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The Transition Controversy

How much CDM should be in the Paris Agreement world?

How much is this ITMO?
Pricing in the early ITMO market

Content

July - August

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editorial

Dear Reader!

From Kyoto to Paris – the transition of the CDM into the Paris Agreement world is one of the most hotly debated issues in the Article 6 negotiations. It is a complex, multi-faceted issue with numerous technical as well as political aspects. In this issue of CMR, we exclusively present new research commissioned by Japan and Germany, which is intended to broaden the empirical basis and make well-informed decisions in the negotiations easier. Please see the adjacent cover feature to find out more.

Also in our cover feature, we analyse the implications of the gap for emission reduction projects, which will occur between the end of the CDM and start of the Article 6.4 mechanism – a gap in time which must be kept as short a possible if use of the mechanism in the first NDC period is to be ensured.

Elsewhere in this issue of CMR, we present an analysis on pricing in the early ITMO market. In the example of Sweden, our authors explore both elements of price setting as well as price drivers. In other articles, the World Bank shares its take-aways from 10 years' experience with the Partnership for Market Readiness programme and we look at the technical and political challenges involved in decarbonizing the shipping sector.

On behalf of the editorial team, I wish you an interesting and informative read.

Christof Arens
Editor-in-chief

Wuppertal Institut

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

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The Transition Question

Identifying realistic numbers for negotiations on Article 6

Thomas Forth, Frank Wolke

The CDM transition was one of the most contentious issues at COP25. It is a crucial aspect for the finalization of the Paris Rule Book. Transitioning of the Kyoto Mechanisms has not been mandated by the Paris Agreement or the accompanying Paris decision. However, the issue has been used by Parties to block the ruling on Article 6 and weaken the international carbon market. The following has been written with the intent to focus the transition debate in the UNFCCC on reliable data. Underlying Japanese and German research serves this goal, hoping that the findings will be accepted broadly.

The broader picture regarding CDM transition

Transition is an overly broad issue consisting of the following components:

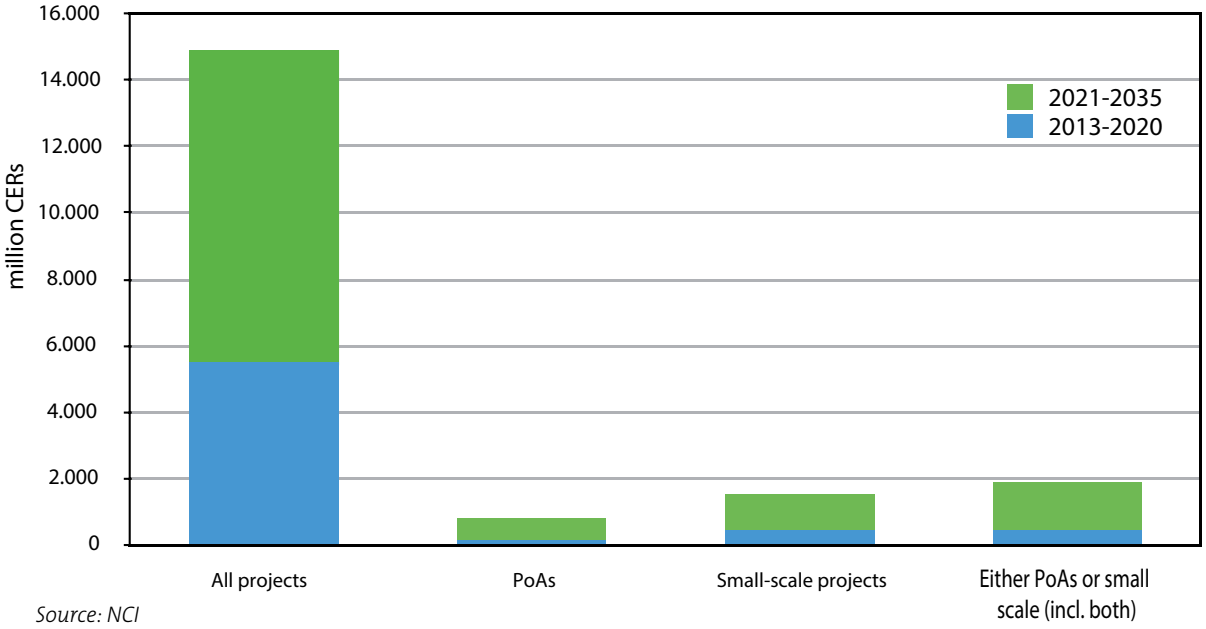
- Transition of pre2021 CERs for uses after 2020, which could undermine the existing NDC ambition in GHG emission reductions
- Use of ongoing CDM project activities under Article 6, which may lead to additional transferable emission reductions in the future, when core rules of Article 6 will be matched
- Future applicability of CDM methodologies and upgrade to the outstanding rules of Article 6
- CDM governance, which needs to be terminated at the end of the true-up period of the Second Commitment Period (CP2) of the Kyoto Protocol
- The CDM funds which could be used for several purposes to allow an early start of Article 6 – including the continuation of the Regional Collaboration Centers (RCC), and the work on transforming the CDM methodologies – to ensure inclusiveness for all Parties intending the use of Article 6
- The winding up of the CDM, allowing the start of Article 6 without distortion of competitive mechanisms and market signals

To reduce the complexity, the following focuses only on the first two aspects and leaves other issues for future reports.

Pre2021 data analysis: Looking at potential CER amounts

The following remarks refer to the challenge of identifying the possible amount of pre2021 CERs that should be part of a risk assumption for any transition debate. In Madrid, great uncertainties on the available amounts of CERs have prevented the negotiations from rationally considering this aspect. The assumptions ranged from high, theoretical numbers based on the total number of registered projects, which easily double the number of the two billion CERs already issued, to estimations of much lower numbers based on adjusted data, as stated during the second week of COP25 but Parties were not convinced. In light of the ongoing negotiations, it must be remembered that the higher the potential number of CERs in

Figure 1: Supply potential from registered and pipeline CDM projects



Source: NCI

the transition, the higher the risk of undermining future ambition.

To support a rational discussion at SB52 and COP26, Japan and Germany have commissioned research activities, which are being conducted by IGES (Japan) and the Federal Environment Agency together with NewClimate Institute/Oeko-Institut (Germany).

The starting point of every discussion is the theoretical total amount of CERs based on unadjusted project status figures as provided by the UNFCCC secretariat. The CDM so far would account for a potential supply of roughly 15 billion credits from all projects if they continued until 2035 (registered and projects in the pipeline) (see Figure 1).

Even if only potential issuances for emissions reductions achieved until the end of 2020 were considered, CERs would still amount to more than five billion and would thus have the potential to significantly influence future ambitions (see Table 1).

Table 1: Supply potential from registered and pipeline CDM projects

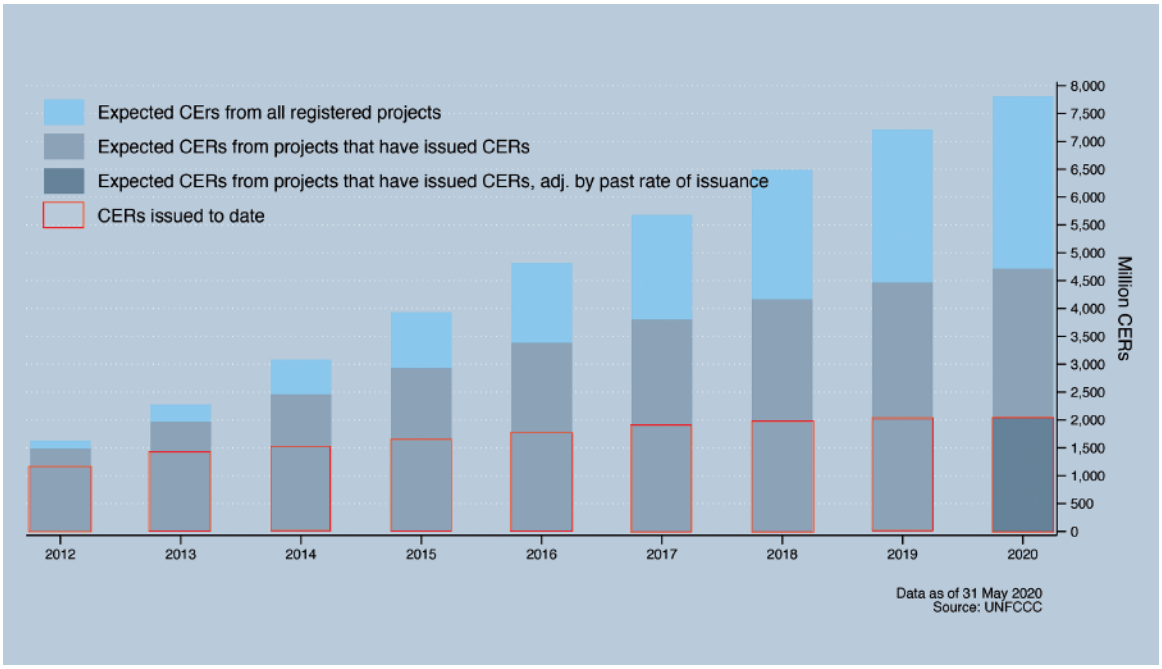
Includes issued CERs plus future issuance potential	mCERs
All projects	5.535
PoAs	166
Small-scale projects	507
Either PoAs or small-scale (incl. both)	572

Source: NCI

Large amounts of potential CERs facing high uncertainties

However, these numbers must be seen in relation to a great degree of uncertainty. Recent numbers published by the UNFCCC in May 2020 show modest results when looking at the potential supply from CDM activities (see Figure 2).

Figure 2: Total potential supply of CERs from end KP 1st CP to 2020



Source: UNFCCC

However, numbers could increase up to the end of CP2. IGES and NCI/Oeko arrive at different projections, which we will address below.

