CDM supply potential for emission reductions up to the end of 2020

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Prepared by

Institute for Global Environmental Strategies (IGES), Mitsubishi UFJ Research and Consulting Co., Ltd., NewClimate - Institute for Climate Policy and Global Sustainability gGmbH and Öko-Institut e.V.

IGES Institute for Global Environmental Strategies

MUFG Mitsubishi UFJ Research and Consulting

NEW CLIMATE INSTITUTE

Öko-Institut e.V. Institut für angewandte Ökologie Institute for Applied Ecology

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Authors:

Takayuki Ishikawa[a], Soshi Yamasaki[a], Harry Fearnehough[b], Lambert Schneider[c], Carsten Warnecke[b], Tatsushi Hemmi[a], Kazuko Yamaguchi[a] and Kentaro Takahashi[d]

a) Mitsubishi UFJ Research and Consulting Co., Ltd.
5-11-2, Toranomon, Minato-ku, Tokyo, 105-8501, Japan
Tel: +81-3-6733-1000 Fax: +81-3-6733-1009
E-mail: info-lowcarbon@murc.jp
URL: https://www.murc.jp/english/

b) NewClimate – Institute for Climate Policy and Global Sustainability gGmbH
Waidmarkt 11a, 50676 Cologne, Germany
Tel: +49-(0)-221-999833-00 Fax: +49-(0)-221-999833-19
E-mail: info@newclimate.org
URL: http://www.newclimate.org

c) Öko-Institut e.V.
Borkumstr. 2, 13189 Berlin, Germany
Tel: +49-(0)-30-405085-0 Fax: +49-(0)-30-405085-388
E-mail: info@oeko.de
URL: http://www.oeko.de

d) Institute for Global Environmental Strategies (IGES)
2108-11, Kamiyamaguchi, Hayama, Kanagawa, 240-0115, Japan
Tel: +81-46-855-3700 Fax: +81-46-855-3709
E-mail: iges@iges.or.jp
URL: https://www.iges.or.jp/en

Abbreviations

CDM	Clean Development Mechanism
CER	Certified emission reduction
COP	Conference of the Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CPA	Component project activity
EU ETS	EU emissions trading system
GHG	Greenhouse gas
ICAO	International Civil Aviation Organization
NDC	Nationally determined contribution
PA	Project activity
PDD	Project design document
PoA	Programme of activities
UNFCCC	United Nations Framework Convention on Climate Change

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Summary

The transition of certified emission reductions (CERs) issued under the Clean Development Mechanism (CDM) for use by Parties towards their nationally determined contributions (NDCs) is a key outstanding issue for Article 6 negotiations at the UNFCCC. The latest draft presidency texts from December 2019 in Madrid include options for restricting which CERs may be used towards NDCs.

To inform the ongoing negotiations, this paper presents updated estimates of the potential CER supply under different possible restrictions for the transition of CERs. The analysis is limited to CERs that can be issued for emission reductions occurring in the second commitment period of the Kyoto Protocol between 1 January 2013 and 31 December 2020.

The paper is prepared by two groups of modelling teams that use separate models to estimate the CER supply potential: IGES/MURC from Japan and NewClimate Institute/Öko-Institut from Germany. The two models are broadly similar in their overall approach and data sources. However, they differ to some extent in their assumptions and the granularity of the application of factors influencing the CER supply potential, leading to a certain degree of variation in the respective estimations of supply across restrictions.

The paper considers two options for restricting the use of CERs towards NDCs:

1. **Registration date**: Only CERs from projects registered on or after a certain date are eligible for transition. This type of restriction is included in the COP25 negotiation texts from the presidency under Article 6 of the Paris Agreement.
2. **Start date of the first crediting period**: Only CERs from projects for which the first crediting period starts on or after a certain date are eligible for transition. This type of restriction was adopted by the International Civil Aviation Organization (ICAO) for the pilot phase of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) from 2021 to 2023.

In general, restrictions based on crediting period start dates lead to a larger volume of CERs eligible for transition than restrictions based on registration dates, for a given cut-off date. This is because the start of a project's first crediting period tends to be either the same as the registration date, or later than the registration date.[1] The more recent the cut-off date, the lower the amount of CERs that are eligible for transition.

Results from the two models are broadly aligned across a range of different restrictions on the eligibility of CERs for transition. They show that the potential supply of CERs is similar among the models for both a given cut-off date and type of restriction.

