CARBON MECHANISMS REVIEW

VOL. 11 | NO. 3 AUTUMN 2023

Driving Green Growth

Africa Climate Summit amplifies region's voice on carbon markets and climate finance

The Future of PoAs

A journey in perspective

content

Autumn


Source: gettyimages.de/EAQ

editorial

Dear Reader!

Africa is responsible for less than four per cent of global GHG emissions while at the same time being particularly affected by extreme heat, ferocious floods, and devastating droughts due to human-caused climate change.
On the other hand, as UN Secretary-General António Guterres put it at the recent Africa Climate Summit, the continent hosts a third of the world's mineral reserves needed for solar power, electric vehicles and battery storage – let alone the region's enormous renewable energy resources.
"With adequate access to financial resources at a reasonable cost and technological support," the SG continued, "renewables could dramatically boost economies, grow new industries, create jobs and drive development."
Against this background, the recent Africa Climate Summit and the related climate week were set to amplify the region's voice also on carbon markets and climate finance. This Carbon Mechanisms Review therefore features a report on the summit, complemented by an interview with seasoned African Carbon Market experts. Also in the cover feature, we explore the future of programmatic carbon market activities, which were a game changer when it comes to offsetting activities in Africa back in the days of the Kyoto mechanisms. How to the transition registered CDM PoAs to the Art.6.4 Mechanism and how to refine the concept to the new Paris Agreement requirements? Further articles in the issue include a snapshot of the core challenges which the Voluntary Carbon Market currently faces, and a summary of latest research on harvested wood products under Article 6. The issue is rounded off by a report on low-carbon trends of the nitric acid industry, which increasingly cover market-based activities.

Enjoy the read!

Christof Arens, Editor-in-Chief

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, and the Kyoto Protocol's flexible mechanisms CDM/JI. CMR appears quarterly in electronic form. All articles undergo an editorial review process. The editors are pleased to receive suggestions for topics or articles.

Published by:
Wuppertal Institute for Climate, Environment and Energy
(Wuppertal Institut für Klima, Umwelt, Energie gGmbH)
Döppersberg 19 · 42103 Wuppertal · Germany

Editor responsible for the content:
Christof Arens, Energy, Transport and Climate Policy Division
Wuppertal Institute for Climate, Environment and Energy
E-Mail: christof.arens@wupperinst.org

Editorial team:
Christof Arens (Editor-in-Chief)
Thomas Forth, Lukas Hermwille, Nicolas Kreibich, Wolfgang Obergassel

Distribution:
Carbon Mechanisms Review is distributed electronically.
Subscription is free of charge: www.carbon-mechanisms.de

Layout:
designlevel 2 | www.designlevel2.de

Title page: Photo by UNEP_NaimYussuf_01 (https://flic.kr/p/2p1jFz8/Flickr/CC BY NC SA 2.0 (https://creativecommons.org/licenses/by-nc-sa/2.0/)
Back page: gettyimages.de/Pandit Vivek

This magazine is compiled as part of the Carbon Mechanisms project at the Wuppertal Institute for Climate, Environment and Energy (wupperinst.org/p/wi/p/s/pd/853). The editorial team works independently of the Marketmechanisms and Article 6 coordination unit at the German Federal Ministry for Economic Affairs and Climate Action.

Vol. 11, No. 3, Autumn 2023
ISSN 2198-0705

Africa Climate Summit

Amplifying Africa's voice on carbon markets and climate finance

by Sven Egbers, GIZ

Family Photo at the Africa Climate Summit
by UNFCCC-LuciaVasquez-14 (https://flic.kr/p/2oZRY7U) / Flickr / CC BY NC SA 2.0 (https://creativecommons.org/licenses/by-nc-sa/2.0/)

African leaders gathered in Kenya from 4-6 September 2023 for the first ever Africa Climate Summit (ACS) under the theme *"Driving Green Growth and Climate Finance Solutions for Africa and the World."* Top of the discussions were carbon markets as one of the innovative means of raising finances to implement Nationally Determined Contributions (NDCs) for African countries. The ACS showcased how carbon markets can play a prominent role in raising finances to implement NDCs and in addressing the financing challenge. Carbon markets offer a significant opportunity to expedite economic progress while at the same time mitigating greenhouse gas emissions. In developing this opportunity for Africa, what is most important now is to build the enabling environment for those investments at both the national regulatory framework level and the private sector level.

The summit further highlighted how investment in international carbon markets can help build vibrant, green economies while also contributing to global climate action, and that Africa has great potential to supply high-quality carbon credits. However, capitalizing on this potential will require careful and intentional efforts, particularly from African stakeholders. The challenge is to drive substantial growth of carbon markets in the African region while at the same time ensuring that carbon credits are transparent, equitable and of high integrity. High quality standards for carbon markets that address the demand and supply sides are needed, including a transparent and robust market infrastructure.

The summit included talks on the integrity of carbon markets and the general need to develop the necessary governance frameworks, concrete actions for carbon market uptake in terms of the development of high-quality projects, and the need for capacity building on carbon markets at all levels. In order to be fully prepared to engage in the VCM and Article 6 transactions, countries need to define the national governance frameworks, build capacity for technical infrastructure, and have a clear picture of how to implement all parts of their NDC in order to not jeopardize the national climate goals by selling credits. The talks also included the need to harness digital monitoring, reporting and verification (d-MRV) technologies that can support data collection, processing, and quality control, as well as reducing the cost of generating carbon credits while increasing transparency and security regarding carbon markets.

VCM alignment

On the sidelines of the ACS, the UNFCCC organized a regional dialogue on carbon pricing and training on Article 6 for West and Central Africa as well as East and South African UNFCCC National Focal Points. Notably, the training comprised of a special technical discussion on harnessing the voluntary carbon market (VCM) for NDC implementation. The session was hosted by the DNA Forum in partnership with BMWK, GIZ and the West and East African Alliance on Carbon Markets and Climate Finance, and provided an opportunity for meaningful

exchange and the sharing of actionable insights that can guide host countries in integrating the VCM in NDC implementation and beyond. The session concluded that private finance and voluntary commitments by corporates can help to bridge the financial gap and increase ambition to implement the goals of the Paris Agreement. A trustworthy, high-integrity carbon market is needed to ensure that the VCM can help achieve net zero. One of the main challenges will be to align VCM activities with host countries' long-term low emissions development strategies and provide support for ambitious climate action. High quality carbon market standards are needed for both the voluntary and compliance markets that address the demand and supply sides, including a transparent and robust market infrastructure. It was clear from the session that the countries are keen on building trust within the VCM by maintaining end-to-end integrity and facilitating decision making processes to ensure that benefits sharing is fair and equitable.

H.E William R[illegible]o, President, Kenya, speaking at the opening of the Africa Cli[illegible]te Summit
by UNFCCC-Lu[illegible]Vasquez-13 (https://flic.kr/p/2oZMUab)/Flickr/CC BY NC SA 2.0 (https://creativecommons.org/licenses/by-nc-sa/2.0/)

Early movers

Observations from the summit are in line with developments in the African region, where countries are building robust infrastructure to participate in Article 6 and voluntary carbon markets. Ghana, Kenya and Uganda are just a handful of countries that have proactively sought to prepare for international carbon markets. Ghana developed its framework on international carbon markets and non-market approaches in 2022, while Uganda is currently developing its carbon market regulation and implementation guidelines. Kenya, on the other hand, launched its Long-Term Strategy 2022-2050 and the amended Climate Change Act during the ACS. Recently, we saw further positive developments in relation to the implementation of Article 6 pilots and bilateral agreements on Article 6.2 of the Paris Agreement between the governments of Ghana and Switzerland, Senegal and Japan, Malawi and Switzerland, and Kenya and Switzerland, among others. On the ground, these pilot activities illustrate how different mitigation activities can be designed in line with Article 6 within various national contexts. However, a lot more work is required to enhance the capacities of governments and private sector actors to increase ambition and the impact of the mitigation actions.

Supportive alliances

German support over the past few years has focused on working with partners on the African continent in addressing these key challenges. For example, the German government supports two initiatives, the East and West African Alliances on Carbon Markets and Climate Finance. Both Alliances promote peer-to-peer exchange, strengthen the sub-region's position in the UNFCCC climate change negotiations, and ultimately improve access to carbon markets and results-based climate finance. The West African Alliance includes all sixteen member states of the Economic Community of West African States (ECOWAS). The East African Alliance comprises of seven member countries. With the support of BMWK and the Global Carbon Market Project (GCM) by GIZ, the alliance activities focus on building the capacities of host governments to effectively participate in global carbon markets. For example, these include:

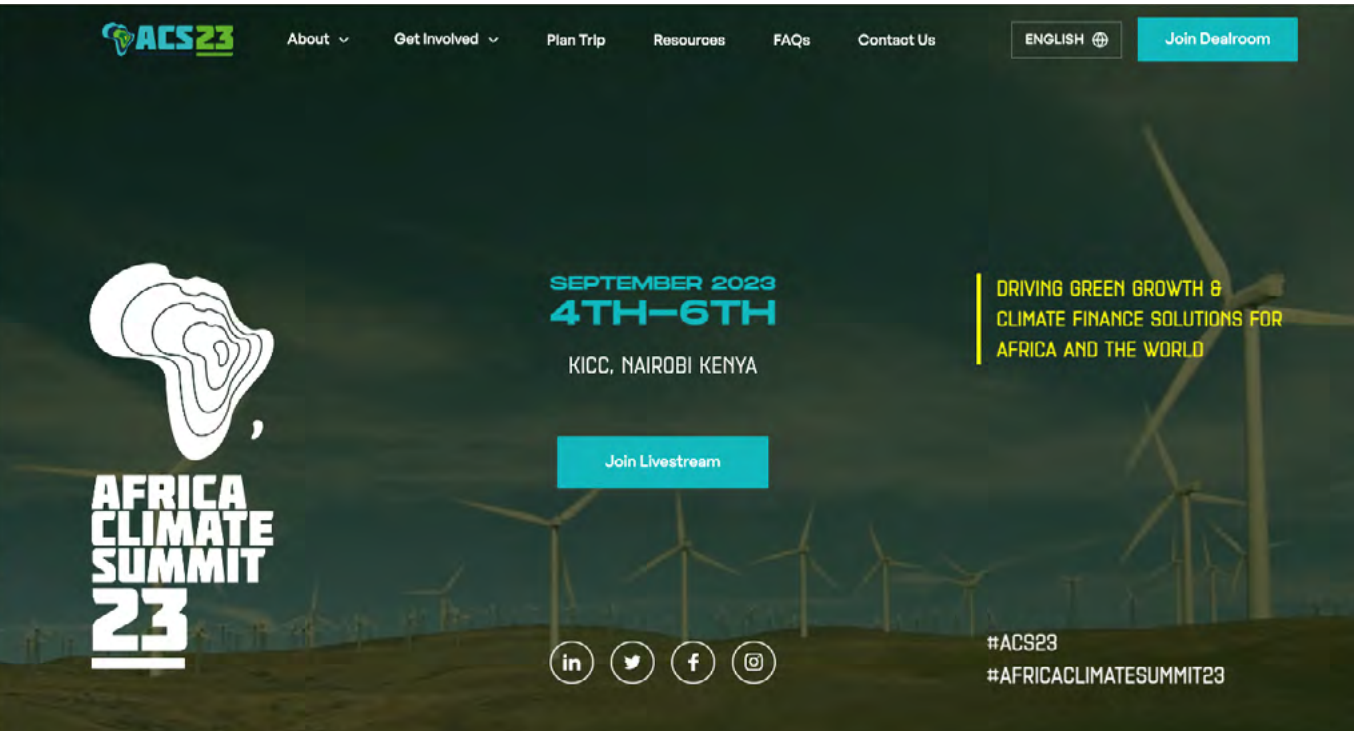
- the development of Article 6 governance frameworks in line with national NDCs of partner countries, building capacity for technical infrastructure, technical assistance to develop criteria for the approval and authorization of mitigation activities for Article 6 transactions, developing standard operating procedures for public and private sector stakeholders, and providing support for the Article 6 blueprint to "demystify a complex process",
- the development of carbon market profiles to provide an overview of each country's carbon market portfolio and readiness to implement Article 6,
- workshops targeting the public and private sectors, in particular to ensure that delegates from the region are well prepared and able to effectively represent the region in international negotiations on carbon market topics, and
- increasing focus on women and young people.

