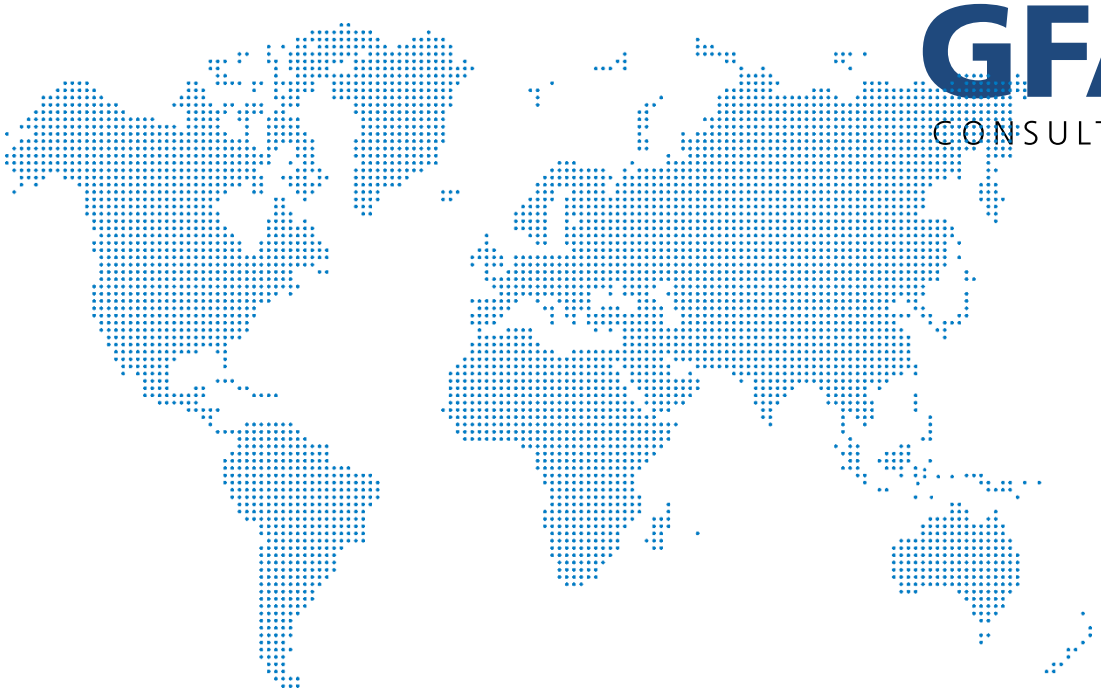

TASK 1 REPORT

GLOBAL

PoA Mapping and Reporting

Presented to:
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In collaboration with

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List of Abbreviations

AAU	Assigned Amount Units
AfDB	African Development Bank
AGN	African Group of Negotiators
BAU	Business as Usual
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CERF	Climate Emissions Reduction Facility
CO2	Carbon Dioxide
CPA	Component Project Activity
EBRD	European Bank for Reconstruction and Development
EE	Energy Efficiency
ERU	Emission Reduction Units
EU-ETS	European Union Emission Trading System
GHG	Greenhouse Gas
HFC	Hydrofluorocarbon
IGES	Institute for Global Environmental Studies
ITMO	Internationally Transferred Mitigation Outcome
JCM	Joint Credit Mechanism
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
LDC	Least Developed Countries
MRV	Measurement, Reporting, and Verification
N2O	Nitrous Oxide
NDC	Nationally Determined Contributions
PA	Paris Agreement
PFCs	Perfluorocarbons
PoA	Programme of Activities
PV	Photovoltaic
SCF	Standardized Crediting Framework
SF6	Sulphur Hexafluoride
UNEP CCC	United Nations Environment Programme – Copenhagen Climate Centre
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank

1 KEY FINDINGS AND RECOMMENDATIONS

This chapter lists the key findings and recommendations drawn from the global survey on Programme of Activities (PoAs), the historical analysis of the PoA concept and the consideration of PoA elements in Article 6 piloting activities.

While Chapter 2 provides brief background information on the scope of the study, Chapter 3 assesses the performance of CDM PoAs by discussing aspects such as the PoA performance by technologies, low issuance rates (compared to the ex-ante estimates), geographical distribution or the amount of renewable electricity generated under PoAs.

Chapter 4 analyses the historic evolution of the PoA concept and its related negotiation process and provides additional insights by comparing the performance of PoAs and individual CDM projects over time. This is complemented by a discussion of the process of migrating PoAs from CDM to Art. 6.

Looking ahead, chapter 5 provides a stock take of PoA elements in Art. 6 piloting activities by evaluating the current Art. 6 pilot activity pipeline and by presenting the findings of semi-structured interviews with representatives from multilateral development banks, engaged in carbon finance.

OVERVIEW OF ONGOING CDM POAS

1. Since the adoption of the PoA framework in 2007, a total of 359 PoAs were developed, whereof only 91 PoAs lead to the issuance of CERs, i.e. the vast majority of registered PoAs (i.e. 75%) did not generate emission reductions by now.
2. While the PoA framework was developed to allow generating CERs at lower transaction costs among other things, the actual investment in mitigation activities has not materialised at the anticipated rate (i.e. compared to the ex-ante estimate of emission reduction). Reasons for this low efficiency can be manifold, but the arguably most conclusive explanation are low CER prices.
3. As envisaged by its framework, the majority of PoAs that have been registered to date indeed comprise multiple CPAs. Particularly PoAs that have successfully issued CERs are associated with several CPAs. On average they comprise 13.45 CPAs per PoA.
4. Looking at the different technologies as categorised by UNEP CCC, from all 359 PoAs that have been registered, the vast majority (109 PoAs) address emissions through energy efficiency measures at household level (e.g. distribution of energy efficient cook stoves). PoAs in the solar space (58 PoAs), on methane avoidance (48) and on hydropower (31) follow this.
5. Across the various technologies (with the exception of EE households), the ratio between registered PoAs and PoAs with actual issuance is low. In total only around a fourth (25.3%) of all PoA have actually issued CERs. The leading technology category in this statistic and a statistical outlier is again EE household with a ratio of 54.9%.
6. The actual performance of different technologies was analysed by looking at the actual CER issuance rate.
    - The technological category that was shown to be the most effective are EE household with a total of 31 M CERs issued, followed by methane avoidance (7.8 M CERs) and landfill gas (4.4 M CERs). These top three technologies account for 78% of the total CERs issued by CDM PoAs.
    - Despite the apparent general prevalence globally, the performance of technologies such as solar (3.5 M CERs), EE service (3.3 MCERs), hybrid technologies (2.3 M CERs), wind (1.4 M CERs) and hydro (0.8 M CERs) was only mediocre.
    - Across several other technological categories, no significant emission reductions were registered in absolute numbers. In transport, combined solar & wind, energy distribution mixed

renewables and biomass energy, PoAs and their related CPAs have generated some emission reductions (0.8 M CERs accumulated).

- Finally, in 21 technological categories, did not generate any CERs, including the complete Agriculture, Forestry and Other Land Use sector. For these technologies, it is concluded that either the PoA framework was generally not conducive or the investment cost per CER are comparably high. The PoA Framework became operational at a time with low CER prices, which may have exacerbated the development of viable projects and may have resulted in a general lack of investments in such technologies.

7. The assessment of PoAs and the related CPAs that are associated with the supply of renewable electricity to the power grid, has shown an estimated 109.5 GWh electricity generated annually from these PoAs, resulting in a cumulative electricity generation of 2,283.1 GWh since the start of the first renewable energy PoA. Overall, this contribution can be considered relatively small. It corresponds to around 0.01% of Africa's annual electricity consumption (cp. EIA, 2022) and hence would arguably not be considered a significant contribution to the decarbonisation of the power sector. Among all grid-connected CPAs, hydropower was the most successful technology in generating electricity, followed by solar and wind.
8. Following the categorisation of UNEP CCC, of all regions, the Asia and Pacific region can be considered the most successful in registering PoAs (164 PoAs) followed by Africa (125 PoAs). Also, the vast majority of PoAs that have successfully issued CERs are predominantly located in these regions, this time ranked vice versa with Africa ranked first (45 PoAs with successful issuance) followed by Asia (36 PoAs). In comparison to Africa and Asia, the numbers of registered and successful PoAs in Latin America are substantially lower, while in Europe & Central Asia and the Middle East they are negligible or even zero.
9. Furthermore, the geographical analysis shows that across the globe, the Asia and Pacific region has delivered most emission reductions over the total operational lifetime of PoAs (27. 4 M CERs, 49.6% of the total emission reductions of PoAs), followed by Africa (21.2 M CERs, 38.2%) and by Latin America (6.1 M CERs, 12.2%). Adopting a somewhat more nuanced view by following the UNEP CCC categorisation of sub regions, it is noted that across all PoAs those in the Southern African sub-region have proven to be most successful with the issuance of a total of 16.2 M CERs to date, followed by East Africa (11.5 M CERs) and Southern Asia (10.7 M CERs).

HISTORICAL OVERVIEW ON THE USE OF THE POA CONCEPT

10. Programmatic approaches have matured in the Kyoto Mechanisms, and have created important precedents with regard to regulatory innovation as well as implementation of programmatic activities across multiple countries and technologies.
11. Programmatic approaches have opened the mechanism to new project types with high sustainable development impacts and low-income country participation, thereby helping to address some crucial concerns about the equitable distribution of benefits of the CDM.
12. There is a recent stand-alone compendium of CDM rules for Programme of Activities (PoA), which has consolidated the distinct features of programmatic approaches for the first time. The modalities and procedures for the Art. 6.4 mechanism should build on lessons learnt & infrastructure from existing programmatic approaches while adjusting to the quality principles defined in the PA Art. 6 rulebook agreed at COP26 in Glasgow. The overriding priority for all market-based policy instruments needs to be the alignment with NDCs. Redesigned programmatic approaches can serve to deliver increased ambition based on high quality and integrity standards.
13. Programmatic approaches have also been selected for fast tracking in CDM transition, which was an African Group of Negotiators priority, underpinning the importance of PoAs for Africa. Moreover, these PoAs offer the potential for rapid upscaling by adding new component activities.

CONSIDERATIONS OF POA ELEMENTS IN ARTICLE 6 PILOTING ACTIVITIES

14. Based on UNEP CCC delineation, statistically, 64% of all regions globally have developed Art. 6 pilots for small-scale technologies. Of all the Art. 6 pilot projects, 50% include a sectoral scope and 85% of them are implemented in single countries (as opposed to multi-country projects).
15. When assessing the projects' approaches in dealing with the complexities of registration and implementation that characterize stand-alone CDM projects, 61% of them do not apply an innovative approach but following usual procedures.
16. Almost 60% of countries identified have a centralized project management entity in charge of overseeing the monitoring and implementation. However, PoA projects in African countries tend to subscribe to a centralized management entity overseeing the implementation of projects.
17. Reform areas for PoAs could be made on (i) steering clear from the need to validate small bundles of activities; and (ii) revising climate finance rules to avoid segregating climate finance away from applicable market mechanisms.
18. Improving the digital MRV in Art. 6 by linking baselines with NDCs and enabling small projects of earning carbon credits from the day of implementation instead of the day of inclusion.
19. Looking at how nature-based solutions, climate smart agriculture and methane lend themselves to PoAs.
20. Attracting project finance is enhanced when technologies disaggregate project risk.

2 INTRODUCTION

The climate crisis is one of the most crucial global challenges. In response, Parties to the Paris Agreement (PA) agreed in Article 2 to limit global warming to at least well below 2°C above pre-industrial levels, and aspire towards the 1.5°C target (PA, Art.2). The Paris Agreement not only defines ambitious long-term objectives, but also requires all countries to define and report on their Nationally Determined Contributions (NDC). For many developing countries, a share of their NDC targets is conditional on international support through technology transfer, capacity building, and climate finance, including through carbon markets.

Still, nations struggle to find an appropriate response. After an unprecedented drop in global Greenhouse Gas (GHG) emissions in 2020 by 5.4% as a result of the COVID-19 pandemic, emissions bounced back to pre-COVID levels during the recovery period. UNEP's Emission Gap Report (2021) estimates the gap between current conditional NDC pledges and a 1.5°C compliant development to be 23.9 GtCO2e by 2030 (UNFCCC 2022).

In order to close this gap significant ambition increases are essential, which also require private sector investments in mitigation activities at unprecedented scales (Hof et al, 2017; Rozenberg & Fay, 2019). For the energy sector alone, in which costs are best understood, IRENA estimates that a full decarbonisation of energy services by 2050 requires a cumulative investment in renewable energy of USD 27 trillion in the period up to 2050. This would imply at least a doubling of annual investments compared to the current levels, from almost USD 310 billion/yr to over USD 660/yr billion (cp. IRENA, 2019). Considering the scale of investment needs, it is obvious that governments may not achieve this, but an effective mobilization of private sector investments is mandatory, facilitated by well-designed policy instruments and cost-efficient incentive schemes including carbon markets. In order to also deliver sustainable development and transformational change impacts, in addition to large-scale point sources of emissions, these investments also need to be addressed towards small and disbursed emission sources, e.g. financing off-grid electrification, introducing electric vehicles or energy efficient air conditioners.

Since COP26 in 2021, the PA Article 6 Rulebook has provided a new framework for generating and transferring emission reductions. The framework allows to generate Internationally Transferred Mitigation Outcomes (ITMOs) through additional mitigation activities, which may be commercialized in order to co-finance these mitigation measures. Article 6.2 defines guidance for emissions accounting in light of NDCs as well as further guidance for various types of cooperative approaches (transfers between NDCs, to the Carbon Offsetting and Reduction Scheme for International Aviation or for voluntary carbon offsetting purposes). Article 6.4 establishes a new UNFCCC market mechanism, which will succeed the Clean Development Mechanism (CDM). While high-level rules have been agreed at COP26, further technical rules for implementing Article 6 (Art. 6) have to be elaborated. What is already clear is that programmatic approaches, in which mitigation activities are bundled (primarily based on their geographic location, but also on the technology and/or methodologies) are also highly relevant for the new mechanisms.

