annual Report. [172] Although the exact price of blue carbon credit is not specified but it has been noted

167 Verra. (n.d.). *Project details for VCS2343*. Retrieved March 18, 2025, from https://registry.verra.org/app/projectDetail/VCS/2343

168 IIGF-China. (2021). *The first blue carbon trading project in China*. Retrieved March 18, 2025, from https://iigf-china.com/the-first-blue-carbon-trading-project-in-china

169 Verra. (2020). Zhanjiang Mangrove Afforestation Project. Verra Registry. Retrieved from https://registry.verra.org/app/projectDetail/VCS/2343

170 Carbon Market Institute. (n.d.). *Delta Blue Carbon Project, Sindh*. Retrieved March 18, 2025, from https://carbonmarketinstitute.org/projects/delta-blue-carbon-project-sindh/

171 Respira International. (n.d.). *Climate Impact X and Respira's landmark auction for blue carbon credits oversubscribed with global demand*. Respira International. Retrieved from https://www.respira-international.com/press-release-climate-impact-x-and-respiras-landmark-auction-for-blue-carbon-credits-oversubscribed-with-global-demand/?form=MG0AV3

172 Plan Vivo. (2024). Mikoko Pamoja Annual Report 2023. Retrieved March 18, 2025, from https://www.planvivo.org/Handlers/Download.ashx?IDMF=9b7ee36c-4868-4ca8-8a00-81134b52788d

that the project provides about $25000 per year to local communities in terms of socio-economic benefits.[173]

The project was launched in 2010 and utilizes its funds in the conservation of mangroves through the sale of carbon credits. The mangrove conservation is mainly being done through forest protection and restoration. In forest protection, activities include increased surveillance and enhanced community education and awareness are designed for the enhancement of carbon stock. In addition to this, activities to avoid deforestation include vigilant enforcement of laws and regulations with the inclusion of local community. Whereas, in forest restoration community-based mangrove forest restoration is initiated and natural vegetation is monitored. A special focus is given to 10-year-old mangroves stand by especially protecting and monitoring them. The project includes other activities aimed at socio-economic wellbeing of local communities. This involves use of energy saving stoves, local development projects for education, water and sanitation and controlling destructive fishing for seagrass conservation.[174] The crediting period is 20 years from 2012 to 2032.

vii. Vanga Blue Forest

Vanga Bay is present on the border with Tanzania and is a community-led mangrove conservation and restoration initiative. Inspired from the Mikoko Pamoja project the communities of Jimbo and Kiwegu villages of Vanga took the protection of Vanga mangroves in their hands. Aimed at the survival of 460 hectares of mangroves, the initiative is motivated to provide livelihood to 9000 people of 3 villages and utilize carbon finance to improve sustainable practices in forest and biodiversity management. 13,546 beneficiaries have been identified and 5,347 tons per year of carbon was expected to be sequestered.[175] According to Plan Vivo project details, the Vanga Blue Forest has claimed 18,840 credits to-date and some of the prominent buyers of these credits are Zero Mission, Planet Moja, Yacht Carbon and GRID Arendal.[176]

The Vanga Blue Forest project consists of the same project activities is same as that of Mikoko Pamoja with an additional activity of delineating and monitoring seagrass coverage and quality for seagrass conservation. These activities have been designed for 20 years starting from 2019 until the year 2039.[177]

9.1 PROJECT DESIGN: RECOMMENDATIONS

Based on this report, a few key recommendations are outlined for the development of the proposed project:

173 : CBEI Blog. (n.d.). *Kenya's Mikoko Pamoja: A blueprint for blue carbon and coastal conservation*. CBEI Blog. Retrieved from https://cbei.blog/kenyas-mikoko-pamoja-a-blueprint-for-blue-carbon-and-coastal-conservation/

174 Plan Vivo. (2020). *MIKOKO PAMOJA: Mangrove conservation for community benefit*. Plan Vivo. Retrieved from https://www.planvivo.org/Handlers/Download.ashx?IDMF=3faf7087-dec2-41ca-8a67-42a98e21c59d