Our analysis indicates that, in the absence of any restrictions, the overall supply potential for CERs for emission reductions from 2013 to 2020 is in excess of 4 billion. Figure 1 shows that restrictions based on the registration date (as included in Article 6 negotiating texts) or the start date of the first crediting period (as adopted for CORSIA's pilot phase) considerably reduce the cumulative CER supply potential.

The cumulative supply potential from projects **registered** on or after 1 January 2013 is on the order of 320 – 341 million CERs; of which approximately 46 – 63 million CERs are from projects registered on or after 1 January 2016.

If a restriction is based on the start date of the **first crediting period** of a project, those starting their first crediting period on or after 1 January 2013 could supply approximately 1,443 – 1,483 million CERs; of

[1] For example, a project which registered in 2012 or earlier can have a first crediting period start date on or after 1 January 2013. Such a project would be *included* when the cut-off date is 1 January 2013 and based on the start of the first crediting period, but *excluded* when the same cut-off date is applied to the registration date.

which approximately 140 – 179 million CERs are from projects whose first crediting period started on or after 1 January 2016.

These estimates, including possible restrictions based on other years between 2013 and 2020, are set out in Figure 1.

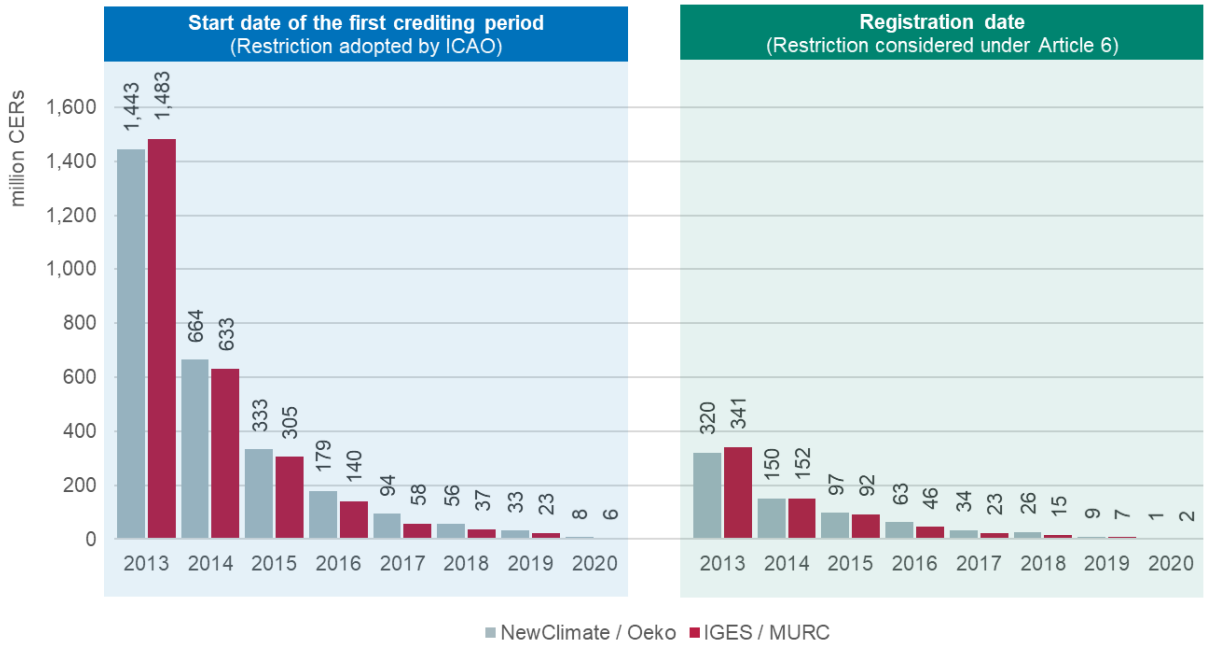

Figure 1: Cumulative CER supply potential under different restriction types and cut-off dates

Finally, the paper shows which countries and regions are the main hosts of projects that make up the supply potential estimates under selected restrictions. Whilst the total amount of the CER supply potential significantly differs between the two options for restrictions – by registration date, or by start date of the first crediting period – the distribution of the CER supply potential among host countries and across regions is relatively similar for a given cut-off date.