In order to effectively and rapidly operationalize these new carbon market instruments, it is essential to learn from the achievements and failures under the CDM. An important lesson that can be learnt from the CDM is the performance of the concept of Programme of Activities (PoA), which was introduced to aggregate multiple source emissions including those from decentralized small appliances. Such programmes are assumed to deliver high development impacts and at the same time significantly reduce transaction costs (i.e. investment cost per Certified Emission Reduction (CER)). In theory, the framework offers many advantages compared to single CDM projects, such as simplified procedures, multiple technologies, adding unlimited CPAs. However, the PoA framework fell short in delivering significant emission reductions (55.4 M CERs from PoAs compared to 2,261.8 M CERs generated by CDM projects, cp. UNEP-CCC, 2022) and it is essential to understand the barriers for a more effective performance and upscaling potential.

Advancing the negotiations of Art. 6, it seems essential to harness approaches, such as the PoA framework, allowing for addressing multiple emission sources and ensuring broad private sector implication / related investment.

This report aims to provide key lessons learned from a critical assessment of the performance of CDM PoAs, as a basis for supporting the transition of the PoA concept to Art. 6 carbon market instruments.

3 Overview on ongoing CDM PoAs

3.1 Introduction & Methodology

Objective

This chapter assesses the performance of Programmes of Activities (PoA) under the CDM of the United Nations Framework Convention on Climate Change (UNFCCC). The assessment shall allow deriving lessons for designing and implementing programmatic approaches under Art. 6 of the Paris Agreement (PA).

Methodology

For this analysis we evaluated three databases, namely the

- UNFCCC CDM PoA and CPA database (UNFCCC, 2022), as well as
- The CDM PoA Pipeline database, published by United Nations Environmental Program (UNEP) Copenhagen Climate Centre (UNEP CCC) as part of its CDM/JI Pipeline Analysis and Database (UNEP CCC, 2022), complemented by
- The Institute for Global Environmental Studies (IGES) CDM Pipeline (IGES, 2022).

The subsequent findings are based on our analysis of said databases, but also present some key insights from data analysis of UNFCCC, UNEP CCC and IGES, respectively.

We note that the different pipelines exhibit minor differences for certain parameters. The differences may be related to different cut off days with respect to the most recent update of the respective dataset and/or differences with regard to the categorisation and potentially varying definitions, as well as to certain statistical uncertainties. Generally, the differences found are considered to be negligible and hence will not be addressed further in the course of this report.

3.2 General Findings

UNEP CCC (2022) lists 605 PoAs, including those that are i) registered having the right to issue Certified Emission Reductions (CERs), but also those that are ii) at validation stage or iii) have been withdrawn or rejected. As shown in

Table 1, the database lists currently 359 registered PoAs, without distinguishing further between those that have already successfully issued CERs or not. From those 359 programs, only 91 PoAs (or 25%) have successfully issued CERs to date.

Table 1: Overview on CDM PoA Performance

	REGISTERED POAS	REGISTERED POAS WITH ISSUANCE
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

The 91 PoAs with issuance comprise a total of 1,224 so called CDM PoA Component Project Activities (CPA), however, not all of them have issued CERs. The number of CPAs that actually have issued CERs is currently 848 according to UNEP CCC data, as seen in Table 1.

.

The following conclusions are drawn:

- **The PoA framework allowed to develop 359 PoAs, whereof only 91 PoAs lead to the issuance of CERs. The vast majority of registered PoAs (i.e. 75%) did not lead to an issuance of CERs. As such, PoAs were developed as framework to generate CERs, but the actual investment in mitigation activities was not conducted in these cases, e.g. due to low CER prices.**
- **Statistically, PoAs comprise multiple CPAs. This is specifically true for PoAs with issuance, which in average comprise 13.45 CPAs per PoA. The PoA framework allows Coordinating and Managing Entities (CME) to stratify mitigation efforts in separate CPAs and to manage related mitigation efforts separately.**
- **Overall PoAs delivered emission reductions in the amount of 55.5 M tCO2e, which is a limited performance. Considering the performance of CDM project approach with 2,265.2 M CERs, the PoA framework delivered only 2.4% of the CDM's total mitigation efforts.**

3.3 PoA Performance by Technologies

This section provides an assessment of PoA performance with respect to specific technologies, answering questions such as "Is the concept of PoA more appropriate to support the implementation of a specific technology?" In our analysis, we follow the categorisation by technologies, as deployed by UNEP CCC. However, in our analysis we do not differentiate between small scale- and large-scale projects types.

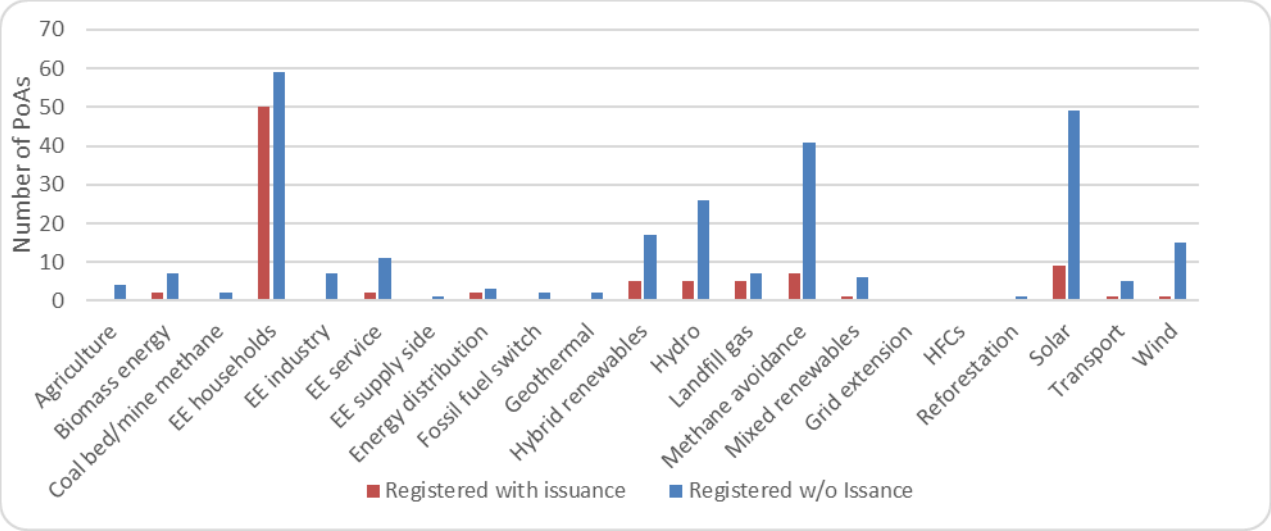
Performance of Registered PoA by Technologies

In a first step, we assess the PoAs performance by technologies in absolute numbers. As is shown in Figure *1*, our findings indicate that among all PoAs registered by far the largest share is associated with categories in the renewable energy and energy efficiency (EE) space, which account for more than 90% of all registered PoAs.

Looking at specific technologies, most PoAs are registered as energy efficiency programs on household level (109), however less than half of these programmes have indeed issued CERs up until today (50). The next most successful technologies are registered as solar[1] (58), methane avoidance (48), hydropower (31) and mixed/hybrid renewables programmes (29). Until today, 356 PoAs have been registered in total, as illustrated in Figure 1.

[1] Please note, UNEP CCC classification of 'solar' refers to i) solar water heating, ii) electricity generation using photovoltaic (PV) panels and iii) concentrated solar power (not relevant for PoAs). These PoAs use the approved CDM methodologies ACM2, AMS-I.A, AMS-1.D, AMS-I.F and AMS I.J.

Figure 1: Registered PoAs by Technology, with and without Issuance



PERFORMANCE OF POAS WITH ISSUANCE BY TECHNOLOGIES

Looking at PoAs that up to now have successfully issued CERs, the distribution across types/technologies correlates to the above. Among PoAs with CER issuances, the predominant type by a large amount are EE programmes on household level (e.g. improved cook stoves). They constitute more than half (55%) of all PoAs that successfully issued CER, followed by solar programmes (10%), methane avoidance programmes (8%) and hybrid renewables, hydro and landfill gas programmes (all 5%).

Following the UNEP CCC classification, there are 15 technologies, which have not registered any PoA yet. These are i) afforestation, ii) cement, iii) carbon dioxide (CO_2) usage, iv) energy efficiency in the industry, v) service, vi) buildings, vii) energy efficiency with own generation, viii) fugitive emissions, ix) grid extension, x) hydrofluorocarbons (HFCs), xi) nitrous oxide (N_2O), xii) perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6), xiii) tidal power generation, xiv) waste and xv) wind & solar combinations. The non-performance of such technologies is related to different aspects:

- Some technologies, such as afforestation and reforestation generally did not perform well under the CDM. In order to account for the non-permanence of CDM afforestation/reforestation efforts, the Executive Board decided to issue non-permanent emission reduction certificates requiring off-takers to replace temporary CERs after their expiry. Such an approach was not accepted by the market, who in turn developed forestry projects under the Verified Carbon Standard (VCS). The VCS developed a non-permanence tool, which serves as a global issuance approach enabling forestry projects to sell permanent credits for a share of their mitigation effort. This approach proved to be very appropriate for forest carbon offsets and was mirrored by the Gold Standard and by World Bank's Forest Carbon Partnership Facility. Moving from CDM to Article 6, the importance of enhancing forest sinks will increase in the future and approaches that are applicable may be considered to address the non-permanence issue.
- A second important aspect is time. The CDM PoA framework become operational by 2012 (cp. Section 2.6). At that time, financially attractive abatement options such as N2O abatement in the adipic acid- and fertilizer production or the deconstruction of HFCs were already realized. Consequently, the CDM PoA framework could not have any impact on such technologies.

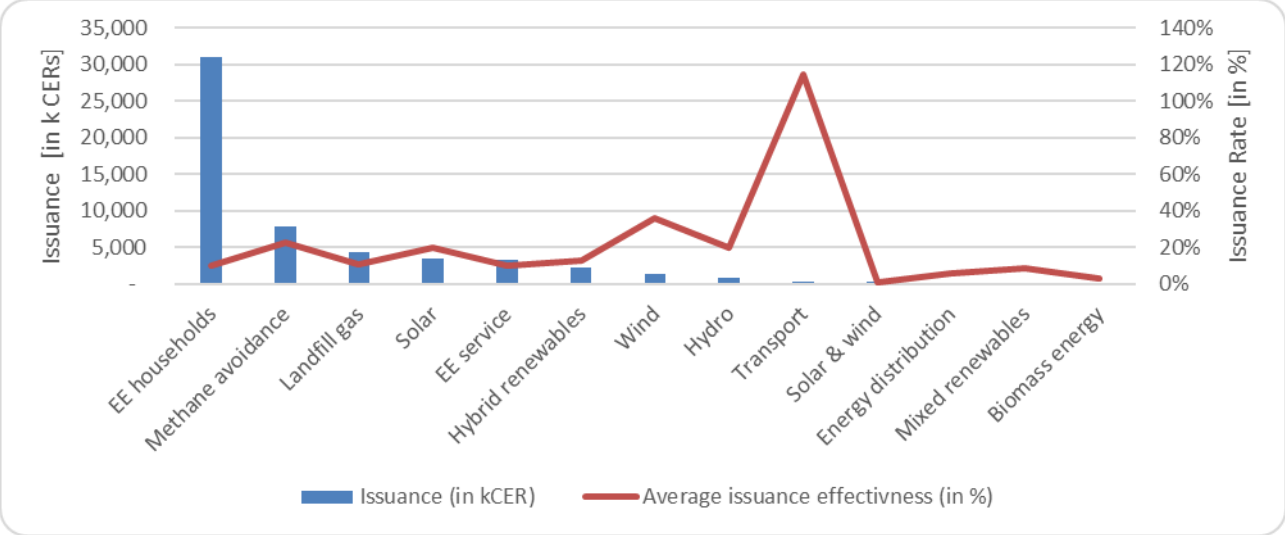
CER Issuance by Technologies

Looking closely at the contribution of PoAs to the abatement of greenhouse gas (GHG) emissions, the different categories of PoA types can be analysed and ranked with regard to their effectiveness and efficiency. Figure *2* below shows that EE household PoAs are by far the largest contributor to the overall emission abatement achieved through PoAs. With 31 M CERs, they represent 56% of the total emission reductions. At the same time however, EE household PoAs fall short of their ex-ante GHG abatement target (as formulated in the CPAs) and achieve an issuance rate of only 12% (referred to as 'issuance effectiveness').

Second ranked in terms of absolute CER issuance are methane avoidance PoAs with a total of 7.7 M CERs. Methane avoidance PoAs are ranked third in issuance effectiveness based on their ex-ante estimate with a rate of 22%, exceeded only by wind PoAs (36%) amounting to 1.4 MtCER.

With the exception of PoAs in the transport category, neither PoA type exceeds an average issuance effectiveness beyond 36%. One single transport PoA from Egypt (replacing old taxis in the greater Cairo region, with three CPAs) has indeed exceeded its ex-ante estimate of emission reductions by 115%. While having a high issuance rate for this single programme, PoAs in the transport sector are not (yet) significant (account for 0.3 M issued CERs) for the overall issuance rate. The average issuance rate of registered PoAs is as low as 21%.

Figure 2: Performance of Technologies by Issuance and by Issuance Effectiveness



CPAs per Technology

Analogously to the distribution of PoAs across types, a similar yet slightly varying pattern is to be found when assessing the distribution of the number of CPAs that have been registered across the different types of project activities as can be seen in Table *2* below. In total, 2,826 CPAs were registered, 848 (30%) of which issued CERs. When looking at the distribution of CPAs by type, methane avoidance CPAs with a total of 1,241 make up the largest share of registered CPAs, as indicated also in Table 2 below. Only 12% of these CPAs however have issued CER until today. More effective in this regard are once again EE household PoAs: 500 CPAs issued CERs, accounting for 59% of the total of 899 registered CPAs that have issued CERs.