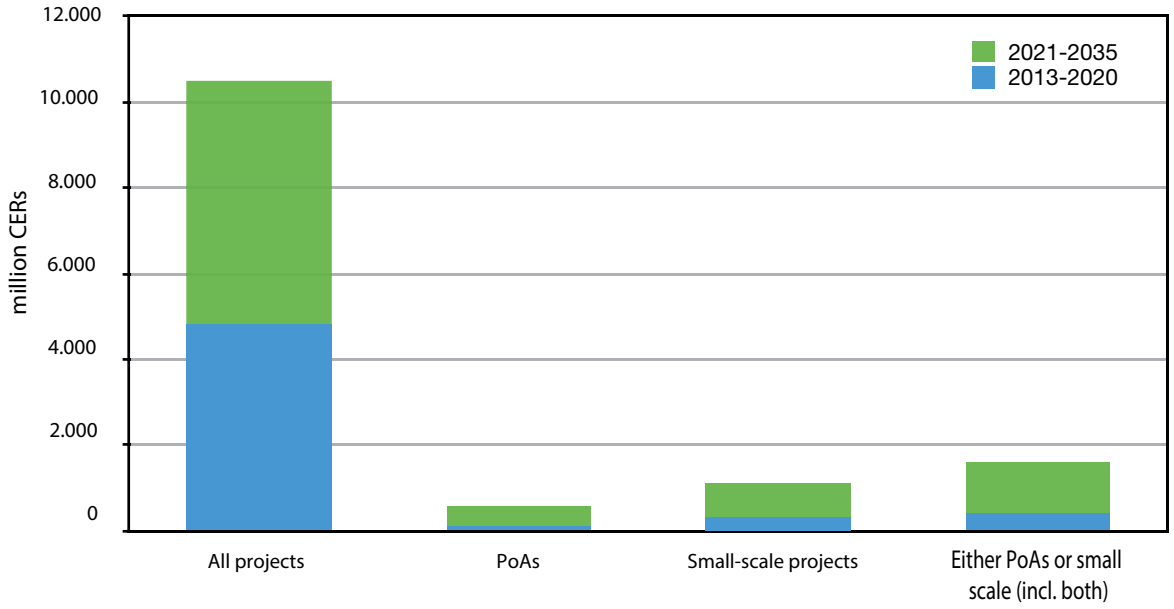
Possibly due to the fact of lacking decisions under Article 6, current requests for new CDM project registrations or issuance requests have almost non-existent. As noted in the latest CDM EB meeting report, 7,830 projects have been registered so far, compared to 7,807 projects a year ago, meaning an addition of only 23 new projects in the course of a year.

The same can be seen for issuance requests. While in June 2019, 1,975,805,451 CERs were issued, the number only slightly increased during a year to 2,033,134,853 CERs – an addition of some 57 million CERs (between 2015 and 2016 numbers almost doubled).

This gives a clear signal that, at least at the moment, the supply from CDM activities only comes from ongoing projects, not from new ones, and is decreasing. Thus, the estimations regarding possible CERs from not-yet registered or started projects are largely based on speculation. Considering only registered CDM projects, the theoretical total supply up to 2020 amounts only to some four billion credits and roughly 10 billion if operation continues up through 2025 (see Figure 3).

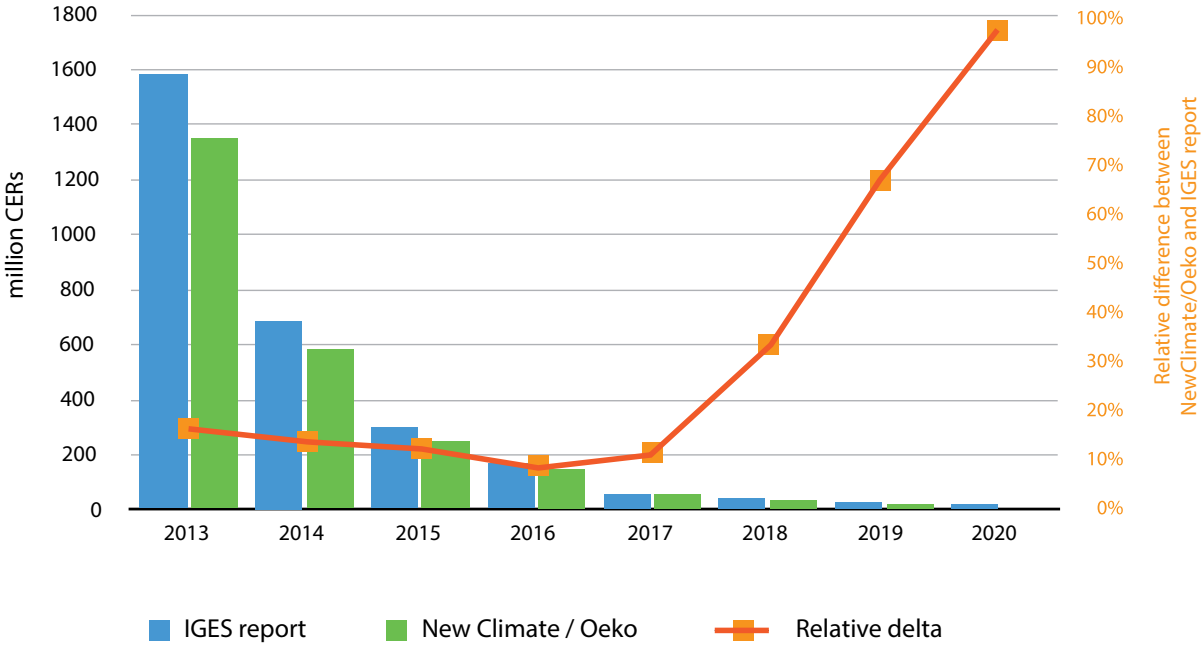
This leads to an approach where the current figures for and circumstances of ongoing projects must be highlighted. Such estimates consider the continued operation of projects as well as the start date of operation. A comparison of the recent research results from Japan and Germany as shown in Figure 4 reveals a congruency to a large extent in the generally estimated potential CER supply for various vintage provisions (date of registration, date of start of project activity).

Figure 3: Supply potential from registered CDM projects



Source: NCI

Figure 4: Comparison of research findings on CDM supply potential



Source: NCI/Oeko (forthcoming)

The graphs disclose only minor discrepancies for the past (orange line in the graph), but they do not lead to particularly material impacts on the overall results and implications for the further negotiations of any CDM transition agreements. With regard to estimates on future issuance of projects already underway, NCI applies adjustments at project level, taking into account project statistics rather than on aggregated portfolio level for all projects.[1] More uncertainty may be found in the estimate for CERs from not-yet registered (but "notified") or renewed projects up to the end of 2020. This is shown with the orange line in the graph, which indicates growing discrepancies in the IGES and NCI/Oeko analysis for the years 2018-2020. For the latter, the CDM Executive Board has stipulated a deadline for renewal applications of September 2020.

One aspect should be noted for future discussions: When looking at the registration date of projects, it may be assumed that projects with later dates – say from 2016 onwards – may not necessarily have been abandoned to the same extent as projects registered prior to this date, as from this point in time, the CDM market had already collapsed. This means that project participants could still be engaged in projects and may have a stronger commitment to conduct such projects. That is at least one reason why the numbers differ from this point in time.

Regarding the outlook to the end of the year, little could be done at this stage. We should avoid new speculative discussion on potential figures and instead continue to analyse the situation concerning 2020 CDM activities in a timely way, ahead of COP26.

In general, the assessments of CDM supply potential according to different registration date and start date of first crediting period as well as vintage restriction scenarios are broadly aligned in their order of magnitude. According to the analysis by NCI, crediting period start date restrictions lead to higher supply estimates (and therefore a larger volume of potential credit carryover) than registration date restrictions for a given vintage. The more recent the vintage restriction, the lower the potential carryover of credits. Furthermore, it should be noted that numbers of registered projects and crediting correlate with the end of the first commitment period of the Kyoto Protocol. It is no surprise that CDM activities started during the CDM Boom 2008/12 sought registration in 2013/2014, but less so in 2015. With the early ratification of the Paris Agreement, it seems there were few expectations regarding a possible extension of the CDM beyond 2020.

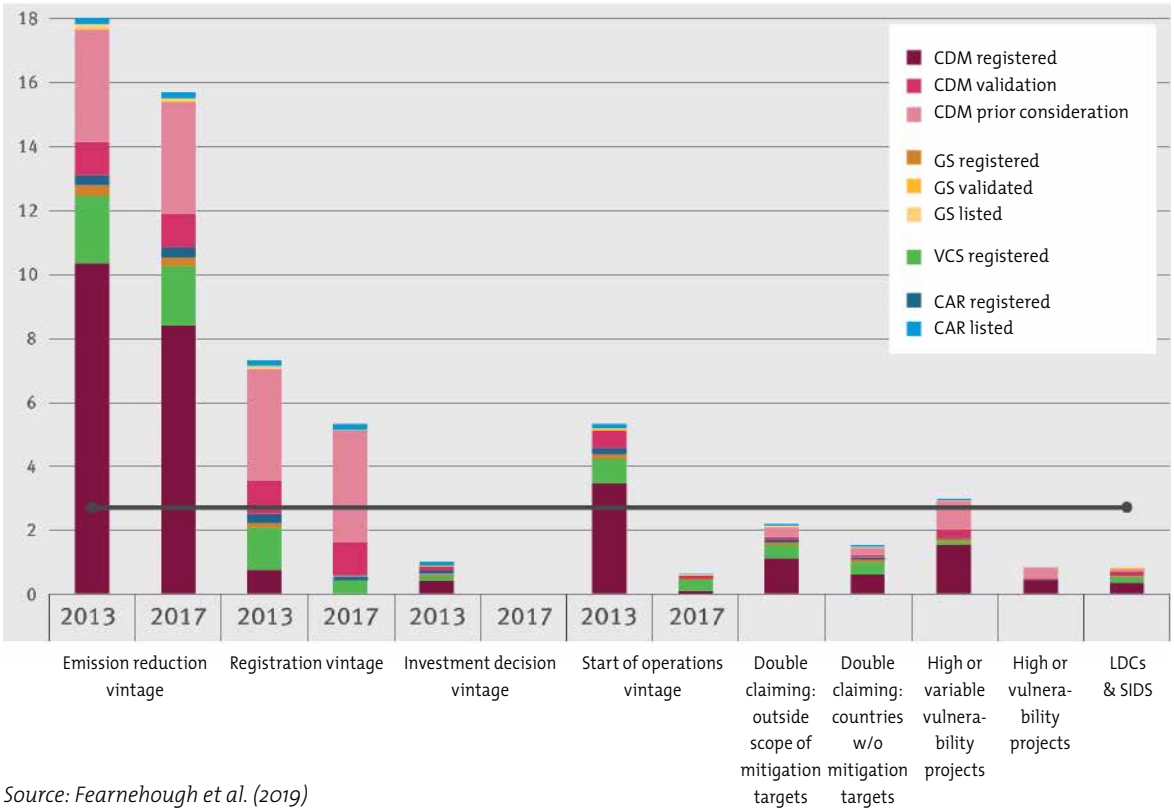
Aggregated numbers and CORSIA demand

If we compare this timeline with the timeline of the whole CP2 we arrive at a situation with declining numbers of credits. Of interest here is that this not only refers to the CDM but also to other programs. Especially vintage restrictions may limit the supply of potential credits to a large extent, as supply potential assessments under different scenarios for various program types under CORSIA, GS and VCS show (see Figure 5).

The aspect of these numbers of other programs also deserves further reflection. As Article 6 is not a pure transition of the CDM approach, the expectation is that a solution like the approach under CORSIA has to factor in also the supply from other programs to have an overall picture of transferable supply.