H.E. Josefa Leonel Correia Sacko speaking at the opening of the Africa Climate Summit
by UNFCCC-LuciaVasquez-12 (https://flic.kr/p/2oZMUca) / Flickr / CC BY NC SA 2.0
(https://creativecommons.org/licenses/by-nc-sa/2.0/)

The two African sister alliances have become an international good practice example regarding how to implement country-driven regional cooperation. Interest in forming similar alliances is increasing in Africa and other regions. Central African countries have reached out to both alliances for support in the process of building their own alliance. Furthermore, an alliance of Caribbean states is currently being developed with German support through the GIZ GCM project.

The ACS and ACW have brought greater global attention to the extensive and diverse engagement of African nations in carbon markets. It is important to keep the momentum going and seize the opportunities offered by the emerging carbon market. Bilateral and multilateral donors can play an initiating and supportive role in investment. At the same time, there is a need to improve access for the private sector because public financing will not be sufficient to raise the trillions of Euros needed. However, the scaling-up of mitigation activities will only be achieved if the rules of cooperation are set in a transparent manner, and the carbon markets are dedicated to the long-term transition of African countries to climate neutrality. With a view to capacity building for Article 6 and a Paris-aligned VCM, however, further support from international donor countries is needed.

Further information
Download the African Leaders Nairobi Declaration on Climate Change and browse further documentation on the summit at https://africaclimatesummit.org/resources



"Robust National Frameworks are Key"

Regional Carbon Market experts review the African Climate Summit

Carbon Markets played a major role during the African Climate Summit. CMR spoke to three key stakeholders active in the region – Ousmane Fall Sarr, (Coordinator, West African Alliance on Carbon Markets and Climate Finance), Isaac Rubayiza, (Coordinator of the Eastern Africa Alliance on Carbon Markets and Climate Finance), and Moubarak Moukaila (Regional Coordinator, UN Climate Change Collaboration Center West and Central Africa).

CMR: ***What should carbon markets deliver for Africa's green growth? What role do you see for regional Alliances such as the East and West African Alliance?***

Isaac Rubayiza: Carbon markets offer several avenues for promoting green growth in Africa, including financial support for green projects, technology transfer, knowledge and skills development, innovation in emissions reduction technologies, private sector investment, and assistance in achieving Nationally Determined Contributions (NDCs). Regional alliances like the Eastern and West African Alliances enhance the effectiveness of carbon markets in Africa by coordinating efforts among member countries, providing capacity-building initiatives, facilitating knowledge sharing, advocating for African interests in international climate negotiations, and assisting in the development of appealing climate projects. These alliances are instrumental in ensuring that Africa can utilize carbon markets to access vital resources for sustainable development and climate resilience.

Ousmane Fall Sarr: We strongly believe that the development of carbon markets in West Africa in a fair manner can trigger important green investments, technology transfer, green jobs creation and mobilization of substantial financial resources through private sector involvement. To achieve this, the West African Alliance on Carbon Markets and Climate Finance is playing a significant role in assisting countries to get ready for Article 6 operationalization, building capacities and raising awareness of key market players, ensuring political buy-in in the region, and establishing a framework for "West Africa Carbon Market Hub" uptake.

Ousmane Fall Sarr

Coordinator, West African Alliance on Carbon Markets and Climate Finance

Isaac Rubayiza

Coordinator of the Eastern Africa Alliance on Carbon Markets and Climate Finance

Moubarak Moukaila

Regional Coordinator, UN Climate Change Collaboration Center West and Central Africa

> *"Benefits must be distributed fairly among stakeholders."*
>
> *Isaac Rubayiza*

Moubarak Moukaila: From a development institution point of view, there is an important need of funding in all sectors in Africa. When you take the gap of funding to implement the SDGs alone, you see that there is an important investment need in Africa and we can use that same opportunity to decarbonize projects and programs and therefore encourage green investment in Africa. Carbon credits from those projects or programs will increase the return rate on investment of those projects and thus help to upscale and mobilize more resources, mostly private ones.

CMR: ***Isaac and Ousmane, in your event on carbon markets during the summit you decided to put the topic of benefit sharing at the heart of the discussion. Why did you choose this focus?***

Isaac: The focus on benefit sharing during the African Climate Summit side event was chosen due to its critical relevance to climate action in Africa. This emphasis recognizes that carbon markets can generate substantial revenues, and it is imperative to ensure that these benefits are distributed fairly among the communities and stakeholders directly impacted by the implementation of carbon projects, including marginalized and vulnerable groups.

Benefit sharing encompasses various mechanisms, such as direct payments and community development initiatives, and should prioritize transparency and accountability to align with the needs and priorities of affected communities. This focus is particularly crucial in Africa, where many carbon projects are situated in vulnerable and rural areas. By emphasizing benefit sharing, the event aimed to promote trust, support, and equitable outcomes within carbon markets, contributing to a more sustainable and just future for the continent.

Ousmane: We want to make sure that more fairness is brought in all carbon markets. Local communities or indigenous people who are affected or who implement the activities on the ground – mainly Nature- Based Solutions – are really benefitting from the project in a fair manner. This is a real guarantee for sustainability of actions implemented.

Moubarak: Benefit sharing is crucial because it gives all stakeholders the sense that they are considered in the project or program implementation and because of those benefits, the project or program will be more sustainable and everyone will be involved. Transparency is key and that's one of the main issues we have these days in the countries in West Africa and

Desert Sunset 2 by Geothermalresourcecouncil (www.flickr.com/photos/geothermalresourcecouncil/15148952372) on Flickr/ CC BY-NC ND 2.0 (https://creativecommons.org/licenses/by-nc-nd/2.0/)

even in Central Africa. The political crisis is actually beyond just politics, but there also social and economic issues in the sense that some of the stakeholders are not benefiting from programs or projects in their countries.

***CMR:** What was your highlight during the African Climate Week?*

Isaac: The Nairobi Declaration, an eleven-point call to action proclaiming African States' unified stance on climate action ahead of the 28th United Nations Climate Change Conference (COP28), which stressed the importance of decarbonizing the global economy for equality and shared prosperity and called for investment to promote the sustainable use of Africa's natural assets for the continent's transition to low carbon development and contribution to global decarbonization.

Moubarak: Ahead of the COP28, it is a very good signal that African Heads of States put out to the rest of the world and it is paramount that Africa speaks in one voice. We can draw a parallel with Africa officially becoming part of the G20, which geopolitically gives a voice to Africa and the Nairobi Declaration can be the African official agenda to all these platforms, like the COP, the G 20 summits, and the like.

> *"More integrity on both the supply side and the demand side is key"*
>
> *Ousmane Fall Sarr*

***CMR:** Carbon markets and especially the voluntary carbon market have faced severe criticism recently. How should these concerns be addressed?*

Ousmane: I believe that bringing in more integrity into the system on both the supply side and the demand side is key, combined with robust third-party auditing.

Isaac: My main concerns are: additionality, permanence, transparency, and the quality of accounting systems and national registries. Of equal importance is preventing double counting, so that carbon credits are not claimed by multiple parties, leading to an overestimation of emissions reductions. Last not least, companies must not use carbon credits to create a false impression of environmental responsibility, without actually reducing their emissions.

Steps to address concerns are developing robust standards and certification mechanisms: this will help to ensure that carbon projects are additional, permanent, and transparent. Further, improving the monitoring and reporting of carbon projects is key: This will reduce the risk of

double counting and greenwashing. Also, oversight and governance must be strengthened, so that carbon markets are operating fairly and efficiently. Finally, the concerns of local communities and indigenous peoples must be taking care of: this includes ensuring that carbon projects are developed and implemented in a way that respects their rights and that they share in the benefits of carbon markets.

> ***"Resources for regional institutions should be ramped up"***
>
> *Moubarak Moukaila*

CMR: ***Where do you see the biggest challenges for African countries when it comes to building high-quality and high-integrity carbon markets and attracting finance through the VCM?***

Ousmane: The main challenge in this field is developing a clear, robust and operational regulatory framework. This requires a lot of capacity building activities at all levels.

Isaac: African countries face a number of challenges in building high-quality and high-integrity carbon markets. These challenges include a lack of capacity and expertise, access to finance, policy and regulatory frameworks, data and monitoring, risk perception, additionality and baseline setting, double counting, benefit sharing, market access, awareness and education, and global market dynamics.

International cooperation, capacity-building initiatives, financial support, and collaborative efforts can help African countries address these challenges and unlock the potential of carbon markets to support climate mitigation and sustainable development.

Additionally, addressing the capacity and expertise gap, improving access to finance, establishing supportive policy and regulatory frameworks, and enhancing data and monitoring capabilities are essential. Managing risk perception, ensuring additionality, preventing double counting, promoting benefit sharing, expanding market access, and raising awareness are key strategies to overcome these challenges. African countries must also adapt to global market dynamics and collaborate with international partners to unlock the potential of carbon markets for sustainable development and climate action.