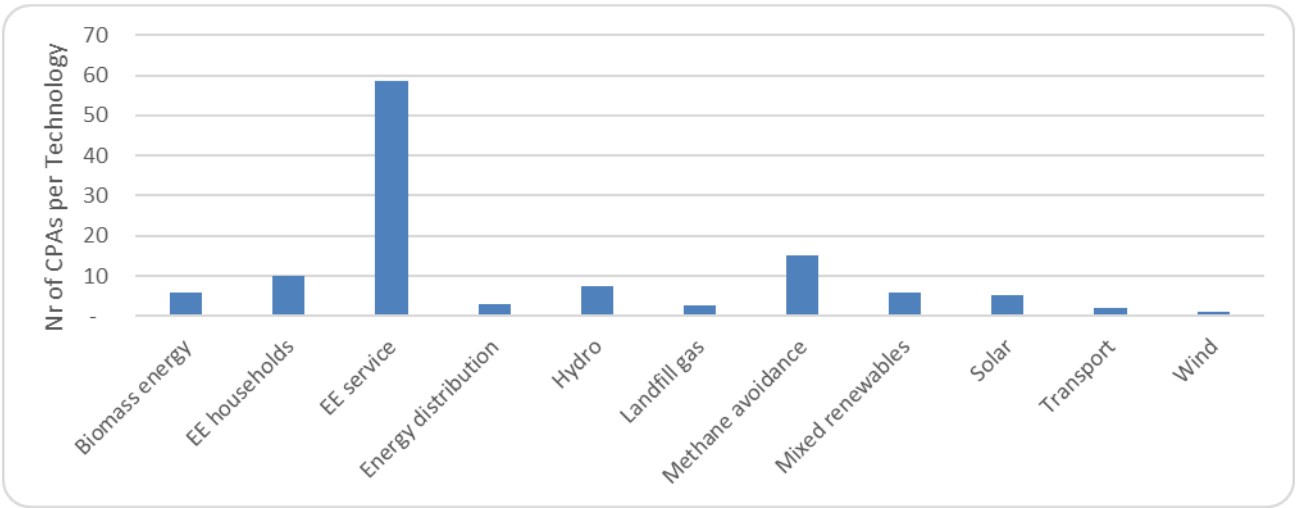
In this ranking, CPAs of EE service PoAs are second most efficient with 117 of 166 registered CPAs marked as having issued CER (14%). In all remaining categories the number of CPAs are below 50, representing a CER issuance realisation ratio of 5% or less.

Table 2: CPA Performance by Technology

TYPE	TOTAL REGISTERED	REGISTERED WITH ISSUANCE	RELATIVE SHARE OF ALL REGISTERED WITH ISSUANCE
EE households	899	500	59%
EE service	166	117	14%
Methane avoidance	1241	105	12%
Solar	231	48	5%
Hydro	99	37	4%
Biomass energy	45	12	2%
Landfill gas	26	14	2%
Wind	62	1	0%
Others	57	14	2%

Furthermore, we assess how effective PoAs have been with regard to the average number of CPAs registered under a PoA across the different type of programmes, illustrated in Figure *3* below. While PoAs that to date have registered but yet have been unsuccessful in issuing CERs, have an average CPA registration rate of less than 2, successful PoAs have an average CPA registration rate of 12.6. The category is led by two programmes in the area of EE services that successfully issued CERs, which have registered 63.5 CPAs per PoA on average, followed by methane avoidance (19.3), Biomass energy (17), and Energy Efficiency in Households (15.2), as seen in Figure 3.

Figure 3: Average number of CPAs per PoA and per Technology



The figure points towards significant differences between EE services and e.g. solar or wind programs. For EE services, e.g. energy efficient cook stoves or energy efficient lighting devices were distributed. Activities were managed by one central CME. For wind or solar programmes, one CPA represented typically one individual power generation project. PoAs for the power sector had to deal with different owners of individual power projects, who sometimes were competing against each other. The owners had hence concerns against commercializing the CERs of their specific CPA jointly with the CERs of their competitors by one joint CME. This led

to a comparably low performance of the PoA framework for the power sector, compared to e.g. CDM project approaches.

Table 3 below presents the efficiency of PoAs by type with regard to their CER issuance rate compared to the respective ex-ante estimate (issuance effectiveness). The analysis is based on the number of years since the start of the first crediting period and the ex-ante estimate of annual CER issuance at the time of the registration request.

The analysis shows that with the exception of the abovementioned PoA in the transport sector in Egypt, under which a total of three CPAs were registered and where the ex-ante estimate of annual CER issuance was exceeded, the average CER issuance rate across the different types does not exceed 36%. The sectors with the highest issuance rate (after transport) are wind, methane avoidance, solar and hydro programmes (20-36%).

Table 3: Issuance per CPA and per Technology

TYPE	AVERAGE NUMBER OF CPA PER POA	AVERAGE CER ISSUANCE RATE COMPARED TO EX-ANTE ESTIMATE
Transport	3.0	114.5%
Wind	2.0	35.6%
Methane avoidance	19.3	22.4%
Solar	5.6	21.1%
Hydro	5.6	19.9%
Hybrid renewables	7.4	12.7%
Landfill gas	4.2	10.8%
EE service	63.5	9.9%
EE households	15.2	10.2%
Mixed renewables	10.0	8.2%
EE distribution	3.0	5.9%
Biomass energy	17.0	2.8%
Solar & wind	8.0	0.9%

The following conclusions are drawn:

- **From the 359 registered PoA, 109 PoAs address emissions through energy efficiency measures at household level (e.g. distribution of energy efficient 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%. This low issuance rate implies that the actual investment into PoAs have not been concluded at the anticipated scale. 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). These top three technologies account for 78% of CERs issued y CDM PoAs.**
  - **Technologies such as solar (3.5 M CERs), EE service (3.3 MCERs), hybrid technologies (2.3 M CERs), wind (1.4 M CERs) and hydro (0.8 M CERs) delivered a mediocre performance.**
  - **Many technologies did not manage to realize any significant emission reductions. Transport, solar & wind, energy distribution mixed renewables and biomass energy have generated some emission reductions (0.8 M CERs accumulated).**
  - **Finally, 21 technologies did not generate any CERs, including the complete Agriculture, Forestry and Other Land Use sector. For these technologies, either the PoA framework was generally not conducive, or the investment cost per CER are comparably high. The PoA Framework became operational in a time with low CER prices, which may have exacerbated the development of viable projects and may have resulted in a general lack of investments in such technologies.**

3.4 PoA supporting Renewable Electricity Generation

In this chapter, programmatic approaches involving grid connected energy projects are assessed in more detail. This includes an assessment of the installed nominal capacities and the electricity generated. The analysis follows the categorisation of technologies as deployed in the UNEP CCC database. It covers the broader categorisation by PoA type (biomass energy, geothermal, hydro, hybrid/mixed renewables, solar, tidal and wind) and further distinguishes project activities based on their sub-type. It is worth noting that some CPAs do not fall within the natural categorisation as their PoA. For instance, some solar or wind CPAs are part of a PoA with a mixed or hybrid approach, hence such CPAs are not necessarily associated with PoAs of the same type, but also with PoAs that combine several technologies (mostly PV, wind and hydro). We also note, that specifically

for energy projects, often an approach was chosen, where one CPA represents one energy project, e.g. a hydropower plant.

For this analysis, PoAs with project activities based on grid connected electricity generation were identified based on the CDM methodology utilised in the course of registration. In this context, the methodologies *'AMS-I.D.: Grid connected renewable electricity generation'* and *'ACM2 Grid-connected electricity generation from renewable sources'* were used to distinguish projects that focused on the replacement or capacity additions based on renewable energy sources and supply electricity to the grid from other projects. From a further distinction between small and large-scale projects was desisted.

The assessment shows that the largest share of installed electricity generation capacities across all registered PoAs is associated with solar activities, as well as hydro and wind activities (incl. combinations thereof; see above). Across all CPAs (of all registered PoAs), solar PV makes up by far the largest share in terms of installed generation capacity (75%). Wind power projects with 21% and run-of-river hydropower projects with 3% follow on the list, while other remaining technologies represented in the list, account for a share of less than 1%, respectively, of the total of 23.4 GW of installed grid connected electricity generation capacity. When filtering for PoAs that have successfully issued CERs, the database shows that only a fraction of installed generation capacity can be associated with these programmes. While for run-of-river hydro projects at least 60% of the overall installed capacity can be associated with successful CPAs, this ratio is only at 4% for solar PV CPAs and is prone to zero for wind and biomass (forest residues) CPAs.

Consequently, the electricity generation and hence CER issuance rate of these grid-connected CPAs shows a similar pattern. Most electricity is generated by the base load CPAs, i.e. run-of-river hydropower projects. Having generated 2,665 GWh electricity across all registered CPAs, 1,539 GWh were generated by run-of-river hydropower CPAs. solar PV CPAs have generated 1,160 GWh, followed by wind CPAs with only 28 GWh.

The following conclusions are drawn:

- **The annual electricity generation is estimated to 109.5 GWh, and total generation since the start of the first renewable energy PoA amounts to 2,283.1 GWh. This is a limited contribution and corresponds e.g. to 0.01% of Africa's annual electricity consumption (cp. EIA, 2022)**
- **In terms of technologies, hydropower was most successful, followed by solar and wind.**

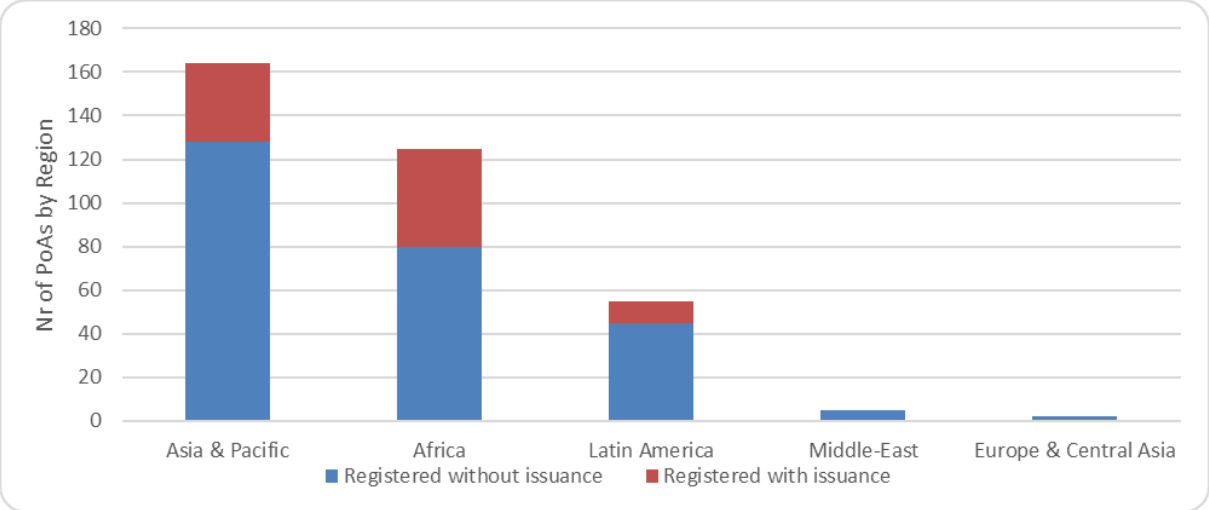
3.5 PoA Performance by Region

Next, the spatial distribution of PoAs and the related CPAs was assessed. This assessment was in a first step based on broader regions (Europe & Central Asia, Asia & Pacific, Africa, Middle East and Latin America) before distinguishing further between sub-regions based on UNEP CCC categorisation.

By Region

The analysis as illustrated in Figure *4* below shows that Asia is the region with the highest share of registered PoAs overall (164 registered in total), followed by Africa (125 PoAs). PoAs that have successfully issued CERs are predominantly located in Africa (45 PoAs with successful issuance) followed by Asia (36 PoAs). In Latin America, numbers are substantially lower and negligible in Europe & Central Asia and the Middle East, as shown in Figure 4.

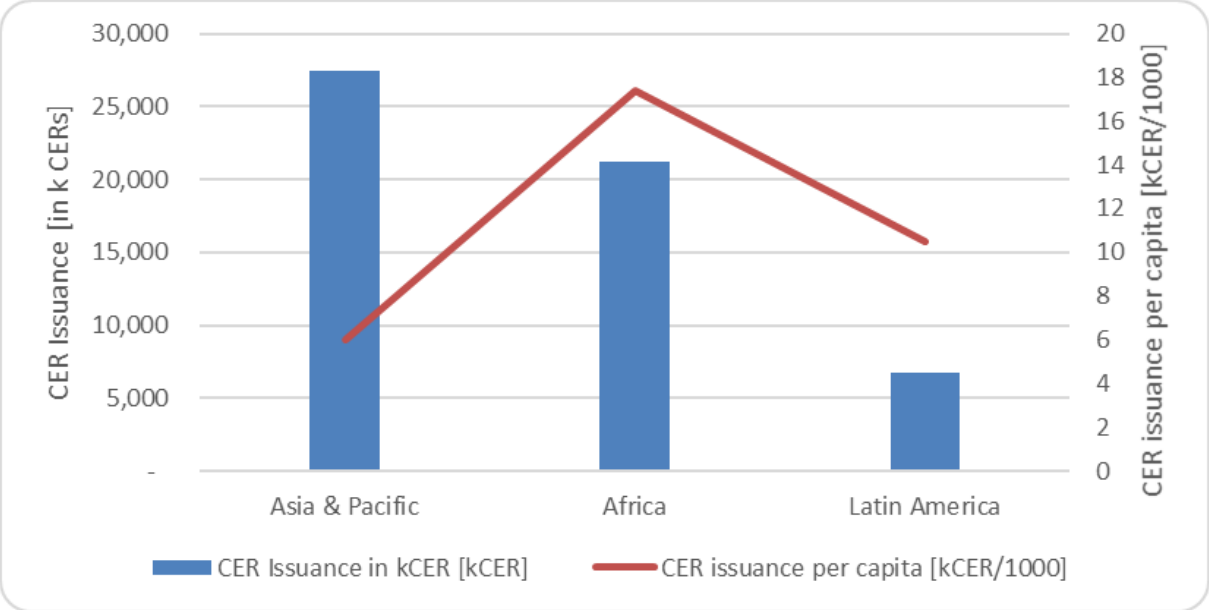
Figure 4: PoA Performance per Region



Analogously to the above, the largest share of CPAs associated with PoAs that are registered with issuances are located on the African continent, with a total of 644 CPAs, followed by Asia & Pacific with 433 CPAs and Latin America with 118 CPAs. It is however worth noting, that despite the arguably high 'success rate' in the regions Africa and Asia & Pacific, the issuance rate that depicts the actual CER issuance compared to their CER issuance estimate as stipulated ex-ante, is as low as 3% and 4%, respectively. In Latin America, where a smaller share of the total number of PoAs and CPAs with issuance is located, the issuance rate of the respective programmes is somewhat higher at 17%.

Finally, and arguably most importantly, our analysis shows that the Asia and Pacific region has delivered most emission reductions over the total operational lifetime of PoAs (27. 4 M CERs, 49.6%), followed by Africa (21.2 M CERs, 38.2%), followed by Latin America (6.1 M CERs, 12.2%). This is illustrated in Figure 5 below.