175 Blue Forest Solutions. (n.d.). *Kenya*. Retrieved March 18, 2025, from https://www.blueforestsolutions.org/kenya

176 Plan Vivo. (n.d.). VANGA BLUE FOREST ANNUAL REPORT 2023. Retrieved March 18, 2025, from https://www.planvivo.org/Handlers/Download.ashx?IDMF=a718ec14-e166-42d2-9afe-59dae93c8de3

177 Plan Vivo. (n.d.). *Vanga Blue Forest Project: Mangrove conservation for community benefit*. Plan Vivo. Retrieved from https://www.planvivo.org/Handlers/Download.ashx?IDMF=aae86576-2a6e-4eab-ac62-8f47dbf4b881

i. A critical priority for project proponents is to ensure crucial aspects of the projects are addressed, specifically additionality, permanence and any leakage issues, to ensure that the project t delivers verifiable and consistent emission reductions that would not have happened without the project, and will be sustained in the future. To do so, ensuring a robust MRV mechanism is integral.

ii. The project must ensure that interventions, specifically. Planting interventions, are closely aligned with local practices and traditional knowledge to ensure an inclusive and informed project, tailored to the region's needs.

iii. Project components should be implemented in the pilot project area with a particular consideration towards indigenous communities of the region. As identified in the socio-economic assessment of the project area, low literacy, poverty, lack of access to basic amenities and limited employment opportunities are some of the prominent characteristics of the coastal areas of Balochistan. Additionally, the exploitation of natural resources by trawlers and poachers along with the political unrest in the region amplifies the sensitivities of the local people that would not allow unilateral interventions. Therefore, considering this landscape strategic project design must be developed that incorporates the opinions, involvement and decisions of the indigenous communities to gain trust and support of the natives. Community participation is another effective way of avoiding resistance and acquiring consent where awareness and education for the locals can build an enabling environment to further provide an opportunity for lucrative communication between the communities and project proponents.

iv. The project must ensure a robust and transparent benefit-sharing mechanism for local communities, prioritizing their needs and experiences. Benefits must address the socio-economic conditions of the region and aim to incorporate development and improvement for locals, while diversifying their avenues of income and capacitating them through training.

v. When selecting a standard and methodology, project proponents must ensure that an improved and updated methodology is employed, and supplemented by additional certifications to ensure a high-quality project that attracts investor attention, and allows the project to cater to a broader market of key players, such as those offered through CORSIA eligibility

vi. Project crediting period should align between 20-30, as witnessed across global projects. While Verra permits AFOLU a crediting period of up to 100 years, and Gold Standard's mangrove methodology allows a maximum of 50 years, the proposed crediting period of 20-30 years is appealing due to a number of reasons. Firstly, it minimizes the risk of consistent reliance on carbon markets so sustain

action and inculcate socio-economic upliftment, identifying a set timeline within which it may deliver results, A 20–30-year period also allows mangroves to fully mature, capturing maximum the carbon sequestration potential. Additionally, this closely aligns with global climate and development goals such as NDC targets and climate commitments. Additionally, through a financial lens, this approach balances revenue generation and provides investors with a realistic payback period, retaining confidence and ambition. It is also critical to note that if a crediting period exceeds this time frame, additional monitoring and verification costs are incurred, which poses financial risk.

vii. To ensure generation of high-quality credits with verifiable social and environmental benefits, proponents must consider additional certifications. One such is the CCB standards or SD vista if Verra is opted for, this ensures that the project attains its climate, community and biodiversity needs, while securing high-integrity credits that perform in the market.

viii. Project proponents must assess and identify potential risks across various aspects such as environmental, social, technical, financial, political, and more, and produce tailored mitigation measures to address such issues to ensure a successful project.