1 The adjustment at project level is derived from: Schneider, Lambert, Thomas Day, Stephanie La Hoz Theuer and Carsten Warnecke (2017): Discussion Paper: CDM Supply Potential up to 2020 (UBA Discussion Paper) (p. 32). German Emissions Trading Authority (DEHSt). Available at: https://www.dehst.de/SharedDocs/downloads/EN/project-mechanisms/discussion-papers/CDM-Supply-Potential-up-to-2020.pdf?__blob=publicationFile&v=7.

Figure 5: Supply potential under different scenarios



Source: Fearnehough et al. (2019)

Further Analytical Work

Even if these numbers need some further refinement, conclusions with regard to the negotiations can now be drawn on a better-informed basis. Both Parties, Japan and Germany, will continue to exchange on the research work. We see it as one important piece of work to deal with the analytics of the pre2021 numbers in a transparent and neutral way. Exchange is also needed with all other interested Parties and to analyze the geographic distribution of available CERs.

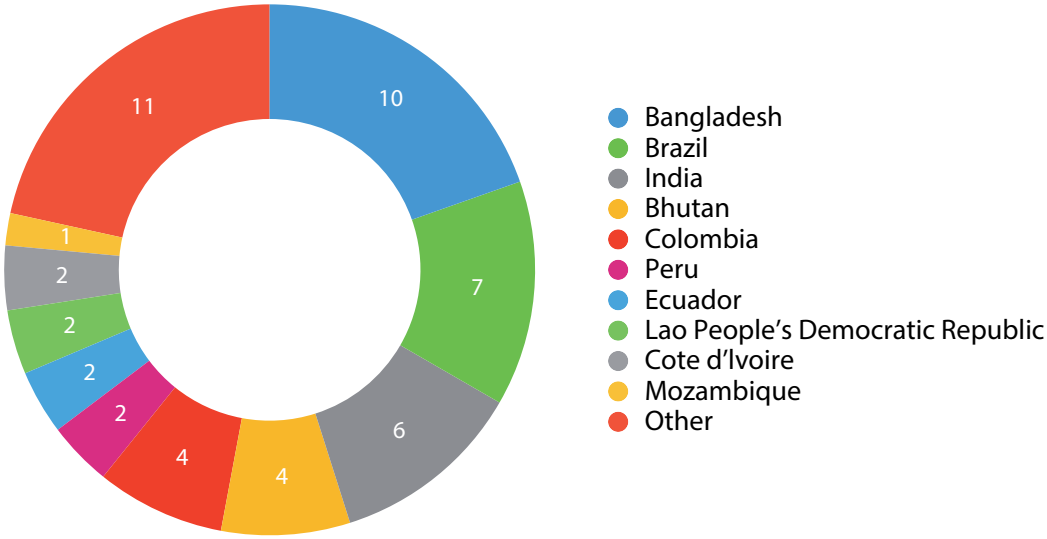
To enable conclusions to be draw, more analytical work is needed:

- The different regional interests have not been tabled so far in UNFCCC negotiations
- Numbers mentioned in the graphs do not show how many certificates are not used for compliance and are available on the market

Regional distribution and varying advantages for CDM host countries

During the Article 6 negotiations at COP25 in Madrid, proposals were made to restrict the number of CDM credits from emission reductions achieved

Figure 6: Supply potential from projects registered since 1 January 2016 over the period to 2020, by top 10 project host countries



Source: NCI/Oeko (forthcoming)

up to 2020 that may be used to achieve NDCs after 2020. One of the iterations of the negotiation text from Madrid included a vintage option of registration date on, or after, 1 January 2016. CDM projects that satisfy this requirement could supply approximately 54 million new (i.e. not already issued) carbon credits for emission reductions delivered over the period to 2020.

Restricting the use of CERs towards NDCs to the 152 projects registered with the CDM since 1 January 2016, projects delivering emission reductions in Bangladesh make up the largest share of the supply potential among different host countries, accounting for 10 million carbon credits, or almost 20% of the total. Brazil and India make up the second and third largest shares of the supply potential, accounting for seven million (13%) and six million (12%) of the total, respectively (see Figure 6).

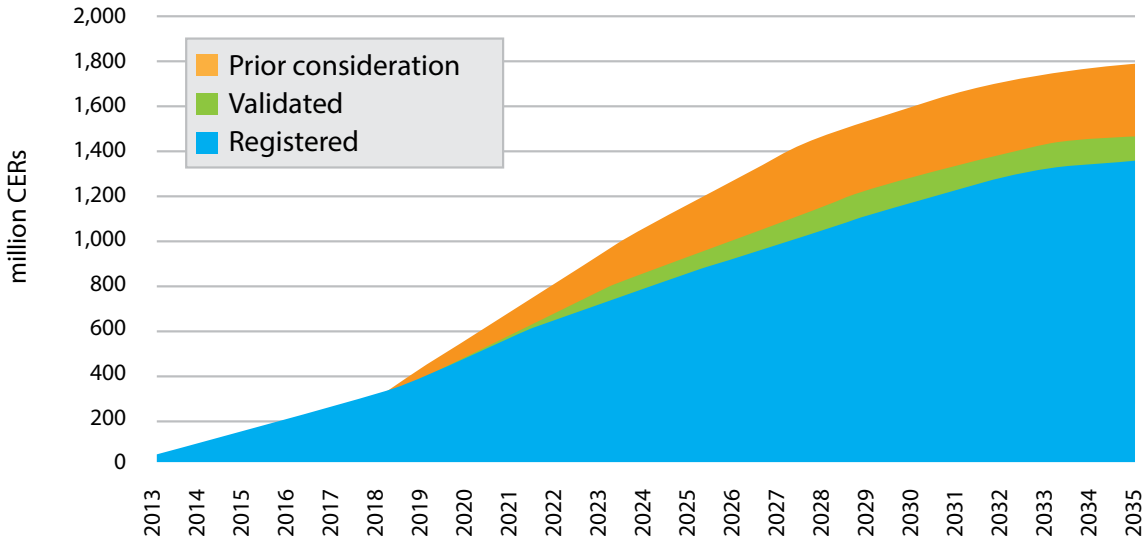
When negotiating any transitional aspect, a view on specific project types could also be worth considering further. In addition to the total supply of all CDM projects, the amount would significantly decrease if concentrated on programmatic and small projects.

Analytical work can help solve political issues

However analytical work will not solve the political questions:

- Why should pre2021 CERs be used for compliance of the Paris Agreement? Can this question be answered with yes when numbers are low?
- Has the political debate recognized the different usages of old certificates?

Figure 7: Cumulative supply potential from PoAs and small-scale projects



Source: NCI

- Could pre2021 CERs be accepted if they cannot be used under Article 6.2?
- The limited advantages for many developing countries resulting from a potential entitlement to use pre2021 CERs needs further consideration for a balanced compromise.

Outlook on further transition data work

With regard to the process of transition data work, we see the need to achieve a common understanding among Parties as to the most realistic numbers for pre2021 CERs. We see the need for certain refinements in the data analysis, we see also the need to repeat the work on all 2020 information, which we will hopefully receive in Q1/2021. Intensive outreach to other Parties is needed in the period up to SB52 and again in the shorter period prior to COP26 so that insights into the data analysis can inform rational positioning. The contentious and political issues outlined above are not part of the analytical work. These must be addressed in negotiations and informal settings.

As stated at the beginning, pre2021 CER analysis touches only one of aspect of transition. More analytical work could be envisaged for the ongoing CDM project activities, but would need to be embedded in the broader context of negotiations. The main challenge in performing analytical work will be finding ways to design the analysis in line with criteria, which match the requirements of Article 6. However, the question of the conditions that must be met to allow some kind of expedited access to Article 6 needs more consideration and a broader consensus between Parties.

Source: Catching the Sun by Nic Bothma / UNFCCC Photo Contest / CDM 0079

Transitioning: the CDM's methodologies and tools are valuable achievements and must not be reinvented

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Bridging the Gap

The uncertain future of Article 6.4

by Thomas Forth, Advisor to the German Federal Environment Ministry

The legal basis for CDM project activities will end in 2020. Registration of new projects and issuance of CERs for post-2020 emission reduction will not be legitimate. Such activities would undermine the ambition of countries' NDCs. Instead, the Paris Agreement provides for a new UNFCCC led carbon market mechanism. However, this mechanism is not ready for use and it seems that this could be the case for several years to come. This leaves a gap for emission reduction projects running between both regimes.

Scene from the Kyoto world: CDM coal mine methane project

How long will the gap exist?

To recap: Postponement of COP26 will further delay finalization of the Paris rule book. The decision on Article 6 has been the only element missing since Katowice (COP24). Negotiations at COP25 in Madrid ended with draft decision texts, the so-called three iterations, which serve the further process. It could be said that these texts represent progress. For many, the third iteration text presented by the Chilean Presidency is the most advanced version, but this is not the common view of negotiators. There are elements in previous iterations which other Parties will certainly bring up again. And of course, with the CMA decision in Glasgow, Article 6 cannot start before work programs have been completed and the establishment of the Article 6.4 Supervisory Body has been successfully completed. My best guess is early 2023.

But with the Covid-19-induced delays, we get some extra time ahead of COP26 in Glasgow in November 2021. Extra time for technical work. Extra time to identify areas of potential convergence. Extra time for outreach activities. Extra time for political momentum. Extra time to define a role for international carbon markets in green recovery. And, let us not forget, extra time to think about accelerating the starting options for Article 6. Only if we use the time prudently can we hope for a positive outcome at COP26, with a well-prepared workplan for the Supervisory Body of Article 6.4. And only then can we assume that the UNFCCC led Article 6.4 mechanism (A 6.4 M) will be ready for use after COP27, perhaps before 2023, if we find a way to start emission reduction activities early.

The gap and the break

Any further delay in CMA decisions on finalizing the Paris rule book will risk the use of A 6.4 M in the first NDC period. Unfortunately, not enough effort can be seen when it comes to getting Article 6 off the ground. One explanation could be that piloting Article 6 under Article 6.2 has already started, meaning that there is no urgency regarding Article 6.4. Furthermore, the lack of a clear picture of the rules, modalities and guidelines for Article 6.4 does not allow for piloting, while the missing guidance

Source: World Bank / Community Development Carbon Fund

Promoting sustainable development: Grameen Shakti Solar Home Systems project in Bangladesh

for Article 6.2 is not a real barrier to conducting emission reduction activities with the intent of transferring mitigation outcomes.

These are not favourable conditions for achieving progress on Article 6.4. In fact, the opposite could be the case. While the legal basis for conducting new CDM activities after 2020 will vanish, uncertainty about the cessation of the UNFCCC CDM is growing. What is to be expected?

From a legal standpoint, it would take a CMP decision to enable further use of the CDM. And from the aspect of the carbon value of such post-2020 CERs, the outlook is far from positive. Their owners would not be able to count them against NDCs, while demand in the CORSIA international aviation offsetting system is limited to pre-2021 units because of the double counting risk involving NDCs.

