CARBON MECHANISMS REVIEW

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From Framework to Action

Fostering high-integrity carbon markets after the Baku breakthrough

REDD+ under Art. 6?
New article in our debate series

content

Spring 2025

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editorial

Dear Reader,

welcome to the latest Carbon Mechanisms Review. In this issue, we take stock of the international carbon market landscape after the Baku conference breakthrough and discuss the prospects for robust market-based climate action (the latest developments in some European member states happened after going to press and are not included here). We then present insights and lessons learnt from an Art. 6 capacity building mission to Pakistan.

On the occasion of the tenth anniversary of the Paris Agreement and 30th of COP1 in Berlin, respectively, we review milestone decisions and analyze success factors as well as roadblocks in different phases of carbon market development in the last 30 years. The issue also covers an interview with Michael Savarin, who coordinates climate Finance and green industrial development in the Government of Dominica on the potential of Article 6 to advance Dominica's national climate goals, and the critical role of international cooperation in this respect.

Last not least we present a report from a real-world laboratory concept activity in Zambia, which explores combined climate change mitigation, adaptation and biodiversity protection measures.

Thank you for your interest and enjoy the read!

The editor

Wuppertal Institut

Carbon Mechanisms Review (CMR) is a specialist magazine on cooperative market-based climate action. CMR covers mainly the cooperative approaches under the Paris Agreement's Article 6, but also the broader carbon pricing debate worldwide. This includes, for example, emission trading schemes worldwide and their linkages, or project-based approaches such as Japan's bilateral offsetting mechanism. CMR appears quarterly in electronic form. All articles undergo an editorial review process. The editors are pleased to receive suggestions for topics or articles.

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On the state and prospects of the international carbon market after Baku

Carbon Market Misconceptions

Why old paradigms are misleading in the post-Baku climate landscape

By Thomas Forth, Advisor to BMWK

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Outdated ideas from the Kyoto Protocol persist in the minds of many in public administration and may prove an obstacle to revitalisation of the carbon market under the Paris Agreement.

It is often the case that long-held views and principles become disruptive under new conditions and objectives. This was elaborated by Thomas Kuhn in his analysis of paradigm shifts in the philosophy of science – and also holds true for paradigm shifts in the political context.

One such view is that market mechanisms should help to reduce costs. At the same time, their use also offers the opportunity to tap into abatement potential that companies would not address without the additional funding provided by international certificates. These are two sides of the same coin: cost efficiency and effectiveness of reduction policies. It is only by combining the two that a society can make progress in climate protection.

These principles apply not only in the national context (i.e. domestic carbon pricing), but also in international cooperation.

With the Paris Agreement, international cooperation has expanded the cost-saving function of the Kyoto Protocol's flexible mechanisms – in particular the CDM – to include the function of raising ambition.

As a reminder of how the CDM works, the flexible mechanisms were designed to provide greater flexibility in meeting the reduction commitments of developed countries (Annex 1) by allowing them to use the reduction efforts of developing countries. Under the KP, however, developing countries were never obliged to meet reduction targets. In fact, developed countries were able to count reduction efforts made by developing countries. As a result, there was no need for host countries to scrutinise CDM projects to ensure that they were consistent with their sustainable development objectives. NDCs, LT-LEDS and net zero targets did not exist at that time. Nevertheless, important questions were already being asked about whether projects were contributing to sustainable development, technology transfer and additional emission reductions. There was much criticism of the CDM, including the fundamental critique that the CDM was built on a kind of black box of uncontrolled emission reductions from an unrestricted national system.

Yet, there are historical reasons for this, stretching back to the division of the world into developed and developing countries, Annex 1 and Non-Annex 1 parties to the Kyoto Protocol. While this division was still justified when the KP was signed in 1997, that was no longer true

"Outdated ideas from the Kyoto Protocol persist in the minds of many in public administration and may prove an obstacle to revitalisation of the carbon market under the Paris Agreement."

when the Paris Agreement was signed in 2015. And, of course, the divergence in economic performance within the international community has continued.

Three decades later, it is necessary to recognise that the capabilities of the international community have changed from the patterns of perception in the 1990s. This recognition is also essential for Article 6. However, the paradigm shift is also slow and could become a burden for effective use of Article 6. Nevertheless, there remains a considerable capacity gap between developing and industrialised countries. The principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) will remain valid for a long time to come. This is not a sign of clinging to old views, but a reality. Yet, it is also a reality that some countries have risen economically and politically, which is also reflected in emissions, along with the level of consideration between poorer and richer countries. The expansion of the climate finance base is characterised by these differences and the slow pace at which responsibility is being assumed.

This has already impacted the international climate negotiations that led to the Paris Agreement, resulting in different rules. In a nutshell, this change culminates in the commitment that all countries have now articulated in their NDCs, which have voluntarily become international commitments. These NDCs are currently being updated and should show progress over time. Article 6 mechanisms as a whole – not only the market mechanisms but also the non-market mechanisms of Article 6.8 – should also contribute to this, albeit to different degrees and with different success parameters.

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NDCs are at the centre of the UNFCCC's overall assessment of progress. From the perspective of the international carbon market, progress in the NDCs is evident. We have progress in interest of participating, but need more information on the potential use cases of mitigation activities.

On the one hand, a large proportion of developing countries will opt to use Article 6. On the other hand, only a few developed countries have so far decided to use Article 6 in or in addition to their NDCs. However, most developed countries have not yet clarified their approach.

This is certainly due to the protracted nature of UNFCCC negotiations: countries have been waiting to see whether Article 6 will become an environmentally sound instrument that is clearly distinct from the CDM. Of course, the benefits of Article 6 are more difficult to determine if the cost savings mentioned above cannot be presented as cost savings resulting from the NDC and domestic policy instruments such as emissions trading systems or taxes. If they do not result from cost savings in the compliance situation of states and companies, altruism will not be enough to mitigate climate change. Companies on the voluntary carbon market need clear use cases of their voluntary targets and the acceptance of them.

After Baku, however, a question has arisen: Is there a need to revise the NDCs of some industrialised countries, which have so far been designed domestically? One indicator of the need for such a rewrite is simply the question of economic burden. Can the targets be met domestically? Is sustainable progress possible? Or are these countries now entering a phase in which the remaining emission reductions will be extremely expensive and large-scale removals are not yet available? If ambitious targets have been set but cannot be achieved domestically, or can only be achieved at such cost that it erodes willingness to contribute to international climate change costs, this clearly will not help.

„Three decades later, it is necessary to recognise that the capabilities of the international community have changed from the patterns of perception in the 1990s."

Seen in this light, the question of the use of Article 6 is not an "add-on" or a "nice to have": instead it must be regarded as a realistic component of national climate policy, a means of transition – including at the international level – to advance abatement technologies that are not yet economically available and to contribute to their cost degression. Without realizing the need for international cooperation, international climate protection will remain suboptimal. Article 6 can identify cost-effective mitigation potentials for international cooperation. Otherwise, valuable time for international climate protection will be wasted.

This is the perspective of the industrialised countries, which are still far from meeting their targets. But the new NDCs should also be read in the light of the statements on international cooperation. Commitments under the Framework Convention and the Paris Agreement, based on the CBDR-RC-principle and the means of implementation, to enable other countries to meet the climate challenge, are often neglected. It would, perhaps, be useful to include reporting requirements in the NDCs for this purpose. The Ambition Workshop scheduled in conjunction with SB62 in Bonn in June this year could serve as a starting point for

„A better understanding is required of the paradigm shift from mere cost-savings to a collective increase in ambition, i.e. the ambition comes first, with markets then lowering the costs."

reviewing progress on Article 6 mechanisms for international cooperation. Policymakers should strive to understand and create structured options for use of the new Article 6 mechanisms. A better understanding is required of the paradigm shift from mere cost-savings to a collective increase in ambition, i.e. the ambition comes first, with markets then lowering the costs.

As noted above, this is not an "add-on" or a "nice-to-have". Instead, it concerns the effective implementation of the cooperation obligations arising from the Convention and the Paris Agreement. These are obligations under international law that also led to the NCQFs in Baku.

The partial fulfilment of this objective through Article 6 offers economic advantages for the cooperating partners of the various participants in the reduction measures. And, of course, it promotes the fulfilment and achievement of the obligations and goals of the participating states. In this sense, Article 6 mechanisms become truly cooperative approaches.

Of course, while I hope that the decisions taken in Baku will lead to the implementation and widespread use of Article 6 mechanisms, it is also good to see them already in use, so that experience can be gained and examples set. A steep learning curve for Article 6 cooperation in the undecided states is, therefore, highly desirable.

There are also some arguments in favour of this, namely the contribution of Article 6 to the New Collective Quantified Goal on climate finance (NCQG). In particular, the innovative side offers a significant opportunity to mobilise investment towards the USD 1.3 trillion target. In terms of investment, fundamental questions arise:

1. How can we achieve significant growth in the primary market for mitigation needs? If this succeeds, the opportunities for mobilizing finance in the secondary market can grow at the same time. This development needs to be stimulated – and is the responsibility of the parties.
2. What incentives should companies have to invest heavily in international projects? Governments can use their well-known and proven incentive instruments (tax exemptions, direct financial incentives, purchase guarantees for the acquisition of certificates, guaranteed prices and opt-out rights if the market price is higher, etc.).
3. Going beyond the incentives addressed in the previous point, can governments find new modalities of involving business in climate finance in a much more direct way on the investment level? In order to avoid this being viewed as an additional financial burden for companies, states must introduce

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instruments that open the door to investment opportunities at the bilateral and multilateral level and thus contribute to the USD 1.3 trillion target through the mutual benefit of the investment participants. This target cannot be achieved as a transfer amount; however, it can be a win-win situation for the contracting private and public participants behind the investments, cooperating through market-based activities supported by a framework setting of the Parties to the Paris Agreement. Such a strategy is the only way to counter intensifying competition in the face of global economic tensions. Some countries will benefit from seeking cooperation, while others will turn their backs on globalisation and create greater burdens for all concerned.

For a successful strategy of investment-oriented climate policy, however, international investment must be seen as part of a country's foreign trade strategy. Companies can only become part of this foreign trade strategy if they can build on their own economic capabilities and operate in a reliable public framework over the long term. To achieve this, countries must enter into bilateral agreements, participate in capacity building in host countries, support technology transfer and improve financing conditions for market entry and market uptake of climate-friendly technologies. Above all, however, countries must ensure that funding is only provided for sustainable investments that are integrated into the host country's economic structure and should be defined through NDCs, LT-LEDS and net zero targets.

We need nothing less than active states working with active companies on the basis of the various carbon pricing models. This must be accompanied by the transfer of mitigation results, with contributions to the achievement of partner countries' targets (the so-called mitigation contribution) or the support of domestic carbon pricing approaches. This way, the level of climate policy ambition in the host countries will rise and their CBAM costs can fall accordingly. Article 6 is a good vehicle for assessing the climate value of cooperative action.