CMR: ***What support and what activities are needed in the next couple of years on the ground in the region?***

Isaac: Capacity building, policy and regulatory development, project development assistance, access to finance, stakeholder engagement, carbon market awareness, monitoring and verification, climate finance mobilization, monitoring and reporting tools, community benefit mechanisms, market access, and peer-to-peer learning are all essential for the growth of carbon markets in Africa. African countries need support in developing the capacity and resources to develop and implement carbon markets effectively, as well as clear and transparent carbon accounting standards and procedures.

Market development initiatives, financial support, and simplification of VCM standards and procedures are needed to increase demand for African carbon credits in the VCM and attract investment. Collaboration among governments, international organizations, NGOs, and the private sector is essential to address these needs on the ground.

Ousmane: For us, we will continue to provide support to our members regarding country readiness, raising awareness at all levels, building capacities for project development, facilitating the emergence of third-party auditors, fostering regional collaboration through peer-peer learning, experience sharing and contributing to the creation of a West African Carbon Market Hub.

Moubarak: Taking up what Ousmane just said, I think regional institutions like the West African Development Bank (BOAD) and the UNFCCC's Regional Collaboration Centres (RCCs) should get more involved. Operational resources for the RCCs should be ramped up so that they can support concrete, on-the-ground projects.

CMR: ***Do you see advantages or disadvantages from a single level playing field for compliance buyers and voluntary carbon market buyers? And how should the VCM contribute to national capacity building?***

Ousmane: A single level playing field with fair carbon price can be an advantage for developing countries like ours, who will be able to mobilize more financial resources that can trigger bigger green investments. But at the same time, having a VCM without a compliance purpose can facilitate NDC implementation and achievement of greater targets in our countries. Considering the important Carbon Assets we have in our region, VCM should contribute to national capacity building by providing tools required for establishing appropriate regulatory frameworks, helping countries to access to the VCM and to deliver high quality of carbon credits. This should be accompanied by support for project origination and facilitating access to finance for upfront investments.

> ***"Each country's unique circumstances must be considered"***
>
> *Moubarak Moukaila*

Isaac: A single level playing field for compliance and voluntary carbon market (VCM) buyers has some advantages, including increased demand for carbon credits, more efficient markets, simplified regulation, and improved environmental integrity. However, it may also lead to higher costs for compliance buyers and reduced access for VCM buyers, potentially increasing market complexity.

To address these dynamics, strategies include enhanced standards, transparency, capacity building, national ownership, regulatory alignment, stakeholder engagement, market access, and risk mitigation. These efforts aim to balance the goals of compliance and VCM buyers while ensuring credit quality and equitable benefits.

The VCM can contribute to national capacity building by providing training and support to project developers, creating opportunities for local communities, and promoting sustainable development. However, the approach must consider each country's unique circumstances and priorities in carbon market design.

CMR: ***Ousmane, Isaac, Moubarak, thank you very much for your time.***

The Future of PoAs

Forging ahead: A journey in perspective

By Peris Waweru and Stephan Hoch, Perspectives Climate Research

The establishment of programmatic approaches represented one of the most significant reform accomplishments of the Kyoto Protocol market mechanisms. The Programme of Activities (PoA) concept, which has been applied in the Clean Development Mechanism (CDM), Joint Implementation (JI) as well as voluntary carbon standards, has led to well-defined rules for implementing programmatic mitigation activities. Unlike single CDM project activities, PoAs offer unique advantages by allowing an unlimited number of component project activities (CPAs) to be implemented in multiple host countries, subject to formal approval by host country DNAs. Moreover, a single PoA can also support several technologies at the same time. This has considerably reduced transaction costs, particularly for small-scale and geographically dispersed activities. As a result, the PoA concept has made CDM activities more accessible, especially for low-income countries, encompassing decentralized initiatives like efficient cooking stoves or off-grid electrification, as well as large-scale renewable energy projects.

"In South Africa, initially, most projects were small scale, posing challenges and reducing cost effectiveness. However, the introduction of PoAs brought a shift in the conventional CDM approach. South Africa's contribution to carbon offsetting in Africa was relatively low, at around 2%. However, with the implementation of PoAs, we witnessed a turnaround and South Africa became one of the early adopters to register a PoA, specifically in the housing and energy sector."

Takalani Rambau – Department of Mineral Resources & Energy, South Africa

---

Some key highlights on the progress of implementation of the PoA concept under the CDM include (Foundation for the Future of the Carbon Market 2022a):

PoAs enabled rapid upscaling of mitigation outcomes through fast-track "inclusion" procedures. Project design documents (PDDs) for standalone CDM activities took years to develop and validate, causing delays and increased costs for project developers and investors. In contrast, after a PoA has been registered, the inclusion time for additional component projects is much shorter.

PoAs supported the inclusion of additional mitigation activities over time, offering flexibility to PoA developers without the need for ex-ante caps or limitations. This was particularly useful for programmes with uncertain scale and locations of potential activities.

PoAs enhanced conventional bundling approaches by allowing flexible crediting periods and simplified small-scale methodologies. This flexibility attracted project developers, especially for decentralized energy activities in Africa and least developed countries, reducing the risk of non-registration and benefiting local communities.

The PoA concept enabled the registration of previously difficult-to-register technologies, such as decentralized energy activities, in many regions, including Africa and least developed countries. PoAs reduced transaction costs, registration time, and provided a simplified inclusion process, making them a preferred choice despite a low average Certified Emission Reduction (CER) price.

Though PoAs have broadened CDM participation and simplified processes, managing these programmes remains challenging, with some falling short of expectations in areas like financing, issuance success, risk reduction, and market scaling. Additionally, the rules of PoAs have been criticized for limiting factors, such as monitoring micro-technologies and multi-country PoAs throughout their lifetime (Foundation for the Future of the Carbon Market 2022b).

PoAs unveiled: Navigating the current landscape

Beyond these conceptual improvements, how have PoAs delivered in practice? According to UNEP CCC (2022) database, there are 605 PoAs listed, comprising of three categories:

i) registered with the authority to issue Certified Emission Reductions (CERs),
ii) at the validation stage, and
iii) withdrawn or rejected.

As shown in Table 1, 359 PoAs are currently registered in the database, with only 91 PoAs (equivalent to 25%) successfully issued CERs to date. There are several potential reasons for this,

Table 1: Overview on CDM PoA Performance

	Registered PoAs	Registered PoAs with issuances
Number of PoAs	359	91
Number of CPAs	2,826	848
Average number of CPAs per PoA	7.88	13.45
CER issuance [in M CERs]	55.45	55.45

Source: UNEP CCC (2022a)

notably the low issuance rate, but the most conclusive explanation is the low prices of CERs.

Out of the 91 PoAs that have issued CERs, they consist of a total of 1,224 CPAs. However, not all these CPAs have issued CERs. Currently, based on data from UNEP CCC, the number of CPAs that have issued CERs is 848, as shown in table 1.

Regarding the performance of PoAs by technology, the vast majority of registered PoAs (more than 90%), are related to renewable energy and efficiency categories. Among the current registered PoAs, the largest share focuses on household-level energy efficiency measures, such as the distribution of energy-efficient cookstoves. This is followed by projects utilizing solar energy sources (like solar photovoltaic), methane avoidance technologies (e.g., domestic biogas), and hydropower.

Box 1: Overview of PoA issuances

- Out of 359 PoAs developed, only 91 resulted in the issuance of CERs. This means that the majority of registered PoAs (75%) did not lead to CER issuance (yet). The main reason for this was the lack of actual investment in mitigation activities, possibly due to low CER prices.
- On average, PoAs with issuance consisted of 13.45 CPAs. The PoA framework allows for the division of mitigation efforts into separate CPAs, enabling better management of these activities.
- Overall PoAs delivered emission reductions in the amount of 55.5 Mt CO_2e. While this is a significant amount, it represents only 2.4% of total mitigation efforts achieved through the CDM project approach, which reached 2,265.2 million CERs.

Source: Foundation for the Future of the Carbon Market (2022c)

Regionally, the Asian & Pacific region stands out as the most successful in terms of PoA registrations, with 164 PoAs, followed by the African region with 129 PoAs. These regions have also delivered the largest number of emission reductions from operational PoAs until August 2022, with 27.4 MCERs for Asian & Pacific and 21.2 MCERs for Africa. This demonstrates that PoAs have significantly contributed to increasing access to CDM benefits for underrepresented countries, particularly in Africa, which is a significant achievement in the ongoing debate about equitable access to the benefits of UNFCCC mechanisms. Latin America has also generated a substantial number of CERs from PoAs, reaching 6.1 MCERs. However, the number of registered and successful CDM PoAs in Latin America is lower compared to Asian & Pacific and Africa, partly due to several countries, including Caribbean small island states, facing challenges in implementing PoAs due to their small size. Meanwhile, the results in Europe, Central Asia, and the Middle East are minimal or non-existent.

Box 2: Overview of PoA technologies

- From the 359 registered PoA, **109 PoAs address emissions through energy efficiency (EE) measures at household level** (e.g., distribution of EE improved cook stoves). This is followed by solar (58 PoAs), methane avoidance (48) and hydropower (31).
- For all technologies except EE households, the ratio between registered PoAs and PoAs with actual issuance is low, i.e., 25.3%. For EE household this ratio improves to 54.9%.
  To some extent, this may be related to the character of PoAs (i.e., a programme may distribute only 2,000 instead of 10,000 cookstoves), but it may equally be related to PoAs becoming operational at a time when the CER price decreased.
- The actual performance of different technologies is represented by the actual CER issuance
  - **Most effective technologies are EE household (31.0 M CERs),** followed by methane avoidance (7.8 M CERs) and landfill gas (4.4 M CERs). Together, they account for 78% of CERs issued by CDM PoAs.
  - Other technologies include solar (3.5 M CERs), EE service (3.3 M CERs), hybrid technologies (2.3 M CERs), wind (1.4 M CERs) and hydro (0.8 M CERs).
  - Transport, solar & wind, energy distribution mixed renewables and biomass energy have not generated significant emission reductions (0.8 M CERs).
  - Finally, 21 technologies did not generate any CERs, including the complete Agriculture, Forestry and Other Land Use sector. While the PoA concept became operational at a time of low CER prices, the LUCUCF sector also did not benefit from single CDM projects as the concept of temporary CERs was never well-accepted by market participants.