And for usages on the voluntary market, the CDM can no longer compete with the voluntary standards. So, what does this mean at the end of the day? The CDM has served its purpose under the Kyoto Protocol (KP). Throughout the whole of the second KP commitment period, Parties could not agree on the overdue reform of the CDM. And with the ratification of the Paris Agreement, Parties opted for the paradigm shift to a new carbon market. A complete break with the CDM is thus the premise for a future UNFCCC led carbon market mechanism.

Shortening the gap period

Parties have diverse views regarding the upcoming Article 6 gap. It is not exactly clear why some negotiators expect that Parties can agree on the continuation of the CDM, even if only for a transitional period. Many Parties would

argue that the price is too high and that the lifetime of new CDM projects would be too long. And it would not be totally absurd to assume that if continuing with the CDM is accepted, negotiations on Article 6 will shift to a constructive track and may well go on forever. Of course that kind of acceptance is not realistic and could equally end up in the complete failure of UNFCCC led carbon mechanisms. If that were to happen, Parties would only be able to use Article 6.2.

But if that is not the preferred route, what is the alternative? For the time being, the most preferable option would seem to break with CDM to enable readiness to re-think the way forward with the UNFCCC led Article 6.4 mechanism can emerge. However, a deadlock situation which continues until late in the coming year would undermine the positive outcome on the CMA decision for Article 6.

Facing this risky scenario, what could be done right now given that the break with the CDM is the outcome of the regime change from the Kyoto Protocol to the Paris Agreement. If the CDM is continued for new project registrations and issuance of emission reductions achieved post-2020 will have come to an end, will the leftovers of the CDM be worthless? Or will there be leftovers – such as unused certificates from recently registered projects, ongoing additional emission reduction activities beyond the unconditional NDC target, methodologies and other technical features – which should not be allowed to disappear?

In the transition debate, which was one of the most contentious issues hindering mutual consent on Article 6 in Madrid, more emphasis is needed on clarifying technical details, the empiric evidence on numbers of pre-2021 certificates and ongoing CDM projects as well as the underlying interest of Parties. For the analytical work on the transition options, the coming months are crucial in generating a common understanding of both the costs and benefits of Paris, also for the Paris Agreement itself. This may pave the way for better-informed decision making in Glasgow.

But the empirical work will not overcome diverging interests. What are the underlying challenges of transition as regards key areas?

Key challenges

Pre-2021 certificates will undermine NDC ambition if they are allowed for compliance use under the Paris Agreement. The open question here is whether there are usages outside the Paris Agreement. CORSIA is expected to produce one main source of demand, but it would be extremely speculative to assume that the volume of that demand will be reactivated once international aviation has recovered.

Ongoing CDM projects could be allowed to continue under Article 6.4 if the registration requirements for the mechanism have been met. Whether expedited access for those projects could be created has not been sufficiently explored. But if it were to be made available, then it would be a matter of agreeing on the final list of criteria for Article 6.4 in Glasgow, which would be more convincing and could garner public acceptance.

Where methodologies are concerned, the generic definition of the upgrade process to meet the requirements under the Paris Agreement, including the NDC dimension, needs to be worked out. When the criteria for Article 6.4 emission reductions have been set, the work on methodologies could be accelerated by means of a top-down program financed by existing CDM funding.

And when it comes to the use of almost USD 100 million allocated in the UNFCCC's CDM budget, it should be clear that any use of those resources to prolong the lifetime of the CDM beyond the obligatory activities during the true-up period needs to be contested.

Finally, transition of CDM leftovers which support the start of Article 6.4 should be welcomed but should not allow only a small group of Parties to benefit. The political challenge for the UNFCCC is thus the question of inclusiveness and fairness. Decisions should not be taken which perpetuate the imbalance in the regional distribution of CDM project activities between CDM host countries. For the early start of Article 6.4, the incentives for new emission reduction activities should be set equally, i.e. comparable conditions for all.

Finding the Right Balance

A global outlook and a Swedish perspective on price setting and price drivers in the early ITMO market

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Jonathan Schwieger, First Climate · Nils Westling, Swedish Energy Agency
Sandra Lindström, Swedish Energy Agency · Urs Brodmann, First Climate

Introduction

The effectiveness of Article 6 market mechanisms at generating meaningful mitigation activities will depend to a large extent on the potential market actors' – public and private – ability to trust that there are enough benefits to be shared such that the mechanism can make both buyers and sellers better off. The price of Internationally Transferred Mitigation Outcomes (ITMOs) will be an important parameter to ensure such trust.

The Swedish Energy Agency (SEA), with its on-going Article 6 piloting efforts, identified that transaction terms will have to be agreed on before there is an actual ITMO market, which makes price setting an important discussion to have at an early stage. SEA thus commissioned consultants from Perspectives and First Climate to assess price setting and price drivers in the early ITMO market, up until 2030. This article summarizes key results of this work.

Learning from the past

Prior experiences with carbon markets under the Kyoto Protocol and existing compliance schemes are testament to the connection between prices and trust in markets. For example, the rock-bottom secondary trading prices of Certified Emission Reductions (CERs) in the Clean Development Mechanism (CDM) since 2012 essentially ceased to stimulate new projects, and up until early 2018 the low carbon price in the EU Emissions Trading System (EU ETS) provided little incentive for installations to direct investments towards the reduction of own emissions. However, a few examples exist where price levels were maintained, and new emission reductions were achieved. Sweden, for example, shifted from market pricing to cost-based pricing in its CDM portfolio when the market collapsed, in order to maintain the incentive to create new projects. Similarly, in certain market niches (e.g. Colombian CERs, CERs eligible for the Korean ETS), prices were sustained and new activities emerged.

This experience must not be forgotten as we work to create a market for ITMOs under the Paris Agreement. There is still no rulebook, the world still has not seen an actual ITMO, and the current COVID-19 pandemic is forcing the postponement of the UNFCCC climate negotiations. Nevertheless, progress has been made on many technical issues and these provisions now need "road-testing" in Article 6 pilots in order to develop standards and best practices.

The Swedish Energy Agency's strategy and targets

Sweden is among those countries that currently work to pilot mitigation activities and trans-

actions under Article 6, with an aim to build a portfolio that could potentially be used to reach Sweden's carbon neutrality target by 2045, including milestones by 2030 and 2040. Sweden's formal commitment under the Paris Agreement is regulated under the EU's NDC for the period up until 2030, but like neighboring Denmark and Finland, Sweden has set stricter domestic targets, thus promising an overachievement of the NDC targets.

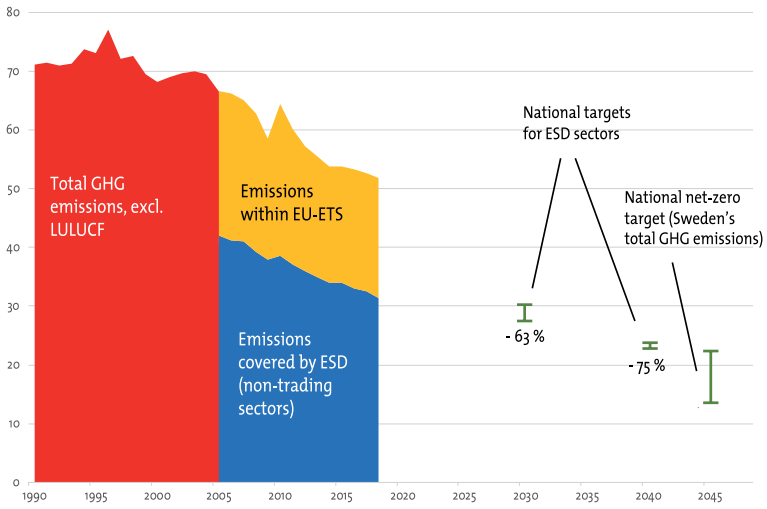
Sweden's ITMO strategy is likely to consist of bilateral as well as multilateral cooperative arrangements. In preparation for the bilateral part of the portfolio, the Swedish Energy Agency (SEA) launched a call for proposals that closed in February 2020 and the agency has also initiated a three-year cooperation program with the Korean-based Global Green Growth Institute (GGGI) to pursue bilateral Article 6 agreements with GGGI member countries.[1]

Four components of ITMO prices

When looking ahead to Article 6 mechanisms, understanding the determinants of ITMO prices is critical to enable market participants to pursue robust piloting activities amid uncertainties in the negotiation process. There are four elements that feed into the overall generation costs of ITMOs:

(i) Incremental costs of mitigation actions. Typically represented in a marginal abatement cost (MAC) curve, incremental costs of mitigation actions comprise of the capital costs, operating costs and risk premiums thereon required by the investors, always above those of the relevant business-as-usual course of action. It appears safe to assume that host countries will tend to direct

Figure 1: Sweden's emission reduction targets



Article 6 funds to abatement potentials on the higher end of the abatement cost spectrum and reserve the lowest-hanging fruit – in particular those at negative costs – as a target for their domestic climate policies. For prospective buyers of ITMOs, MAC curves can be a useful starting point for identifying promising sectors for mitigation programs. However, the uncertainty inherent in such curves is significant, and reliable determination of incremental costs will generally require direct negotiation with the respective project owners.

(ii) Opportunity costs for host countries. From a seller country's perspective, an opportunity cost will arise if the transfer of ITMOs results in the need for that country to take other, more costly, abatement action in order to meet its NDC. The level of the opportunity cost depends on the cost differential between the Article 6 activity and the alternate abatement potentials available to the host country. Article 6 activities should ideally avoid creating high opportunity cost scenarios for seller countries and instead help them meet their

1 GGGI is a multinational organization that works together with its member countries' governments to achieve the commitments expressed under the Paris Agreement and the Sustainable Development Goals. With embedded country teams, GGGI conducts technical assistance and helps to mobilize finance for climate change mitigation. The program with Sweden is specifically targeted at helping potential Article 6 host countries with analysis and preparation for Article 6 cooperation and ITMO transactions.

Into the future: understanding the determinants of ITMO prices is crucial for market participants

current NDCs and strengthen the ambition of future NDCs. However, establishing rules that require sellers to make corresponding adjustments at the same stringency as the buyers increases the risk for opportunity costs. This can, in turn, be avoided by, for example, jointly pursuing Article 6 activities within the conditional part of the host country's NDC and sharing the emission reductions between the host country and the acquiring country.

In the context of single-year targets, Parties can now choose between two accounting approaches that will have different implications on their engagement strategy in carbon markets. Establishing a multi-year accounting trajectory enables continuous engagement in carbon markets, while it may be a technically and politically challenging option. Accounting for the average ITMO transfer in the single-year target is simpler, but less representative and may lead to delayed action, as the surplus available or deficit to balance are only known in the target year.