10. CONCLUSION

The report delivers a comprehensive Carbon Pricing Feasibility and Market Assessment Report, first assessing the global institutional and regulatory carbon market landscape within which this proposed intervention will be strategically positioned. Through assessment of the global carbon market landscape, including key factors such as pricing trends, key players, demand patterns, and more, across key carbon market forest and blue carbon credits, supplemented by a review of globally prominent projects, the report acknowledges and re-affirms the potential of the global carbon markets to provide Balochistan an avenue to work towards environmental resilience and ensure generation of high-quality credits. The demand for nature-based projects is significant and is further projected to continue as key players look to offset their emissions. To ensure that Balochistan province is able to harness this opportunity, the report outlines key standards and methodologies the project can opt for to ensure efficient, data-driven and a technically sound path forward, one that is cognizant of local communities and environmental considerations. The report also acknowledges that Pakistan's recent finalization of its Carbon Market Policy has produced another avenue for the province if it aims to target authorization of credits, allowing them to attract and capture many other opportunities such as production of CORSIA eligible credits. Finally, the report binds together its assessment by producing critical recommendations that will inform the project design and interventions, ensuring alignment with global best practices.

While the report identified suitable standards and methodologies for the proposed project, it is important to note that the final decision will depend upon consultations and discussions amongst project proponents once the project has entered design phase. At that stage, various factors are to be considered, such as the international reputability of standards that might influence market performance. Moving forward, this report provides a robust foundation to guide and inform proponents of the potential avenues and options available to them as they embark upon the development and operationalization for Balochistan's first carbon market project. The next steps include development and finalization of project design, in consultation with stakeholders, to ensure a successful project.

ANNEX A: CARBON MARKET PROJECTS IN PAKISTAN

Project	Status	Location	Crediting Period	Year	Sector
Verra Standard (17 Projects)					
Safe Drinking Water Program in Sindh, Pakistan[178]	Under validation	Sindh	**1st** 22/06/2023 - 21/06/2033	2024	Energy demand
The Clean Choola Initiative[179]	Under development	Sindh	**1st** 15/03/2023 - 14/03/2030	2024	Energy demand
Safe Drinking Water Programme in Punjab, Pakistan[180]	Registered	Punjab	**1st** 01/01/2023 - 31/12/2032	13/05/2025 **(Registration Date)**	Energy demand
Waste Heat Recovery Based Power Generation Project of Bestway Cement Limited at Pakistan[181]	Under validation	Punjab	**1st** 05/04/2023 - 04/04/2033	2024	Manufacturing industries
Grouped Solar Power Plant Project of Bestway Cement Ltd[182].	Under validation	Punjab	**1st** 01/10/2022 - 30/09/2032	2024	Energy industries (renewable/non-renewable sources)
Delta Blue Carbon 2[183]	Under validation	Sindh	**1st** 14/08/2023 - 13/08/2083	2024	Agriculture Forestry and Other Land Use
Credo Renewables Improved Cookstove	Under validation	Pakistan	**1st** 01/04/2025 - 31/03/2032	2024	Energy Demand

[178] https://registry.verra.org/app/projectDetail/VCS/5388
[179] https://registry.verra.org/app/projectDetail/VCS/5378
[180] https://registry.verra.org/app/projectDetail/VCS/5141
[181] https://registry.verra.org/app/projectDetail/VCS/5124
[182] https://registry.verra.org/app/projectDetail/VCS/5098
[183] https://registry.verra.org/app/projectDetail/VCS/5063

Project	Status	Location	Crediting Period	Year	Sector
Project in Pakistan[184]					
Green Hydrogen Project: Sindh, Pakistan[185]	Inactive	Jhimpir, Sindh	**CREDITING PERIOD HAS YET TO START** 01/01/2027 - 31/12/2051	-	Energy industries (renewable/non-renewable sources)
REVIVE ENRIVONMENT IMPROVED COOKSTOVE PROJECT IN PAKISTAN[186]	Registered	Sindh	**1st** 18/11/2023 - 17/11/2033	16/04/2025 **(Registration Date)**	Energy demand
Grouped Captive Solar Power Project by Kohinoor Maple Leaf Group[187]	Under validation	Lahore & Rawalpindi	**1st** 12/07/2021 - 11/07/2028	2023	Energy industries (renewable/non-renewable sources)
Agro Forestry01	Under development	Punjab	**1st** 01/01/2018 - 31/12/2037	2022	Agriculture Forestry and Other Land Use
Composting of Organic Content of Municipal Solid Waste in Lahore, Pakistan[188]	Late to verify	Lahore	**3rd** 01/01/2022 - 31/12/2028	06/04/2020 **(Registration Date)**	Waste handling and disposal
DGKCC municipal solid waste management	Under development	Punjab	**1st** 01/01/2016 - 31/12/2025	2014	Waste handling and disposal