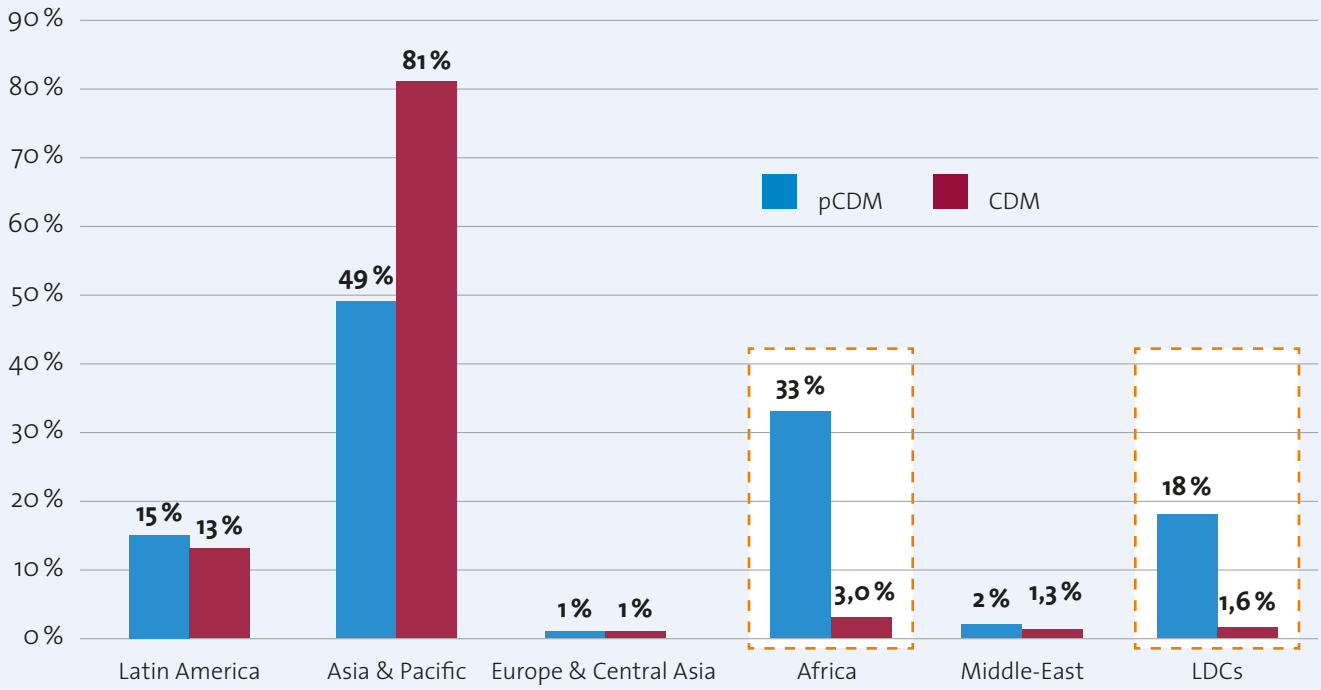
Source: Foundation for the Future of the Carbon Market (2022c)

Forging the path ahead: Shaping the future of PoAs in the Paris mechanisms

PoAs have been developed to improve the Kyoto mechanisms. However, their benefits are well-aligned with the enhanced ambition of the Paris Agreement. PoA rules enable rapid upscaling through including new CPAs without having to go through the full activity cycle. CDM rules (standards, methodologies) have significantly evolved to operationalize PoAs, which can be further improved to align fully with the quality principles defined in the Article 6 rulebook (e.g., baselines, crediting periods).

A key short-term focus should thus be the transition of registered PoAs to the nascent Art.6.4 Mechanism, in order to enable the rapid expansion of those PoAs that have successfully transitioned and thus demonstrated having met all relevant Paris Agreement participation requirements. Even before the Article 6.4 Mechanism's full operationalization, the CDM's temporary measures permitted the provisional addition of CPAs to PoAs, anticipating their eventual con-

Figure 1: Comparison in regional distribution between PoAs and single CDM activities



Source: UNEP CCC 2022a; UNEP CCC 2022b

version to Article 6.4 (Foundation for the Future of the Carbon Market 2022c). PoAs, due to their scalability, could also be integrated with policy instruments in support of key technologies for achieving NDC targets. The established stakeholder roles within PoAs – involving the coordinating management entities (CMEs) and CPA proponents – are valuable not just for implementation and MRV purposes, but also for ownership of carbon assets and associated business models.

Unleashing the PoA potential: Embracing new Article 6 opportunities

As the initial implementation period of the first Nationally Determined Contributions (NDCs) beginning in 2021 is underway, the rules for programmatic and sectoral crediting approaches under Article 6 of the Paris Agreement require clarification. Article 6.2 guidance focuses on authorization, accounting, and reporting for ITMO transfers without mentioning PoAs, leaving the definition of crediting approach modalities to participating Parties. Programmatic approaches could theoretically fit within Article 6.2 (and are widely used in VCM standards), but their operationalization remains outside the UNFCCC's scope. Article 6.4 rules, modalities, and procedures (RMP) are building on CDM rules. While the RMP introduce the concept of PoAs in Article 6.4, they do not (yet) differentiate

Table 2: SB activities with potential relevance for PoAs in 2023

Activity	SB 004	SB 005	SB 006	SB 007	SB 008
Special circumstances of LDCs and SIDS	Concept				
Ways to encourage participation by small and micro businesses in the mechanism, in the LDCs and SIDS	Concept				
Develop activity standards	Concept				
Develop activity cycle procedure	Concept and Draft	Final			
Develop validation and verification standard	Concept and Draft	Final			
Review CDM methodologies, standardized baselines, methodological tools, and guidelines for application to the A6.4 Mechanism		Final	Final	Final	Final
Develop new (top-down) methodologies and standardized baselines		Final	Final	Final	Final

Source: Workplan of the Supervisory Body 2022–2023

between programmatic approaches and standalone projects regarding activity cycle steps. Specifics of the cycle, such as baseline setting and CPAs, fall under the jurisdiction of the Article 6.4 Supervisory Body which now has the task to review and adjust CDM rules to make them fit for purpose for the new mechanism.

Reforms to the PoA concept under Article 6.4 could either be requested by the CMA or directly emerge from SB decisions. At this moment, no formal mandate for the SB exists for revisiting the rules of PoAs. Without an explicit initiative from either Parties or SB members, the current practice could simply be transferred to the Article 6.4 mechanism, if it is consistent with the RMP.

While it is evident that Article 6 approaches will encompass projects, programmes, and other activities like policies within carbon markets, there is a substantial need for technical refinement to determine how insights from the Kyoto mechanisms will be incorporated into the Article 6.4 Mechanism. This necessitates thorough deliberation in UNFCCC negotiations and particularly within the regulatory framework of the Article 6.4 Supervisory Body. Meanwhile, voluntary carbon standards like the Gold Standard and VCS continue to operate, evolving Programmes of Activities (PoAs) often by drawing on CDM methodologies. A similarly close interplay with VCM standards and the Art.6.4 mechanism will be particularly useful if the UNFCCC mechanism is not yet fully operational, as voluntary standards can be more agile.

Simultaneously, CMA decisions regarding CDM transition have explicitly emphasized a fast-track approach for PoAs in transitioning to the Article 6.4 mechanism, aligning with the priorities of the African Group of Negotiators (AGN) resulting from the importance of PoAs in facilitating access to the CDM for African host countries. Once transitioned, especially those PoAs that have been supporting the NDCs of low-income countries should receive particular attention for enabling swift expansion, given that some may have been struggling to generate concrete benefits for PoA developers as well as host countries due to unfavorable pre-2020 carbon

market conditions (Foundation for the Future of the Carbon Market 2022c). Nevertheless, a challenge arises from the absence of established UNFCCC guidelines for transitioning PoAs to Article 6.4. Only PoAs registered after January 2013 are eligible to generate CERs applicable to the initial NDCs until 2030, and host country governments must devise their criteria to evaluate a CDM activity's alignment with the NDC.

While the Article 6.4 mechanism remains non-operational, the CDM has been operating under temporary measures and is essentially being wrapped up. Although work is underway to update PoA methodologies to Article 6 quality principles, further adjustments are needed for stakeholder roles to adhere to the new PA requirements. By leveraging lessons from the comprehensive body of PoA-related CDM rules, timely adjustments can be achieved. Moreover, host countries must decide which PoAs are eligible for transition to Article 6.4, based on how these PoAs will support NDC implementation. This determination cannot be established by UNFCCC due to sovereign prerogatives in defining NDC features and targets.

The PoA experience also offers insights for innovative approaches like policy crediting due to potential similarities with programmatic activities. The new policy layer, which PoAs could not integrate into the CDM due to a lack of political mandate, might result in a more seamless integration of PoAs with national policy instruments designed for NDC fulfilment. Early documentation from Article 6 pilot activities often highlights their contributions to host country NDC objectives, indicating a convergence of programmatic approaches and national policies. While these pilot initiatives remain limited in scale, the aggregation potential of programmatic approaches across countries and technologies – demonstrated by CDM PoAs – can significantly accelerate scaled-up mitigation efforts. A primary barrier at present lies in the incomplete institutional framework and capacity across many host countries, as the Article 6 rulebook was only recently finalized at COP26. Moreover, demand from buyer countries for achieving their NDC targets remains uncertain. Once these obstacles are addressed and PoAs transition to the mechanism while introducing new activity types, the replication potential of programmatic approaches, harmonized with domestic NDC-supporting policies, could swiftly unlock transformative mitigation action at scale.

Acknowledgement
The authors acknowledge the valuable contributions from the referenced publications by the Carbon Market Foundation, which have greatly enriched this article.

References

- Foundation for the Future of the Carbon Market (2022a): Report 3: PoA Mapping and Reporting: Critical analysis and recommendations, http://www.carbonmarket-foundation.org/userfiles/zdk/Report%203%20PoA%20Mapping%20and%20Reporting(1).pdf (accessed August 2023)
- Foundation for the Future of the Carbon Market (2022b): Report 2: PoA Mapping and Reporting: Evaluation of country interviews, Report 2 - PoA Mapping and Reporting(1).pdf (carbonmarket-foundation.org) (accessed August 2023)
- Foundation for the Future of the Carbon Market (2022c): Report 1: PoA Mapping and Reporting, http://www.carbonmarket-foundation.org/userfiles/zdk/Report%201%20-%20PoA%20Mapping%20and%20Reporting(2).pdf (accessed August 2023)
- UNFCCC (2022): CDM Programme of Activities, United Nations Framework Convention on Climate Change, Bonn, Germany
- UNEP CCC (2022a): PoA Pipeline Overview, UN Copenhagen Climate Centre, University of Copenhagen; Copenhagen, Denmark
- UNEP CCC (2022b): The UNEP CCC CDM/JI Pipeline Analysis and Database. http://cdmpipeline.org/ (accessed October 21, 2022)

Overcoming the Challenges

A snapshot of the core challenges facing the VCM, which is becoming the main source of demand for international certificates

by Thomas Forth, Advisor to BMWK

Recent dialogues and meetings at the African Carbon Summit (ACS) in Nairobi and the North American Climate Summit (NACS) in New York showed growing interest in voluntary carbon markets (see the ACS reporting elsewhere in this issue). However, the VCM still needs to make further efforts to finally align with the Paris Agreement when it comes to carbon neutrality and recognition by governments.