(iii) Carbon credit-related transaction costs. The term transaction cost is used by the authors to denote all costs related to the monitoring, certification, sale and transfer of ITMOs and underlying emission reductions. Transaction costs under the CDM likely provide a good basis here for order-of-magnitude estimates noting that these costs may vary considerably between different project types. In addition, costs will arise related to the negotiation, due diligence and execution of ITMO purchase and sale agreements, where estimates can be derived of some JI track 1 cooperation agreements.

(iv) Market premiums. This term denotes either producer rents earned by sellers of carbon credits if their ITMO generation cost is less than the price offered by the buyers, or premiums offered by buyers for sustainable development (SD) co-ben-

Table 1: Overview of key price drivers for Article 6 emission units with qualitative rating (1. Low to 5. High) of their impact of carbon price. Question marks (?) indicate special uncertainty.

Drivers	Qualitative assessment of relevance for price until 2030
Demand-side drivers	
Ambition of NDCs in buyer countries	Medium (ratcheting up after 2025)
Eligibility of ITMOs in domestic carbon pricing schemes (ETS, taxes)	Medium (unlikely in EU)
Use of ITMOs by Parties (governments) for non-ETS sectors	High
Policy choices by ICAO for CORSIA concerning use and vintage of mitigation outcomes	Medium - high
Voluntary market: Demand and preferences (e.g. purchase of ITMOs versus financial contributions)	Low - medium
Rules for ITMOs used by buyers to meet their single-year NDCs	High
Supply-side drivers	
Transition of CDM units to Article 6/use towards NDCs	High
Transition of CDM activities to Article 6	High
Ambition increase of seller country NDCs	Low - medium (ratcheting up?)
Risks associated with opportunity costs due to corresponding adjustment	High
Transaction costs: Fees, share of proceeds (OMGE), need for validation/verification	Low
Buyer approaches (Art. 6.2) and UNFCCC rules on crediting periods, baselines, additionality, ...	Medium-high

efits associated with ITMOs beyond emission reductions. The ability for sellers to earn premiums is more likely to occur if a competitive market for ITMOs with meaningful demand materializes. Based on data available to date, such a situation is rather unlikely before 2030, considering that so far only few and mostly small and medium-sized Parties have stated an intent to procure ITMOs[2] and the possible use of such units under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is unclear. This is a major difference to the heydays of the CDM where owners of certain project types with low abatement costs earned massive windfall profits. However, in specific market niches determined for example by high quality criteria, the situation could be different and create market premiums earlier than in the broader market, especially regarding SD co-benefits. This would mirror conditions on the voluntary market.

Estimated demand-side and supply-side price drivers pre 2030

In the current international negotiation process on Article 6, demand and supply characteristics for ITMOs remain uncertain. In light of past experience with carbon markets, where frequent issues of oversupply and trends towards demand-constrained markets had profound downwards impacts on prices, the following prominent drivers with the potential to affect ITMO price formation up to 2030 can be identified (see Table 1).

2 Canada, Japan, Liechtenstein, Monaco, New Zealand, Norway, South Korea, Switzerland and Sweden (World Bank, 2019)

Demand-side drivers

CORSIA is likely to become a large source of demand for emission units post-2020. The ICAO Council's recent decision has restricted eligibility of credits in the pilot phase (2021-2023) to those generated between 1 January 2016 and 31 December 2020, thus effectively reducing demand for Article 6 units in this initial phase. ##note to editor: cross-ref. aviation article##

In parallel to demand in the aviation sector, future demand for ITMOs from voluntary carbon markets or by Parties to offset their non-ETS sectors is also likely to be material, albeit unclear. For voluntary carbon markets, the contentious issues surrounding double counting risk between corporations claiming carbon neutrality and countries accounting the same emission reductions under their NDCs will need to be resolved. In addition, after 2025, the ratcheting up of NDCs could add further demand from buyer countries as ambition increases or more countries opt for procuring ITMOs. Other sources of demand for ITMOs could emerge from national or regional compliance policies, such as various carbon pricing schemes.

Last but not least, demand from buyer countries with single-year targets may differ if they choose an averaging or trajectory-based accounting approach. In the case of an averaging accounting approach, the buyer could only account for 1/5th or 1/10th of the acquired ITMOs towards its single-year target.

Supply-side drivers

Two drivers are seen as having high potential relevance for ITMO pricing: the rules for the transitioning of CERs and CDM projects, and the detailed rules for corresponding adjustments, which is associated with the risk of opportunity costs for the host country. From a pricing perspective of emission units post-2020, the transition of CDM units (CERs) as well as CDM projects plays a critical role. If fully transitioned over to Article 6, the current vast supply of CERs could flood the market and, without any significant ramp up in demand to compensate, average transaction prices would likely be substantially lower than without such transitioning. In the COP25 negotiations, a limited CER transition was discussed which would allow the use of pre-2020 CERs for NDCs if they come from projects registered after 2012 or 2016, but due to limited understanding of the implications of these cut-offs in terms of numbers of units, Parties were not able to agree to a compromise. It is clear that a cut-off date around 2016 would lead to a rather limited volume of transition, reaching a small percentage of currently issued CERs.

The final rules for corresponding adjustments will also be critical, in particular in determining countries' readiness to sell ITMOs and the opportunity cost of such transactions for seller countries. As highlighted previously, this is particularly relevant in the context of single-year targets chosen by most developing countries in their NDCs.

In contrast, the authors expect that the potential ratcheting up of seller countries' NDCs will only affect supply after 2025. Equally, for supply until 2030, the relevance for ITMO prices of transaction costs due to UNFCCC regulations and of the detailed methodological rules for Article 6.4 will likely be low, or medium at most.

Conclusions and next steps

Markets are based on trust. This is especially important for complex, purely policy driven markets such as international market mechanisms for climate change mitigation. Market participation is likely to be hampered by the many uncertainties identified above. Therefore, robust and clear decisions and agreements are needed at the international level – not least a long-awaited agreement on the Article 6 rulebook – that reduce uncertainties and provide clarity and predictability.

A question of trust: the future ITMO market needs well-functioning institutions, and a robust system

The market for ITMOs, as envisioned by the authors, will involve a multitude of stakeholders in different countries and on different levels, such as governments, companies and NGOs. All need to be able to trust that the market does what is intended, while offering the possibility of mutual benefits, both economic and in terms of mitigation results. Host country governments need to be able to trust in the long-term benefits of Article 6 cooperation, whereas buyer country governments and private sector buyers need trust in environmental integrity, permanence of emission reductions and somewhat predictable prices. Private sector actors on the sell-side need to be able to trust in stable and (reasonably) predictable return on investments, stability and volume of credits generated as well as future demand. Simultaneously, civil society and the general population need to be able to trust that climate benefits are real, that sustainable development co-benefits are generated and, especially, that no harm is done.

Suspicions that the opposite will occur are likely to reduce the willingness to participate in the market, as was the case in the CDM after critical media and NGO reports in the mid-2000s and early 2010s.

Well-functioning institutions, a robust system and rules that provide long-term clarity, certainty and credibility will be needed to ensure trust when, at some point in the future, there is an international market for ITMOs. Without such safeguards, the risks of double counting, lack of environmental integrity, etc., risk eroding trust and reducing the efficiency of the market as it will fragment into many small niches. Thus, for actors such as Sweden, that intend to be early movers and spearhead this non-existent market, building trust and ensuring integrity is at the forefront.

Price and trust

Ambition raising is at the core of the Paris Agreement, and also of its Article 6. It is only by enabling a cost-efficient complement to domestic mitigation that Article 6 cooperation can have this effect and allow ITMO buyers to reach higher mitigation than otherwise possible. By promoting mutually beneficial trade, such cooperation should also allow host countries to enhance their NDCs beyond what they would currently deem feasible.

As this article has shown, price drivers are different in the Paris era than under the CDM, partly due to the different structure of the Paris Agreement, which requires host country agreements and corresponding adjustments. Since there is now a requirement, meaning a potential cost, on the host country, there must also be benefits for them. Sweden's view – at this point in time, when rules and safeguards are lacking – is that an Article 6 cooperation likely needs to be a long-term engagement rather than a one-off transaction. This requires an agreement on price that makes both sides better off.

In summary, ITMO prices should incentivize both host country involvement (among the private and public sectors) and additional and transformative mitigation activities, while not rising too high in order to remain a cost-efficient complement to domestic mitigation that enables large-scale activities and raised ambition. Finding that balance is the key task in the years to come.

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Putting a Price on Carbon

Lessons from World Bank's Partnership for Market Readiness

by Timila Dhakhwa, Marcos Castro and Venkata Putti, Carbon Markets and Innovation Unit, The World Bank

Use of carbon pricing[1] to reduce greenhouse gas emissions is not a recent phenomenon and carbon taxation has been considered since 1970s, albeit mainly in the industrialized world. The beginning of the 2000s saw the rise of notable regional and national carbon market initiatives such as the EU ETS, the UK ETS, the New South Wales GHG Abatement Scheme, the Regional Greenhouse Gas Initiative, the Western Climate Initiative, and others. Furthermore, the flexible mechanisms (CDM/JI) under the historic Kyoto Protocol, operational since 2005, helped instigate the international carbon markets with strong supply side participation from developing countries. The World Bank Group has played a pioneering role in developing the international carbon markets under the Kyoto Protocol with its Prototype Carbon Fund in 2000 and subsequent carbon funds thereafter.

A key lesson that can be drawn from these experiences is that a well-designed carbon price is an indispensable part of any strategy to reduce emissions in an efficient way. As mentioned in the 2018 IPCC Special Report on 1.5°C, ambitious climate action would require a significant shift in investment patterns and behaviors, and innovation in technologies, infrastructure and financing. The report went on to state that 'policies reflecting a high price on emissions are necessary in models to achieve cost-effective 1.5°C consistent pathways.' Policies that strike a balance between regulations and market-based tools that incentivize both the private and public sector to invest in a low carbon future are therefore critical. The High-Level Commission on Carbon Prices proposed that the explicit carbon-price level consistent with achieving the Paris Agreement target should be at least US$40-80/tCO2 by 2020 and US$50-100/tCO2 by 2030, provided a supportive policy environment is in place (HCC, 2017). Though the current carbon price is nowhere near this price level, it is encouraging that 96 of the Nationally Determined Contributions (NDCs) submitted by parties under the Paris Agreement have mentioned carbon pricing

Figure 1: Carbon pricing in numbers

1 Carbon pricing here refers to explicit instruments such as carbon tax, emissions trading schemes (cap and trade) and carbon offset mechanisms and does not include implicit carbon pricing such as fossil fuel subsidy removals, deployment of renewable energy and energy efficiency technologies, etc.

as part of the menu of mitigation options to meet their climate obligations.