Figure 5: CER Issuance by Region



The above findings represent absolute values. However, as there is a positive correlation between number of people and GHG emissions (more people, more emissions), it is also important to consider the CER issuance per capita. The PoA framework has facilitate the reduction of 17.4 CERs per 1000 citizens in Africa, 10.5 and only 6.0 for Latin America and Asia respectively.

The PoA's relative success in Africa may be related to Africa not being a large industrial emitter, but being characterized by many distributed GHG emission sources / abatement options. Obviously the PoA framework proved to be suitable for addressing distributed emission sources and hence had substantial success in Africa.

By Sub-Region

Looking at sub-regions provides a more nuanced picture of the distribution of PoAs, CPAs and their effectiveness. Again, the assessment is based on the delineation of sub-regions provided by the UNEP CCC and the results are presented in Table *4*.

The analysis shows that East and Southern Africa together with East Asia are the sub-regions with the highest representation across the globe in terms of total PoAs registered. They account for 62, 59 and 61 registered PoAs respectively.

The rate at which registered PoAs have indeed successfully issued CERs varies substantially across the globe without a clear pattern to draw conclusions from. Globally, the Pacific sub-region is the statistically most successful sub-region in relative terms, counting one registered PoA that has also successfully issued CERs, while PoAs in Europe, Central Africa, Caribbean, among others have been the least successful sub-regions both in absolute as well as in relative terms, with zero successful registrations.

Most successful in absolute terms of registered PoAs with issuance is the African region, as already presented in the previous subchapter and indicated by two of its sub-regions among those with the highest absolute numbers in terms of registered PoAs with issuance. The highest numbers are registered in East Africa, where 25 PoAs and hence around 40% of all registered PoAs issued CERs, and West Africa (12 PoAs, 55%), as well as in Southern Asia (18 PoAs, 31%) as the most successful sub-region outside Africa and second most successful overall. In other sub-regions with registered PoAs, the number of registrations is in single-digits.

Table 4: PoA Performance per Sub-Region

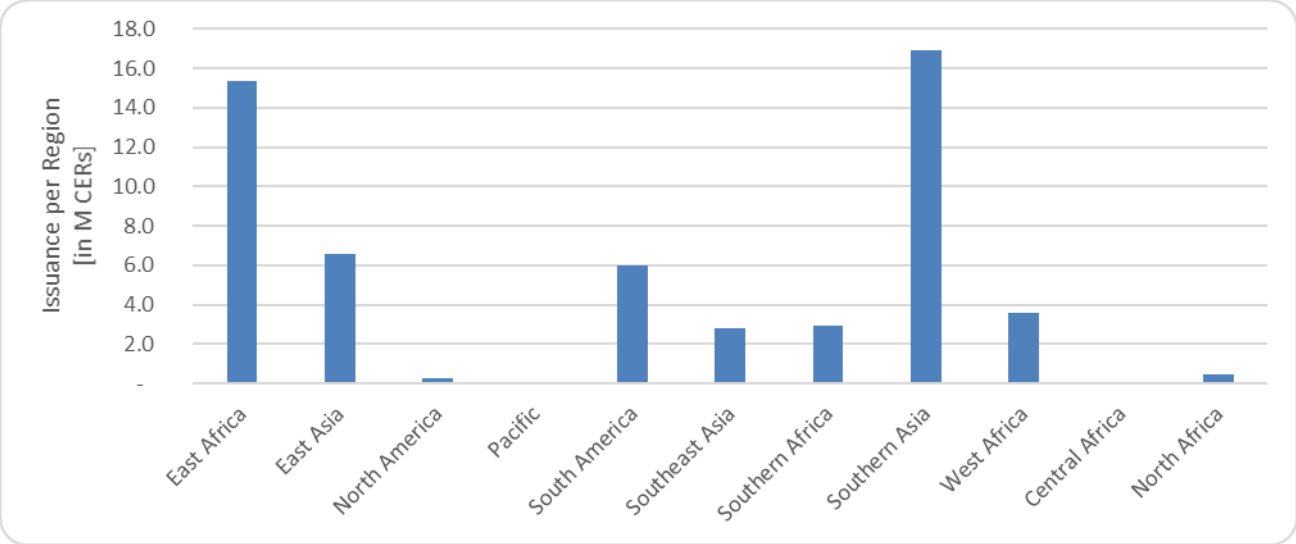
SUB REGION	TOTAL POA REGISTERED	POA REGISTERED WITH ISSUANCE	AVERAGE RATE OF REALISATION	CER ISSUANCE (IN K CER)	AVERAGE ISSUANCE EFFECTIVENESS
East Africa	62	25	40%	15,353	4.7%
East Asia	61	8	13%	6,575	2.3%
Europe	2	0	0%	-	-
North America	8	2	25%	262	0.7%
Pacific	1	1	100%	27	1.4%
South America	36	5	14%	5,988	2.8%
Southeast Asia	44	9	20%	2,810	3.2%
Southern Africa	34	5	15%	2,924	2.2%
Southern Asia	59	18	31%	16,947	4.2%

SUB REGION	TOTAL POA REGISTERED	POA REGISTERED WITH ISSUANCE	AVERAGE RATE OF REALISATION	CER ISSUANCE (IN K CER)	AVERAGE ISSUANCE EFFECTIVENESS
West Africa	22	12	55%	3,609	7.6%
Central Africa	3	0	0%	5	-
North Africa	7	3	43%	452	21.1%
Central Asia	0	0	0%	-	-
Central America	10	3	30%	494	5.3%
Caribbean	4	0	0%	-	-
Arabian Peninsula	3	0	0%	-	-
Fertile Crescent	1	0	0%	-	-
Iranian Plateau	0	0	0%	-	-

As was done in sub-chapter 2.3 based on different technological categories, the average issuance effectiveness across different sub regions was assessed by looking at the actual issuance rate of PoAs compared to their ex-ante estimate of CER issuances in the different geographical areas. It reveals that only with the exception of North Africa, where the issuance effectiveness reached 21.1%, across all other sub-regions the issuance effectiveness is only single-digit.

Figure 6 shows that the Southern Asian region is the most successful sub-region in terms of delivering actual emission reductions (16.9 M CERs to date). The largest contributor here are PoAs in India and Bangladesh that focus on energy efficiency on household level, particularly on improved cook stoves and lighting. In the ranking of most CERs issued, Southern Asia is followed by East Africa (15.4 M CERs) – similarly with PoAs on improved cook stoves and lighting, as well as water purification contributing the largest share – East Asia (6.6 M CERs) and South America (6.0 M CERs). Sub-regions with very limited abatement potentials such as the Pacific or Europe, where countries are regulated under Annex B of the Kyoto Protocol (i.e. do not serve as CDM host countries) have not delivered significant emission reductions.

Figure 6: CER Issuance per Sub-Region



The development of CDM POAs in eastern and southern Africa was facilitated by the development of regional grid emission factors, which were approved as so-called 'standardized baselines'. This allowed to remove barriers for grid connected CDM projects and programmes in those sub-regions.

In southern Africa, the Republic of South Africa was specifically successful in developing PoAs. This may be related to South Africa's carbon tax, which came into force by June 2019. The carbon tax regulations allow offsetting a part of the tax payment by CERs generated from CDM projects and programmes in South Africa. This created a national demand for CERs at a time, when the PoA framework was already operational.

The following conclusions are drawn:

- **From all regions, the Asia and Pacific region was most successful in registering PoAs (164 PoAs) followed by Africa (125 PoAs). PoAs that have successfully issued CERs are also predominantly located in Africa (45 PoAs with successful issuance) followed by Asia (36 PoAs). In Latin America numbers are substantially lower and negligible in Europe & Central Asia and the Middle East**
- **Our analysis shows that Asia and Pacific region has delivered most emission reductions over the total operational lifetime of PoAs (27. 4 M CERs, 49.6%), followed by Africa (21.2 M CERs, 38.2%) and by Latin America (6.1 M CERs, 12.2%).**
- **When assessing performance per sub-region, it is noted that the Southern African region is most successful (16.2 M CERs to date) followed by East Africa (11.5 M CERs) and Southern Asia (10.7 M CERs).**

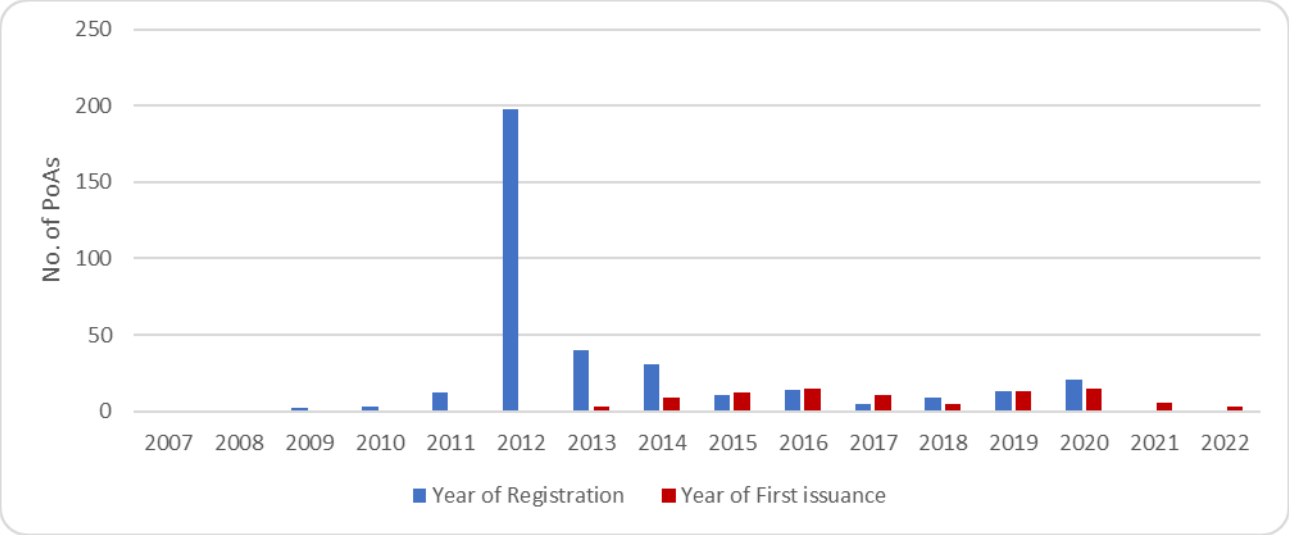
3.6 PoA Registration and Issuance over Time

According to the UNEP CCC database, first registrations of PoAs took place in 2007, the year when the PoA framework was operationalised and two years after the climate conference in 2005 where programmatic approaches under the CDM and the Kyoto Protocol were first introduced. Numbers of registrations slowly but

gradually increased in subsequent years, before an historic peak was reached in 2012, with the registration of 198 programmes according to the official UNFCCC database. The same year, a first programme issued its first CER. In subsequent years, the number of registrations fell to mid to low double-digit level or even below both for registrations and first issuances.

In Chapter 4, a more comprehensive and nuanced overview on the historic development of PoAs will be provided.

Figure 7: PoA Registration and First Issuance over Time



The following conclusions are drawn:

- **CDM PoA registration commenced late and reached a historic peak by 2012. This unique peak is related to the EU's ban of integrating CERs from non-LDCs into the EU emission trading system (cp. EU No 559/2011).**
- **PoAs actually started delivering CERs only in 2012 (1 PoA with issuance) reaching peaks in 2016 and 2020 (15 PoAs with issuance, each). It is noted, that PoAs have a significant lead-time, before issuing CERs.**

4 Historical Overview on the Use of the PoA concept

4.1 Introduction & Methodology

The successful establishment and operationalization of programmatic approaches has been one of the most relevant reform achievements in the Kyoto mechanisms. The PoA framework as a key innovation in CDM and Joint Implementation (JI) has generated a mature, consolidated set of rules for programmatic approaches in carbon market implementation. As indicated before, unlike single CDM project activities, PoAs have distinct features in that they enable an unlimited number of CPAs implemented in an unlimited number of geographical locations (as long as the host country DNAs approve formally) under one registered PoA. These features have significantly lowered the transactional cost and implementation complexity of activities that can be classified as small in size and geographically dispersed. Therefore, the development of the PoA concept resulted in CDM activities generally becoming more accessible, especially to low-income countries, both for decentralized activities such as efficient cooking stoves or off-grid electrification, as well as large-scale renewable energy projects (compare chapter 2).

This section aims to provide an overview of the historical evolution of the PoA concept by starting with the rationale for introducing the CDM PoA framework. The historical evolution also describes the roles of different stakeholders and their contribution to the PoA concept while explaining how this concept evolved from a regulatory point of view.

This section has been developed by desk research based on literature and document analysis, as well as data and information extracted from the analysis of the CDM/JI Pipeline Analysis and Database (UNEP CCC, 2022). It also touches on quantitative impacts of how PoAs have reduced GHG emissions across multiple sectors, by highlighting some key insights as presented in chapter 2 on the performance of CDM PoAs and individual CPAs over time, geographically, and in terms of types of activities. Subsequently, this chapter discusses the lessons learned from the implementation of PoAs under the CDM as well as JI to the extent that these are relevant for the design of the new generation of carbon market instruments under Art. 6, in particular with regard to the Art.6.4 mechanism. The final section in this chapter lays out the potential and limitations for continuing PoAs under the Paris Agreement Art.6.

Analysis of the Historic Evolution of PoA Concept

The first introduction of PoAs was at the first Conference of the Parties to the Convention, serving as the Meeting of the Parties to the Kyoto Protocol (CMP1) in 2005. PoAs were presented as an alternative to the decision not to allow national/regional/local policies or standards to be eligible for consideration as CDM project activities. The section on PoAs relating to the decision in the CMP decision decided "that a local/regional/national policy or standard cannot be considered as a clean development mechanism project activity, but that project activities under a programme of activities can be registered as a single clean development mechanism project activity provided that approved baseline and monitoring methodologies are used that, inter alia, define the appropriate boundary, avoid double-counting and account for leakage, ensuring that the emission reductions are real, measurable and verifiable, and additional to any that would occur in the absence of the project activity (UNFCCC 2005)." Therefore, PoAs can be seen as incremental step of evolving the project-based CDM towards sectoral or policy-based carbon market activities, but with clearly defined boundaries within the programmatic framework.