What alignment means in terms of operational details has not been discussed sufficiently. In my view, not every single decision on Article 6 must be replicated by VCM standards and initiatives. On the contrary, this would not make much sense at all. This is simply because of the different reference points of countries and companies regarding transformational requirements. Article 6 mitigation activities must be counted against progress beyond unconditional NDC commitments and immediate support for the host country's LT-LEDS to the Paris LTGs. Companies define progress towards carbon neutrality based on the operational steps and milestones of their business transformation strategy to net zero, increasingly under the proceedings of the science-based target initiative, which might need to be further strengthened in regard to the SBTI target implementation. There would appear to be similarities, but specific requirements and timelines are different.

Source: gettyimages.de/abriendomundo


Source: gettyimages.de/EAQ

However, both reference systems are not separate worlds; they are linked, and this does not allow for double counting or double claiming. A key topic for the VCM will be ending the counting of international compliance certificates against carbon neutrality and the interim milestones. The options can be clearly differentiated in theory: if the mitigation outcome is counted against the emissions of the same year, the question is whether this should be counted in full during the crediting period, a discounting rate should be applied, or combinations of both these options should be implemented. For the trading option on carbon markets, the first option is academic but it is not applicable for market transactions. The topic requires further consideration.

My main takeaways are that voluntary carbon markets need both more attention from governments in order to establish the legal framework of this as yet unregulated commodity market, and more acceptance of the nature of the Paris Agreement by project developers and VCM initiatives, especially in view of the roles and requirements of host countries. The challenges range from capacity building to supporting their transformation to net zero through benefit sharing and acceptance of their NDCs and LT-LEDS.

The private sector, which is expected to form a major source of international carbon financing, find themselves in a difficult situation between allegations of greenwashing and opaque requirements with regard to selecting and performing these mitigation activities properly. These criticisms have been forcefully raised for almost two years and will not go away without regulation of the VCM commodity market.

With the following snapshot reflections, I hope to contribute to a broader, common understanding of where we stand today and of the challenges of the coming months in helping the VCM to grow.

The demand side

To date, carbon market growth has been very limited. Data show financing of USD 2 billion, which has decreased slightly over the past 12 month, and average prices of USD 6 to USD 8. This means that the volume of contracted mitigation is perhaps 3 million tCO_2e. However, some institutions have highlighted the considerable potential for this to grow to USD 100 billion (Morgan Stanley, Credit Suisse) by the end of this decade, while Bloomberg and Barclays foresee a much higher volume of financing in the next decade.

Whether these fantastic figures can be achieved or not depends on the scaling opportunities, which do not depend primarily on the available capital but rather on the rationale for investing such amounts. I believe a lot of work has to be done soon to allow for scaling up on both the demand side and the supply side. On the demand side, governments are facing the challenge of establishing frameworks for companies, i.e., regulation of the commodity markets and recognition of company activities as well as political and global activities with regard to the sectors (energy transformation, removals) and GHG gases (non-CO_2 GHG). On the supply side, we need more progress on Article 6 strategy based on the identification of cooperative approaches beyond unconditional NDC options and along the support line for long-term strategy (LT-LEDS).

The VCM is the space for countries such as the US, Germany, other EU member states and presumably others who have decided to achieve their NDC targets through domestic efforts but want to share responsibility for the acceleration of mitigation activities globally. Carbon neutrality is the driver, and perhaps climate financing contributions by the private sector, too, but certainly not both with the same money and the same mitigation outcomes. In the first case, certificates can be used; in the second case, certificates must be cancelled and mitigation outcomes counted toward the host country.

Source: gettyimages.de/Alfribeiro

Some assumptions that come up short

Assuming that rhetoric has a life of it is own, it would be quite helpful to refrain from telling certain stories sometimes, because it sends the wrong signals outside the community and is merely a waste of time inside.

Catchphrase "action gap"

The money is there, but governments and standards are adding and updating principles and criteria that do not result in better action on the ground but rather lead to mistrust of certificates generated from mitigation activities before the latest update to the standard. This may lead to confusion and a lack of direction, which could easily make companies feel reluctant.

Of course, there is a convincing underlying logic, but for the time being I tend to agree only to a certain extent. Firstly, alignment with the Paris Agreement has not been given serious consideration as a requirement for the long time. This year, the Paris Summit for a New Global Financial Pact did adopt a call for alignment, showing that governments do see the need to establish frameworks. Also, companies came into conflict with greenwashing critics, none of which can be ignored. So it is now time to move for standards, initiatives and countries. Part of the alignment is accepting the roles of host countries, their NDCs and their LT-LEDS. This is essential for their readiness to cooperate under Article 6 and/or VCM standards. The host country must come first with their cooperation vision before it becomes clear where to invest. Having said this, it does not mean that this will take years. Many host countries have started this journey and should be expected to be ready by 2024.

Catchphrase "environmental integrity"

The attitude that "perfection is the enemy of good" is a rationale that is often used by players who refrain from using markets but might have an underlying frontline position against carbon markets. How could anyone be against better solutions without risking environmental integrity? Compared to UNFCCC negotiations, the VCM stakeholders have the opportunity to be more straightforward but have not been so far. They are struggling with the request for Paris alignment and sometimes invent complicated rules and options for their clients, which do not solve or circumvent the operational steps of Paris alignment. The strategy to sustain the vision of the VCM as a separate world for as long as possible will ultimately be very costly because the criticisms of its integrity are not going to go away. So the challenge is to separate criticism of its integrity regarding certain activities or types of activities from those regarding the VCM design gaps. However, this can only succeed if methodologies that overestimate certificates and fail to transparently clarify the additionality question as to whether the NDC ambition of the host country is reflected in the baseline setting are set aside, and certificates that have already been issued are retracted.

Source: gettyimages.de/Watchara Kokram

Catchphrase "markets only come in addition to domestic and corporate efforts."

These kinds of arguments forget that the Paris Agreement is about cooperation, and cooperation should enable countries to do more to counteract climate change and provide implementation resources that accelerate global ambition. And that is exactly for what carbon markets are. It is not about implementing Article 6 when the world has already reached the point of unavoidable emissions. Whether the role of carbon markets is well understood in the UNFCCC context was observed in the Global Stocktake (GST). A real assessment of the actual status of emerging carbon markets would be helpful for all stakeholders in the carbon market, but COP28 might be too early for this. For now, carbon market stakeholders should feel comfortable when GST highlights the future role of carbon markets and the acceleration of mitigation outcomes of the parties to the Paris Agreement. The use of carbon markets should supplement domestic efforts, not substitute them, and not in a sequenced manner, meaning the market would be welcomed when it is too late. The truth lies in the movie title often quoted nowadays: "Everything Everywhere All at Once."

Steps to be taken, new levels to be entered

Having repeatedly mentioned the relevance of the host country perspective and its duties, there is an urgent need to strengthen support if carbon market participants on the acquiring side want to cooperate with greater clarity and success. Capacity building and infrastructure are key to the development of Article 6 cooperation capability.

There are things that can be done through the UNFCCC Secretariat, such as direct capacity building and support to build infrastructure. Furthermore, the Regional Collaboration Centres (RCCs) should be strengthened. But there are other things that need to be financed and organized by carbon market players. This is true of supporting the internal processes of the host countries who cannot make decisions on a project-by-project basis but rather need scaling-up based on the long-term strategy to net zero. They need to know how the transformation can be organized in a sustainable and economical manner and which projects foster their transformation goals. This is a necessary "burden" to be taken on by all market stakeholders, including those in the VCM as well as the parties. It sounds like there is a big gap in the financing of these capacity building activities and, no, there is not enough money or resources in play. There is a responsibility to do something about this. Otherwise, scaling up will remain a daydream.

Scandals, self-organization and politics

The market might be growing but some achievements on the VCM are not real. Media and academia are still discovering loopholes and fake certificates, which have no positive climate impact and crowd out real mitigation outcomes. This might be true for some standards and especially for certain scopes of activity. Some market players have used the black sheep theory as an explanation or exculpation. These can be found in all economic activity. This is certainly true and is far from offering any meaningful message. But the critics have not only identified behavior worthy of criticism by a small number of market participants but also picked up on systemic failures. So it is not just about a handful of black sheep. It is about destroying trust in clients and carbon markets in general. Such deep failures in the market are undermining carbon markets in general.

In regard to demanding self-healing carbon markets, I do not see sufficient progress, and we do not have time to start renewed carbon markets under the Paris Agreement taking a learning-by-doing approach. We have already experienced this with the flexible mechanisms of the Kyoto Protocol. A better solution might be alignment with the Paris Agreement, as was called for at the Paris Summit in June this year. Agreeing to the alignment, questions have come up such as what this alignment would require and how it might be operationalized. VCM standards and initiatives should move designs, rules and operations in this direction quickly. If they fail to do so, positive recognition of the issued certificates for their contribution to the carbon neutrality of companies and states will not be possible.

The time for alignment is running out, especially if governments are going to regulate the VCM. The VCM is still an unregulated market. If market players value of their mitigation assets, they need to meet requirements that allow them to enter the commodity market for carbon neutrality or other compliance markets.