It matters, however, which cut-off date is used as restriction: In the case of a 1 January 2013 cut-off date, CERs from Asia-Pacific countries account for around two thirds of the total supply potential, with China and India making up the largest share. In the case of a 1 January 2016 cut-off date, the CER supply potential is more diverse with a lower portion from Asia-Pacific countries.

1. Introduction

This paper provides estimates of the potential supply of certified emission reductions (CERs) issued for emission reductions or removals achieved from 1 January 2013 to 31 December 2020 by projects registered with the Clean Development Mechanism (CDM). The potential supply of CERs could be one of the important factors affecting an outcome of the international negotiations at the United Nations Framework Convention on Climate Change (UNFCCC) on the transition of CERs for use toward Parties' Nationally Determined Contributions (NDCs) under the Paris Agreement. The latest draft text proposed by the President at COP25 sets several restrictions on the transition of CERs. One is the "registration date restriction" where only CERs generated by projects that have been registered on or after a certain date can transition, though the date is undetermined. In addition to Article 6 negotiations at the UNFCCC, the International Civil Aviation Organization (ICAO) Council has adopted a decision on the eligibility of units for offsetting under the pilot phase for the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). ICAO approved the use of CERs issued by projects whose first crediting period started on or after 1 January 2016 and occurred through 31 December 2020.[2] To inform the ongoing negotiations on Article 6, this paper estimates the potential supply of CERs under different restrictions for registration dates and first crediting period start dates.

The Institute for Global Environmental Strategies (IGES), Mitsubishi UFJ Research and Consulting Co., Ltd. (MURC), NewClimate Institute and Öko-Institut have estimated the potential volume of CER supply in a number of previous studies. NewClimate Institute and Öko-Institut, along with other researchers, have published several studies that analyse the supply potential under various restrictions, drawing on various data sources, including results from a detailed CDM project survey (Fearnehough et al., 2018; 2020; Warnecke et al., 2019). IGES and MURC also published a study with results on the potential supply of Pre-2020 CERs (Ishikawa et al., 2020) which estimates the supply potential based on CDM data as of January 2020, including restrictions based on registration dates and first crediting period start dates.

This paper builds on this earlier work with the aim of updating and further clarifying the likely CER supply potential under different restrictions and explaining the drivers of any differences between estimates from the two models.

The paper first compares the similarities and differences in databases and methodologies used for both models. Then, it sets out estimates of the potential supply of CERs for different dates of registration and start dates of the first crediting period, using the latest CDM project databases as of early October 2020, according to the two sets of modelling approaches. The results also show the CER supply potential for different host countries and regions.

[2] In addition, ICAO will not accept CERs from afforestation or reforestation projects during CORSIA's pilot phase, even if they meet the vintage eligibility criteria.

2. Data and methodology

This section describes the scope of the analysis, the data sources and the methods used by the two groups of research institutes to estimate the CER supply potential.

2.1. Scope of the analysis

This paper provides estimates of the CER supply potential with regard to the following scope:

- **Timeframe:** The analysis covers CERs that may be issued for emission reductions or removals occurring during the second commitment period of the Kyoto Protocol from 1 January 2013 to 31 December 2020. It does not consider CERs issued for the first commitment period, nor carbon credits that may be issued for emission reductions or removals occurring after 31 December 2020; for example, if CDM projects were to transition to the new mechanism established under Article 6.4 of the Paris Agreement.
- **Projects:** The analysis covers project activities (PAs) and programmes of activities (PoAs) that were registered, and component project activities (CPAs) that were included in PoAs, by the beginning of October 2020. New PAs, PoAs or CPAs that may still be registered or included up to the end of 2020 are not considered; however, this potential is very small given the short period.

The methodology aims to estimate a *realistic* supply potential in the case that the project participants have sufficient economic incentives to proceed to the issuance of CERs. The methodology does not aim to provide a *forecast* of the likely future issuance of CERs, as this will strongly depend on the demand for CERs.

Lastly, the estimates include CERs that have already been issued, CERs that are in the pending account awaiting to be forwarded to holding accounts of project participants, as well as CERs that could still be issued in the future. It should be noted that a part of these CERs may be used for alternative purposes, such as compliance with Kyoto targets, with obligations under the EU ETS or for voluntary offsetting, and would therefore not be available for use to achieve NDC targets from 2021 onwards. Some of these CERs have already been retired or cancelled.