However, it is crucial that the Article 6 accounting options defined in Baku lead to purchasing systems that justify the payments. This would have to lead to joint strategies with the partner countries, both on the corporate side and in the buyer states. If contributions to the climate finance target are tripled to USD 300 billion, a large part of the funds earmarked for reductions should be processed through Article 6: this would lead to a better oversight on the induced emission reduction in line with NDC strategies and guaranteed additionality control, which represents the most advanced form of result-based carbon financing. These funds, defined as direct transfers, can have a significant impact on the USD 1.3 trillion target. It is important to reiterate that these are not export strategies to strengthen one's own economy, and that economic benefits must exist on both sides.

Returning to the original issue of cost efficiency as a motivation for market mechanisms: the NCQG targets agreed in Baku, and a win-win investment situation protected by bilateral and multilateral frameworks set by two or more governments and/or financial institutions, can promote efficiency and deliver cost savings.

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Sparking Article 6 Readiness

SPAR6C's mission strengthens Pakistan's carbon market pipeline and operational readiness

by Urwah Khan (UNEP-CCC); Mavra Bari (GGGI); Xianli Zhu (Ex. UNEP-CCC); Karen Olsen (UNEP-CCC)

Pakistan, the world's fifth most polluted country, faces acute climate vulnerabilities. The country has been ranked as the most vulnerable country to climate change in 2022 after it faced devastating and unprecedented flooding that submerged one third of the nation, according to data in the Climate Risk Index (CRI) for 2025 report released by European think-tank Germanwatch1. The 2022 floods highlighted its exposure to climate disasters, costing $54 billion (4% of GDP). With a population of 247.5 million (2023) and 1.5% annual growth, its lower-middle-income status underscores the dual challenge of poverty reduction and climate resilience.

Pakistan's high meat consumption and agricultural practices, particularly livestock farming, contribute significantly to greenhouse gas emissions. Despite government bans, seasonal stubble burning persists, exacerbating severe smog that frequently forces school and office closures.

Air pollution remains a critical public health and environmental challenge. A University of Chicago study in 2022 estimated that the average life expectancy loss in Pakistan is 3.8 years, relative to the level if the air pollution were kept within the World Health Organization's guidelines of 5 $\mu g/m^3$ was met. [2]

Despite its low historical contribution to global emissions (less than 1%), Pakistan presents significant potential for carbon market project development across multiple sectors, including municipal solid waste and wastewater management, renewable energy (solar, wind, small hydro, and biomass), electric mobility and public transport, energy efficiency, and industrial fuel switching—particularly in cement and brick kilns—as well as household technologies such as cookstoves and air conditioning. Article 6 of the Paris Agreement offers a pathway for the country to monetize

1 https://www.germanwatch.org/en/cri

2 https://aqli.epic.uchicago.edu/wp-content/uploads/2021/09/PakistanFactSheet_2022_PK-version.pdf

emission reductions through international carbon markets, enabling it to attract climate finance, lower abatement costs for global partners, and invest in sustainable development.

Support from programs like Supporting Preparedness for Article 6 Cooperation (SPAR6C) is essential to unlock this potential. They enhance institutional readiness, develop carbon market pipelines, and ensure that transactions meet environmental integrity and transparency standards. The objective is to transition Pakistan from a position of vulnerability to one of value in the international carbon market ecosystem.

SPAR6C support to Pakistan

UNEP Copenhagen Climate Centre (UNEP-CCC) leads the SPAR6C technical support to Pakistan, with GFA Consulting Group as the supporting delivery partner.

Pakistan is advancing its engagement in Article 6 carbon markets but requires capacity building, a robust governance framework, and clear institutional arrangements to authorize high-integrity mitigation activities. While the country has prior experience in voluntary carbon markets, it has yet to initiate cooperative approaches under Article 6. SPAR6C aims to support Pakistan strengthen national planning frameworks, enhance Article 6 trading regulations, and approve at least three pilot projects with Mitigation Activity Design Documents (MADDs) ensuring alignment with host country criteria for baseline setting, additionality, and environmental integrity, consistent with evolving Article 6.2 guidance. As of January 2025, SPAR6C has conducted a gap analysis, completed sectoral studies in cement, transport, and waste, supported the development of carbon market policy guidelines, built an initial mitigation activity pipeline, and delivered nine national workshops. In 2025, SPAR6C will accelerate implementation through:

1. finalizing sectoral studies to inform NDC 3.0, currently being updated under the leadership of the Global Change Impact Studies Centre (GCISC) at the Ministry of Climate Change and Environmental Coordination (MoCC&EC), in collaboration with development partners including UNDP, UNICEF, GIZ, and UNEP-CCC through the SPAR6C Program. The update process includes multi-stakeholder consultations with provincial governments to ensure alignment with national and sub-national mitigation priorities and integration of carbon market considerations into national policy,
2. developing Carbon Market Rules & Regulations and integrating carb on trading into public investment proposals,
3. advancing pilot transactions, such as for the prioritized Lakhodair Landfill project and facilitating, e.g., bilateral agreements between Pakistan and potential carbon credit buyer countries under Paris Agreement Article 6.2 government to government transactions, and
4. strengthening capacity through a Carbon Market Dashboard, a webinar series, an Art. 6 project development guide, and targeted training programs.

The Strategic Dialogue Mission

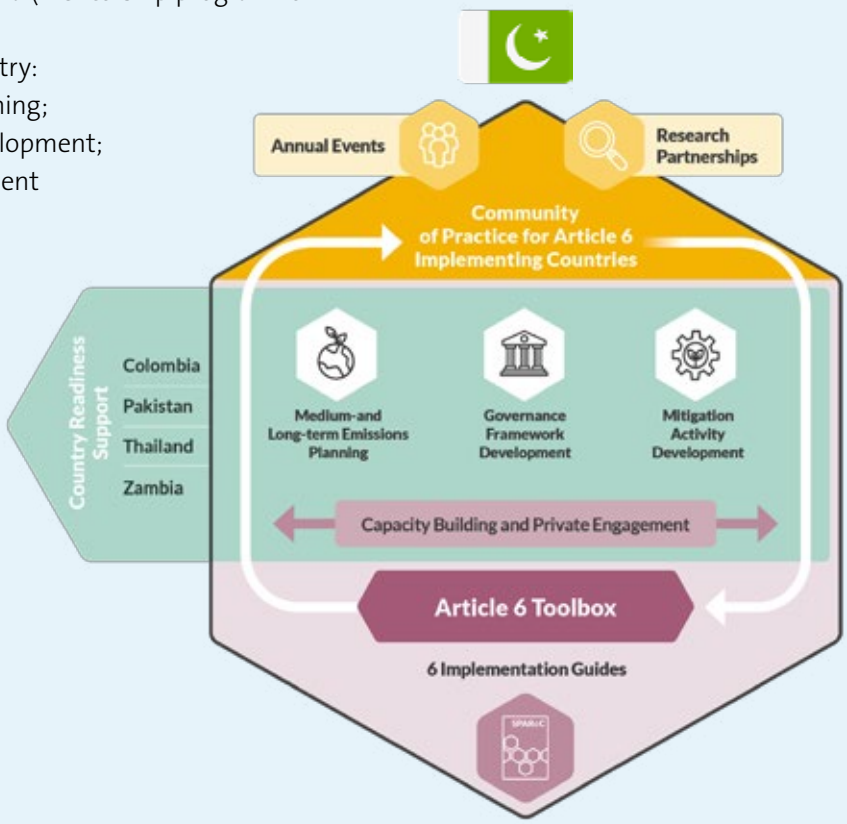
The Strategic Dialogue Mission marks a significant milestone in strengthening Pakistan's engagement in Article 6 carbon markets under the SPAR6C program. As part of this dialogue, focal points from Federal Ministry for Economic Affairs and Climate Action of Germany (BMWK) recently undertook a mission, held from February 18–21, 2025, which was designed to raise awareness of Pakistan's participation in SPAR6C, solidify the German-Pakistani partnership, and advance key technical discussions to shape the next phase of program implementation. High-level representatives in the delegation included officials from BMWK, the Global Green Growth Institute (GGGI), UNEP

SPAR6C – The Basics

The overall objective of the 'Supporting Preparedness for Article 6 Cooperation' (SPAR6C) program is to facilitate readiness of countries to participate in cooperative approaches under Article 6 of the Paris Agreement by engaging the private sector and working closely with governments. This program enables the development of the international carbon market created by Article 6, leading to cost-efficient, flexible, high integrity carbon markets with positive, transformational sustainability impacts.

Key Highlights about SPAR6C

- Overall mandate - "Making Article 6 Implementation Easier"
- Duration (2022-2027)
- 6 interlinked work packages – 4 on countries, 2 international: Toolbox and support to academia (mentorship program for master's degree students)
- Four workstreams in each country:
  - ✓ Medium and long-term planning;
  - ✓ Governance framework development;
  - ✓ Mitigation activity development
  - ✓ Capacity building



Activities in the four in-country work packages focus on three areas of work:
1) Medium and Long-term emissions planning, 2) Governance framework readiness, and 3) Design of pilot mitigation activities. Capacity building and training activities are conducted throughout all these areas to ensure stakeholders are prepared to effectively play their role in Internationally Transferred Mitigation Outcome (ITMO) transactions. In the remaining two work packages, best practice tools and approaches to implementing cooperative approaches under Article 6 are developed into a toolbox of Article 6 guides.
https://www.spar6c.org/

Copenhagen Climate Centre (UNEP-CCC), and GFA Consulting Group. Through a series of strategic and technical discussions, the mission facilitated key decisions with government stakeholders and documented critical next steps to advance SPAR6C's implementation in Pakistan.

Strategic Dialogue with the MoCC&EC on the 18 February

The Strategic Dialogue with the Ministry of Climate Change and Environmental Coordination (MoCC&EC) on February 18, 2025, was a pivotal engagement aimed at strengthening Pakistan's participation in Article 6 carbon markets. Facilitated by the German Embassy in Pakistan, the meeting was attended by representatives from the BMWK, the German Embassy, and senior leadership of the Ministry of Climate Change and Environmental Coordination (MoCC&EC).

A key priority articulated by the MoCC&EC Secretary was Pakistan's objective to secure two bilateral agreements under Article 6.2 in 2025. The Ministry has already initiated discussions with potential partners, including Sweden, Norway, and Singapore, and emphasized the need for structured cooperation to advance these agreements. In response, GGGI's Carbon Transaction Facility reaffirmed its readiness to provide technical support to MoCC&EC in facilitating these bilateral agreements, which are expected to primarily consist of ITMO transactions under Article 6.2 of the Paris Agreement.

During the dialogue, BMWK officials clarified that the German government does not intend to purchase ITMOs Article 6 carbon credits for compliance, as the EU 2030 NDC is a domestic target and thus rules out any use of carbon credits for the EU ETS. Instead, Germany's engagement in international Article 6 readiness programs is designed to create investment opportunities for German companies to voluntarily finance mitigation activities in developing countries, contributing to global net mitigation rather than direct compliance targets.