Although the concept of PoAs was agreed by Parties as early as 2005, it took until 2007 that the CDM Executive Board (CDM EB), at its 32nd meeting, adopted the procedures that allowed PoAs to be registered as CDM activities for the first time. PoAs were defined as: "*a voluntary coordinated action by a private or public entity*

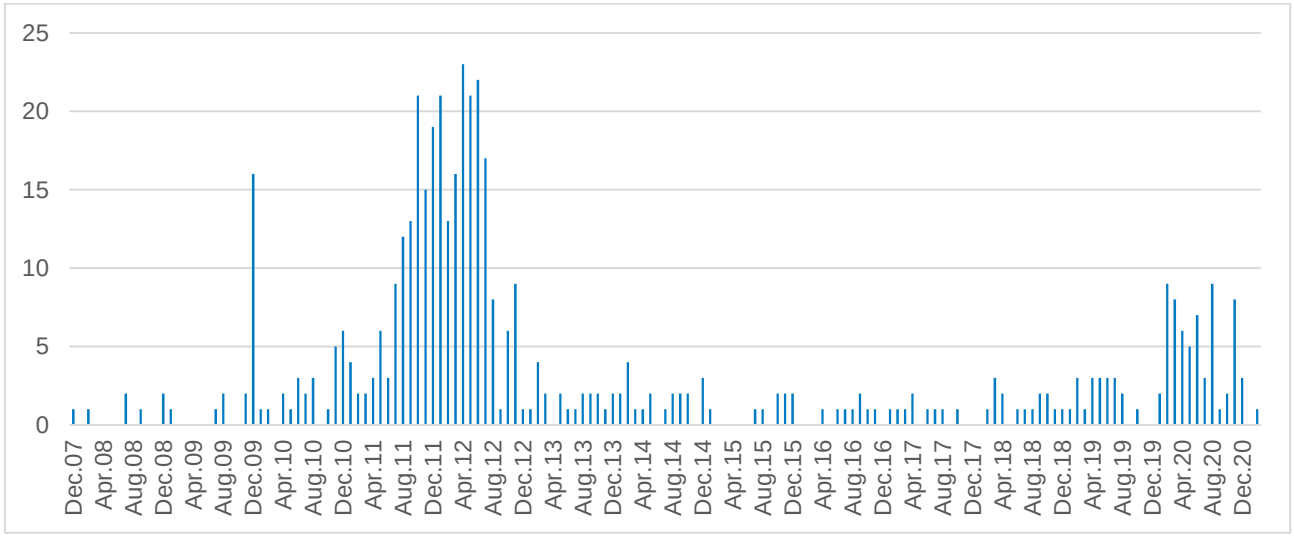
which coordinates and implements any policy/measure or stated goal (i.e. incentive schemes and voluntary programs), which leads to GHG emission reductions or increases net GHG removals by sinks that are additional to any that would occur in the absence of the PoA, via an unlimited number of CDM program activities." (CDM EB 2007).

At the following CDM EB meeting, several critical decisions were taken regarding PoAs. These decisions covered the approval of the design documents, procedures to register PoAs and issue CERs, and the amendment of small-scale CDM methodologies to make them suitable for programmatic activities. This led to a crucial regulatory evolution that defined new roles and actor types with specific roles in the more complex programmatic design structure. These include the CME, which leads the overall programme, as well as subproject implementers of CPAs. For all of these separate types of activities have been developed for the programme level (PoA-DD), component projects (PoA-CPA-DD), with different templates and requirements for small scale (SSC-PoA-DD) and large-scale activities (PoA-CPA-SSC-DD). Even after the adoption of these design documents, it took until 2009 to get the first PoA registered, and it was an energy-efficient lighting project in Mexico called "Cuidemos México". After further improvements in technical guidance, the number of submitted PoAs continuously increased and reached 40 submissions by the end of 2009.

In October 2009, the Joint Implementation Supervisory Committee (JISC) also adopted a procedure for registering Joint Implementation programmes of activities (JI PoA). Under this procedure, the first JI PoAs could be submitted by December 2009.

Prior to 2012, there were long delays in the first verification and issuance of CER for PoAs of up to three years. CMP6 was able to address the delays by simplifying the activity cycle, allowing for a combination of multiple methodologies, and providing specific sampling guidelines. With the new guidelines, DOEs no longer had to verify every CPA, which shifted their liability concerns onto the CMEs.

Figure 8: PoAs submitted between December 2007 and July 2014



Source 1: UNEP CCC, 2022

As can be observed in Figure 8, there was a "run-up" from 2011 to mid-2012 in submission of new PoAs. Several factors played a key role in this rapid uptake, although the dominant factor was the decision by the EU that non-Least Developed Countries (LDC) CDM activities would only be eligible to supply CERs for compliance purposes in the 3rd phase of the European Union's emission trading system (EU ETS), if they had been registered before 2013. This led to massive private sector-led spurt in the development of activities. After this peak in 2012, this 'gold rush' (Michaelowa and Buen 2012) was followed by a massive decline in CER demand and prices. This sudden change in fortune was due to the CER import bans by the EU mentioned above, as well as

a general global lack of mitigation ambition in the wake of the financial crisis, NGO criticism of the Kyoto mechanisms, as well as political uncertainty on the future of the global climate policy architecture prior to the Paris Agreement (Michaelowa et al. 2019). This market crash occurred at a point in time when developing countries with limited financial and administrative resources (e.g. LDCs and African countries) had just built their capacities in order to benefit from a range of CDM reforms that aimed at broadening access to the mechanism. At the same time, the carbon market depression was certainly a dominant factor that prevent many PoAs to harness their upscaling and replication potential.

During this low-price environment, the UNFCCC Secretariat and CDM EB instead focused on generating alternative use cases for CERs e.g. by using them in the context of results-based climate finance and voluntary offsetting through promoting the 'voluntary' cancellation of CERs (Michaelowa et al. 2019). Interestingly, after a long period of very low submissions of new PoAs, one a modest increase took place around 2020, arguably in anticipation of a possible transition to the new Art. 6.4 Mechanism and in order to cater to new buyers such as South Korea, which allow limited imports of international credits into their ETS.

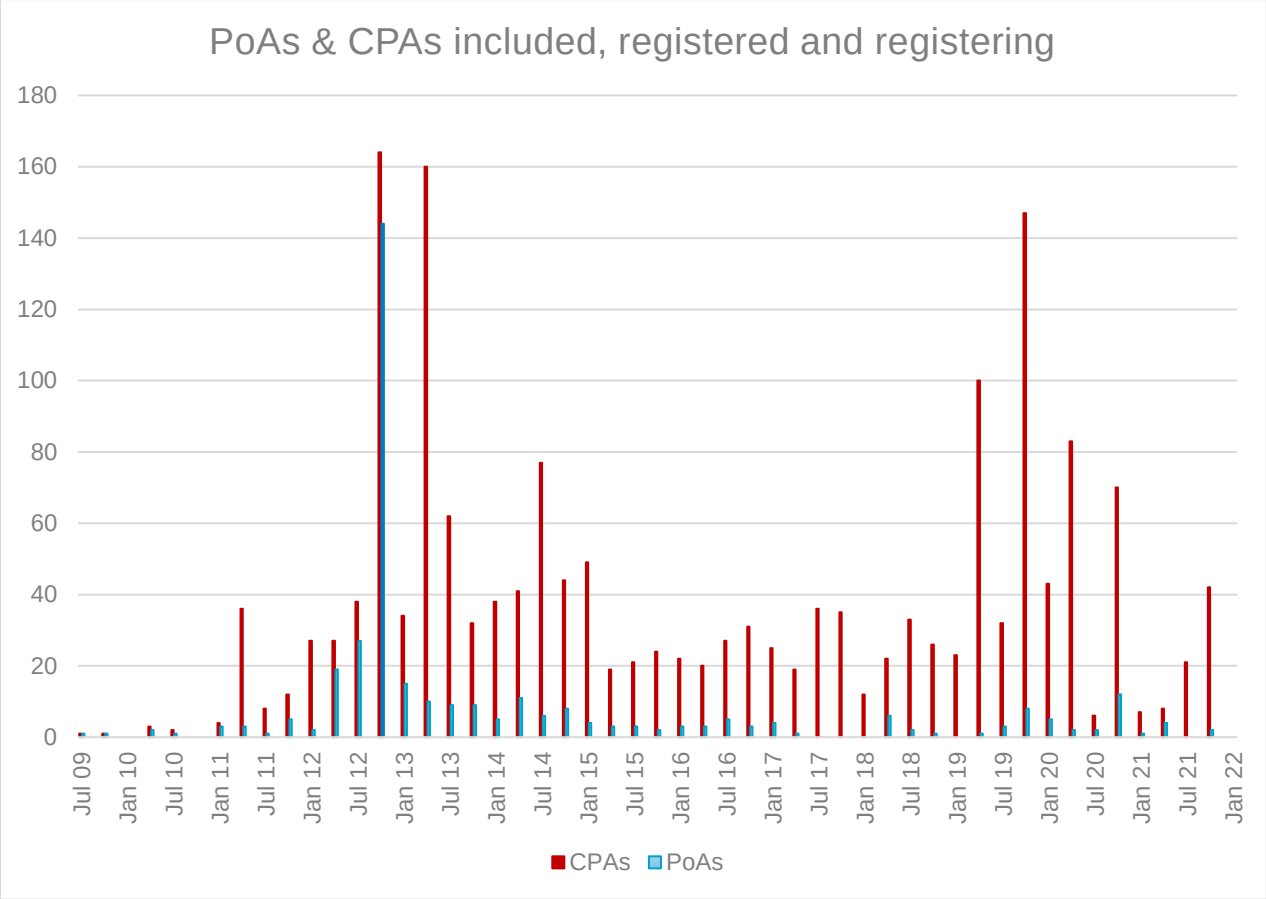
In order to consolidate the comprehensive regulatory experience of moving from single projects to PoAs within the CDM, in 2017 the 93rd EB meeting finalized a set of standalone PoA guidance documents (see Box 1). This was an important step as PoAs had previously been covered in guidance that was aimed at single project level. However, programmatic approaches benefit strongly from having regulatory guidance that fully takes into account the specific features of PoAs (e.g. sampling procedures for MRV).

- CDM project standard for programmes of activities
- CDM validation and verification standard for programmes of activities
- CDM project cycle procedure for programmes of activities
- Standard: Sampling and surveys for CDM

4.2 Analysis of the Historic Performance of CDM PoA and CDM Projects

This section analyses the importance of the PoA concept in quantitative terms with a focus on the temporal, geographical, and technological distribution of PoA activities. The temporal registration trajectory of PoAs and CPAs is illustrated in Figure 9. As discussed in the previous section, PoA submissions were mostly active in 2012, with the maximum monthly number of 144 PoAs registered in October 2012. The maximum monthly number of 164 CPAs was registered in the same month. Although the number of new registered PoAs continuously declined after 2012, with a brief resurgence in 2019 and 2020, the registration of new CPAs into existing PoAs remained relatively constant and also experienced an increase starting in 2019. This shows that even in a low CER price environment the significantly lower transaction costs and time of registering new CPAs was sufficiently attractive to enable the registration of new mitigation activities to existing PoAs. Even if the CER issuance rate is generally low, as was shown in chapter 2, there are several activity types with more than 100 CPAs which shows the practicability and general ability of the PoA concept to generate large numbers of replicable activities in practice.

Figure 9: The temporal trajectory of PoA and CPA registration until January 2022

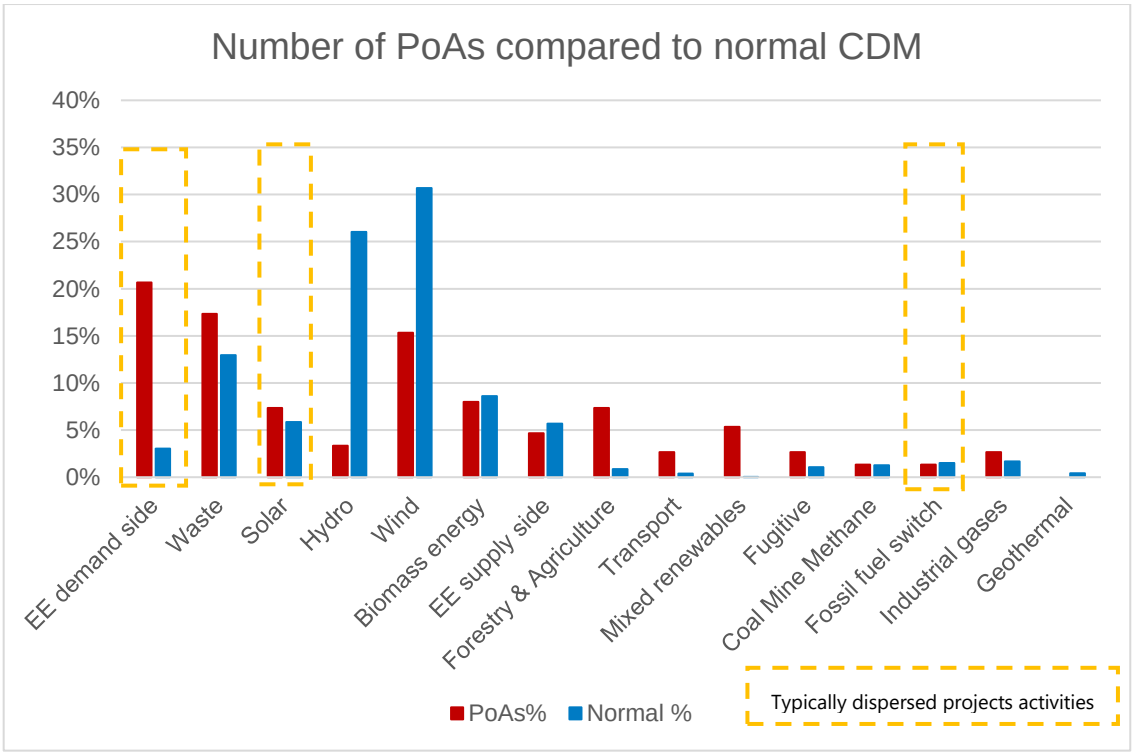


Source 2: UNEP DTU 2022

Comparison of Technology Distribution by CDM PoAs and Projects

When comparing the technology distribution of PoAs with single CDM projects, illustrated in Figure 10, it is evident that PoAs have played an important role in enabling access to technologies that did not manage to access the CDM previously, often because they are too small on their own. These include in particular energy efficiency through improved cookstoves and energy efficient lighting activities on the demand side at household level. PoAs are thus able to aggregate dispersed types of activities whereas single CDM projects were more dominant in sectors that include waste and grid-connected renewables technologies.