[184] https://registry.verra.org/app/projectDetail/VCS/5029
[185] https://registry.verra.org/app/projectDetail/VCS/4863
[186] https://registry.verra.org/app/projectDetail/VCS/4517
[187] https://registry.verra.org/app/projectDetail/VCS/4164
[188] https://registry.verra.org/app/projectDetail/VCS/651

Project	Status	Location	Crediting Period	Year	Sector
bundled project[189]					
Delta Blue Carbon -I[190]	Registered	Sindh	**1st** 19/02/2015 - 18/02/2075	20/12/2021 **(Project Registration Date)**	Agriculture Forestry and Other Land Use
49.5 MW Wind Power Project by Master Wind Energy Limited in Pakistan[191]	Registered	Sindh	**1st** 14/10/2016 - 13/10/2026	06/04/2020 **(Project Registration Date)**	Energy industries (renewable/non-renewable sources)
Pakarab Fertiliser Co-generation Power Project - CER Conversion[192]	Units Transferred from Approved GHG Program **(Not registered with VCS)**	Multan District, Punjab Province	**CREDITING PERIOD HAS EXPIRED**, 21/12/2009 - 20/12/2016	2015	Energy industries (renewable/non-renewable sources)
49.5 MW Wind Power Project by FFCEL in Pakistan[193]	Registered	Sindh	**CREDITING PERIOD HAS EXPIRED**, 16/05/2013 - 15/05/2023	06/04/2020 **(Project Registration Date)**	Energy industries (renewable/non-renewable sources)
Gold Standard (12 Projects)					
Community-based Micro-hydro Mini-grids in Khyber Pakhtunkhwa[194]	Listed	KP	Sep 30, 2021 — Sep 29, 2026	2023	Small, Low - Impact Hydro (Energy)
Foundation Wind Energy-II (Private)	Gold Standard	Gharo, Kutti Kun New Island	Jan 01, 2021 —	**Registered under CDM**	Large Scale Wind (Energy)

[189] https://registry.verra.org/app/projectDetail/VCS/1263
[190] https://registry.verra.org/app/projectDetail/VCS/2250
[191] https://registry.verra.org/app/projectDetail/VCS/1559
[192] https://registry.verra.org/app/projectDetail/VCS/1508
[193] https://registry.verra.org/app/projectDetail/VCS/1346
[194] https://registry.goldstandard.org/projects/details/3986

Project	Status	Location	Crediting Period	Year	Sector
Limited 50 MW Wind Farm Project[195]	Certified Project	in Taluka Mirpur Sakro District Thatta, Sindh	Dec 09, 2024	**on** 31/12/2012	
Foundation Wind Energy-I Limited 50 MW Wind Farm Project[196]	Gold Standard Certified Project	Gharo, Kutti Kun New Island in Taluka Mirpur Sakro District Thatta, Sindh	Jan 01, 2021 — Apr 10, 2025	**Registration in CDM on** 31/12/2012	Large Scale Wind (Energy)
The OASIS Box Sustainable Project[197]	Gold Standard Certified Design	Nowshehra, Pakistan	Jun 01, 2024 — May 31, 2029	**Requests the registration of the proposed project activity as a GS project activity** 04/02/2025	Small Scale Other (Water Supply)
Methane Reduction from Rice Cultivation in Punjab Pakistan[198]	Gold Standard Certified Project	Sheikhupura District, Punjab	Jun 25, 2022 — Jun 25, 2032	**Meets all relevant requirements** 25/12/2023	Small Scale Other (AFOLU)
Sapphire 49.5MW Wind Farm Project[199]	Gold Standard Certified Project	Jhimpir, Thatta District, Sindh	Nov 22, 2015 — Nov 21, 2025	**The CDM registration date was** 14/11/2012	Large Scale Wind (Energy)
Zorlu Enerji Wind Project (GS3946 CER to VER	Gold Standard Certified Project	Jhimpir, Thatta District, Sindh	Jan 01, 2014 — Dec 31, 2024	**The CDM registration date was** 06 Jan 14[201]	Small Scale Wind (Energy)