The private sector and think tank workshop on 19 February

A dedicated private sector and think tank workshop was held on 19 February 2025 in Islamabad, providing a platform for businesses, financial institutions, and experts to explore scalable investment models, risk mitigation tools, and innovative financing mechanisms. A key focus of the discussion was Pakistan's newly notified carbon policy, A key focus of the discussion was Pakistan's newly notified carbon policy, which provides a strategic roadmap for

Source for all images in this article: Mavra Bari

leveraging carbon market financing as a key mechanism for achieving national climate and economic objectives. The policy sets out a clear and transparent regulatory structure, prioritizing sectors with high emissions reduction potential—such as energy, agriculture, waste management, and forestry—while ensuring inclusivity and equitable benefit-sharing. It also emphasizes robust Measurement, Reporting, and Verification (MRV) systems, and introduces a simple fee structure and digital platform to streamline application and ensure integrity of credits. This policy framework outlines how businesses can leverage carbon finance to de-risk climate-aligned investments, structure carbon transactions, and generate sustainable revenue streams while aligning with national decarbonization goals

The workshop featured high-level presentations, including a keynote address by Additional Secretary of MoCC&EC, who provided an in-depth overview of Pakistan's climate finance and carbon market policies, including the recently issued policy guidelines for trading in carbon markets and the draft carbon market rules and regulations. In the carbon market policy guidelines, the Government envisions the establishment of two distinct market mechanisms: voluntary carbon markets (VCM) and the compliance market. The guidelines address such issues as eligibility criteria for proposing emission reduction projects, monitoring and verification protocols, standardization, compliance mechanisms, governance and oversight, transparency and reporting, and social and environmental safeguards. These guidelines envision carbon markets as a catalyst for mobilizing private sector finance, driving investment in sustainable projects, and accelerating the transition to a low-emission development and transition to net zero economy. Private sector representatives also shared concrete project proposals, including several project idea notes developed under SPAR6C.

Interestingly, even though Pakistan is still working on its carbon market policies, the Pakistan private sector has already started its journey for Article 6 project development. One precondition for an entity to initiate an Article 6.4 project under the Paris Agreement is to submit a "Notice of Prior Consideration" to the UNFCCC Secretariat through (Prior consideration notifications | UNFCCC).

The strategic dialogue with federal ministries

The strategic dialogue with key federal ministries on carbon market implementation was held at the Ministry of Climate Change and Environmental Coordination (MoCC&EC) on the morning of

20 February. The meeting brought together representatives from the Ministry of Planning, Development, and Special Initiatives (MoPD&SI), the Ministry of Foreign Affairs (MoFA), the Ministry of Finance, the Ministry of Industry, and the Board of Investment to discuss the integration of carbon market mechanisms into national development planning and project financing.

A key focus of the discussion was the MoPD&SI's role in screening and approving project proposals for government funding and its intention to assess its project pipeline for opportunities to leverage carbon finance. Participants highlighted the challenges of demonstrating additionality for public-sector projects under Article 6, as government-funded initiatives are typically driven by policy priorities rather than financial returns. MoPD&SI officials noted that the Government of Pakistan faces fiscal constraints, often leading to the rejection of project proposals or reliance on international concessional financing to implement priority projects. To address this, MoPD&SI has requested SPAR6C's support in developing a screening tool to assess the 1,000+ project proposals it receives annually for carbon market potential.

The Ministry of Foreign Affairs (MoFA), in coordination with MoCC&EC, plays a critical role in representing Pakistan in international negotiations and securing bilateral agreements under Article 6. Their engagement is essential for advancing government-to-government cooperation on carbon markets, ensuring that Pakistan can maximize climate finance opportunities while aligning with its national and international commitments.

BMWK's Mission to Lahore

The SPAR6C delegation visited Lahore to engage with Punjab's provincial government and initiate support for Article 6 project development. Following extensive coordination, stakeholders agreed to prioritize the Lakhodair Landfill as the first project to receive Article 6 technical assistance under the SPAR6C program.

Lahore, Pakistan's second-largest city with a population of approximately 11 million, faces

significant urban mobility challenges. The city's streets are congested with motorbikes, three-wheelers, and private cars, while public transport options remain limited.

The 18th Amendment to Pakistan's Constitution, enacted in 2010, significantly decentralized decision-making authority, granting provinces substantial autonomy over governance and resource allocation. Each province has its own parliament and exercises considerable control over policy and development decisions, with Islamabad Capital Territory remaining under direct federal administration. While the Ministry of Climate Change and Environmental Coordination (MoCC&EC) is responsible for international climate negotiations and overarching policy development, the implementation of climate policies, including carbon market project development, primarily takes place at the provincial level.

Held at the Punjab Planning and Development Department, the meeting brought together senior officials to discuss carbon market opportunities and SPAR6C's support, particularly for developing the Mitigation Activity Design Document for Lakhodair. While the Punjab government seeks to develop an Article 6 strategy, SPAR6C has deferred support for provincial policy development until the national Carbon Market Rules and Regulations are finalized. The Punjab Environment Protection Department has established a 13-member Project Management Unit to support carbon market initiatives and has requested SPAR6C's assistance in capacity building, which SPAR6C has committed to providing.

The SPAR6C delegation visited the Lakhodair Landfill, located 40 minutes by car outside Lahore. Spanning 200 acres, the landfill has been in operation since 2016, receiving over 5,000 truckloads of municipal waste daily. With waste piles reaching up to 50 feet, the site is expected to reach full capacity within three years. Limited funding has left only two of its six zones properly lined, leading to leachate contamination of local groundwater.

Following the visit, the delegation attended a kick-off ceremony at the office of Punjab's

"We aim to empower more provincial initiatives like the Lakhodair Landfill project to help translate local achievements into significant national progress."

Ms. Romina Khurshid Alam,
Coordinator to the Prime Minister on Climate Change

Deputy Chief Minister, marking the launch of SPAR6C's support for the Lakhodair project feasibility assessment. The event was attended by Coordinator to the Prime Minister on Climate Change and Environmental Coordination, along with Additional Secretary of MoCC&EC.

Her Excellency Ms. Romina Khurshid Alam, Coordinator to Prime Minister on Climate Change highlighted that "we aim to empower more provincial initiatives like the Lakhodair Landfill project to help translate local achievements into significant national progress, as 5% of the emissions reduced will be reflected in Pakistan's Nationally Determined Contributions,".

Reflections and outlook

The four-day mission successfully met its objectives, with intensive discussions across key stakeholders.

Despite high interest rates (Pakistan's benchmark lending rate stood at 11 percent in January 2025), the private sector remains eager to invest in low-carbon technologies and participate in international carbon markets.

As Pakistan prepares to submit NDC 3.0 by July 2025, stakeholders engaged during the mission emphasized the importance of clearly defined baselines and realistic, sector-specific mitigation targets to unlock carbon finance opportunities. The 2021 Updated NDC includes an unconditional 15% and conditional 35% reduction target by 2030 (relative to a BAU of 1,603 $MtCO_2e$), prioritizing renewable energy, electric vehicles, coal phase-out, and forestry. Discussions during the mission highlighted that, despite recent economic constraints, slower-than-expected GHG growth may enhance the country's ability to meet its targets. This provides a strategic opportunity to position Pakistan as a credible ITMO supplier under Article 6.

The current national carbon market policy guidelines do not specify a positive or negative list of eligible sectors and technologies, nor do they outline clear criteria for reserving low-cost mitigation options for domestic NDC targets. Addressing these issues—particularly in high-potential sectors such as cement, textile, transport, and waste—will be essential to ensure environmental integrity and market confidence as Pakistan operationalizes its Article 6 engagement.

Globally, Article 6 aims to enhance climate ambition by facilitating voluntary international cooperation. A well-defined and credible Nationally Determined Contribution (NDC) target is a critical factor for potential ITMO buyers when considering Article 6 transactions. As countries like Pakistan prepare their updated NDCs, careful consideration will be required in setting emission baselines and targets to align with market expectations while maintaining environmental integrity.

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Celebrating anniversaries ...

... may remind us to speed up implementation now!

A short flash back on the genesis of UNFCCC carbon markets

by Thomas Forth, Advisor to BMWK

2025 is the time for celebrating the anniversaries of the 10 years Paris Agreement and 30 years of COP1, both of which are highly related to carbon market mechanisms, but these two anniversaries are not the only relevant COPs. Carbon markets are notorious for their protracted and technical negotiations. Therefore, let us check what could be considered as milestone decisions and when conferences led to implementing phases during the last 30 years.

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1995
Berlin / COP 1

The decision on a pilot phase for market mechanisms, the so-called 'Activities Implemented Jointly' (AIJ), enabled Parties to gain experience in more than 150 carbon market activities. The main part of them was carried out in the group of "Countries in transition", former communist states in Middle and Eastern Europe (86), followed by Latin America (40). After 1999, there were also a few AIJ activities in Asia (18) and Africa (13), according to the UNFCCC statics for 2006 in the last AIJ report. During the AIJ pilot phase, the transfer of mitigation outcomes was not a feature, action was completely voluntary and therefore, an important feature of 'baseline and credit' approaches was missed.

1997
Kyoto / COP3

The Kyoto Protocol laid down the foundation of three flexible mechanisms to achieve the obligations of the Annex I – Parties:

1. the CDM, with a prompt start advantage for activities with a start date before the KP's entry into force and finally more than 8000 projects and up to 5% programmatic approaches (PoAs),
2. the Joint Implementation (JI), available for Annex I Parties useable for activities with KP's entry into force and finally 900+ projects,
3. International Emission Trading, which enabled historically a few "Green Investment

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Schemes" (GIS), based on the Annex I Party allocated AAUs. With the delay of KP's entry into force, the overlap with the AIJ pilot phase made some sense because altogether 30 projects in Asia and Africa should have terminated much earlier to allow emission trading-based mitigation activities for these two regions with the CDM.

2005 – 2011

CDM and JI main use phase

After more than 8 years, the quorum for the KP was reached and the protocol could finally enter into force. After the slow start of CDM and JI, a rush of activities followed between 2007 and 2011, not least caused by the linking of the flexible mechanisms to the EU-ETS and by public purchase programs of selected Parties.

2011 – 2015

Paris / COP21

At the same time. other Annex I Parties didn't show an interest in the KP and the flexible mechanisms, such as the US or Japan, which in 2013 decided to go its own way with the Joint Crediting Mechanism (JCM). At the end of the KP's first commitment period, prices for Certified Emission Reductions (CER) collapsed due to a lack of demand under a never fully operationalized second commitment period. Despite strong criticism of the CDM, Parties showed no willingness to reform this mechanism or make further use of the instrument. Apparently, this was a kind of crisis, where many buyer companies refrained from further activities, intermediary companies left the market, and professional biographies took a new direction. However, in parallel, intense efforts were undertaken by many negotiating groups to create a new market mechanism, which in the end led to the birth of Article 6 of the Paris Agreement.

2016 – 2021

Glasgow / COP26

In this period, the number of new CDM projects dropped dramatically. In parallel, an extreme lack of willingness to negotiate on the new Article 6 straight forward could be observed. One explanation might be the character of the new market mechanisms as voluntary instruments for ambition raising, which requires a deep involvement of host Parties to contribute to the "progression over time" in the subsequent NDC updates. However, the successful Glasgow conference (COP26) adopted the basic rulebook for Article 6 in a well-balanced compromise.

On the one hand, the Glasgow decisions allowed a high number of 3500 CDM project activities being eligible under certain criteria for the transition to Article 6 in principle – while 1500 projects requested transition in practice and only a small

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fraction of them got host country approval. Parties at Glasgow decided against a hard cut to the CDM, respecting host countries' potential benefits from the continuation of ongoing CDM activities and also in respect to project participants, which should see reliability in carbon markets, also for the sake of the future activities under Article 6.