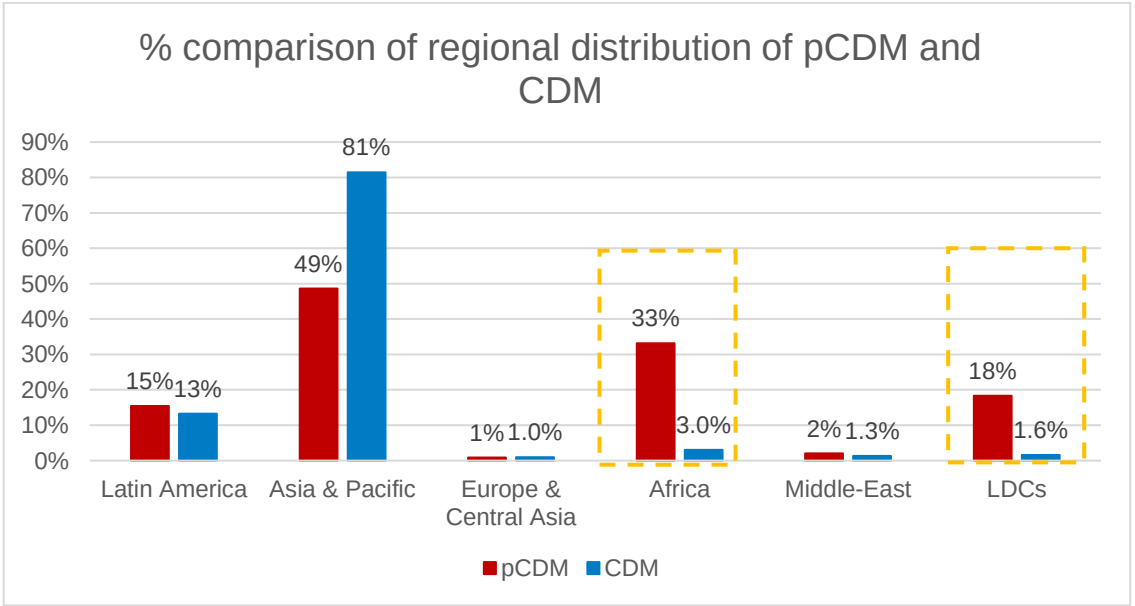
Figure 10: Comparison between PoAs and normal single CDM project distribution across different types of technology categories.



Source 3: UNEP DTU 2022.

Comparison of Geographic Distribution by CDM PoA and -Projects

Figure 11: Comparison in activity regional distribution between PoAs and normal single CDM



Source 4 UNEP DTU 2022

When looking at the geographical distribution of PoAs across regions, as illustrated in Figure 11, similarly to single CDM project activities, the region with the majority of PoAs is the Asia and Pacific region. A large majority of the PoAs in Asia and the Pacific can be found in China or India. Unlike single CDM projects, though, PoAs are more equitably distributed, with a significant share of PoA activities taking place in Africa. This considerable increase in activities in Africa is also subsequently reflected in an almost tenfold increase in the percentage of activities undertaken by PoAs in LDCs compared to conventional single CDM project activities. This increase in activities in LDC can be mostly attributed to energy-efficient cook stoves and off-grid solar PV appliances.

A6 Ready PoAs with CER Issuance

UNEP CCC classifies PoAs as "Art. 6 ready" (NDC eligible) and those that are not Art. 6 ready, although the methodology for this evaluation is not clearly established. To date, there are 142 Art. 6 ready PoAs, of which 33 have been issued CERs. (compare also chapter 2). This can partially be explained by low carbon market demand for many years of the crediting periods for most of these PoAs.

Table 5. Summary of the status of PoAs submitted.

STATUS OF POAS	NUMBER
Registered, no issuance of CERs	146
Registered, CER issued	71
Total registered but not Art. 6 ready	217
Art. 6 ready	142
Art. 6 ready, CER issued (2022)	33

Source 5 UNEP CCC, 2022.

There are different layers or scenarios, to assess the potential use of CDM PoAs under the Paris Agreement for NDC compliance. Two that arguably seem natural to assess are:

- What is the potential supply of CDM PoAs to meet the NDC targets by 2025?
- What is the potential supply of CDM PoAs, considering that more investment may be provided / stable demand?

In a first step, we analysed data available through UNEP CCC and UNFCCC to assess a 'business-as-usual' scenario, under which past issuance rates of currently registered and "Article 6 ready" PoAs is analysed. Data of UNEP CCC suggests that the 142 PoAs that are classified as being "Article 6 ready" have issued an accumulated 21,432 kCER over the time period since 2013 to 2022. When assessing the performance and potential impact of "Article 6 ready" PoAs, it is important to distinguish between those PoAs with a registration vintage from 2013 and 2020 and those with a registration vintage from 2021 and after. This relates to the outcome of COP26 in Glasgow which suggests that CERs with vintages from the 'earlier period' can be used towards the achievement under countries first NDC. However, looking at the historic performance, our analysis of the UNEP CCC database suggests that all CER of "Article 6 ready" PoAs have been issued by PoAs registered between 2013 and 2021. Unsurprisingly, considering the current so-called temporary measures provided by the CDM EB since, PoA registered in 2021 and after have not yet issued any CERs.

Assuming a constant issuance rate of the "Article 6 ready" PoAs and extrapolating the historic trend (i.e. the average issuance rate between 2013 and today) into the future, the issuance potential of PoAs that are eligible to issue CERs for use under the first NDC adds up to a total of 6,430 kCER in the remaining approx. three years

until 2025. Such 'business-as-usual' scenario would imply that no new investments would take place, hence no new CPAs would be included, and instead the existing CPA continue to issue CERs at this arguably low rate.

In a second layer, the data used is complemented with information on the ex-ante estimate of annual issuance for each PoA, respectively. Under an alternative 'best case' scenario, we assume that the existing "Article 6 ready" PoAs and CPAs tap their full potential. In this scenario, investments in CPAs materialise and CERs are issued to the full extent of the ex-ante estimate of each PoA, respectively, as published by UNFCCC. Our analysis that integrates these ex-ante estimates, indicates an issuance potential of 75,416 kCER annually, which can almost entirely be associated with PoAs with a registration vintage between 2013 and 2021 (99.4%),

The UNEP CCC database suggests an 'expected accumulated' issuance until 2025 of 461,360 kCER of all "Article 6 ready" PoA, although the methodological approach and how this figure was derived is not fully understood. Finally, It is worth emphasizing, that PoAs that are currently at the validation stage are not included, as their ex-ante estimate of carbon credit issuances is unknown and hence their CER issuance potential and their impact on international carbon markets is not quantified here.

4.3 Lessons learned on programmatic Approaches in the Kyoto Mechanisms

The successful establishment and operationalization of programmatic approaches has been one of the most relevant regulatory reform achievements in the Kyoto mechanisms. CDM and JI Programme of Activities have tapped into significant mitigation potential, enabled access to carbon markets for new green technologies such as decentralized sustainable energy access technologies and boosted access to the CDM for low-income countries. For instance, Africa hosts one-third of all registered PoAs which is a much larger share compared to single projects.

In the case of single CDM projects, every project activity has to be submitted to the UNFCCC for requesting registration after a partly exhausting validation process. Hence, the risk of non-registration or delays is considerable. This is an important barrier for (risk-adverse) investors. Once a PoA is registered, this risk of not passing validation has been eliminated or at least reduced, and the CME can include further CPAs within a few months without undergoing the same entire registration process again. The streamlined procedure and registration at PoA level also considerably reduced the time between project initiation and CER issuance, which helps reducing investment uncertainties. Having said that, the more complex programmatic frameworks also raise additional technical questions, e.g. in the Measurement, Reporting, and Verification (MRV) context, such as whether sampling across CPAs is possible, and with which sampling methods. Still, overall PoAs are more flexible and scalable compared to single CDM projects, as the exact location and size of how the programmatic framework will eventually expand to do not have to be defined ex-ante.

As a result of these achievements, there have been early efforts to facilitate the transition of PoAs into the new generation of market mechanisms under PA Art. 6. This includes the Future of the Carbon Market Foundations targeted support for high quality CERs during a low carbon price environment, as well as the World Bank Carbon Initiative for Development (Ci-Dev). Programmatic approaches have also been explored by financing institutions such as the GCF. Results-based climate finance could directly build on programmatic crediting mechanisms by procuring mitigation outcomes that are then retired, and can therefore be accounted to the NDC of the host country. Moreover, results-based climate finance can also draw on individual CDM PoA elements such as MRV standards and institutional design.

Lessons learned from CDM

Key features of CDM rules for programmatic approaches include the ability to add an unlimited number of CPAs, potentially for multiple technologies implemented in multiple countries, all without undergoing the full CDM project cycle for each CPA. CPAs are comparable to single projects in terms of technology and scale, as

often the same methodologies can be used for projects and programmes. PoA specific elements in CDM methodologies took a long time to develop and should certainly be carried forward with further improvements that reflect the quality principles of the Art.6 Glasgow decisions. Further key aspects are regulatory documents such as the ones described above, which are the result of many years of deliberation and gathering practical experiences.

There are further CPA crediting periods that are also aligned with single projects (either 7 years renewable of 10 years non-renewable), however, PoA lifetimes can be up to 28 years. This means that some registered CDM PoAs have a validity that theoretically even extends beyond first NDC periods. This also means that currently registered PoAs can be rapidly scaled up if transitioned successfully, provided all other relevant participation requirements are met. Even ahead of the operationalization of the Art.6.4 Mechanism, the CDM's temporary measures would enable CMEs to add further CPA to the CDM PoA on a provisional basis, with the expectation that they would then be able to transition to Art.6.4. Due to their replication and upscaling potential, PoAs could potentially also be integrated with policy instruments that improve e.g. the regulatory environment for implementing related technologies. For such purposes, the stakeholder roles established through PoAs meaning the relationship with the CME and CPA proponents is highly valuable not only with regard to their role in the implementation and MRV purposes, but also for ownership of carbon assets and related business models.

Lessons learned from Joint Implementation

JI enables an Annex B Party to buy emission reduction units (ERUs) from an emission reduction or removal activity in another Annex B Party. Since ERUs have to be converted from host Parties' Kyoto carbon budgets (Assigned Amount Units, AAUs), JI operates in a "capped environment" with national emissions reduction commitments. Therefore, conceptually JI is somewhat similar to PA market mechanisms where all parties have emissions reduction commitments in their NDCs. However, different countries implemented JI differently depending on whether they had a surplus or deficit of AAUs. Countries with ambitious emissions reduction commitments had an incentive to ensure additionality and environmental integrity, while countries with "hot air" (=surplus AAUs) have treated additionality more leniently (Shishlov and Cochran, 2015).

While PoAs were allowed in JI as of 2009 as described above, the uptake of PoAs was much more limited compared to the CDM. A comparatively large number of single JI projects could have been theoretically structured as PoAs, but only very few countries actually implemented the concept, including Germany, France and Poland. This led to a total of 19 JI PoAs, of which only 6 actually achieved ERU issuance. None of these PoAs achieved adding more than 2 component activities, which means that significant upscaling as seen in CDM PoAs did not materialize. On the other hand, there was a high degree of replication in single JI project activities in various sectors such as landfill gas, coalbed methane, but also renewables (UNEP CCC JI Pipeline 2022). Owing to the more advanced economic development in these host countries, JI PoAs had a stronger focus on industry compared to CDM, which may also provide additional insights and methodological experience with technologies and project types that are also relevant for implementing Art. 6 in emerging economies that have already been industrializing.

JI PoAs also show that host country governance is crucial. JI PoA host countries experimented with different approaches to ensure environmental integrity such as discount factors (France) and reverse auctions (New Zealand). On the other hand, JI also generated many activities with low integrity that can only be seen as laundering hot air due to unambitious emission reduction targets and weak governance (Kollmus et al 2015). Therefore, the experience with JI PoAs shows that ambitious or unambitious interpretations of the same rules by different host countries can lead to very different outcomes in terms of both scale and integrity. However, this was also only made possible by contextual factors such as a large degree of hot air in the emission reduction targets of some countries.

4.4 CURRENT RULES AND LIMITATIONS FOR CONTINUING POAS UNDER PA ART.6

As the first NDC implementation period starting from 2021 has begun, the rules for programmatic and sectoral crediting approaches under Art. 6 need to be clarified. While it is clear that Art. 6 approaches will allow both projects and programmes, as well as "other" activities (e.g. policies) to access carbon market instruments, there is a lot of technical work required to clarify exactly which lessons and experience from the Kyoto mechanisms will be transitioned to the Art6.4 Mechanism. This needs to be worked out further both in UNFCCC negotiations, but in particular at the regulatory level of the Art.6.4 Supervisory Body. In the meantime, voluntary carbon standards such as the Gold Standard and VCS continue to operate and evolve PoAs, often closely leaning on CDM tools such as methodologies.

At the same time, the decisions on CDM transition also clearly defined that PoAs would be fast-tracked in the transition process from CDM to the Art.6.4. mechanism, which was a key priority for the African Group of Negotiators (AGN), reflecting the importance of PoAs for enabling access to the CDM in Africa. Once transitioned, such PoAs may also enable rapid implementation and upscaling as many of them already operate one or several component projects, and may even already have been registered for further CPA types that have actually never been implemented due to unattractive and uncertain general carbon market prospects prior to 2020. A key challenge is that there are no clearly defined UNFCCC rules for transitioning PoAs to the Art. 6.4 mechanism. It is clear that only PoAs registered after January 2013 are eligible to generate CERs that can be used towards the first NDCs under the PA until 2030. The host country governments will have to develop own criteria that evaluate the relationship of a CDM activity with the NDC. While the Art. 6.4 mechanism is still not operational, the CDM continues to operate under so-called temporary measures (CDM EB 2020). This means that the fully CDM activity cycle is available in principle, but registration and credit issuance are only temporary and can thus not be released from the UNFCCC registry. However, PoA proponents can already make use these temporary measures as a way to "prepare" for the transition. While technical work has been initiated in particular on updating methodologies to reflect the Art. 6 quality principles on baseline and additionality, many aspects of these methodologies but also stakeholder roles such as host countries, CMEs and CPA implementers still need to be adjusted based on the new PA requirements. However, provided lessons from the Kyoto mechanisms are diligently taken into account rather than reinventing regulatory guidance from scratch, this can be achieved relatively quickly. The consolidated body of PoA-related CDM rules already offers a substantial body of experience, regulatory guidance and methodological tools. These lessons from programmatic approaches should be harnessed, while ensuring that rules are adjusted to reflect the new global context. The COP 21 decision related to Art. 6 also clearly refers to building on existing experience.