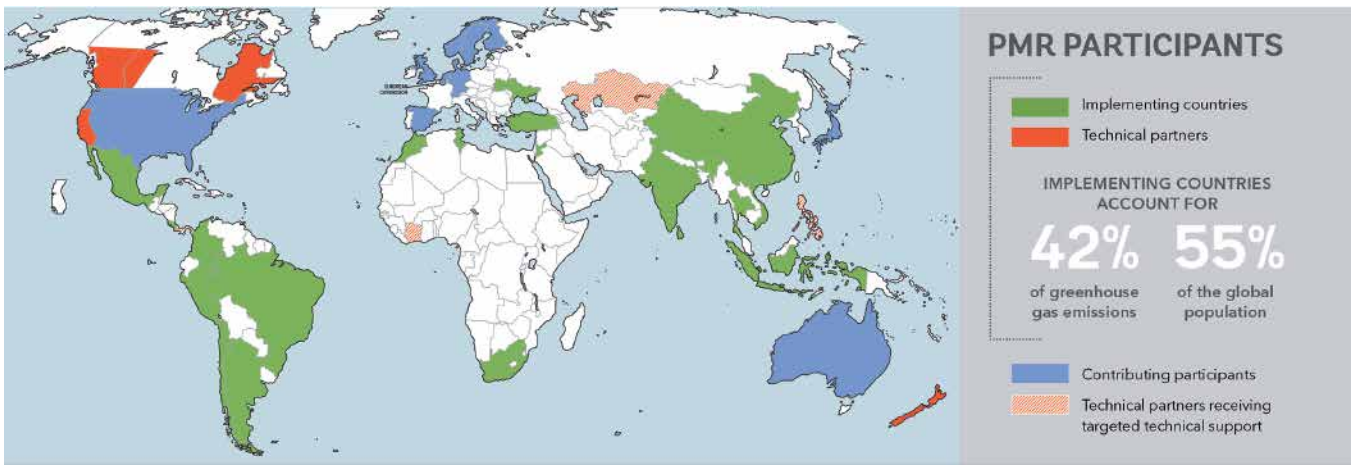
There is increasing evidence that interest in carbon pricing as a climate solution, both at national and subnational levels, continues to increase. The World Bank's State and Trends of Carbon Pricing 2020 report states that 46 national and 32 subnational jurisdictions have put a price on carbon to date (Figure 1) (World Bank, 2020). The carbon pricing initiatives implemented and scheduled for implementation would cover 12 gigatons of carbon dioxide equivalent or about 22 percent of global GHG emissions (compared to 8 gigatons or about 15 percent in 2017). While more than half of the emissions reductions covered were priced at less than US$10/tCO2e, governments raised US$45 billion in carbon revenues in 2019.

For nearly a decade, the World Bank's Partnership for Market Readiness (PMR) has supported emerging markets and developing countries to design and deploy carbon pricing and market instruments to facilitate cost-effective mitigation action. Conceived in 2010 to support domestic development of carbon markets in emerging economies and sustain the momentum on international carbon markets in the wake of the failure of the UN Copenhagen Climate Conference, the PMR brings together more than 40 developed and developing countries and subnational jurisdictions whose actions are critical to global climate mitigation efforts. Through grant funding and technical assistance, the PMR supports countries to prepare and implement carbon pricing and other innovative instruments to scale up domestic greenhouse gas mitigation.

As of May 2020, the PMR has supported 23 countries (Figure 2) to build their 'readiness' to implement carbon pricing. While the primary goal of this support is to develop the domestic architecture for carbon pricing implementation (e.g. MRV systems, registries) and build capacity to sustain it, the program scope and size has varied across countries based on the country context and the selected instrument, including the feasibility of more than one carbon pricing option (Figure 3).

As the PMR sunsets in June 2021, the countries supported by the program have already started to pilot, strengthen or implement their carbon pricing instrument of choice. Some of the prominent examples of PMR support in this regard include the national ETS development and/or piloting in China, Colombia, Kazakhstan, and Mexico; techni-

Figure 2: Partnership for Market Readiness: Paving the Way for Carbon Pricing in Developing Countries



cal support activities for the carbon tax programs in South Africa, Chile and Argentina; and the GHG crediting mechanism in Vietnam. Most of the other PMR countries are expected to either reach a decision on the instrument of choice or the sector expansion of the carbon pricing policy by the time the program ends in June 2021.

Governed by a unique partnership model that enables effective country-to-country knowledge exchange, the PMR has also evolved into a platform for collective knowledge-sharing and action on cost-effective approaches to climate action.[2] Overall, the PMR has empowered a community of over 3,500 carbon pricing practitioners through dedicated capacity building and e-learning activities, and has generated and disseminated a substantial body of knowledge on various aspects of carbon pricing. As shown in the chart of 'Quick Facts', the PMR produced more than 30 high quality publications on various aspects of carbon pricing. For instance, the Carbon Tax Guide: A Handbook for Policymakers (PMR, 2017) and the Emissions Trading in Practice: A Handbook on Design and Implementation (PMR, 2016), both published by the PMR, are the most downloaded 'how-to' guidebooks in the carbon pricing world.

The experience to date from all these activities across countries and regions has shown that implementation is complex, and many lessons have been learned on improving effectiveness and efficiency of such mechanisms.[3] Key insights gained include:

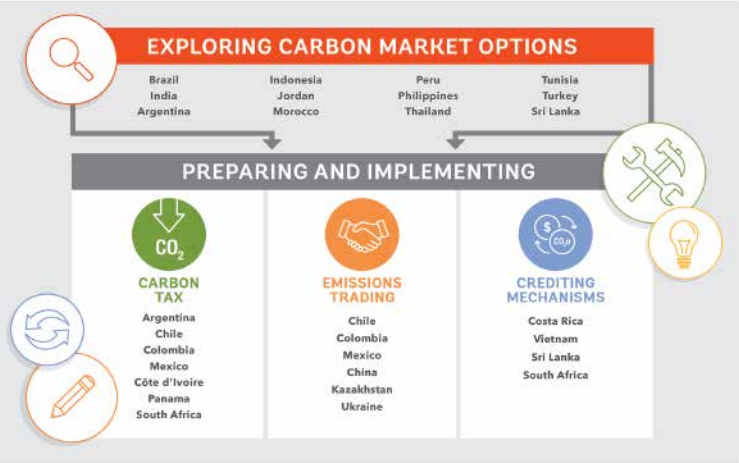


Figure 3: PMR country instrument choice

- **Ground-up Approach to Instrument Selection:** An important feature of the PMR has been that it was agnostic towards the choice of the carbon pricing instrument, which has significantly helped in the design of analytical activities that aligned with the political economy of the country. This approach has increased the probability of the instrument being adopted by the government over time. The program design is therefore built from the ground up, with importance given to diverse stakeholder engagement and consultations such that voices from different segments and sectors of

2 In the second independent evaluation of the PMR conducted in 2018, this partnership approach -- involving recipient countries, donors, technical partners, observers and subject experts -- was identified as the most beneficial factor for the stakeholders.

3 These have been documented in, among others, the PMR independent evaluation report and PMR Secretariat discussion papers (www.thepmr.org).

Source: World Bank Group

Building readiness, supporting implementation: 21st Partnership Assembly (PA21) in Berlin, Germany

society play a critical role in the choice and design of the instrument. This country-driven approach to the design of readiness activities has ensured that the program continued to receive goverment support even if administrations changed over the course of the program. The lesson here is that successful policy adoption needs buy-in from diverse stakeholders.

- **Need for Effective Communication:** Another key learning is that what remains true about clear and effective messaging in policy making is equally true for carbon pricing. One of the challenges that carbon pricing faces is opposition from the industry/private sector that may have to pay a price for carbon. Another argument against carbon pricing is the distortionary nature of the policy that may negatively impact lower-income households. In the face of such arguments, the messaging can be lost on the multiple co-benefits and the cost-effectiveness of putting a price on carbon, such as cleaner air to better-paying jobs in a decarbonized economy. Recognizing the increasing demand from countries to seek guidance on effective communication, the PMR published the Guide to Communicating Carbon Pricing (PMR, 2018) with accompanying regional trainings that turned out to be very successful. The lesson here is that an effective communication strategy should be an integral part of the design and implementation of any carbon pricing program.

- **Effective Partnerships:** As the name of the program itself suggests, partnerships have been at the heart of the PMR. The PMR has reaped the value of partnerships in different ways – this includes partnering with different organizations to conduct technical workshops and trainings, delivering country programs through partner agencies, to conducting bi-annual Partnership Assemblies (PAs). The Assembly, which has served as the governance as well as the primary knowledge-sharing forum for both south-south and north-south exchange, has also fostered enduring professional relationships among carbon pricing practitioners from different countries.

The PMR was established to rebuild confidence and maintain a technical dialogue on inter-

national carbon markets after the setback of COP15 in Copenhagen. In the post-Paris Agreement era of international climate politics, as countries work to translate their NDCs into actionable low-carbon development plans, this support has become even more critical.

Raising the Ambition: From Readiness to Implementation

Leveraging the PMR's global network and in-depth country experience, the World Bank and its PMR partners are currently in the process of launching a successor program, the Partnership for Market Implementation (PMI). As indicated by its name change, the PMI is a step up from the 'readiness' of the current phase to 'implementation'. It reflects the unanimous consensus of the extended PMR community and other key stakeholders in placing emphasis on moving towards the piloting and implementation of full-fledged, explicit carbon pricing instruments. It also responds to the increased demand from (World Bank client) countries to focus on enabling mitigation policy instruments, including carbon pricing, that would support them in meeting their current NDC targets and raising ambition in the next round of NDCs.

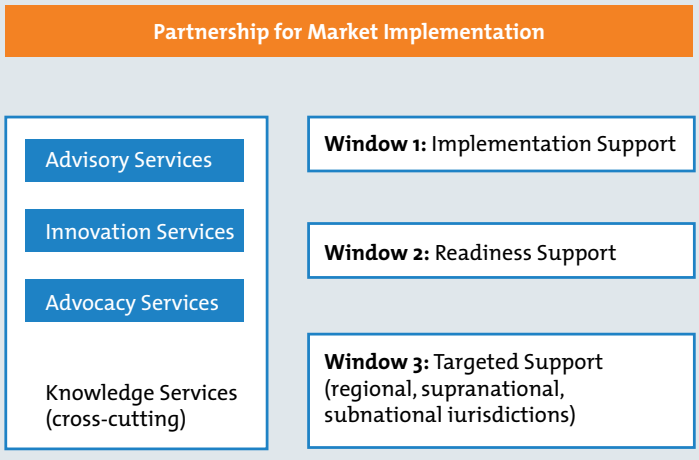
The two-fold overarching goal of the PMI is to contribute to the acceleration of low carbon development efforts by: (i) assisting client countries to design and deploy explicit carbon pricing policies appropriate to their domestic context and compatible with their sustainable development priorities; and (ii) catalyzing the development of and enabling countries' participation in the next generation of international carbon markets. In support of its development objective, the PMI will offer:

- Advisory services, to help countries build capacity, infrastructure and policy frameworks for scaling up their domestic mitigation efforts using carbon pricing instruments.
- Innovation services, to catalyze, enable and pilot new ideas for the next generation of carbon markets and rapidly scale up transformational climate action.
- Advocacy services, to convene and deliver policy discussions at the global, regional and national level – with a heterogenous set of practitioners, policymakers and other relevant stakeholders – on the role of carbon pricing as a central policy instrument for climate change action.