On the other hand, for some negotiating groups, it was a price to pay for the acceptance of a clear set of high integrity principles and rules for the new Article 6 market mechanisms at the Glasgow summit.

2021 – 2024

Baku / COP29

While many expected rapid progress after Glasgow, negotiations again needed more time. After limited progress in Sharm El-Sheikh (COP27) and a total failure in Dubai (COP28), the Baku conference in 2024 finally delivered the breakthrough for the missing details of the Article 6 framework. This would not have been possible without the heavy work of the Art. 6.4 Supervisory Body (SBM). which successfully produced standards and tools, which were accepted by the Parties at Baku. And not to forget, some contentious issues such as "avoidance" could be postponed to the year 2028.

One learning from Baku could be that highly technical documents like tools and standards cannot be developed or further processed at the negotiation tables of the UNFCCC conferences. An important success factor for Baku was the attention which Heads of Delegation (HoDs) invested at the SB60 meeting in Bonn in June 2024, which saw an intense exchange on the chances and conditions for coming to a decision on Article 6. At such meetings, HoDs focus on the high-level political issues but also take note of the less political but technical implementation aspects. This double attention helped laying the foundations for the Baku breakthrough and thus for a serious start of the new mechanisms this time. This approach should also be considered fort he 2025 SB meeting

2024 – 2028

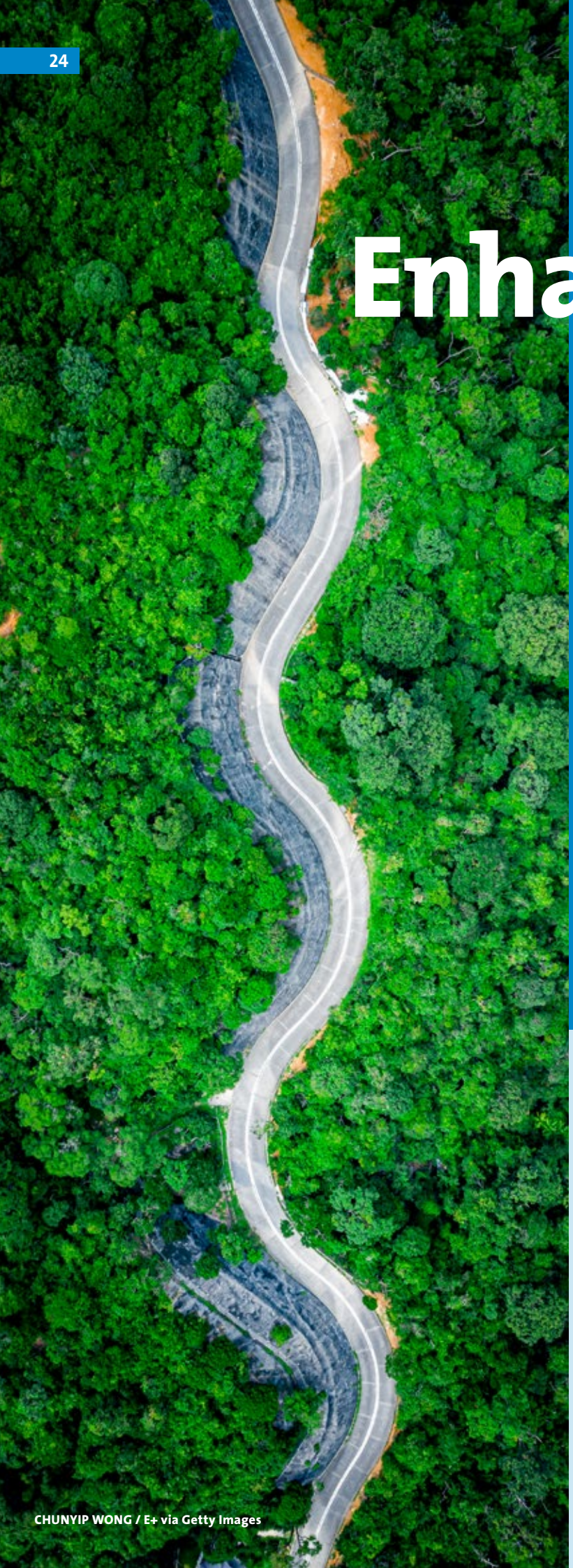
Belém / COP30

The new mode of work might be now characterized as "Let's get down to business". Relevant events of this year include the 'ambition workshop' in conjunction with SBI62 in Bonn in June. The review of the first batch of Initial Reports, the report on Capacity building, and progress on the Article 6 infrastructure, especially the establishment of the registries. Notably, the first step on an interim registry was already taken earlier this year.

2025 will not only see regularly recurring implementation tasks within the UNFCCC – it will also be a time to think about the sources of demand. Today, we see demand by only a few Parties and there is hope that corporates on the voluntary carbon may operate with Paris-aligned standards and intermediaries, which are able to unlock mitigation potentials in coordination with the host country, their NDCs and LT-LEDS to NetZero. This is not a bad start, but this will not lead to a sufficient level of activity to help closing the ambition gap. Parties must therefore politically reflect whether they want to engage in Article 6 stronger or even if they have already decided to follow ambitious NDCs strategies to NetZero.

One unexplored field of demand may originate from the NCQG goals for the year 2035. This is something negotiators should reflect on the road to Belém, because Article 6 cooperations are not offering the transfer of mitigation outcomes, but also the new artifact of mitigation contributions (MCUs), whose incentive structure should not be limited to philanthropic motivations.

On the side of the host countries, we will see clear commitments to Article 6 by much more than 100 Parties in the new round of NDCs and many of these Parties have made substantial progress in building their respective capacities for Article 6 cooperations, while a major part of these Parties has undertaken first steps. Nonetheless, the supply of appropriate mitigation activities eligible to be performed under Article 6 is growing. If Article 6 should work for the purpose of ambitious mitigation goals, much higher demand and well-elaborated activity proposals are the challenges, which we must not postpone for future NDC periods.



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Enhancing Integrity

How to credibly bring REDD+ into international carbon markets under Article 6.2

by Sandra Dalfiume and Axel Michaelowa, Perspectives Climate Group

A Complex Relationship

This article is a contribution to the CMR discussion series on the relationship between Articles 5 und 6 of the Agreement we started last year. CMR would like to thank Perspectives Climate Group for presenting their position. We will continue this series in the coming issues with further perspectives and we invite colleagues cordially to raise their interest to contribute to the debate.

In the context of international climate policy, reduction of emissions from deforestation and forest degradation (REDD+) was negotiated by Parties during multiple Conferences of the Parties (COPs) of the United Nations Framework Convention on Climate Change (UNFCCC), with the set of decisions governing it adopted in COP 19 in Warsaw in November 2013 and later recognised in Article 5 of the Paris Agreement. The Warsaw Framework for REDD+ (WFR), as these decisions are collectively known, established the international requirements for developing countries to reduce deforestation and forest degradation and enhance forest carbon stocks and obtain results-based climate finance payments in exchange for measured, reported and verified results. Under the WFR, REDD+ was designed to operate at a national scale[1], requiring participating developing countries to implement key elements to access the payments: a national REDD+ strategy, a national forest reference emission level (FREL) or forest reference level (FRL), a robust and transparent national forest monitoring system, and a system for reporting on how environmental and social safeguards (safeguard information system, SIS) were addressed.

According to the WFR, results-based finance could come from a variety of sources, including public and private, bilateral and multilateral (UNFCCC 2011). Examples of such public funding made available for REDD+ include the Green Climate Fund (GCF) REDD+ Results-Based Payments, the Forest Carbon Partnership Facility (FCPF) focusing on jurisdictional approaches and Germany's REDD+ Early Movers (REM) Programme. At the same time, negotiations on the role of international carbon market mechanisms in a future international climate policy regime were ongoing. Consequently, the option of funding REDD+ through market-based approaches was principally deemed as potentially applicable to REDD+, but beyond the requirements listed under the WFR, additional criteria to ensure environmental integrity are required (Streck 2022, UNFCCC 2011).

Given that negotiations on international carbon market rules took until 2021 for the key elements and 2024 for all technical details, it is unsurprising that market-based approaches to REDD+ first originated and evolved within the voluntary carbon markets (VCM), building on work that started already in the late 1990s[2]. Verra, with its REDD+ project level methodologies developed since 2011, became the leading standard for project-level REDD+. More recently, ART (Architecture for REDD+ Transactions) introduced its TREES (The REDD+ Environmental Excellence Standard) methodology for generation of jurisdictional carbon credits. Early project-level carbon market initiatives had very limited alignment with UNFCCC decisions, whereas ART TREES was designed to align more closely with the WFR, including incorporation the four REDD+ elements and compliance with Cancun Safeguards. An extreme position is that of the Coalition for Rainforest Nations (CfRN) that claims that emission reductions identified under the WFR should directly become emissions credits, without the need to meet any additional requirements.

With the Paris Agreement, the concept of "nested" approaches was further cemented as a crucial mechanism for integrating REDD+

1 Subnational FRELs/FRLs are possible as an interim measure.

2 Actually, the first reference to a REDD+ approach traces back to the Noel Kempff Mercado Climate Action Project in Bolivia (1997), which pioneered the use of carbon market mechanisms for forest conservation.

activities across national, subnational, and local scales—spanning both market and non-market approaches. Nesting in the REDD+ context relates to aligning carbon accounting, governance and safeguards across multiple scales—from project to national levels. Over the past years, some countries[3] and carbon market programmes[4] have worked towards developing nesting approaches. For example, Verra's Jurisdictional and Nested REDD+ (JNR) framework provides a structured approach to integrating REDD+ activities at different levels. Similarly, TREES supports the integration of project-level activities with national and jurisdictional REDD+ programmes.

Article 6.2 Cooperative Approaches and REDD+

Article 6.2 establishes a framework for cooperation through which countries can authorise, transfer and use internationally transferred mitigation outcomes (ITMOs). The definition of ITMOs under Article 6.2 includes emissions reductions and removals from any sector. Consequently, REDD+ carbon market approaches can be accepted under Article 6.2, as parties involved can eventually decide which activities should be part of cooperative approaches. Some countries have already included REDD+ in their Article 6.2 activities. For example, in 2023, the first REDD+ project was registered under the Joint Crediting Mechanism (JCM) by Japan and Cambodia (Carbon Pulse 2023).

Adhering to both the Article 6.2 Guidance and Article 6.4 RMPs is critical

For REDD+ to generate ITMOs, it must comply with the guidance on cooperative approaches under Article 6.2. However, Article 6.2 rules only provide high-level integrity criteria that serve as international guidance. The operationalisation of these high-level criteria depends on the host country's rules for authorisation, e.g. whether a government directly accepts credits from VCM programmes or applies specific requirements under bilateral agreements and frameworks with partner countries[5]. Given that the Article 6.4 Paris Agreement Crediting Mechanism (PACM) integrity criteria and requirements go way beyond the requirements of the different VCM programmes, Perspectives Climate Group proposes that the PACM's internationally designed requirements and procedures should serve as a benchmark[6] for national REDD+ arrangements under Article 6.2. Below, we present key environmental and social integrity criteria required under Article 6.2 and 6.4 that are not fully addressed by the WFR nor VCM jurisdictional REDD+ methodologies.