[195] https://registry.goldstandard.org/projects/details/3898
[196] https://registry.goldstandard.org/projects/details/3897
[197] https://registry.goldstandard.org/projects/details/3787
[198] https://registry.goldstandard.org/projects/details/3785
[199] https://registry.goldstandard.org/projects/details/3328
[201] https://cdm.unfccc.int/Projects/DB/BVQI1388809991.59/view

Project	Status	Location	Crediting Period	Year	Sector
conversion)[200]					
Bahawalpur Solar Power Plant Project[202]	Gold Standard Certified Design	Bahawalpur, Punjab	Jul 01, 2018 — Jun 30, 2025	**Completion date of the validation report** 27/04/2023	Large Scale Solar Thermal – Electricity (Energy)
50MW Photovoltaic Power Project in Cholistan, Islamic Republic of Pakistan[203]	Listed	Cholistan, Sindh	Jul 30, 2013 — Jul 29, 2020	2021	Large Scale Solar Thermal – Electricity (Energy)
PoA Solar PV in Pakistan[204]	Listed	Cholistan, Sindh	Mar 08, 2015 — Mar 07, 2022	24 Dec 2012 **(submitted at the time of requesting registration of the PoA)**[205]	Large scale Solar Thermal – Electricity (Energy)
Zorlu Enerji Wind Project[206]	Gold Standard Certified Project	Jhimpir, Thatta District, Sindh	Jan 06, 2014 — Jan 05, 2024	**It has also completed the transition from GS-CER to GS-VER on** 20/09/2022	Large Scale Wind (Energy)
49.5 MW Sachal Wind Power Project, Jhampir[207]	Gold Standard Certified Project	Jhimpir, Sindh	Apr 11, 2022 — Apr 10, 2027	**The CDM registration date was** 22/04/2016	Large Scale Wind (Energy)
GCC (16 Projects)					
Zhenfa 100MW Solar Power Project[208]	Registered	District Layyah, Punjab	28-05-2025 –	**Registration date** 2025-05-28	Energy industries (renewable-/non-

[200] https://registry.goldstandard.org/projects/details/2819

[202] https://registry.goldstandard.org/projects/details/1732

[203] https://registry.goldstandard.org/projects/details/1312

[204] https://registry.goldstandard.org/projects/details/1311

[205] https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/UV2XPK9W4IH0FMLETG6AC81Q5O3YNB/view

[206] https://registry.goldstandard.org/projects/details/673

[207] https://registry.goldstandard.org/projects/details/609

[208] https://projects.globalcarboncouncil.com/project/1455

Project	Status	Location	Crediting Period	Year	Sector
			27-05-2035[209]		renewable sources)
Jhimpir Power Wind Farm Project[210]	Registered	Jhimpir, Sindh	16/03/2018 - 15/03/2028[211]	**Registration date** 2025-05-05	Energy industries (renewable-/non-renewable sources)
Hawa Energy Wind Farm Project[212]	Registered	Jhimpir, near Nooriabad, District Thatta, Sindh	15/03/2018 - 14/03/2028[213]	**Registration date** 2024-12-22	Energy industries (renewable-/non-renewable sources)
Wind Power Project in Jamshoro, Sindh by Master Green[214]	Registered	North-East of Karachi in Goth Dehson Walhar District Jamshoro, Sindh	01/09/2021 to 31/08/2031[215]	**Registration date** 2025-04-07	Energy industries (renewable-/non-renewable sources)
Zephyr Power Limited - 50 MW Wind Power Project[216]	Registration Requests **(incomplete Request for Registration (RFR) checklist[217])**	Gharo, Sindh[218]	-	**Submission Date** 2022-06-20[219]	Energy industries (renewable-/non-renewable sources)
Wind Power Project in Thatta, Sindh	Registration Requests **(incomplet**	Thatta, Sindh	-	**Submission Date** 2022-05-19[222]	Energy industries (renewable-