Further information

Download the Paris summit's Call to Action for Paris-Aligned Carbon Markets at https://nouveaupactefinancier.org/pdf/call-to-action-for-paris-aligned-carbon-markets.pdf

The VCM potentials studies mentioned in the article be be obtained from the following websites:

Morgan Stanley:
https://www.morganstanley.com/ideas/carbon-offset-market-growth

Bloomberg:
https://www.bloomberg.com/professional/blog/long-term-carbon-offsets-outlook-2023/

Credit Suisse:
https://www.credit-suisse.com/media/assets/sustainability/treeprint-carbon-markets.pdf

Barclays:
https://www.sustainabletimes.co.uk/post/report-global-voluntary-carbon-credit-industry-estimated-to-hit-250bn-by-2030

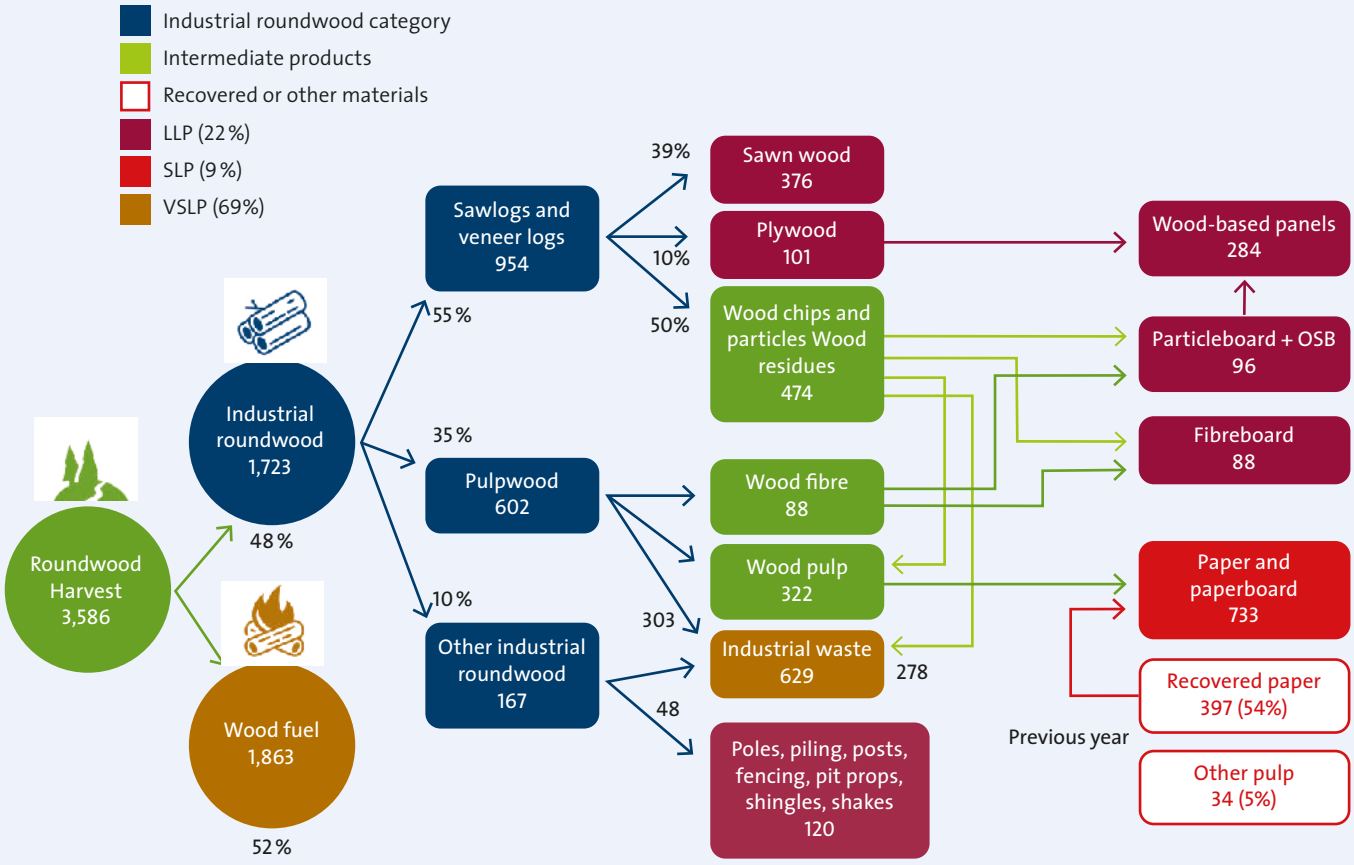
Mission Impossible

Harvested Wood Products under Article 6

by Soyoung Oh, Olivia Wallis, Matthias Honegger, Axel Michaelowa, Perspectives Climate Research

Harvested wood products (HWP) – a term for various forms of woody biomass that are the result of forestry activities that has been coined in the context of national-level accounting in greenhouse gas inventories – are seen by some as important opportunity for climate change mitigation. However, their consideration under the Paris Agreement's Article 6 is not straightforward as discussed in this article.

Figure 1: Flowchart of 2010 global roundwood (million m3), tracing the relationship between consumption of different wood products and wood harvests.



Source: Peng et al. (2023)

The relevance of Harvested Wood Products for climate change mitigation

HWP occur at different steps in the forestry value chain as shown in Figure 1 below and have strongly differing lifetimes, ranging from days (for woodchips) to centuries (for structural buildings timber). HWPs can contribute meaningfully to climate change mitigation (Chen et al., 2018; Geng et al., 2017; Wakelin et al., 2020) due to their capacity to sequester carbon in durable wood products within long-lasting wooden commodities such as buildings.

Source: gettyimages.de/Stockbyte

COP28 and HWP – addressing challenges of accounting HWP

The forthcoming 28th Conference of the Parties (COP28) to the United Nations Framework Convention on Climate Change (UNFCCC) in Dubai as well as the meetings of the Article 6.4 Supervisory Body (SB) in September and October/November present an opportunity for providing greater clarity on the role of HWPs in the broader context of climate change mitigation. One concrete venue for improving clarity may be within Intergovernmental Panel on Climate Change (IPCC) Guidelines on HWPs with a view to generate greater consistency of national level accounting as would be required for pursuing HWP-based mitigation under Article 6. Under the UNFCCC, Parties report net emissions from the overall HWP pool in their national greenhouse gas inventories (i.e., changes in the HWP pool accounted for in accordance with decision2/CMP.7). The IPCC provides guidance on how HWP should be categorised and covered in national GHG inventories (IPCC, 2006). For instance, as shown in Table 1, the US GHG inventory reports the net changes to carbon stocks.

Table 1: US greenhouse gas emissions and removals (Net Flux) from Land Use, Land-Use Change, and Forestry (million t CO_2 eq.)

Land-Use Category	1990	2005	2017	2018	2019	2020	2021
Forest Land Remaining Forest Land[a]	(815.8)	(695.4)	(695.2)	(692.9)	(638.1)	(684,0)	(670.5)
Land Converted to Forest Land[b]	(98.5)	(98.4)	(98.3)	(98.3)	(98.3)	(98.3)	(98.3)
Cropland Remaining Cropland	(23.2)	(29.0)	(22.3)	(16.6)	(14.5)	(23.3)	(18.9)
Land Converted to Cropland[c]	54.8	54.7	56.6	56.3	56.3	56.7	56.5
Grassland Remaining Grassland[d]	8.8	11.7	11.6	11.9	14.6	6.7	10.6
Land Converted to Grassland[c]	(6.7)	(40.1)	(24.5)	(24.2)	(23.3)	(25.9)	(24.7)
Wetlands Remaining Wetlands[e]	41.5	43.1	41.8	41.8	41.8	41.8	41.8
Land Converted to Wetlands[e]	3.3	1.4	0.8	0.8	0.8	0.6	0.6
Settlements Remaining Settlements[f]	(107.8)	113.9	(125.6)	(125.0)	(124.5)	(131.6)	(132.5)
Land Converted to Settlements[c]	62.5	85.0	80.9	81.0	81.1	81.0	81.0
LULUCF Carbon Stock Change[g]	**(938.9)**	**(853.5)**	**(842.5)**	**(829.5)**	**(768.2)**	**(852.5)**	**(832.0)**
LULUCF Emissions[h]	57.9	72.4	68.3	64.4	64.2	76.4	77.8
CH_4	53.5	61.3	60.1	57.3	56.9	65.4	66.0
N_2O	4.4	11.1	8.3	7.0	7.3	11.0	11.8
LULUCF Sector Net Total[i]	**(881.0)**	**(781.1)**	**(774.2)**	**(765.1)**	**(704.0)**	**(776.2)**	**(754.2)**

a Includes the net changes to carbon stocks stored in all forest ecosystem pools (estimates include C stock changes from drained organic soils from both Forest Land Remaining Forest Land and Land Converted to Forest Land.) and harvested wood products.
b Estimates include emissions from fires on both Forest Land Remaining Forest Land and Land Converted to Forest Land.
c Estimates include emissions from N fertilizer additions on both Forest Land Remaining Forest Land and Land Converted to Forest Land.
d Estimates include CH_4 and N_2O emissions from drained organic soils on both Forest Land Remaining Forest Land and Land Converted to Forest Land. Carbon stock changes from drained organic soils are included with the Forest Land Remaining Forest Land forest ecosystem pools.
e Includes the net changes to carbon stocks stored in all forest ecosystem pools.
f Includes changes in mineral and organic soil carbon stocks for all land use conversions to cropland, grassland, and settlements. Also includes aboveground/belowground biomass, dead wood, and litter carbon stock changes for conversion of forest land to cropland, grassland, and settlements.
g Estimates and N_2O emissions from fires on both Grassland Remaining Grassland and Land Converted to Grassland.
h Estimates include N_2O emissions from N fertilizer additions on both Settlements Remaining Settlements and Land Converted to Settlements because it is not possible to separate the activity data at this time.
i LULUCF emissions subtotal includes the CH4 and N_2O emissions reported for Peatlands Remaining Peatlands, Forest Fires, Drained Organic Soils, Grassland Fires, and Coastal Wetlands Remaining Coastal Wetlands; CH4 emissions from Flooded Land Remaining Flooded Land, and Land Converted to Flooded Land, and Land Converted to Coastal Wetlands; and N_2O emissions from forest soils and settlement soils. Emissions values are included in

Source: US EPA (2023)

The IPCC guidelines provide four accounting approaches for reporting HWPs, each with distinct system boundaries and the responsibility for carbon emissions and removals. Depending on the approach, results can differ greatly at national level (Yang and Wang, 2017). For instance, the stock-change approach involves a comparison of carbon stored in products at the beginning and end of the accounting period, with the deduction of emissions from decay or combustion that occurred during the period. By contrast, the production approach measures carbon stored across different wood products. Meanwhile, the atmospheric flow approach estimates the movement of products through the economy, including processes such as harvesting, recycling and disposal (Sato & Nojiri, 2019).

Among the four approaches, the stock-change(s), production, and atmospheric flows approaches are considered in principle suitable for international carbon markets (Michaelowa et al., 2023). The production approach estimates the amount of carbon stored in HWP based on the amount of wood harvested, the carbon content of the wood, and the expected lifespan of the products. Many Parties including the United States, the United Kingdom, and Denmark use the 'production' approach in their national GHG inventories. The 'production' approach is to be used under the Paris Agreement and the Enhanced Transparency Framework (ETF). Carbon in HWP can be reported in three types of semi-finished wood products: sawn wood, wood-based panels and paper, and paper products.