Additionality – regulation non-enforcement cannot be claimed anymore

Additionality is a key requirement under Article 6.2 and the PACM, ensuring carbon credits represent mitigation that would not have occurred otherwise. While Article 6.2 provides only a general requirement for participating Parties to assess additionality based on national criteria, the

3 This includes the creation of national regulatory frameworks to facilitate the integration of activities (e.g., Renami in Peru).

4 Carbon crediting programmes have also introduced guidelines and methodologies to align project-level emissions accounting and social and environmental safeguards with broader jurisdictional systems.

5 E.g., Activity developers applying VCS/ART seeking authorisation of REDD+ credits as ITMOs to be sold to e.g. CORSIA and voluntary buyers

6 Note that some countries or carbon crediting standards could also use CORSIA or ICVCM benchmark to further operationalise their Article 6.2 requirements

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PACM's additionality standard agreed in February 2025 goes well beyond additionality tests in the VCM and under the CDM. The investment test is now the default, and the barrier test can only be applied under very restrictive circumstances for household sector level activities and activities run by small entities, both of which does not apply for REDD+ actions. Generally, most REDD+ activities should pass the investment tests as – except for a few tourist hotspots – they do not generate any revenues. Furthermore, the PACM additionality standard does not allow to claim non-enforcement of host country regulations, which is highly relevant in the case of forest protection regulation. It can now no longer be assumed that such regulations are ignored, as it has been the case under Verra – while the TREES methodology did just ignore the issue altogether, omitting both the additionality test and the regulatory test.

While acknowledging that market-based approaches for REDD+ must uphold environmental integrity, the WFR does not provide explicit guidance on how additionality should be demonstrated. Given that the WFR emphasised to take future COP decisions into account, a specific additionality test is a minimum must to make REDD+ "Art. 6 compatible". This thus rules out the CfRN interpretation that an additionality test is not needed as well as the similar interpretation of jurisdictional VCM REDD+ approaches like TREES. The assumption that any jurisdictional REDD+ is automatically additional is just not acceptable.

Aligning jurisdictional REDD+ with the new additionality paradigm means that ART needs to revise its methodology to show how the revenues from credit sales enable the implementation plan (required as per ART2021). Similarly, Verra's Jurisdictional and Nested REDD (JNR) need to show how new policies (Verra n.d.) make forest protection attractive. The TREES High-Forest, Low-Deforestation (HFLD) score threshold which is definitely not in line with the additionality requirement will have to be revised as well.

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Baseline set in a conservative way and below business-as-usual

In all international carbon markets to date, baselines were generally set at Business as Usual (BAU), allowing all emission reductions or removals beyond BAU to generate credits. Now, under Article 6.2 and PACM, baselines must be set below BAU and be in line with the long-term goal of the Paris Agreement. Article 6.2 provides only general guidance, requiring e.g., use of conservative reference levels, and address uncertainties and leakage, but leaves requirements and procedures to host countries. Under the PACM, baselines must be specified using one of three eligible baseline-setting approaches – best available technologies, performance-based or historical emissions. Downward adjustment of the baseline is mandatory for the baseline setting approach based on historical emissions and actual emissions. The specific approaches on how to operationalize downward adjustment are set to be agreed by the Article 6.4 Supervisory Body in the coming months.

The WFR offers little guidance on how to set a baseline or Forest Reference Emission Level (FREL) (Chagas et. al 2020). While it outlines general principles – such as using historical data and ensuring transparency and consistency – it does not prescribe specific methodologies. Countries can develop their own approaches, subject to technical assessment by the UNFCCC – which lacks the authority to approve or reject a baseline, and periodic updates are encouraged but not mandated. Furthermore, FRELs can be adjusted based on national circumstances (e.g., future infrastructure projects). National circumstances allow countries to justify a higher or lower FREL than what would be derived purely from historical data, which is a less conservative approach (Streck 2020). Therefore, the conservativeness of FREL varies significantly between countries (Chagas et. al 2019). This further reinforces that

FREL are not appropriate baselines for Article 6.2, as they struggle to be conservative even when applying a BAU scenario.

TREES builds upon the foundation of the UNFCCC FREL and includes requirements to improve baseline stringency but does not address the below BAU requirements and downward adjustment yet. The FCPF Carbon Fund methodology, which may be used by countries under Article 6.2, allows low deforestation countries to set the baseline at 0.1% above average annual historical emissions, arguing that BAU may be higher than historical emissions. This assumption seems to be flimsy. Similar, problematic adjustments are possible under the TREES HFLD methodology, which is built on a completely synthetic threshold.

It is clear that all current jurisdictional baseline methodologies need to be revised to be aligned with Article 6 principles, particularly any HFLD components.

Environmental and social risks

Under Article 6.2 and the PACM, activities are required to minimise, and where possible, avoid negative environmental, economic and social impacts and contribute to sustainable development objectives. Under the former, requirements are operationalised by the participating Parties in accordance with their national criteria and procedures. Under the PACM, the SBM has adopted a mandatory A6.4 SD Tool that must be applied by all activities. The A6.4 SD Tool aims to ensure that, under PACM, activities uphold the principles of "do no harm" and contribute to the sustainable development priorities of countries. Furthermore, the tool provides requirements and processes for risk assessment for eleven safeguards' elements, such as land, ecology and natural resources, labour, health and safety, gender equality, land acquisition and involuntary resettlement, Indigenous Peoples, corruption and cultural heritage.

At COP16 in 2010, the seven Cancun Safeguards for REDD+ were adopted. These safeguards require REDD+ activities to align with forest programmes and international conventions, promote transparent and effective national forest governance structures, respect Indigenous peoples' and local communities' rights and knowledge, promote effective participation of stakeholders, conserve natural forests and biodiversity, address reversals (permanence) and avoiding displacement of emissions (leakage). The operationalisation of these safeguards and the SIS was left to the discretion of countries.

Relying solely on the Cancun Safeguards to meet Article 6.2 requirements is insufficient (even less so for PACM), as they do not necessarily address issues like corruption, labour rights, vulnerable populations, gender equity, and international equity. The scope and breakdown of safeguards also depend on how host countries implement them. This further underscores why Article 5.2 should not be directly linked to Article 6.2.

Jurisdictional REDD+ standards have operationalised these Cancun safeguards. ART TREES, using the seven Cancun safeguards as a foundation, has developed indicators to support jurisdictions. However, their scope is less robust than what Article 6 requires. In contrast, FCPF safeguards require compliance with World Bank social and environmental standards beyond the Cancun Safeguards. Prior to the adoption of the A6.4 SD Tool, World Bank and IFC safeguards were considered among the most robust safeguards for carbon market practices (Lauer et al. 2024).

Thus, relying on Cancun Safeguards alone does not meet the stringent Article 6 requirements. REDD+ methodologies should comply with both the Cancun Safeguards and Article 6.2, using the A6.4 SD Tool as a benchmark. Demonstrating adherence to Cancun Safeguards should not excuse bypassing Article 6 requirements.

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Conclusion

The WFR provides an important framework for international cooperation on forest conservation recognised in Article 5.2 of the Paris Agreement. However, while funding REDD+ through market-based approaches was potentially allowed, the WFR required additional criteria to be developed to ensure carbon markets' environmental integrity.

While Article 6.4 rules specify a detailed set of principles and criteria that activities need to satisfy before they can get registered, Article 6.2 only provides high-level integrity principles for cooperative approaches, with countries having the ultimate authority to operationalise these. Therefore, Perspectives suggests using PACM as a benchmark for REDD+ arrangements under Article 6.2, as it establishes stricter requirements than the different VCM programmes. This is a precondition for increasing trust in REDD+ credits.

Thus, permitting a direct link between Article 5.2 and Article 6.2 without extra requirements would be wholly inconsistent with the principles of Article 6 and should be avoided. In this context, the CfRN proposal, which depends solely on the WFR, cannot be accepted. We would like to note that at COP21 in Glasgow, CfRN's efforts to have Article 5 emission reductions recognised as ITMOs were explicitly rejected by Parties.

Methodologies of several jurisdictional REDD+ programmes such as FCPF for results-based financing and TREES for carbon crediting – and more recently, the new Verra 0048 methodology – are built on the WFR. While these methodologies go beyond WFR's general requirements, they still do not fully align with the requirements of Articles 6.2 and 6.4. Further adjustments are necessary, including strengthening additionality assessments, setting baselines below BAU, eliminating simplistic and synthetic HFLD baselines, and introducing more robust safeguards. In our view, adhering to the WFR is a necessary but insufficient condition for REDD+ to fulfil the requirements of Article 6. The dream of many REDD+ supporters to directly translate Art. 5.2 emission reductions into ITMOs is a pipe dream and should be given up as quickly as possible.

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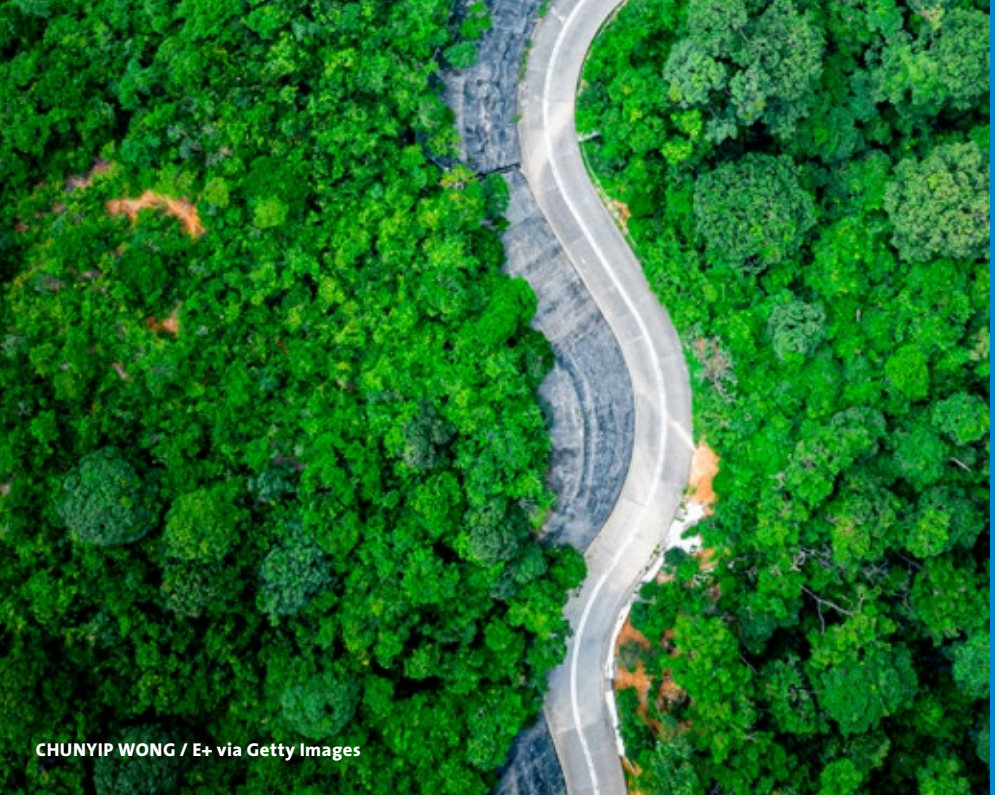

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"Policy Alignment is Essential"

Michael Savarin, Coordinator of Climate Finance and Green Industrial Development at the Ministry of Finance, Economic Development, Climate Resilience and Social Security in Commonwealth of Dominica, on the potential of Article 6 to advance Dominica's national climate goals, and the critical role of international cooperation and policy alignment in achieving sustainable growth.