[209] https://gctproject.s3.amazonaws.com/private/project_listing/1455/verification_report/Final_GCC-PVR_1070_Zhenfa_Solar_%C3%96yk%C3%BC_Yakupo%C4%9Flu_v10_06-05-2025_cl.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAY4SGB7CKBGIMOIOE%2F20250613%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20250613T103418Z&X-Amz-Expires=43200&X-Amz-SignedHeaders=host&X-Amz-Signature=ac95ac53f87b25a0645d4d5c78232d2452172b074549dc86bb79a7757be122ef

[210] https://projects.globalcarboncouncil.com/project/246

[211] https://gctproject.s3.amazonaws.com/private/project_listing/246/verification_report/S00232_PVR_Clean_Jhimpir_Power_22_04_2025.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAY4SGB7CKBGIMOIOE%2F20250613%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20250613T104054Z&X-Amz-Expires=43200&X-Amz-SignedHeaders=host&X-Amz-Signature=e51a28b258f83314a18c94633b8c92d68870f9da88822277458e5c2f4b6b4fd8

[212] https://projects.globalcarboncouncil.com/project/245

[213] https://gctproject.s3.amazonaws.com/private/project_listing/245/verification_report/S00231_PVR_Clean_HAWA_Energy_05_12_2024.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAY4SGB7CKBGIMOIOE%2F20250613%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20250613T104254Z&X-Amz-Expires=43200&X-Amz-SignedHeaders=host&X-Amz-Signature=957650760652884eba8b4c32d521cb6ad8a022c49249ac62c85f5b36800a3bde

[214] https://projects.globalcarboncouncil.com/project/199

[215] https://gctproject.s3.amazonaws.com/private/project_listing/199/verification_report/S00164_PVR_Clean_Jamshoro_R9_29_03_2025.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAY4SGB7CKBGIMOIOE%2F20250613%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20250613T104441Z&X-Amz-Expires=43200&X-Amz-SignedHeaders=host&X-Amz-Signature=581f806deee554c1ad177499d60c9c13486365a42241bdac44799749420e4996

[216] https://projects.globalcarboncouncil.com/pages/requesting_registration_projects

[217] https://www.globalcarboncouncil.com/wp-content/uploads/2023/12/RFR-Checklist-V1.0.pdf

[218] https://www.zephyrpwr.com/

[219] https://projects.globalcarboncouncil.com/project/591

[222] https://projects.globalcarboncouncil.com/project/333

Project	Status	Location	Crediting Period	Year	Sector
by NASDA Green Energy Limited[220]	**e Request for Registration (RFR) checklist[221])**				/non-renewable sources)
Emission Reductions from Tenaga Generasi Limited Grid Connected 49.5MW Wind Power Plant[223]	Registration Requests **(incomplete Request for Registration (RFR) checklist[224])**	Deh Khuttikun, in the Sindh region[225]	-	**Submission Date** 2022-03-30[226]	Energy industries (renewable-/non-renewable sources)
Wind Power Project in Jhimpir Thatta, Sindh by Indus Wind Energy Limited[227]	Registration Requests **(GCC ASSESMENT)**	Jhimpir, Sindh	-	**Submission Date** 2022-05-16[228]	Energy industries (renewable-/non-renewable sources)
Wind Power Project in Thatta, Sindh by Liberty Wind Power 2 Limited[229]	Registration Requests **(incomplete Request for Registration (RFR) checklist[230])**	Jhimpir District Thatta, Sindh[231]	-	**Submission Date** 2022-03-25[232]	Energy industries (renewable-/non-renewable sources)
Wind Power Project in Thatta, Sindh by Liberty	Registration Requests **(incomplete Request for**	Jhimpir District Thatta, Sindh[235]	-	**Submission Date** 2022-03-25[236]	Energy industries (renewable-/non-