Table 2: Overview of HWP accounting approaches

Approach	HWP pool accounting	Risks	Not evaluated/ tracked	Stock-change(s)
Production	Producing country	Emissions/removal are not accurately reflected. Obtaining explicit data on exported wood is challenging.	HWP pool imported. Where stock changes occur.	Pool-based
Simple decay				Flux-based
Atmospheric flow	Consuming country	Imported wood is counted as gain of carbon in the HWP pool.	HWP pool exported.	Flux-based
Stock-change(s)				Pool-based

Source: Michaelowa et. Al (2023), Sato and Nojiri (2019)

Yet, there are important considerations regarding accounting methodologies, additionality, and the potential for unintended ecological consequences that cannot be overlooked. Accounting for HWP is particularly challenging due to the difficulty of accurately measuring the carbon stored across a wide range of products, which also incurs high transaction costs of HWP accounting (Ellison et al., 2011; Sato and Nojiri, 2019; Vacha, 2011). This complexity clashes with the requirement of clear mitigation (emissions reductions or -removal) values attributable to distinct projects or activities under carbon markets.

Furthermore, the current interpretation of "managed forests" in the IPCC report for HWP can sometimes be too broad, which presents a potential for countries to overestimate their carbon sink. It sometimes has led countries to use this ambiguity to rationalize deforestation practices (Peng et al., 2023). Also, forest harvest is often endorsed as sustainable and carbon neutral if harvests maintain carbon stocks by not exceeding the annual growth of the forest (Peng et al., 2023). This means that growth or regrowth of forests may counterbalance for harvesting of wood. The additional sequestration potential of the counterfactual – where no harvesting takes place – may thus be neglected.

Source: gettyimages.de/PaulGrecuad

Lastly, problems in accounting for imported wood need attention: wood imports are currently not considered within the scope of the production approach, which presents a significant challenge in establishing an accurate emissions baseline. According to the territorial principle outlined in the IPCC Guidelines, the HWP-producing country is also held responsible for CO_2 emissions or removals under the production approach, which removes it from view for the downstream user, thus potentially distorting the characterisation of imported biomass-use. This approach potentially overlooks an important question: who should bear the responsibility for potential re-emissions of CO_2 from HWPs? This becomes particularly pertinent when considering instances where wood fibre is exported at a large scale to another country for the purpose of bioenergy production.

To address these accounting gaps, the IPCC should consider providing additional guidance on how to best refine explicit and accurate national GHG inventory of HWP – potentially complemented by refined baseline and monitoring, reporting, and verification (MRV) practices to gradually be adopted in carbon markets. A transparent MRV of "sustainably managed forests" could help ensure its accurate contribution to mitigation efforts by e.g. considering carbon flows on both sides of a national border through a widened life cycle system boundary. For instance, in response to Peng et al. (2023), Moomaw and Law (2023) note that it would be critical to track the life cycle of harvested wood through quantifying the carbon stocks, emissions associated with the decay and combustion of residues left at the harvest site, the decay of wood products in landfills, and emissions from the combustion of harvest residues at timber mills. This could help to ensure that mitigation claims for individual wood products – as well as the aggregate GHG accounting – is done conservatively without resulting in incompatible claims on one and the other side of a national border.

HWP accounting for international carbon markets

Forth (2023) is the first article to address HWP under Article 6. As Forth highlights, HWPs have already faced challenges to meet the requirements of the Clean Development Mechanism (CDM). Forth notes that additionality, permanence, and absence of leakage are difficult to measure and achieve in HWP-related activities. This means that HWP projects may not straightforwardly be pursued under Article 6 unless careful adjustments in methodologies and implementation are undertaken which are discussed below.

Article 6.4 baseline and monitoring methodologies for HWPs?

Presently, no baseline and monitoring methodologies for HWP have been approved under any international compliance carbon market. This is largely because of the HWP accounting methodologies not specifying a consistent approach (see Table 1). The production and simple-decay methodologies can both be applied at jurisdictional levels but do not account for imported HWP or track where a stock change occurs, resulting in emissions and removals not being accurately accounted for. More data is needed to ensure that stock changes are accounted for and from the right place, but this is difficult to achieve at a local level and leads to accurate estimates. To avoid double counting, changes to the carbon stock must be acknowledged and imports and exports must be reflected in the baseline.

Article 6.4 rules state that methodologies, including HWP-related ones, must be real, transparent, conservative, below 'business as usual' and encourage ambition over time. It also states that methodologies must contribute to reducing emission levels in a host Party while aligning to its NDC and long-term emission development strategy (LT-EDS), if available. However, this poses a particular challenge given Parties' different accounting methods used and the substantial differences in projecting baselines in land- and forestry sinks. This is exacerbated by the lack of consistency in accounting for land sinks in national GHG inventories as also noted regarding avoided deforestation (REDD+) (Lee et al., 2018; Olander et al., 2010). Land and forest carbon pools are often assessed – and accounted for – in highly aggregate terms, whereas the project-level MRV for HWP-activities in carbon markets would require much more fine-grained monitoring and reporting at 'product-based sub-pools' which are likely to generate rather different results for carbon stored.

Article 6.4 rules require to address reversals – that will inevitably occur for all types of HWP – "in full" (Decision 3/CMA.3, para. 31). One solution is to require buffer stocks to mitigate this risk or apply the tonne-year accounting approach with an 'equivalence period' (UNFCCC 2022), whereby after a certain timeframe, a reversal can no longer be considered to negatively impact the climate. However, tonne-year accounting has proven problematic (Michaelowa et al., 2023) in part as equivalence periods are debated: they can range from tens of years up to 1000 years and depend largely on the development of technologies that will be available at-scale in the future (Broekhoff et al., 2023). Tonne-year accounting has thus been excluded from the approaches considered by the A6.4SB.

Additionality of HWP-related activities can only be deemed credible when HWP pools that have occurred under 'business as usual' are differentiated from those incentivised by the sale of carbon credits. This is clearly not the case for HWP accounted in national inventories. Making such a differentiation consistently is, however, very challenging. Given these challenges, it may be more promising to pursue HWPs through non-market approaches under Article 6.8. With clearer guidance for consistent HWP accounting across national borders from the IPCC, Article 6.8 could incentivise Parties to ensure the quality of efforts on harvested wood products. At the same time, it is critical to recognise the regional diversity of forest growth and varying capacities in tracking (and certifying sustainability of biomass), which will not go away overnight. The limited guidance provided for Article 6.8 activities, strategies, however, may be developed appropriately for specific regional contexts – without risking to undermine the overall credibility of a market.

Source: gettyimages.de/filmfoto

Looking to the future

The current ways of accounting for HWP are incompatible with the requirements for international carbon markets under Article 6. If well-designed, individual projects to increase the use of HWPs may be able to prove additionality and show sufficient permanence, e.g. in the context of construction-related wood use. However, aligning accounting of these projects with the national inventory-based accounting is currently nearly impossible, given the serious gaps of the latter.

The promotion of cooperative HWP-use increase-activities through non-market approaches under Article 6.8 could channel funds towards and formalise HWP activities. It could enable increasing the integrity of HWP activities without risk of undermining integrity of carbon markets. Should individual countries start pursuing this path, this could also prove to be an opportunity to gradually refine and align baseline and MRV methodologies, as well as improve the comparability of accounting practices between countries so that over time the cross-border trade of HWP can increasingly be clearly and properly accounted for.

References

- Broekhoff, Derek; Brander, Matthew; Scneider, Lambert (2023): Letter to the Article 6.4 Supervisory Body Comments to the information note "Removal activities under the Article 6.4 mechanism" in document A6.4-SB004-AA-A04, https://unfccc.int/sites/default/files/resource/SB004-call-for-input-Derik%20Broekhoff%2C%20Matthew%20Brander%2C%20Lambert%20Schneider.pdf (accessed April 26, 2023)
- Chen, Jiaxin; Ter-Mikaelian, M; Yang, Hongqiang; Colombo, Steven J (2018): Assessing the greenhouse gas effects of harvested wood products manufactured from managed forests in Canada. Forestry: An Interna-

tional Journal of Forest Research, 91(2), 193–205. https://doi.org/10.1093/forestry/cpx056
- Ellison, David; Lundblad, Mattias; Petersson, Hans (2011): Carbon accounting and the climate politics of forestry. Environmental Science & Policy, 14(8), 1062–1078. https://doi.org/10.1016/j.envsci.2011.07.001
- Forth, Thomas (2023): A topic on repeat - Harvested Wood Products under Article 6, in: Carbon Mechanisms Review, 11, p. 12-19.
- Geng, Aixin; Zang, Hongqiang; Chen, Jiaxin; Hong, Yinxing (2017): Review of carbon storage function of harvested wood products and the potential of wood substitution in greenhouse gas mitigation. Forest Policy and Economics, 85, 192–200. https://doi.org/10.1016/j.forpol.2017.08.007
- IPCC (2016): IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4. Chapter 12 Harvested Wood Products, https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_12_Ch12_HWP.pdf (accessed August 21, 2023)
- Lee, Donna; Llopis, Pablo; Waterworth, Rob; Roberts, Geoff; Pearson, Tim (2018): Approaches to REDD+ Nesting: Lessons Learned from Country Experiences. World Bank, Washington, DC. https://doi.org/10.1596/29720
- Michaelowa, Axel; Koch, Tobias; Charro, Daniel; Gameros, C (2022): Military and conflict-related emissions: Kyoto to Glasgow and beyond, Perspectives Climate Research, Freiburg.
- Michaelowa Axel; Wawrzynowicz, Ingrid; Wallis, Olivia; Honegger, Matthias (2023): Harvested wood products under Article 6.4, Perspectives Climate Research, Freiburg, Germany.
- Moomaw, William; Law, Beverly (2023): A call to reduce the carbon costs of forest harvest. Nature, 620(7972), 44–45. https://doi.org/10.1038/d41586-023-02238-9
- Olander, Jacob; Seifert-Granzin, Joerg; Chagas, Thiago; Streck, Charlotte; O'Sullivan, Robert (2010): Nested approaches to REDD+: an overview of issues and options. Climate Focus, Amsterdam.
- Peng, Liqing; Searchinger, Timothy D; Zionts, Jessica; Waite, Richard (2023): The carbon costs of global wood harvests. Nature, 620(7972), Article 7972. https://doi.org/10.1038/s41586-023-06187-1
- Sato, Atsushi & Nojiri, Yukihiro (2918) : Assessing the contribution of harvested wood products under greenhouse gas estimation: Accounting under the Paris Agreement and the potential for double-counting among the choice of approaches. Carbon Balance and Management, 14(1), 15. https://doi.org/10.1186/s13021-019-0129-5
- UNFCCC (2022): Recommendations: Activities involving removals under the Article 6.4 mechanism, A6.4-SB003-A03, Bonn.
- UNFCCC (2023): Information note. Removal activities under the Article 6.4 mechanism, version 3.0, A6.4-SB004-AA-A04, Bonn, https://unfccc.int/sites/default/files/resource/a64-sb004-aa-a04.pdf (accessed August 21, 2023)
- US EPA (2023): Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021. U.S. Environmental Protection Agency, EPA 430-R-23-002, https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021 (accessed August 21, 2023)
- Vacha, Dusan (2011): Harvested Wood Products. Approaches, Methodology, Application, Hayami/Prague.
- Wakelin, Steven J; Searles, Nigel; Lawrence, Daniel; Paul, Thomas S. H. (2020): Estimating New Zealand's harvested wood products carbon stocks and stock changes. Carbon Balance and Management, 15(1), 10. https://doi.org/10.1186/s13021-020-00144-5
- Yang, Honqiang; Wang, Shanshan (2017): Reviews of carbon accounting for HWP based on IPCC framework: approach selections and the relevant interests, in: China Population Resources and En-vironment, 27, p. 44-51.