Interviewers: Patrick Munyaneza (RCC Caribbean) and Dr Annett Fleischer (GIZ)

Dave Primov / iStock / Getty Images Plus via Getty Images

Michael Savarin
Michael is Coordinator of Climate Finance and Green Industrial Development at the Ministry of Finance, Economic Development, Climate Resilience, and Social Security in Dominica. He is responsible for the Green Climate Fund (GCF) portfolio and climate finance.

CMR: ***How does Dominica perceive the potential of Article 6 to contribute to its national plans?***

Michael Savarin: Dominica's Nationally Determined Contributions (NDCs) were drafted with several considerations, including our significant renewable energy potential, which plays a key role in our transition to a low-carbon economy. Transforming sectors like transportation and manufacturing is central to our goals. As we decarbonise, we also aim to build a more resilient economy, leveraging new economic opportunities. Article 6 provides a means to de-risk investments and secure climate financing to aid this transition.

CMR: ***What are the opportunities and challenges associated with implementing Article 6 in Dominica?***

Michael Savarin: Currently, we are progressing with a Swiss bilateral agreement, having completed feasibility studies, engaged stakeholders, and approved the MAT document by the government. We are at the MOPA stage.

Fortunately, we have not encountered major difficulties, as the Swiss have been highly cooperative and responsive to our needs.

CMR: How did the cooperation between Switzerland and Dominica come about?

Michael Savarin: Our significant geothermal resources and our vision for a low-carbon economy inspired us to seek climate finance opportunities. Article 6 became relevant as we pursued funding for a low-carbon transport project. A transportation consultant we engaged also had connections with the Swiss, which led us to combine GCF funds with Swiss financing to de-risk the project. This approach ultimately facilitated the partnership.

CMR: ***Are you working to ensure that you have the necessary policies, regulations, and institutional arrangements to support the implementation of Article 6?***

Michael Savarin: At present, we have a joint registry arrangement with Switzerland, as we are not yet ready to establish our own registry due to capacity and staffing issues. However, we have been studying the legal framework in place in The Bahamas, particularly their carbon market legislation, and plan to adapt it for our own context. We believe standalone legislation for carbon markets would be more specific and comprehensive.

CMR: ***What specific projects and initiatives are you planning to include under Article 6?***

Michael Savarin: The cabinet has approved a Swiss agreement to develop a municipal waste-to-energy project using biodiesel. Once we return, we will submit this project to the Click Foundation and proceed with the de-risking process. Additionally, we are conducting a pre-feasibility study for green ammonia and green methanol. We are assessing our emissions and sequestration to decide how to incorporate these into Article 6.

Photos on left and right: RCC Grenada, 2024

***CMR:** What are the main barriers to advancing Article 6 in Dominica?*

Michael Savarin: The main barrier is the slow internal government decision-making process. While the government is committed, other pressing issues can cause delays. Financing is another potential challenge. Once past the de-risking stage, securing long-term financing, especially from entities like the GCF, can be time-consuming. However, for the waste-to-energy project, we expect private financing, so we do not anticipate needing GCF funds.

Michael Savarin: We have a GCF coordinating mechanism linked to our country program, ensuring public engagement across all projects through national workshops with various sectors, including the private sector and key public ministries.

***CMR:** How did you address concerns about electric vehicles (EVs) in Dominica's terrain, and are the current 14-seater buses suitable for conversion?*

Michael Savarin: We conducted a year-long study to assess traffic, grid capacity, and transport routes, proving EVs can handle the elevation. However, the current 14-seaters aren't viable for EV conversion; slightly larger models are necessary, but this won't impact their business operations.

***CMR:** What key lessons or success stories can inspire other countries?*

Michael Savarin: Policy alignment is essential. Our Low Carbon Climate Resilient Development Strategy and NDC support our transition to low carbon, leveraging our 70% forest cover and significant sequestration. Other countries with similar resources, like St. Kitts and Grenada, could follow suit.

***CMR:** What are the plans for low-carbon transport infrastructure and potential bans on internal combustion engine vehicles?*

Michael Savarin: We're developing biodiesel for heavy transport and geothermal power plants, with plans for PV stations by 2025. While we're exploring reduced EV charging rates with the Independent Regulatory Commission (IRC), new policies will be necessary for a complete transition. Initiatives like cruise passenger fees could help finance EV adoption for private bus drivers.

***CMR:** Regarding Article 6, when do you expect the first ITMO transfer in Dominica, and how's the capacity building progress?*

Michael Savarin: We're aiming for our first ITMO transfer by 2030, potentially as early as 2026, depending on capacity development. Support from the Green Climate Fund (GCF) and the Swiss Foundation has been crucial for baseline assessments and stakeholder engagement, but we need increased involvement and financial backing from impact investors.

***CMR:** How do you see the Paris Agreement Mechanism (PACM) evolving in Dominica?*

Michael Savarin: Article 6.4 may benefit local NGOs more than the state, while the private sector, particularly tourism, may hesitate to engage fully. Thus, Article 6.2 appears to be the more viable path for us.

The Caribbean Alliance on Carbon Markets and Climate Finance

Following the experiences of West and East Africa, the six independent Member States of the Organisation of Eastern Caribbean States (OECS) decided to launch the Caribbean Alliance on Carbon Markets and Climate Finance (hereinafter "the Alliance") in 2023, with the purpose to serve as a platform for member countries to advance their capacities and readiness to make use of carbon market-based mechanisms and related climate finance instruments. The Alliance got the formal political backing of all six independent OECS MS being officially endorsed at Minister level during the 2024 edition of the OECS Council of Ministers for Environment Sustainability meeting.

The Alliance held its very first in-person meeting in October 2024 in Grenada at the margins of the RCC Caribbean week, where initial deliberations on the operationalization of the Alliance's structure and functioning took place. 2025 is set to be the year where formal work under the Alliance can take off, with a high priority set in securing an expert that can act as coordinator, as in the sister Alliances in Africa. The Alliance has been continuously supported by the German Federal Ministry for Economic Affairs and Climate Action (BMWK) and is now welcoming potential donors and partners to materialise and accelerate the implementation of activities.

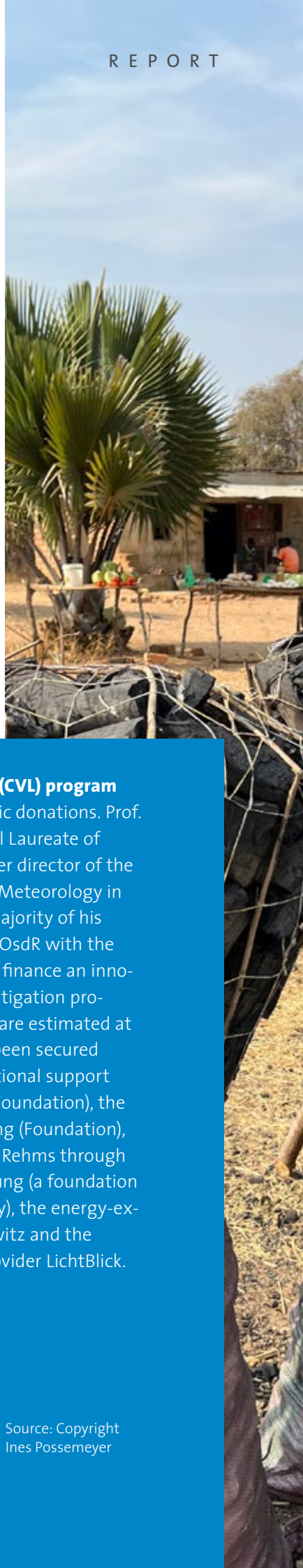
Testing High-Quality Removals

The Climate Village Lab Program in Zambia explores combined climate change mitigation, adaptation and biodiversity protection measures

by Joachim Schnurr, GFA Group; Ines Possemeyer, GEO schützt den Regenwald e.V.; Michael Helbig, KfW Stiftung; Jörg Seifert-Granzin and Martin Burian, GFA Group

Acknowledging the importance of strengthening removals to achieve net neutrality, the "Climate Village Lab" (CVL) program in Zambia tests different mitigation measures in Zambia. CVL was jointly developed by GEO Rainforest Conservation (GEO schützt den Regenwald e.V., GEOsdR) and GFA Consulting Group. The main objective of the program is to test and evaluate different measures in three rural communities of Zambia in terms of their greenhouse gas (GHG) mitigation potential, their contribution to biodiversity protection, and socio-economic development. Building on various nature-based solutions approaches (NBS), this real-world laboratory concept foresees to implement different activities ranging from electrification to GHG removals, which were jointly identified with the villagers.

The 5-year program intends to obtain detailed information on the acceptance and success of individual measures that could then be replicated and rolled out by Article 6 activities complemented with biodiversity certification at national or even regional level, as the program area is considered exemplary for large parts of sub-Saharan Africa. Regular monitoring, reporting and verification (MRV) will measure



The Climate Village Lab (CVL) program is funded by philanthropic donations. Prof. Klaus Hasselmann, Nobel Laureate of Physics in 2021 and former director of the Max Planck Institute for Meteorology in Hamburg donated the majority of his Nobel Prize money to GEOsdR with the objective to develop and finance an innovative climate change mitigation program. The program cost are estimated at US$1.58 million and has been secured through significant additional support from the KfW Stiftung (Foundation), the Alexander Gruner Stiftung (Foundation), the entrepreneur Florian Rehms through the Klaus-Friedrich-Stiftung (a foundation set up by the Mast family), the energy-expert Heiko von Tschischwitz and the renewable electricity provider LichtBlick.

Source: Copyright Ines Possemeyer

program impacts with scientific rigor on i) GHG emissions / sequestration, ii) biodiversity and iii) socio-economic development of the villages. This serves as a basis for evaluating the efficiency and effectiveness of mitigation measures and shall inform the development of NBS related policies and regulations on national scale.

The emissions from unsustainable charcoal production are decisive for Zambia's national emission / removals profile. The Zambian Ministry of Green Economy and Environment (2021) estimates the national emissions from forest degradation and deforestation to 23.5 M tCO2/yr. The Biennial Update Report (BUR, 2020) indicates that the emissions from forest land are the biggest source, and equally that firewood and charcoal production is the biggest driver (27.6%). Still, in 2025 for most of the rural households the production and sale of charcoal is a key source of income. Therefore, measures under the CVL program explore alternative low carbon alternative income generation. To assure permanence of removals, CVL measures shall create in the mid-term a higher income compared to current, GHG intensive practices.