As a first step, countries will need to make decisions on which PoAs they allow to transition to the Art. 6.4. mechanism, as the relationship of these PoAs to the NDC is a crucial decision-making criterion, which cannot be determined multilaterally, since NDCs greatly differ in their methodological features and target definitions. Hence, host countries have a high degree of flexibility in how they define criteria for approving activity transition, which will give a first indication in how they interpret their new role in the Art. 6 context with regards to preventing overselling mitigation outcomes.

Regarding PoA lessons for more innovative carbon market approaches, such as policy crediting – the potentially most innovative future element of Art. 6.4. mechanism – which has similarities with programmatic approaches by defining clear investment boundaries. This is likely to lead to a demarcation of activities that may resemble component activities of PoAs, with an additional policy layer that PoAs were not able to integrate into the CDM due to a lack of political mandate by Parties. However, as programmatic activities will contribute to host country NDC objectives, this may lead to a much more common integration of PoAs with national policy instruments that will be designed for NDC implementation. Emerging documentation in actual early Art. 6 pilot activities typically states how they will contribute to the host country's NDC objectives. While these pilots remain small, even programmatic approaches road-tested under CDM, aggregating mitigation activities

in multiple countries and with multiple technologies can go a long way in delivering rapidly upscaled mitigation activities, as some CDM PoAs with hundreds of CPAs clearly show. A crucial barrier at this time remains the incomplete institutional framework and capacity in almost all host countries since the Art. 6 rulebook has only recently been agreed at COP26. Once these barriers have been overcome, PoAs begin to transition to the mechanism and new activity types emerge, the replication potential of programmatic approaches, integrated with domestic policies in support of NDCs could quickly unfold their potential.

4.5 Conclusions and Outlook

The analysis showed that despite low CER issuance rates (see chapter 2), PoAs have been firmly established in the international carbon markets through the Kyoto mechanisms and established a crucial progression beyond single project activities that achieved multiple important impacts. These include in particular broadening access to the CDM to a larger group of previously underrepresented countries, but also opened the mechanism to decentralized technologies beyond point-source emissions.

While the initial experience with registering the first PoA was very cumbersome, taking many years to before first CER issuances could be achieved, continuous improvements of regulatory guidance has generated a consolidated set of CDM rules for PoAs which cater to the distinct features of programmatic approaches. These do not yet reflect the PA Art. 6 quality principles, but still represent an important foundation for enabling programmatic approaches to play a key role in the successor to the CDM (the Art. 6.4 Mechanism) which is likely to also spill over to other elements of Art. 6 such as bilateral cooperative approaches.

On a practical level, the existing CDM portfolio comprises a large number of PoAs that are likely to transition not least because a comparatively large number are hosted in low-income countries, but also because many PoAs have been registered more recently than many single project activities. Once transitioned, those PoAs may be able to replicate a currently small number of component activities quickly, in particular if carbon credit demand continues to increase and there are meaningful price signals. This may enable large-scale mitigation at rapid pace. Perhaps even more important is how newly emerging technologies with more transformational impacts that have not been supported under CDM (e.g. electric mobility, green hydrogen but also productive use of off-grid renewable energy) can also tap into these existing foundations once they have been adjusted to Art. 6 requirements.

Demonstrating the viability of such reinvented programmatic approaches in pilot applications will be crucial and should be actively promoted by the public sector, in order to create confidence by private sector stakeholders to invest and innovate in PoAs in Art. 6 carbon market instruments.

5 Consideration of PoA Elements in Article 6 Piloting Activities

5.1 Introduction & Methodology

The aim of this section is to identify whether there are considerations of PoA elements in Art. 6 pilot activities. This chapter outlines and evaluates existing and emerging pilot programmes that intend to harness Art. 6 of the Paris Agreement. As discussed above, the PoA concept was established with the aim to bundle mitigation measures under one umbrella to reduce transaction costs and reduce time required for project inclusion in the CDM. Typically and as mentioned, such (often small scale) mitigation actions offer also significant contributions to sustainable development and the achievement of the Sustainable Development Goals (SDGs). Under the Art. 6 Rulebook of the PA, PoAs can be implemented under both Art. 6.2 and Art. 6.4 to help meet countries' NDC targets.

COP26 in Glasgow marked the completion of the Paris Rulebook, which now includes, inter alia, the modalities, rules, and procedures (under Art. 6.4) governing Art. 6 pilot activities. Since the conclusion of the Art. 6 Rulebook in 2021, a wide range of Art. 6 pilots have crystallized and instead of adopting the guidance used by PoAs based on CDM methodologies, the topical Art. 6 rules and texts steer the on-going and future pilot initiatives.

This chapter add to the previous mapping exercise by looking at the uptake of programmatic approaches under the CDM and Art. 6 pilots. This part of the report depicts existing Art. 6 pilot activities by tracking publicly available information from the UNEP-CCC[2] database. This shall inform policy makers and investors on the current and future state of PoAs under Art. 6 of the Paris Agreement. The analysis seeks to explore the consideration of PoA elements in Art. 6 pilot activities. On this basis, the characteristics and features outlined in this analysis are used solely to simplify and to help better understand the similarities, interlinkages and combined characteristics of PoA elements in Art. 6 pilot activities.

The information presented in this analysis has been developed based on a combination of (i) desk research identifying and assessing PoA elements in Art. 6 pilot activities and (ii) the subsequent findings on the representation of these elements in Art. 6 pilots. Finally, semi-qualitative interviews (see Annex II) were conducted with two financial institutions that are active in the Art. 6 landscape.

5.2 Assessing PoA Elements in Article 6 Pilot Activities

For the purpose of this assessment, we again have extracted data from the UNEP-CCC database on Art. 6 pilot activities. These activities are assessed and categorized based on their different characteristics and sizes. The activities are grouped according to their respective geographic locations: West Africa, East Africa, South Africa, Latin America, Caribbean, Asia and Middle East and North Africa (MENA). Multinational activities and initiatives were separated from the various regions identified due to their cross-cutting nature. A few multinational initiatives listed in the UNEP-CCC database were excluded from the analysis to avoid duplication since they aggregate Art. 6 pilots that are included as standalone pilots.

In a first step, we listed the Art. 6 activities extracted from the UNEP-CCC database. The list of activities is not intended to be exhaustive. The activities included in the assessment only provide a partial view of the landscape of recognized Art. 6 pilots. It is important to note that a number of Art. 6 pilot activities in the analysis may lead to different types of results-based finance that do not lead to an international transfer of mitigation outcomes (ITMOs) or emission results. Table 6 provides a snapshot of some of the Art. 6 pilot activities that were

[2] UNEP-CCC database retrieved from the Article 6 pipeline. Available here.

included in this analysis and Annex I comprises a complete list of A6 projects analysed. The assessed Art. 6 pilot activities could represent a framework that can accommodate an increasing number of similar and discrete greenhouse gas reduction activities, registered under a single project. Under the CDM, this was doable if underlying activities (CDM-CPAs) promoted either the same or multiple technologies, facilitated its dissemination and construction, and the provision of maintenance and/or support with financing[3].

Table 6: Snapshot of the assessed Art. 6 pilot activities

REGION	COUNTRY	ART. 6 PILOT ACTIVITIES
West Africa	Senegal	EcoCar Solaire
West Africa	Ghana	Solar PV for health centres
East Africa	Kenya	Geothermal energy
East Africa	Kenya, Tanzania	Biogas programme
Latin America	Colombia	Biogas from industrial wastewater
Latin America	Peru	Green ITMO credit line for the Peruvian SME Industry (ITMO-GCL)
Caribbean	Dominica	Green finance for e-mobility
Asia	Laos	Clean and improved cooking
Asia	Thailand	The SHIFT Project: Promoting the adoption of electric vehicle fleet mobility for logistic services
MENA	Morocco	Organic waste to energy programme

In a second step, a wide range of attributes of PoA activities were identified from which a selected list of attributes and characteristics of PoAs (Table 7) **were chosen**. This was done through the existing knowledge on the PoA concepts. Contrary to standalone CDM projects implemented and restricted to one location, bundling projects or subprojects implemented in different locations are simplified using the PoA concept through predefined crediting periods and the application of simplified small-scale methodologies (depending on the size of a CPA). The characteristics and features of PoAs identified were complemented by a short question to support the mapping of PoA elements in Art. 6 pilot activities.

Table 7: List of characteristics and features of PoAs

CHARACTERISTIC/FEATURE	QUESTION
Small-scale technologies	Does the project promote small-scale activities such as cookstoves, solar water heaters, energy efficient lightbulbs, among others?
Grouping similar activities	Does the Art. 6 pilot follow a CDM-PoA project cycle?
Project Boundaries	Are Art. 6 pilots implemented in multiple countries?
Sectoral Approach	Does the pilot have a sector-wide coverage?

[3] The Handbook for Programmes of Activities: Practical Guidance to Successful Implementation. Available here.

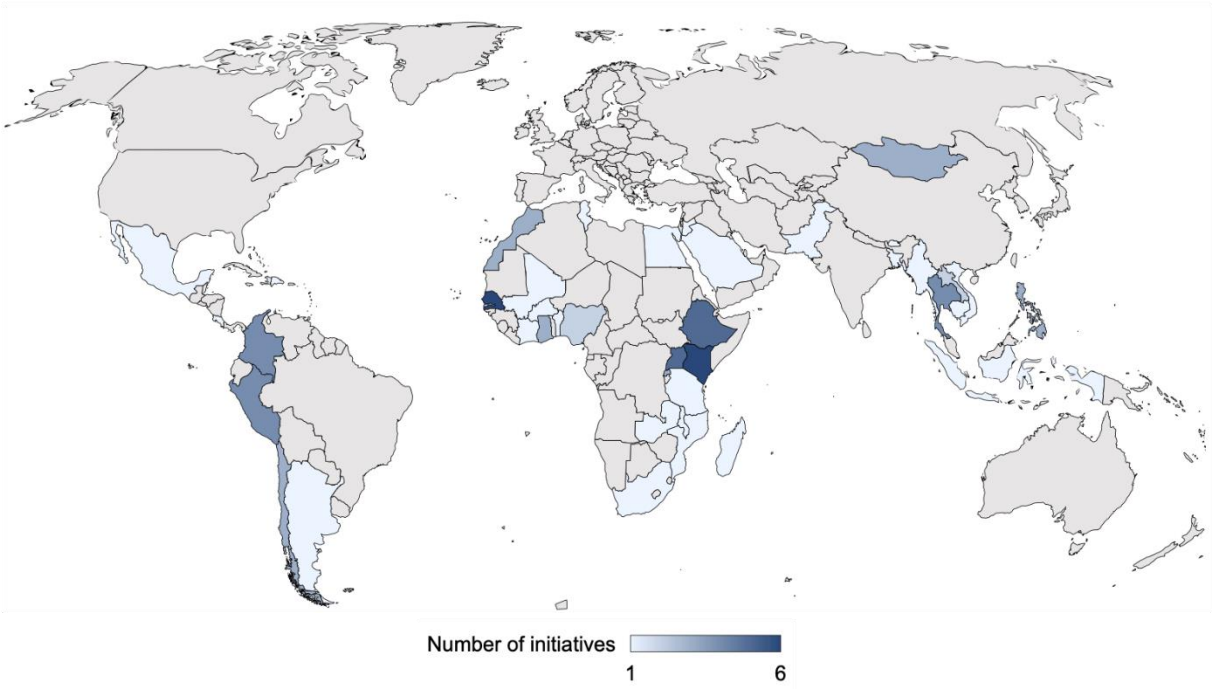
CHARACTERISTIC/FEATURE	QUESTION
Innovation	Does the project deploy innovative approaches for dealing with reducing time, effort and transaction costs?
Coordination	Is there a central entity that oversees project monitoring and implementation?
Voluntary Carbon Market	Do the Art. 6 activities follow a Verified Carbon Standard (VCS) grouped project or Gold Standard PoA approach?
Implementing entity	Who is the main implementer of the pilot activity (government, project developer or other)?

Fifty-three ongoing Art. 6 pilot activities were identified and mapped. Each consortium member identified potential considerations of PoAs based on the characteristics and features presented in Table 7 in Art. 6 pilot activities under their assigned group of countries. An Excel table listing the Art. 6 pilot activities, including the mentioned characteristics and features, was used to analyse PoA elements (Annex 2).