Sector Transformation

Low-carbon trends of nitric acid industry confirmed at ANNA conference

by Emilio Martin Rodriguez and Volker Schmidt, GIZ

The Ammonium Nitrate Nitric Acid (ANNA) conference is an international organization of Ammonium Nitrate and Nitric Acid manufacturers with the goal of promoting networking within the industry. Every year, a specialized gathering of experts takes place focusing on safety, production and management of ammonium nitrate and nitric acid, two crucial chemicals involved mainly in the further production of fertilizers and explosives. At the ANNA conference, nitric acid producers from both, developing and industrialised countries as well as technology providers and licensors from all over the globe engage through in-depth discussions and high-level technical presentations regarding latest advancements, best practices and regulatory updates of both sectors. In fact, the ANNA conference is "the place to be" also for getting a substantiated impression on the current levels of environmental awareness and sense of responsibility within the nitric acid industry, as well as future plans and developments, more and more regarding its climate related impacts. Against this background, representatives of the Secretariat of the Nitric Acid Climate Action Group (NACAG) attended the ANNA Conference, which took place from 10th–15th September in Varna, Bulgaria.

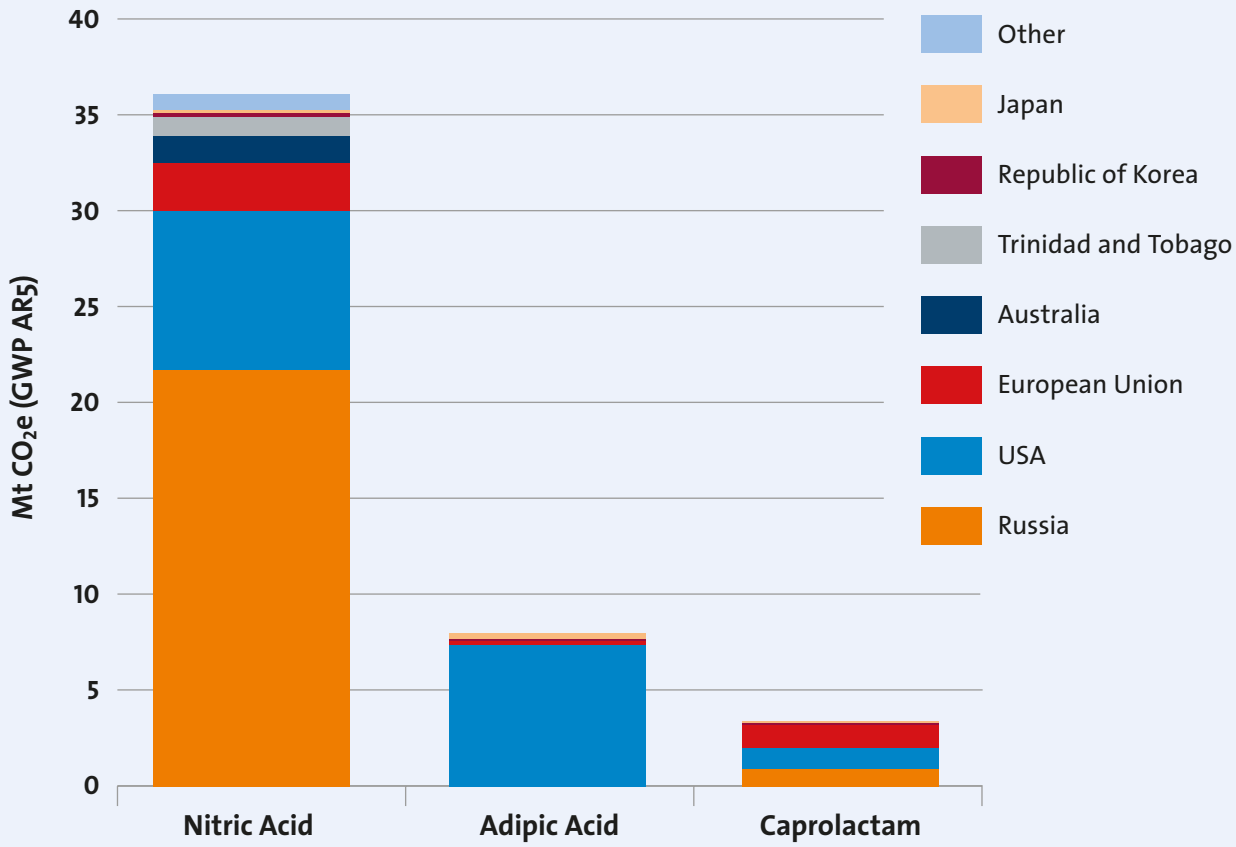
Nitric Acid Climate Action Group (NACAG)

The Nitric Acid Climate Action Group (NACAG) initiative was launched by the German Federal Government in 2015, with the vision of reducing N_2O emissions from nitric acid production worldwide and especially focusing on harvesting these long-hanging fruits in developing countries. Since the launch of the initiative, 10 developing countries have committed to setting up adequate climate policies that will ensure the permanent reduction of N_2O emissions from the nitric acid sector. Under the umbrella of this initiative, so far 9 plant operators located in NACAG partner countries[1] have secured financing to cover the purchase and installation of state-of-the-art N_2O abatement and monitoring technology. The annual direct impact of the abatement projects in the course of being implemented under the umbrella of NACAG is estimated at around 20 mill. tons CO_{2eq}. Find out more at https://www.nitricacidaction.org/

In comparison with previous ANNA conferences in 2016 (in Eindhoven, the Netherlands) and in 2019 (in Vienna, Austria), one remarkable difference that could be observed was the increasingly growing interest of participants in the topic of N_2O emission reductions. This year's conference offered a dedicated slot on this specific topic. Technology providers for N_2O

1 Partners – The Nitric Acid Climate Action Group (nitricacidaction.org)

Figure 1: N_2O process emissions 2020 from chemical industry in industrialised countries



Note: 'Other' countries: Canada, Chile, Israel, Norway, Saudi Arabia, Singapore, United Arab Emirates, United Kingdom
Source: own representation of study results

abatement and monitoring technologies, as well as plant operators, were given the opportunity to present new technological developments and exchange about best and better practices. In fact, the topic on reducing N_2O emissions was part of a significant number of presentations and related talks during the conference, reinforcing the message that this issue is now being taken very seriously by industry participants in an increasing number of countries.

A study on the status of N_2O emissions from the chemical industry in industrialised countries around the world, conducted by German Öko-Institut and commissioned by Deutsche Gesellschaft für International Zusammenarbeit

(GIZ) covers 75% of the worlds nitric acid production[2]. The study shows that ambitious climate policies in many of the countries analysed[3] have significantly pushed the level of N_2O emissions caused during the production of nitric acid down to 36 Mtons of CO_{2eq} in 2020, cp. also CMR 01-2023. This represents approximately only 50% of the emission levels in 2000. Carbon pricing instruments, such as carbon taxes or emission trading systems, as well as voluntary carbon markets or the implementation of emission limits have contributed significantly to this reduction. Additionally, increasing carbon prices, as it is the case in the EU- ETS, where allowance prices in the period 2022-2023 range between 80 and 100 EUR/ton CO_{2e}[4], have fostered significant investments to further improve the abatement rates up to levels not known before. Interviews conducted during the ANNA conference with main nitric acid producers in Europe, as well as information presented by technology providers, confirm that current emission reduction levels clearly overperform the 95% reduction mark achieved in the EU in the period 1990-2020.

Nevertheless, this trend is to be seen not only in the EU. In Australia, the entire installed capacity for nitric acid production has already been equipped with N_2O abatement technology and revamping of old abatement technologies is taking place at the time of writing. Another example is the USA. Even without any climate policies affecting N_2O emissions yet in place, a considerable number of new abatement activities is under development, increasing over 50% the installed capacity equipped with N_2O abatement technology. These recent activities are, on the one hand, triggered by the extra finance obtained from the sales of emission reduction certificates in domestic voluntary carbon markets and on the other hand, driven by expectations within the industry that federal climate policies might be implemented soon.

One main takeaway from the ANNA conference this year is that some sort of paradigm shift is starting to occur in this industry sector, leading to an increasing number of international companies and individual plant operators taking responsibility by setting their own ambitious

2 https://www.oeko.de/fileadmin/oekodoc/NACAG-N_2O-mitigation-potentials.pdf

3 A total of 15 jurisdictions including Australia, Canada, Chile, the European Union, Israel, Japan, the Republic of Korea, Norway, Russia, Saudi-Arabia, Singapore, Trinidad and Tobago, United Arab Emirates, United Kingdom and the United States of America were analysed.

4 Source: https://tradingeconomics.com/commodity/carbon

climate targets. This industry has finally understood that harvesting these low-hanging fruits is not only a must-do responsibility in the climate change contexts but also an opportunity to differentiate themselves from competitors and create new products, such as “green” fertilizers or fertilizers with low-carbon footprint, that ultimately will contribute to the long-term collective goal defined in the Paris Agreement.

Source: UNFCCC / Fredes / CDM 1229

A6.4 Supervisory Body meeting reports

Browse Wuppertal Institute's reports on the meetings of the Art. 6.4 Supervisory Body at **https://www.carbon-mechanisms.de/en/publications**

Insights from the tourism industry

New Carbon Mechanisms Research paper explores demand-side perspective on the Voluntary Carbon Market. Download at **www.carbon-mechanisms.de/en/Demand-side_Perspective_VCM_Tourism**

Glossary

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