[220] https://projects.globalcarboncouncil.com/pages/requesting_registration_projects
[221] https://www.globalcarboncouncil.com/wp-content/uploads/2023/12/RFR-Checklist-V1.0.pdf
[223] https://projects.globalcarboncouncil.com/pages/requesting_registration_projects
[224] https://www.globalcarboncouncil.com/wp-content/uploads/2023/12/RFR-Checklist-V1.0.pdf
[225] https://pact.capital/project/wind-farm-project/
[226] https://projects.globalcarboncouncil.com/project/223
[227] https://projects.globalcarboncouncil.com/pages/requesting_registration_projects
[228] https://projects.globalcarboncouncil.com/project/319
[229] https://projects.globalcarboncouncil.com/pages/requesting_registration_projects
[230] https://www.globalcarboncouncil.com/wp-content/uploads/2023/12/RFR-Checklist-V1.0.pdf
[231] https://www.pacra.com/rating-report/MTQwNTQ=
[232] https://projects.globalcarboncouncil.com/project/219
[235] https://www.pacra.com/summary_report/RR_2088_12628_20-Feb-24.pdf
[236] https://projects.globalcarboncouncil.com/project/218

Project	Status	Location	Crediting Period	Year	Sector
Wind Power I Limited[233]	**Registration (RFR) checklist[234])**				renewable sources)
Wind Power Project in Thatta, Sindh by Triconboston[237]	Registration Requests **(incomplete Request for Registration (RFR) checklist[238])**	Thatta, Sindh	-	**Submission Date** 2022-02-11[239]	Energy industries (renewable-/non-renewable sources)
Tarbela 5th Extension Hydropower Project[240]	Verification	Swabi, Khyber Pakhtunkhwa[241]	-	**Submission Date** 2024-02-27	Energy industries (renewable-/non-renewable sources)
300 MW Floating Solar in Pakistan Project[242]	Verification	Ghazi Barotha Complex, KP[243]	-	**Submission Date** 2023-11-06	Energy industries (renewable-/non-renewable sources)
50 MWp Solar Power Project by Oursun Solar[244]	Verification	District Thatta, Sindh province in Pakistan[245]	-	**Submission Date** 2022-06-30	Energy industries (renewable-/non-renewable sources)
50 MW Solar Power Project in Pakistan by Gharo Solar Limited[246]	Verification	Gharo, Sindh	-	**Submission Date** 2022-06-14	Energy industries (renewable-/non-renewable sources)

[233] https://projects.globalcarboncouncil.com/pages/requesting_registration_projects

[234] https://www.globalcarboncouncil.com/wp-content/uploads/2023/12/RFR-Checklist-V1.0.pdf

[237] https://projects.globalcarboncouncil.com/pages/requesting_registration_projects

[238] https://www.globalcarboncouncil.com/wp-content/uploads/2023/12/RFR-Checklist-V1.0.pdf

[239] https://projects.globalcarboncouncil.com/project/137

[240] https://projects.globalcarboncouncil.com/project/1795

[241] https://www.wapda.gov.pk/project-details/63c44244fb73646d1525bb60

[242] https://projects.globalcarboncouncil.com/project/1647

[243] https://projects.worldbank.org/en/projects-operations/project-detail/P176308

[244] https://projects.globalcarboncouncil.com/project/960

[245] https://gctproject.s3.amazonaws.com/private/project_listing/960/attachment1/PSF_V02_50_MW_10112022.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAY4SGB7CKBGIMOIOE%2F20250613%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20250613T112521Z&X-Amz-Expires=43200&X-Amz-SignedHeaders=host&X-Amz-Signature=1fcaacf79ede13e88e0735b4c78f77b139bf296e501ca753ca6d8e18db9501c4

[246] https://projects.globalcarboncouncil.com/project/526

Project	Status	Location	Crediting Period	Year	Sector
18 MWp Solar Power Project in Pakistan by Harappa Solar Private Limited[247]	Verification	Harappa, Punjab	-	**Submission Date** 2022-06-16	Energy industries (renewable-/non-renewable sources)

[247] https://projects.globalcarboncouncil.com/project/552