5.3 PoA Elements in Article 6 Pilots

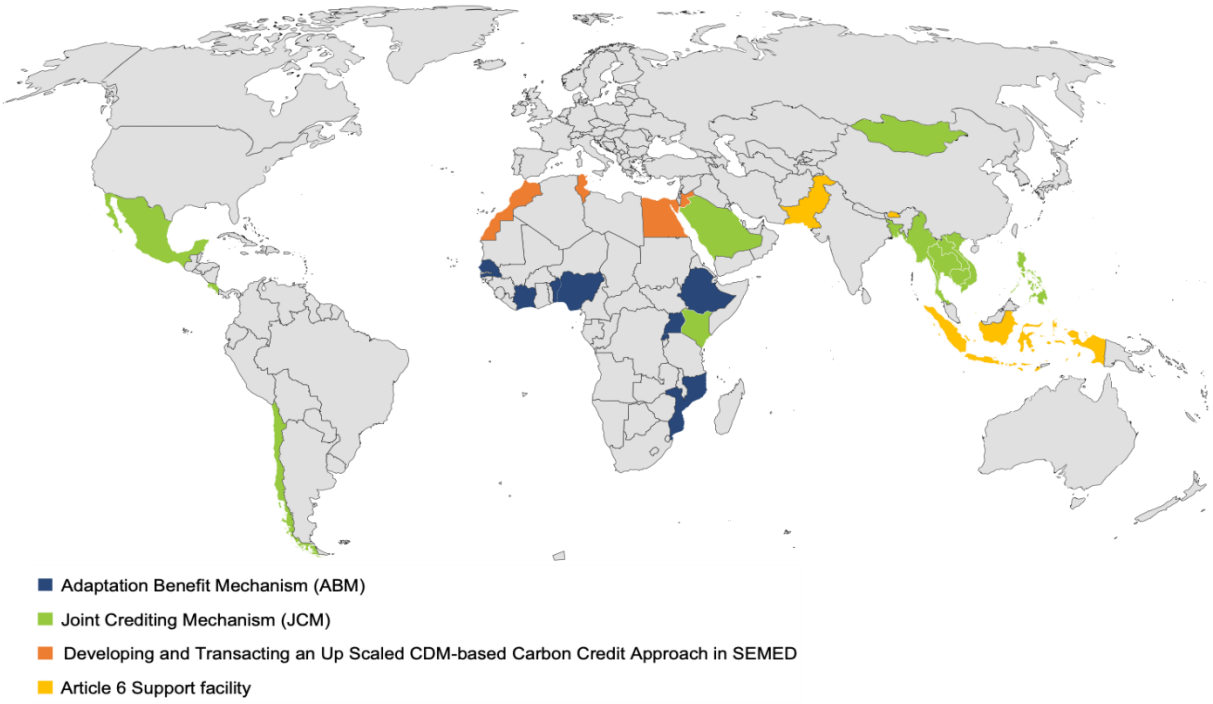
Upon the identification of most relevant elements of the PoAs, a desk review was conducted to identify ongoing Art. 6 projects with these selected PoA attributes. PoAs attributes in Art. 6 activities were implemented in all regions (Table 6). As shown in, most of the 53 Art. 6 pilot activities are located in the African continent, with 11 in the West Africa region, 13 in East Africa and 4 in Southern Africa. Other registered projects include 10 projects in Latin America, 2 in the Caribbean, 7 in Asia, and 2 in the MENA region. Additionally, 4 projects from multinational initiatives are considered.

Figure 12: Initiatives implemented



Additionally, as shown in Figure 13, 4 of the Art. 6 initiatives mentioned above are being implemented on a multinational level. These are the Joint Credit Mechanism (JCM) led by Japan, the Art. 6 Support facility developed by the ADB, the Developing and Transacting an Up scaled CDM-based Carbon Credit Approach in SEMED by the European Bank for Reconstruction and Development (EBRD), and the Adaptation Benefit Mechanism mobilized by the public and private sector finance led by the African Development Bank (AfDB).

Figure 13: Multinational initiatives



Among the elements analysed, most regions (64%) have developed pilots for small-scale technologies. In this regard, the region with the largest number of pilots is East Africa, with 10 PoA-type projects, followed by West Africa and Latin America with 7 and 6, respectively.

Furthermore, during the analysis of PoA elements in Art. 6 pilots, many Art. 6 pilots lacked detailed descriptive information, which lists those projects that follow CDM or PoA project cycle. However, for Art. 6 pilots that contain complete information, a large number of projects (51%) had PoA attributes, and these projects were identified in East Africa -mainly in Kenya, Ethiopia and Uganda, Latin America -with the largest number in Peru and Colombia, and Asia.

Also, most of the Art. 6 pilots presented are implemented in a single country, where these represent 85% of the total. Only the East and Southern Africa regions have 2 and 1 pilot implemented in different countries respectively. On the other hand, as described in Figure 133 above, there are also Art. 6 pilots implemented at a multinational level, 2 in Latin America, 1 in the Caribbean and another in the MENA region.

Regarding the sectoral approach of the pilots, it can be identified that half of the projects include a sectoral scope, with a higher emphasis on those in Latin America. In contrast, there is a marked tendency not to include this approach in the African continent, with a greater number of projects in the East Africa and West Africa region, with 10 and 7 projects, respectively.

On the other hand, taking into consideration whether the project deploys innovative approaches for dealing with the registration and implementation complexities that characterized CDM stand-alone projects, the results show that most of the projects (60.71%) do not reflect these PoA considerations. However, approximately

36% of the projects are innovating in some way; almost half of this innovation comes from Latin American countries, revealing the potential of this region in the development of Art. 6 projects and PoAs.

Finally, almost 60% of the projects have a centralized project management entity in charge of overseeing the monitoring and implementation. Despite the data showing that only 19.64% of the projects have multiple entities overseeing the implementation of these projects, there is a lack of sufficient information in 21.43% of the projects. The analysis shows that PoA projects in African countries tend to subscribe to centralized management entity overseeing the implementation.

5.4 Interview findings with financial institutions

To further support the analysis of considerations of PoA elements in Art. 6 pilots, we conducted three interviews at the start of September 2022 with two financial institutions, the World Bank (two interviews) and the Asian Development Bank (one interview). The purpose of the interviews was to obtain insights from financial institutions (i) with experience with PoAs under CDM ii) on the prospects of PoA and the implementation of its considerations in current and future Art. 6 projects, including the future of PoAs under Art. 6 lists the institutions that were selected to be interviewed and to garner their inputs on the consideration of PoA elements in Art. 6 pilot activities.

Asian Development Bank

Currently, the Asian Development Bank is supporting the development of pilot projects under Art. 6 in East Asia countries such as Indonesia, Vietnam, and Thailand. However, even though ADB considers PoAs an important destination for funding and investment decisions related to mitigation activities, it is not their principal approach. Their funding portfolio supports actions aligned to the fulfilment of the countries' NDCs, not only for the development of carbon projects.

ADB does not condition the resources for the development of carbon projects. This means that any country or organisation interested in purchasing carbon credits coming from ADB financed projects can acquire them without any problem. On the other hand, when ADB plans to purchase carbon credits, it prefers to finance projects with technologies where the risks are distributed. For example: in large-scale projects the risk concentrates in a single plant, thus, if the plant fails the certified emission reductions related can be jeopardized.

Finally, ADB finds PoAs a practical concept to monetize the emission reductions they purchase, however, some challenges associated with the PoAs transaction rules, technologies and MRV issues are perceived. In relation with Art. 6, while PoAs are not explicitly mentioned, there is no record for its prohibition. This suggests that possible changes to Art. 6 could include making the rules more flexible and less punitive.

World Bank

The World Bank (WB) supported the development of the PoA concept that simplified the restrictive process under the CDM. Also, the intent was to help countries that were bypassed by the CDM (i.e. smaller countries) get access to it and scale up the mechanism to include large sectoral programmes. Finally, PoAs were developed to become more sophisticated on the finance side, to facilitate upfront financing and reducing risk and ease project developers' experience.

According to the World Bank, PoAs helped facilitate access to market mechanisms for smaller countries and innovative features that make PoAs attractive such as the standardization of MRV should be applied/carried over to Art. 6. The World Bank developed one successful mitigation programme in the waste management sector (landfills), through the Carbon Partnership Facility. However, overall, scaling up the market fell behind expectations. Reasons behind the underperformance of the PoAs could be attributed to the decline of the market and the imperfection of PoA rules.

When considering PoA elements under Articles 6.2 and 6.4, the World Bank highlights the importance of Art. 6.4 for smaller countries. Bearing in mind that the poorer countries are priority clients for Art. 6.4, the focus of the work for smaller countries should be on methodologies. Additionally, due to the bottom-up approach of PoAs, several elements of PoAs can lend themselves to Art. 6.2. Under Art. 6.4, if PoAs become what could be referred to as CDM+ (or PoA+), the resurgence of similar issues such as high transaction costs and long implementation processes might occur. Also, unlike CDM-PoAs, NDC targets need to be considered under Art. 6.

Under a new umbrella facility called the Climate Emissions Reduction Facility (CERF), the World Bank seeks to adopt programmatic crediting approaches that they consider highly relevant under Art. 6. Also, the Standardized Crediting Framework (SCF) reflects the World Bank's vision for PoAs, moving away from CDM into potential new market mechanisms. Programmatic crediting and the PoA tradition continue through the SCF.

The World Bank differentiates between sectoral approaches and PoAs. Sectoral approaches are an inventory-based approach, where sectoral emission evolution over time can be observed. A sectoral approach offers advantages in scalability and in flexibility of project implementation. However, disadvantages of the inventory-based approach include working in homogeneous sectors that are less interwoven with others.

Regarding potential reform areas, the World Bank highlights (1) the importance of a *project cycle reform*: i.e., going away from the need to validate small bundles of activities as it differs from the PoA concept; and (2) revising *climate finance rules* since there is tendency in modern climate finance to segregate climate finance away from market mechanisms and the most extreme case is the Green Climate Fund. Art. 6 should also contain improvements to the digital MRV by linking baselines with NDCs and enable small projects to start to earn credits from day of implementation instead of the day of inclusion. Finally, it's important to look at how nature-based solutions, climate smart agriculture and methane lend themselves to PoAs as well.

5.5 Conclusions

The following conclusions are drawn:

1. Globally, 64% of regions have developed Art. 6 pilots for small-scale technologies, 50% of the projects include a sectoral scope and 85% are implemented in single countries.
2. 61% of the projects do not reflect innovative approaches to deal with the complexities of registration and implementation that characterize stand-alone CDM projects.
3. Almost 60% of countries identified have a centralized project management entity in charge of overseeing the monitoring and implementation. However, PoA projects in African countries tend to subscribe to a centralized management entity overseeing the implementation of projects.

Interview insights with financial institutions include:

4. Reform areas for PoAs could be made on (i) steering clear from the need to validate small bundles of activities; and (ii) revising climate finance rules to avoid segregating climate finance away from applicable market mechanisms.
5. Improving the digital MRV in Art. 6 by linking baselines with NDCs and enabling small projects of earning carbon credits from the day of implementation instead of the day of inclusion.
6. Looking at how nature-based solutions, climate smart agriculture and methane lend themselves to PoAs and the additional technologies that were largely missing in the CDM, namely off-grid renewable energy, electric mobility, technological carbon removals and hydrogen.
7. Attracting project finance is enhanced when technologies disaggregate project risk.

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Annex I: List of A6 Pilot Activities Analysed

Table X: List of analysed Article 6 pilot activities extracted from UNEP-CCC

West Africa	Mali: Rural Electrification – Mali
	Dissemination of Domestic Biogas Digesters in Senegal's Rural and Peri-urban Areas – Senegal
	Sustainable Waste Management Program in Senegal – Senegal
	EcoCar Solaire – Senegal
	West Africa: Biodigesters – Burkina Faso
	Sustainable biomass in Senegal – Senegal
	Senegal: Rural Electrification – Senegal
	Solar PV for health centers in Ghana – Ghana
	Nigeria renewable energy - mini grids – Nigeria
	Ghana's Transitional National Clean Energy Access Program – Ghana
	Clean Cooking: Transformative Cookstoves in Rural Ghana – Ghana
East Africa	Uganda rural electrification – Uganda
	Kenya geothermal energy – Kenya
	Kenya: Biodigesters – Kenya
	Kenya: Small-hydro – Kenya
	Ethiopia: Biogas – Ethiopia
	Ethiopia: Off-Grid Renewable Energy – Ethiopia
	Efficient household stoves in Ethiopia – Ethiopia
	Biogas programme in Kenya and Tanzania – Kenya, Tanzania
	Rwanda: Clean and Improved Cooking DelAgua – Rwanda
	Uganda: Rural Electrification – Uganda
	Safe water access in Uganda and Rwanda – Uganda, Rwanda
	Kenya: Solar Lighting – Kenya
	Sustainable transportation – Uganda
Southern Africa	Cookstove and Sustainable Biomass Programme – Malawi
	Efficient cookstoves in Zambia – Zambia
	Production of green hydrogen in South Africa – South Africa
	Madagascar: Ethanol Cookstoves – Madagascar

Multinational	Joint Crediting Mechanism (JCM) – Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Vietnam, Laos, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Philippines and Thailand
	African Development Bank (AfDB): The Adaptation Benefit Mechanism
	Article 6 Support facility – Asia and the Pacific (ADB)
	Developing and Transacting an Up Scaled CDM-based Carbon Credit Approach in SEMED – Egypt, Morocco, Jordan, Tunisia
Latin America	Green ITMO Credit Line for the Peruvian SME Industry (ITMO-GCL) – Peru
	Program to reduce emission in the Chilean waste sector – Chile
	Peruvian waste sector (SWS NAMA ITMO) – Peru
	Chile "Firm and Flexible" Renewable Energy Virtual Pilot – Chile
	Net Zero Energy Buildings (NZEB) – Colombia
	Biogas from industrial wastewater – Colombia
	Off grid solar PVs – Colombia
	Renewable energy from industrial waste and rural small scale solar in Colombia – Colombia
	Biogas production in Argentina – Argentina
	Tuki Wasi ("Clean Homes"), Improved Cook Stoves in rural areas – Peru
Caribbean	Biogas production in the Dominican Republic – Dominican Republic
	Green Finance for E-Mobility – Dominica
Asia	Ground source heat pumps in Khovd city – Mongolia
	The SHIFT Project: Promoting the adoption of electric vehicle fleet mobility for logistic services – Thailand
	Renewable Heating Virtual Article 6 Pilot – Mongolia
	Philippines Food Cold Chain Virtual Pilot – Philippines
	Policy Brief Proposal for Biogas Waste Banks in Indonesia – Indonesia
	Lao: Clean and Improved Cooking – Laos
	Thailand low carbon cities programme – Thailand
MENA	Organic Waste to Energy Program Morocco – Morocco
	Energy Efficiency Fund in Morocco – Morocco

Annex II: Guiding Questions for Interviews with Financing Institutions

Guiding questions for interviews with the World Bank and the Asian Development Bank	
Experience with PoAs:	
Q1	When you developed Article 6 pilot activities as a financial institution, did you consider PoA elements in the process? If yes, is this an integral part of your financing or investment decision for mitigation activities?
Q2	Do you think that there is a [growing] awareness and interest within the banking system on sectoral approaches and the opportunity it holds for diversified investments? Would you say there are disadvantages too?
Q3	From your field experience, do you think that projects/activities adopting a sectoral approach have more financing prospects?
PoA opportunities for Article 6 projects:	
Q4	Are you aware of any ongoing Article 6 pilot activities (whether in the agreement formalization stage) that are up taking any attributes of PoAs?
Q5	Having financed CDM-PoA activities before, which element of the CDM-PoA project cycle would you promote for adoption into Article 6 implementation?
Working with host countries:	
Q6	There is a growing understanding that PoA implementation is a great opportunity for host countries to implement their SDGs. How are host country governments helping financing institutions with mitigating uncertainties linked to capital investments and lowering risk with loan financing?