The CVL mitigation measures (contributing equally to resilience and adaptation) are implemented in cooperation with three villages and comprise:

- Creation of irrigated community farming areas protected by electric fences against wildlife damage
- Establishment of agroforestry cooperatives, irrigated and also protected by electric fences
- Introducing assisted natural regeneration, protected against wildlife damage
- Introducing forest conservation measures
- Electrifying households

The Climate Village Lab program provides the financial means (seed funding) for implementing the planned mitigation activities. The CVL equally honors the engagement of CVL partner

villages in agroforestry and forest conservation measures through so-called performance-based payments. Payments will be administered by the so-called Community Resource Board, which is a community-elected board providing legal and institutional mechanisms for managing natural resources in Zambia's Game Management Areas, and may be reinvested in non GHG intensive measures.

Program Preparation Phase

The basic decision to implement the program in Zambia was primarily based on the favorable framework conditions including:

- Strong support from the Zambian government for making maximum use of carbon finance as well as the presence of the BMWK funded ICI program called 'Supporting Preaddress for Article 6 Cooperation'
- High potential for GHG emission reductions and removals with Zambia's forestry sector being the largest CO2 source. Only 8 per cent of rural households have access to electricity. This framework conditions mirror the situation in many sub-Saharan countries.

In order to discuss the planned CVL concept with the national stakeholders and to produce a design study, a mission to Zambia was conducted in 2024. It had the following main objectives:

1. Assessment of the implementation possibilities of the possible measures anticipated in the original concept through discussions with local stakeholders, but especially in the course of meetings with interested communities;
2. Final identification of a maximum of 3 villages with which the program could be jointly implemented, provided that the general framework conditions (e.g. approval by the respective chief/chief executive of the region) are met;
3. Identification of a suitable and experienced local partner;
4. Identification of suitable measures on the basis of discussions with the villagers and other stakeholders;
5. Localization and mapping of areas for the implementation of the planned activities;
6. Collection of basic data for estimating program costs (separately for individual measures);
7. Check the options for the simulation of results-based payments (e.g., from selling emission reduction or biodiversity certificates) to villages by establishing or using existing village funds.

Figure 1: Location of the three selected villages Malabanyika, Mugurameno and Chimusabo; Copyright Klaus Kühner for GEO 2024

Source: Copyright GEOsdR

The three selected villages (612 households with 2,319 persons) are located in the Game Management Area (GMA) Chiawa, west of Lower Zambezi National Park, in the Southeast of Zambia. Due to the high density of wild animals, Chiawa is the region with the most human-wildlife conflicts. Poaching is widespread. Most families are self-sufficient (subsistence agriculture), the production and sale of charcoal is their main source of income.
At the time of the on-site discussions, all three potential villages were heavily affected by the months-long drought due to a lack of rainfall. Crops could only be harvested on irrigated agricultural land; on the rain-fed agricultural land, the crop loss was 100%. The only means of survival for the majority of the villagers is then the production and sale of charcoal to get some income for buying food for the families.

This design study was mainly based on the results of the intensive, FPIC-based meetings held with the villagers, feedback received from governmental institutions in charge and on the results of a sample-based household survey in each of the villages. The consultations with the villagers applied the free, prior and informed consent requirement (FPIC).
Using a questionnaire prepared in advance, 67 households - corresponding to 14.3% of the total households of the three villages - were interviewed to get an overview of income, agricultural practices, etc. The main objective was to obtain data for the establishment of a socio-economic baseline, i.e., getting access to information on current household income generation from agriculture, charcoal production, and to assess the needs for electricity supply. Respective data is required for performing cost/benefit analyses on household and program level considering current income vs. revenues accruing from the successful implementation of mitigation measures.

Proposed Mitigation and Adaptation Measures

For all mitigation measures implementation cost, revenues for the households and the impacts on GHG mitigation were calculated. Some of the activities include so-called performance-based proxy payments, i.e., grants provided by the program are used to simulate carbon finance. These payments are specifically foreseen for activities that do not create (yet) a significant impact on HH income but contribute to mitigation and biodiversity monitoring, restoration, and conservation.
These payments follow the subsequent underlying rationale:

- Incentives have to be provided for e.g. forest conservation or for establishing agroforestry plots (bearing fruits and revenues only after a few years) to assure proper implementation;
- Incentives are generally related to emission reductions. However, the CVL will only measure the performance of mitigation measures on HH level. The emission reductions are accurately recorded on program level, e.g. using spatially explicit data;
- Payments are performance-based providing, i.e. the payment is done if and only if the carbon sequestration effect/emission reduction effect was achieved. If an inappropriate execution should lead to a reduced mitigation achievement, the payment will be reduced.

Performance payments shall be disbursed on an annual basis after the conduction of a monitoring event. The program may provide the payments into a dedicated Climate Village Fund (CVF) for each village. The community may decide on an annual basis how to invest the proceeds into further income-generating activities (e.g. maize mill, etc.) and investments (micro-credits) as long as such investments do not lead to an increase in emissions. This promotes participation and ownership. In the following, the different individual planned measures of the program are described in detail, see also figure 2.

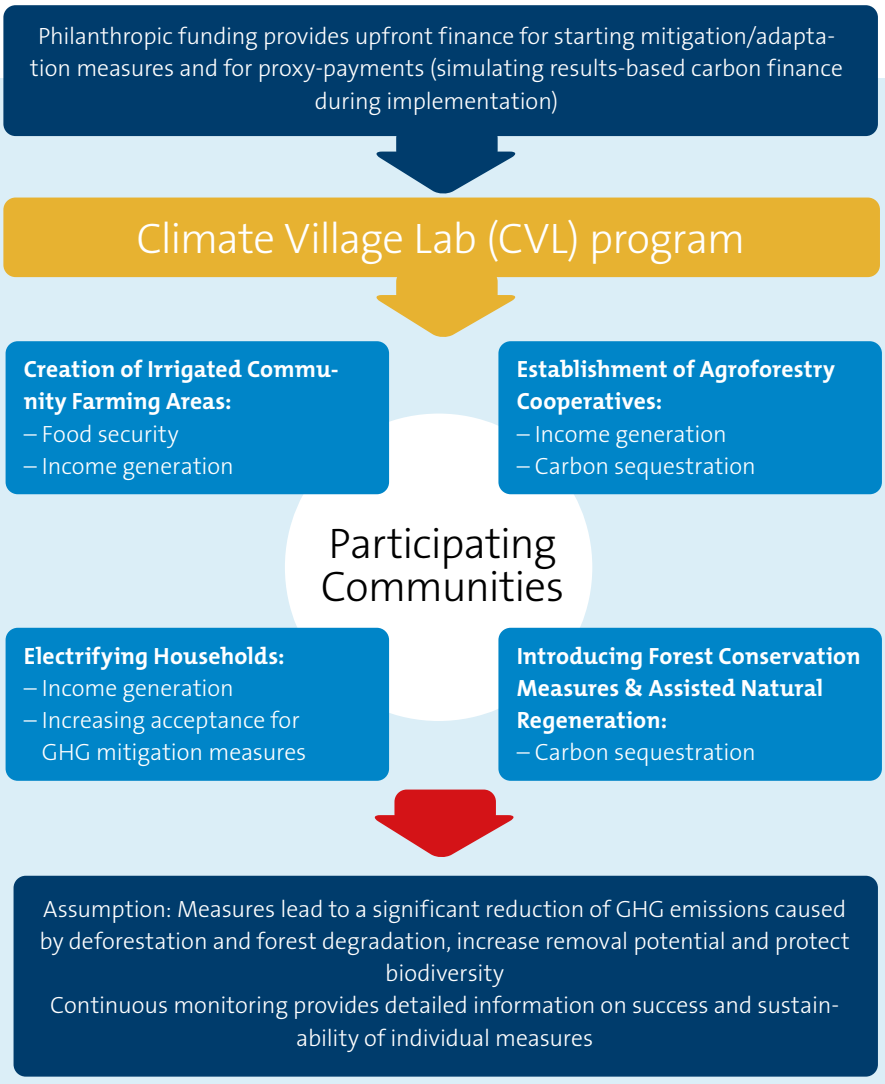


Figure 2: The CVL program concept

Creation of irrigated community farming areas

This measure, which is arguably the most important, aims to convert the common practice of rain-fed agriculture to irrigated agriculture. Over 90% of the villagers practice subsistence farming, i.e. the crops they grow form the basis of their household diet. In the event of more frequent drought events, as in the 2023/24 growing season, the harvest fails completely. In this case, the already common practice of generating income through the production and sale of charcoal or other wood products is dramatically reinforced.

The introduction of irrigated agriculture has two main objectives:

- Food security is ensured;
- Irrigation of agricultural land enables at least two harvests per year and thus creates additional income.

All three villages are located in the immediate vicinity of two of Zambia's most water-rich rivers, the Zambezi and the Kafue. Solar pumps will be provided by the project to irrigate the communal agricultural areas on a permanent basis. To reduce water consumption taken from the rivers, the use of drip irrigation systems is planned. All three municipalities have already designated jointly (cooperatively) used cultivation areas, each of which can be irrigated using one central solar-powered system.

As the communities are located in a game management area in proximity to a national park, the area is rich in wildlife. Specifically, the presence of elephants leads to frequent human-wildlife conflicts. To mitigate those, community farming areas have to be organized in one adjacent block, which is protected by a solar-powered electric fence.

The irrigation costs are estimated to USD 1,281 per ha. The measure will increase the productivity of agricultural activities by 55.8%. The creation of irrigated and protected community farming activities does not result in direct emission reductions. However, the increase of the productivity from farming (and its security) will render its alternative, charcoal production, less attractive.

Establishment of agroforestry cooperatives

As a further income-generating measure, the establishment and commissioning of communal agroforestry areas is planned. Cash crops (e.g. mangoes or avocados) are to be grown together with other crops such as tomatoes, onions, and other vegetables in inter-cropping systems in degraded or deforested areas localized together with the villagers. Here too, both irrigation and electric fencing are required for most of the areas. Planting material and training must be provided.

The underlying paradigm is based on the fact that CO2 is stored over time by long-lived plants and trees within the agroforestry system. However, similar to the measure for irrigating agricultural land, the primary aim is to reduce the increasing degradation and destruction of forests by generating alternative income. The land must be cultivated by the villagers. Proxy-payments are made to the Climate Village Fund (CVF) depending on the intermediate successes in the establishment of agroforestry areas (plantations; survival rates; establishment of firebreaks).

Immediate income improvement is given through payments to households during the establishment phase of the agroforestry areas, while agricultural yields are still low.

The total agroforestry costs are estimated to be 5,795 USD/ha. Based on current exchange rates this would result in an accumulated income for the community members of USD 56,323 per ha over a 10-years period. Figure 3 below shows the carbon sequestration potential of a Mango plantation with intercropping, i.e., until trees are grown up, other cash crops such as vegetables can be cultivated on the same area.