Timely and relevant

"As a recipient of the PMR technical assistance, Vietnam has not only benefited from the capacity built in the country for carbon market instruments, but the PMR has also provided a great platform for knowledge sharing and exchange with many other countries. As we now move towards consolidating our strategy on NDC implementation, including use of carbon pricing tools, a program like the PMI is very timely and relevant," Tran Hong Ha, Minister of Natural Resources and Environment, Vietnam, at COP25 Madrid.

Figure 4: PMI support categories



PMR Chile: A Case Study on Moving the Needle from Readiness to Implementation

The PMR Chile market readiness roadmap had three main components: (i) an analysis of options for developing carbon pricing instruments in Chile; (ii) design and implementation of an MRV system for a carbon tax (also referred to as the "impuesto verde" or "green tax"; (iii) stakeholder engagement. Chile received US$3 million in 2013 when it joined the PMR and additional finance of US$2 million in 2017. The focal agency for the project was the Ministry of Energy in collaboration with the Ministry of Environment. In addition, a diverse steering committee was established that included the Ministries of Foreign Affairs, Finance, Economy, Agriculture, Mining, Transport and Telecommunication. The biggest achievement of this program has been that, based on the technical assistance provided by the PMR, Chile became the first country in Latin America to implement a carbon tax. The tax reform approved in January 2020 further includes a scalable MRV program supported by the PMR.

During the launch of the PMI at COP25, Chilean Minister of Energy Juan Carlos Jobet affirmed his support by stating: "The PMR has been key in building capacities on carbon pricing in our country, including the mechanisms to track greenhouse gas emissions and mitigation outcomes. By creating new knowledge and fostering a critical mass of stakeholders, it has also supported public policies related to carbon pricing and has raised awareness on the relevance of market instruments for climate mitigation. We believe that cost-effective mechanisms, like offsets and emissions trading, can play a relevant role in accelerating progress towards NDC implementation, carbon neutrality and social welfare. New programs such as the PMI come at a very good moment for Chile and other implementing countries, since sustained efforts are essential for our climate policy where carbon pricing is a core element".

- Cross-cutting knowledge services, to continue generating cutting-edge knowledge products and to facilitate technical discussions and knowledge exchange on carbon pricing and other mitigation policy instruments through a variety of delivery modalities.

A key premise of the programmatic approach of the PMI is that countries are at different stages of the carbon pricing readiness continuum. Therefore, the PMI will operate through clearly defined program windows to address the requirements of the different support categories (Figure 4) – namely (i) an implementation support window to partner with countries or jurisdictions that have an explicit political mandate or a prior policy action to implement and operate a carbon pricing instrument; (ii) a readiness window, similar in scope to the current PMR, aimed at providing technical assistance to (new) country participants to assess the choice of an appropriate carbon pricing instrument and carry out the early stages of policy development roadmaps; and (iii) a targeted support window, which will deliver technical assistance to advance carbon pricing initiatives carried out at a regional/supra-national level or at a sub-national level, provided there is commitment and endorsement from the responsible federal entities. The PMI was formally launched at the Conference of Parties (COP25) in Madrid in December 2019 and will become operational in the latter half of 2020 (World Bank, 2019).

Conclusion: Towards a Green Recovery

Going forward, the likely impacts of the ongoing COVID-19 pandemic will need to be factored into strategies for climate action, including carbon pricing. The adverse economic and social fall out of the pandemic throws up significant challenges for sustainable climate action. As the world moves to rebuild its economies, green recovery packages that include progressive environmental and low-carbon incentives will be key to encourage the private sector to shift investments towards a green economy (Hepburn et al., 2020). It is critical for countries to identify clear development priorities and requirements to minimize the adverse impacts of the pandemic in the short run, while keeping a clear-eyed focus on developing roadmaps for long-term sustainable recovery through progressive climate policies, including carbon pricing instruments and clean technologies, to help transition to green investments. A well-designed carbon pricing instrument can not only direct investment flows towards clean technology but also potentially raise revenue for the government.

With more than 70 countries committing to reaching net-zero targets by 2050, it is critical that we deploy every available tool to reach that target. With less than a decade left to effectively bend the GHG emission curve, the Partnership for Market Implementation (PMI) aims to channel a decade worth of technical experience and global network through the PMR such that countries have the analytical tools in place to put a meaningful price on carbon.

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Decarbonising Shipping

Shining a light on the sector's technical and political challenges

Isabelle Rojon, Principal Consultant, University Maritime Advisory Services (UMAS)

Overview

Shipping plays an important role in the global economy, with over 80% of global trade by volume and more than 70% of its value being carried onboard ships (UNCTAD 2017 and 2018). Demand for maritime transport has risen significantly over the past few decades and so have GHG emissions: in 2012, international shipping was estimated to produce 796 million tonnes of carbon dioxide (CO_2) which accounts for approximately 2.2% of global anthropogenic CO_2 emissions. Under business-as-usual scenarios, and depending on future economic growth and energy developments, CO_2 emissions from international shipping are projected to grow by between 50% and 250% by 2050 (IMO 2014).

The International Maritime Organization (IMO) is the United Nations specialised agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. In the late 1980s, the IMO started discussing GHG emissions from ships, but it was not until 1997 that work on GHG emissions was formally triggered through the adoption of Resolution 8 on 'CO_2 emissions from ships'. This resolution requested IMO to undertake a study on GHG emissions from ships and to consider feasible emissions reduction strategies (IMO 2011). It also referenced the Kyoto Protocol which designates IMO as the agency to deal with GHG emissions from international shipping.

Since then, the IMO has adopted the Energy Efficiency Design Index – a design efficiency standard for new ships – and the Ship Energy Efficiency Management Plan for all ships, both of which entered into force in 2013. In the late 2000s, it also discussed market-based measures (MBMs), however with Member States unable to agree on the design of an MBM and the underlying guiding principles, in 2013 discussions were suspended (Chircop et al. 2018). In 2016, IMO adopted a Data Collection System for ships' fuel consumption, which entered into force in 2018.

In 2015, discussions on GHG reductions from international shipping were revived by the Marshall Islands – the world's second largest ship registry and a small island developing state (SIDS) – who called for IMO to establish a 1.5°C-aligned GHG reduction target for international shipping and to adopt measures to reach that target. This proposal gathered significant support and was followed by a number of countries – most vocally Pacific and Caribbean Island States, African and European countries – as well as industry and civil society organisations submitting proposals calling for the definition and adoption of a sectoral GHG reduction objective. Under pressure to demonstrate the shipping industry's contribution to the goals of the Paris Agreement (Chircop et al. 2018), in 2016, the IMO adopted a roadmap for developing a comprehensive IMO GHG reduction strategy. This roadmap foresaw the adoption of an initial strategy in 2018 and of a revised strategy in 2023.

In line with the roadmap, in April 2018, IMO adopted the 'Initial IMO Strategy on reduction of GHG emissions from ships' (Initial GHG Strategy). Nearly all IMO Member States supported the adoption of the Initial Strategy. A few countries raised specific objections, and Saudi Arabia alongside the USA reserved their position which can be interpreted as opposing the adoption of the Strategy.

The Initial GHG Strategy sets the ambition to reduce the carbon intensity of international shipping by at least 40%

The long way to decarbonisation: tackling the shipping sector's emissions is a complex endeavour

by 2030 and to reduce total annual GHG emissions by at least 50% by 2050, both compared to 2008. This is while pursuing efforts towards phasing out GHG emissions this century as a matter of urgency, consistent with the Paris Agreement temperature goals. The Initial GHG Strategy also aims to achieve GHG reductions from international shipping before 2023 (IMO 2018). This emphasis on emissions reductions in the short term, as well as on the 'at least' 50% GHG reduction language in the Initial Strategy is important as it means the IMO's Strategy can be aligned much closer with a 1.5°C trajectory which, as shown in the IPCC Special Report on Global Warming of 1.5°C, will require significant global GHG reductions in the next ten years and GHG emissions to reach net zero around 2050.

Achieving the IMO's levels of ambition – the technical perspective

The options to reduce GHG emissions from shipping can broadly be divided in two categories:

1. Technologies or operational changes that increase energy efficiency, such as propulsion devices, modifications to ship design, main machinery, engine and auxiliary systems, reducing ship speed, maintenance, just-in-time arrival.

2. Alternative fuels, energy sources, and related machinery – for example, synthetic fuels (including hydrogen, ammonia and methanol), biofuels, ship electrification, wind propulsion.

A detailed overview of these options, including of their GHG abatement potential, level of maturity and cost reduction potential can be found in Smith et al. (2019a, cp. also CMR 04-2018).

Despite often being ready, mature and creating a commercially viable return on investment, there is still significant scope for greater uptake and implementation of options increasing ships' energy efficiency (Smith et al. 2019a). Depending on which option or combination thereof is being implemented, energy efficiency improvements – and in particular operational changes – have the

potential to achieve the IMO's 2030 carbon intensity target (Faber et al. 2019). However, to achieve absolute emissions reductions whilst accommodating an expected increase in maritime transport demand, shipping will need to reduce its average carbon intensity by more than can be achieved through energy efficiency alone (Smith et al. 2016). Therefore, a transition to low- and zero-carbon fuels and electricity from renewable energy sources will need to occur.

Based on a profitability analysis of seven different zero-emission vessel technologies under different regulatory and economic scenarios, Lloyd's Register and UMAS (2017) find biofuel to be the most profitable zero-emission solution overall, followed by ammonia and hydrogen with internal combustion machinery. Hybrid and electric solutions, which require large quantities of batteries at high capital cost, are identified as least competitive. The report also notes the significant sustainability and availability challenges related to biofuels, shifting the question to what the 'next best' solution could be. Smith et al. (2019b) investigate this question further by modelling several decarbonisation scenarios which limit the low-emissions fuel options to ammonia, methanol and hydrogen. They find that ammonia and methanol are preferred over hydrogen for most of the fleet due to the higher costs of onboard storage for hydrogen, with ammonia being generally preferred over methanol for the majority of ship types and sizes. Testing broader ranges of biomass- and hydrogen-derived (produced from both natural gas and renewable electricity) fuels, including synthetic hydrocarbons, Lloyd's Register and UMAS (2020) identify ammonia as the lowest-cost and most profitable long-run fuel for the majority of the fleet.

Shipping will thus need to focus on increasing its operational energy efficiency in the short term, not just to meet the IMO's 2030 target, but also to help soften the cost impact of the sector's transition to more expensive low- and zero-carbon fuels. In light of ships' long lifespan, achieving the IMO's 2050 target means that zero-emission vessels and their associated fuels will need to enter the fleet by 2030 and form a significant proportion of newbuilds from then on.

Achieving the IMO's levels of ambition – the political perspective

Potential policy measures

The Initial GHG Strategy includes a non-exhaustive list of candidate short-, mid- and long-term policy measures, meaning measures that could be finalised and agreed between 2018 and 2023, between 2023 and 2030 and beyond 2030, respectively. The Initial GHG Strategy also states that certain mid- and long-term measures will require work to commence before 2023 (IMO 2018).

The IMO's ongoing discussions focus primarily on the short-term measures, and in particular on improving technical and/or operational efficiency in order to meet the 2030 carbon intensity target. The main proposals on the table advocate either a technical approach which would require all ships to meet minimal technical efficiency levels (championed by Japan and Norway), or an operational approach which would require all ships to meet minimal operational efficiency levels (championed by Denmark, Germany and Spain). From a conceptual point of view, the latter is more ambitious as operational energy efficiency encompasses technical efficiency, whereas technical efficiency is only weakly related to operational efficiency. Worse even, increases in technical efficiency can be counteracted by the incentive they create for increased operating speed (often referred to as the rebound effect), meaning operational carbon intensity could increase, thereby achieving the opposite of the stated aim. It is possible or even likely that both approaches will be further developed in the IMO. In light of the IMO's stated aim to achieve emissions reductions before 2023, the urgency of adopting an effective short-term measure is high.

Another short-term measure soon to be discussed has been put forward by shipping industry associations who propose the establishment of an International Maritime Research and Development Board (IMRB) and related fund to initiate and progress R&D for low- or zero-carbon shipping financed by mandatory contributions from shipping companies set at US$2 per ton of fuel oil purchased for consumption – equivalent to US$0.63/tCO2. Despite shar-

Between technical options and political restraints - creative solutions and political compromise are needed for the shipping sector

ing many characteristics of a carbon pricing mechanism, the proposal is explicitly not framed as an MBM, but its proponents acknowledge that it could provide some of the architecture for a levy-based MBM for shipping (ICS et al. 2019, cp. also CMR 01-2019).

While the list of candidate short-term measures is long and fairly specific, this is not the case for the candidate mid- and long-term measures. These broadly focus on the implementation of low- and zero-carbon fuels without going into specifics on how that could be achieved. The candidate list also vaguely refers to "new/innovative emission reduction mechanism(s)" and in that context mentions MBMs. Since the adoption of the Initial Strategy, a number of Pacific and Caribbean SIDS, and European and African countries have submitted documents to the IMO on the subject of MBMs – however no concrete proposals have been put forward – which means that the discussion on MBMs can be expected to slowly start again after having been put on hold in 2013. Alternative or complementary regulatory options to MBMs could include policies that stipulate the GHG emissions intensity of the exhaust or the specification of the fuel, but no concrete proposals have been made to date. A recent submission has requested the establishment of a standing agenda item on the mid-term measures – this would be a first step in ensuring time is dedicated to progressing work on these measures.

Impacts on States

Regardless of which candidate IMO policy measure is considered, the Initial GHG Strategy requires the socio-economic impacts on States of IMO climate policy measures to be assessed and taken into account before their adoption (IMO 2018). This requirement was a response to concerns of SIDS, and developing and least developed countries (LDCs) that additional climate mitigation policy measures in shipping could negatively impact their economies and hamper their access to goods and services.

To date, a procedure for assessing impacts on States has been agreed and a few impact assessments for policy proposals submitted, however the latest round of negotiations has shown that these did not satisfactorily address the concerns of developing countries, SIDS and LDCs. Hence, more substantive work will be required to enable the adoption of IMO climate policy measures, both in terms of the assessment of impacts, but also – and

perhaps even more critically – by identifying adequate mechanisms that ensure vulnerable countries are neither adversely affected by said policies nor left behind technologically. While this is already proving to be a complex endeavour for the short-term policy measures, this complexity will only increase for the mid- and long-term measures which may be expected to have more pronounced impacts on countries as they will need to accomplish a shift to more expensive low- and zero-carbon fuels. Identifying potential solutions early on and setting up the necessary structures, systems and possibly funds to protect and support vulnerable countries will likely be key in navigating this complexity later on.

Guiding principles

The Initial GHG Strategy is furthermore guided by a number of principles. On the one hand there is the need to consider principles included in IMO conventions, i.e. the principle of non-discriminatory regulation of all ships in international trade irrespective of flag or ownership and the principle of no more favourable treatment (NMFT) which requires that IMO members apply the provisions included in IMO conventions to ships that are registered in countries that are not party to the relevant convention. The rationale of these principles lies in the ease of registering ships in other countries and changing their flag registration.

On the other, there is the need to consider the principle of common but differentiated responsibilities and respective capabilities (CBDRRC), in the light of different national circumstances which is enshrined, among other things, in the UNFCCC and the Paris Agreement. It combines the idea of a common responsibility of all countries to fight climate change with an acknowledgement of countries' different levels of responsibility for climate change and capabilities to address it.

These different principles have created significant tension in the IMO between developed and developing countries in the past because many developed countries do not recognise the relevance of CBDRRC in the IMO context (which however is highlighted as pivotal by developing countries, including SIDS and LDCs), because the principles are often perceived as contradictory and it is unclear how CBDRRC could be operationalised in the IMO. These tensions persist and were particularly palpable in the negotiations leading up to the adoption of the Initial GHG Strategy. The language in the Strategy, which lists the non-discrimination and NMFT principles side-by-side with CBDRRC, was a hard-fought-for political compromise that does not specify how the principles should be interpreted or operationalised. These questions will undoubtedly return with full force at the latest once the work on mid- and long-term measures begins and the stakes of IMO climate policy are raised.

To avoid another break-down of negotiations as happened in 2013 (cp. above) creative solutions and political compromise will need to be found. Reconciling the principles could for example be achieved through preserving equal treatment on countries' core obligations of a regulation while providing financial, technological and capacity-building assistance to vulnerable countries (for more information, see Romera and van Asselt 2015).

Finding such compromise will require time, which as we know is running out, to avert catastrophic levels of climate change. This means that the earlier countries can come to the table with an open mind to reconcile their different positions on the guiding principles, the bigger a chance we have of effectively tackling GHG emissions from international shipping in an equitable and fair way.

The next round of discussions was tabled for March/April 2020 but, due to the COVID-19 pandemic, it had to be postponed. It is unclear when the next official meeting can be convened or in which format, but in the meantime, the IMO will hold an informal virtual meeting without decision-making power on the short-term measures from 6-10 July 2020.

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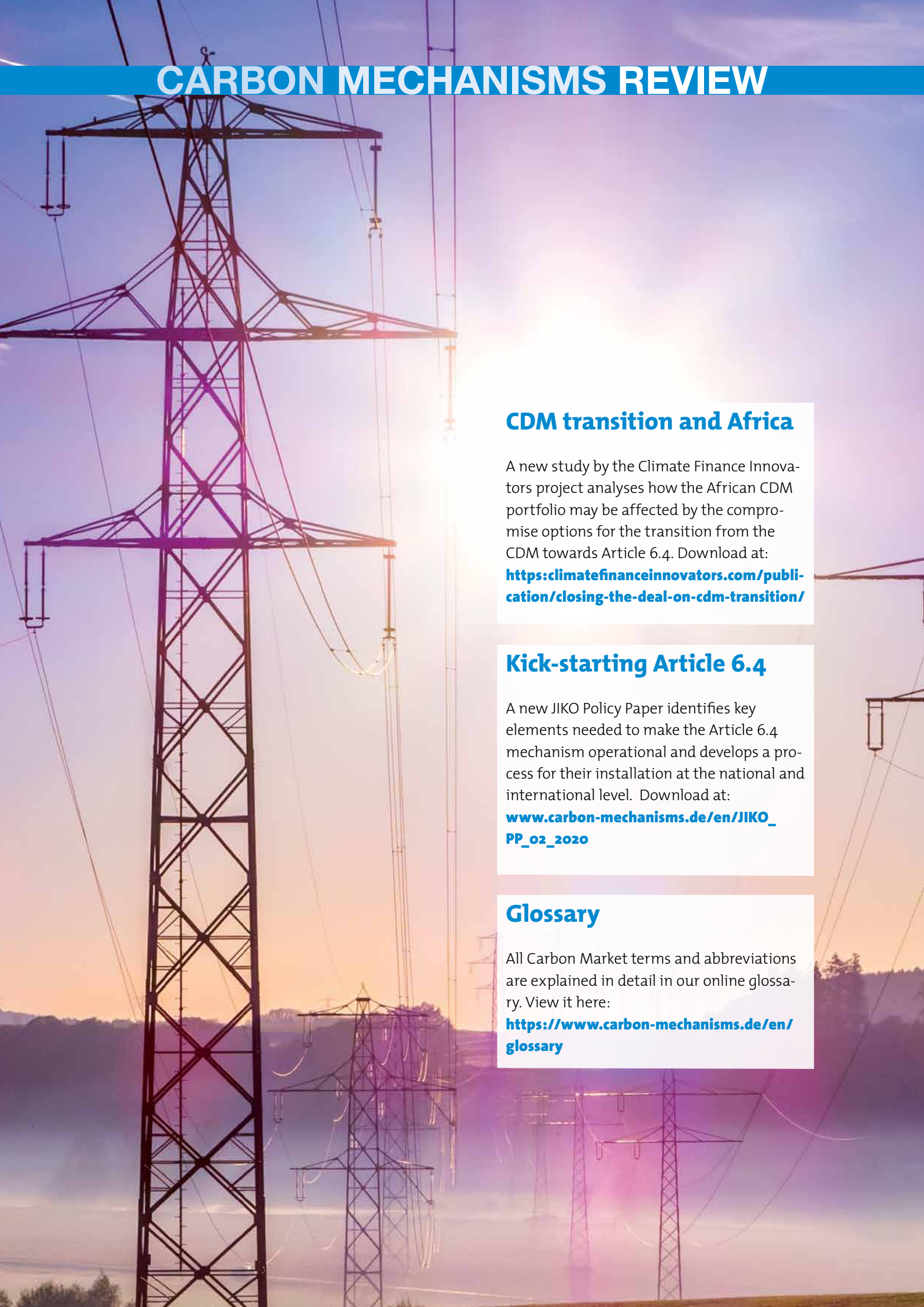

CDM transition and Africa

A new study by the Climate Finance Innovators project analyses how the African CDM portfolio may be affected by the compromise options for the transition from the CDM towards Article 6.4. Download at:
https:climatefinanceinnovators.com/publication/closing-the-deal-on-cdm-transition/

Kick-starting Article 6.4

A new JIKO Policy Paper identifies key elements needed to make the Article 6.4 mechanism operational and develops a process for their installation at the national and international level. Download at:
www.carbon-mechanisms.de/en/JIKO_PP_02_2020

Glossary

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