Figure 3: Carbon sequestration potential of a Mango plantation with inter-cropping. Source: Authors

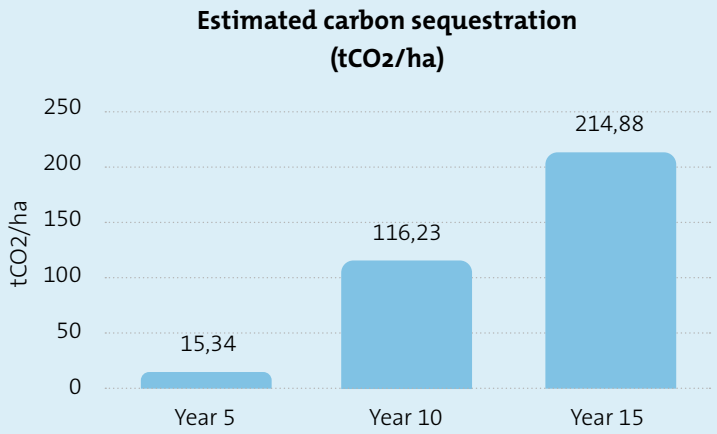
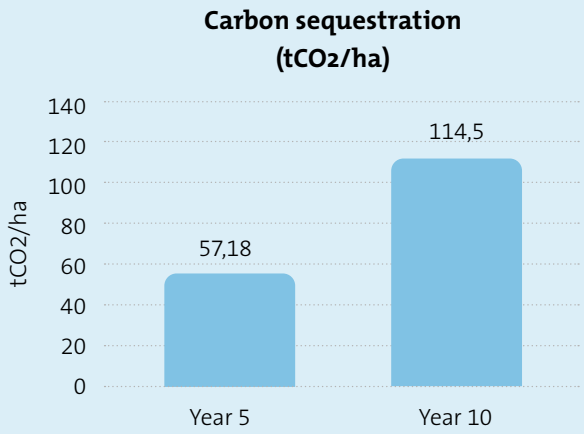


Figure 4: Carbon sequestration potential of assisted natural regeneration. Source: Authors



Assisted natural regeneration

Based on agreements with the community in one of the villages, an area of 625 ha may no longer be used for the extraction of firewood as well as charcoal production and grazing by goats, i.e. all uses are discontinued. This measure aims at evaluating the natural regeneration potential of degraded former forest areas. The villagers are compensated for not using the area by simulating carbon payments. A hidden terrestrial sampling system will be set up on the plot, which will allow biomass increases (or decreases) to be recorded accurately. If the evaluation of the sampling system data at periodic intervals shows that the area has actually remained unused, agreed-upon proxy-payments will be made to the Climate Village Fund. In order to identify potential leakage effects, the future development of the areas surrounding the community will be monitored by using remote sensing technology.

Costs involved amount to USD 41 per ha for the protection of the area and for proxy-payments to the villagers. The potential carbon sequestration potential (removal) is shown in Figure 4 below.

Introducing forest conservation measures

Still, existing forest areas within the village boundaries are to be protected from further degradation or deforestation. To this end, contracts are being concluded with all three villages that rule out any further utilisation or conversion into agricultural land. Some exceptions are the use of the areas for firewood production and the removal of individual trees for construction timber. The contracts would also include compliance with other agreements. These include, for example, compliance with the regulations on the use of individual areas agreed as part of land use planning and compliance with all biodiversity protection measures, i.e. strict adherence to the rules relating to wildlife corridors.

The further development of the vegetation areas within the village boundaries is monitored by periodically analysing remote sensing data. Here, too, it is planned to simulate carbon payments. If the satellite image analyses prove that there will be biomass gains or a reduction in degeneration in the area, agreed-upon proxy-payments will be made to the Climate Village Fund. Furthermore, proxy-payments can be considered for collaborating in biodiversity monitoring activities piloting a biodiversity crediting scheme at the level of the Climate Village Lab.

Such conservation payments amount to USD 1 per ha/yr. Considering the envisaged design, this measure does not produce any revenues, apart from performance-based proxy payments. These payments however will be provided to the Climate Village Fund and can be spent on village development.

Assuming that each community has on average a 5,000 ha forest area and a performance factor of 0.5%, the mitigation measures may reduce emissions by 318 tCO2/yr.

Electrifying households

Zambia's government has made a commitment to attain universal access to clean, reliable, and affordable energy for all by the year 2030. By now, none of the CVL communities have access to power. All households will be electrified, providing enough energy for basic appliances and for productive use. One village will be connected to the national grid, the other two will be served by a PV mini grid.

The objective of this measure is to assess the impact of electrification on the socio-economic development of the villages. The following assumptions are made:

- Every household has the option of using electricity to operate low-power devices such as lamps, cell phones, or laptops. This opens up the possibility of accessing the internet (e.g. for education and training content) or conducting financial transactions (mobile money). This in turn enables the processing of simple business transactions (e.g. the sale of surplus harvests) without the need for intermediaries, thus achieving greater added value;
- SMEs can develop. For those households that want to start their own business and have higher energy demands, enough power can be delivered. In case of a mini-grid will be installed, sufficient battery storage capacity should exist, to guarantee power supply when required.

The electrification of communities does not result in direct emission reductions. However, the increase in productivity will again render charcoal production less attractive.

Estimated GHG Mitigation Potential

The total removals and emission reductions were estimated for all three villages. The annual average emission reductions are estimated at 9,236 tCO2 and the total over 10 years is estimated to be 92,359 tCO2.

Table 1: Emissions and Removals under the Baseline and Project Case for the three Model Villages

	Year	Unit	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Sum
Baseline	Deg + Def Emissions	tC	173,32	173	173	173	173	173	173	173	173	173	1.733
	Agroforestry Sequestration	tC, accumulated	0	0	0	0	0	0	0	0	0	0	0
	ANR Sequestration	tC, accumulated	0	0	0	0	0	0	0	0	0	0	0
	Sum		173	173	173	173	173	173	173	173	173	173	1.733
Project Case	Deg + Def Emissions		87	87	87	87	87	87	87	87	87	87	867
	Agroforestry Sequestration	tC	128	128	128	128	128	841	841	841	841	841	4.845
	ANR Sequestration	tC	1.948	1.948	1.948	1.948	1.948	1.948	1.948	1.948	1.948	1.948	19.478
Emission Reductions	Sum Removals	tC/yr	2.076	2.076	2.076	2.076	2.076	2.789	2.789	2.789	2.789	2.789	21.534
	Total Emission Reductions	tCO2/yr	7.929	7.929	7.929	7.929	7.929	10.543	10.543	10.543	10.543	10.543	92.359

Table 2: Cost/Benefit analysis per household (in Zambian Kwatcha)

	Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Sum
Baseline Case	Farming	12.850	12.850	12.850	12.850	12.850	12.850	12.850	12.850	12.850	12.850	128.499
	Charcoal production and sale	1.950	1.950	1.950	1.950	1.950	1.950	1.950	1.950	1.950	1.950	19.505
	Sum	14.800	14.800	14.800	14.800	14.800	14.800	14.800	14.800	14.800	14.800	148.004
Project Case	Farming	12.850	12.850	12.850	12.850	12.850	12.850	12.850	12.850	12.850	12.850	128.499
	Charcoal	0	0	0	0	0	0	0	0	0		0
	Agroforestry	2.496	2.496	22.027	30.397	38.768	44.643	53.013	61.384	69.754	78.125	403.103
	Community Farming	4.992	4.992	4.992	4.992	4.992	4.992	4.992	4.992	4.992	4.992	49.915
	Performance Payment Agroforestry	460	460	460								1.380
	Performance Payment Forest Conservation	75	75	75	75	75						375
	Sum	20.872	20.872	40.404	48.314	56.685	62.484	70.855	79.225	87.596	95.966	583.274

Estimated Costs and Benefits

Key for assuring permanence of removals, we assess the costs and benefits for communities. The analysis assesses whether the HH is better off with or without the proposed program interventions. Table 2 provides the result of the cost/benefit analysis from the household perspective.

Comparing the baseline case, with the project case, it becomes obvious that the program's mitigation activities will lead to a significant increase of household income. The increase over a 10-year period will amount to 435,269 ZMW (15,520 USD), equal to 294,2%. The investments into irrigation and agroforestry are expected to significantly alter the HH income making charcoal production obsolete, and will enable the communities to i) reduce GHG emissions and ii) generate a significantly higher income than under a CO2-intensive BAU scenario.

Estimated Cost of Removals

The cost of the program implementation comprises both a) the investment in mitigation measures and b) the cost of program management. The table below provides a summary of the planned investment costs of all five mitigation measures, for all three villages. The total investments amount to 1.34 M USD.

The model villages will reduce GHG emissions / increase carbon sequestration by 92,350 tCO2e over a period of 10 years. The cost of one ton CO2e would amount to USD 17.13 including program management costs and the expenses for the electrification of the villages.

Table 3: Sum of Investment per Activity and per Village (in USD)

	Community Farming	Agroforestry	Power	ANR	Forest Conservation	Sum
Malabanyika	53,325	173,025	144,000	0	1,198	371,548
Mugurameno	151,915	457,815	134,167	17,578	4,648	766,123
Chimusabo	41,281	124,406	36,458	0	464	202,609
Sum per Activity	246,521	755,246	314,625	17,578	6,309	1,340,280

Source: Copyright Michael Nolan

Consideration of a Biodiversity Crediting Mechanism

This CVL component aims to develop, pilot, and extend a biodiversity crediting mechanism complementary to and compatible with the Climate Village Lab's mitigation activities. Its objective is to increase conservation and restoration finance and provide financial incentives at the community and protected areas level. Following the definition of the Biodiversity Credit Alliance (BCA), "a biodiversity credit is a certificate that represents a measured and evidence-based unit of positive biodiversity outcome that is durable and additional to what would have otherwise occurred." (Biodiversity Credit Alliance, 2024, p. 7).

The territory of two or three villages of the climate village lab can be used to pilot biodiversity conservation and/or restoration activities and to monitor their impact on biodiversity. Although the village territories might be too small to implement a fully eligible and operational biodiversity crediting scheme, they can serve as a training and piloting environment for a future roll-out at a larger scale. An upcoming feasibility study will assess the potential, define the scope, eligible activities, standard requirements to be met, measures to be implemented, safeguards, and benefit sharing, amongst other legal, technical, and policy aspects, and estimate the costs and benefits of such a mechanism.

Outlook

The CVL will explore different mitigation / adaptation measures and test their impact on household income. Communities will only change their common practices and behaviour if their economic situation and general living conditions improve. The repetition of the detailed household income survey after five years will inform the CVL program on acceptance, performance and sustainability of individual measures. These insights will also support the development of national NBS/removal policies, strategies and best practices. The ultimate objective is to roll out the program as a large-scale Article 6 activity, which is based on the experiences made by the Climate Village Lab.

German Government position paper on the voluntary carbon market

The German Federal Government has published a new position paper that highlights important basic principles for action on the voluntary carbon market and embeds it politically in the global carbon market. Find out more at **https://www.carbon-mechanisms.de/en/publications/details/paris-aligned-carbon-markets-as-per-the-paris-agreement**

Innovate4Climate registration open

Innovate4Climate, the global conference on carbon pricing and carbon markets, is taking place in Sevilla, Spain, from June 10-12. I4C brings together leaders from the public and private sectors to drive action in climate finance, carbon markets, policy, and technology. Register at **https://www.innovate4climate-conference.org/event/Innovate4ClimateConference/Home**

Glossary

All Carbon Market terms and abbreviations are explained in detail in our online glossary. View it here:
www.carbon-mechanisms.de/en/glossary