2.2. CDM project database

Both models use a range of key project level information as the basis for estimating the CER supply potential. These include, amongst others: the expected emission reductions included by project participants in project design documents (PDDs); key milestone dates (such as registration dates, crediting periods, monitoring periods and issuance dates), classification of project types; issuance records, etc. The CDM supply potential model used by NewClimate Institute and Öko-Institut takes project information from the database published online by the UNFCCC secretariat on 5 October 2020.[3] The IGES and MURC model is based on its own database which is fed with information from the UNFCCC website. The data is based on the status of projects in September 2020.[4] Both models thus use the same authoritative data from the UNFCCC, though small differences may exist due to the different dates and other minor inconsistencies in the data inputs.

[3] Downloaded from https://cdm.unfccc.int/Projects/projsearch.html (note the live version accessible on the website is updated on a monthly basis and therefore no longer reflects the actual data used for this analysis).

[4] IGES/MURC uses three databases with different data status for each: available data up to 30 September 2020 is considered for IGES CDM Project Database (version 12.7), up to 31 August 2020 for IGES CDM Monitoring and Issuance Database (version 8.5), and up to 9 September 2020 for IGES CDM Programme of Activities (PoA) Database (version 10.5).

2.3. Factors affecting CER supply potential

The *realistic* CER supply potential is typically lower than the estimates provided by project participants in the PDDs at the start of the project or at the renewal of the crediting period. This is for two main reasons: first, the implementation and operation of projects may differ from the expectations by the project participants at the start of the project or a new crediting period; and, second, regulatory requirements, or changes in these requirements, can affect either the ability of projects to issue CERs or the number of CERs they can issue. Figure 2 illustrates how these factors impact the CER supply potential. The following sections explain in more detail how the factors are considered in the two models.

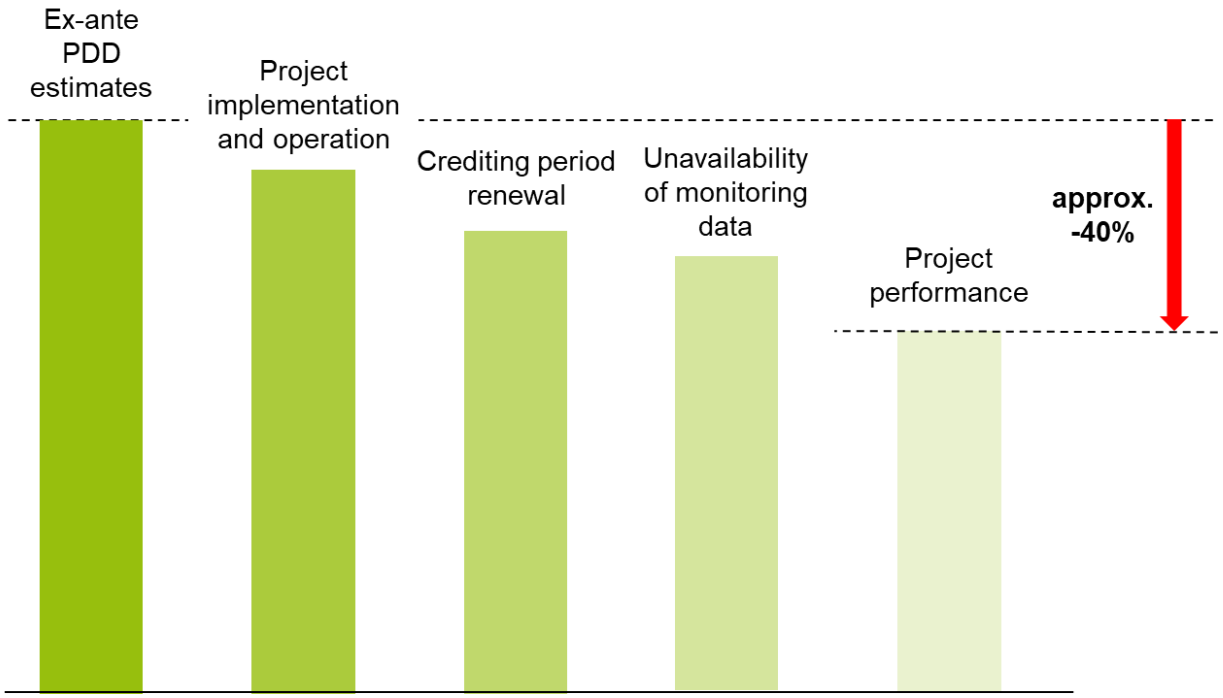

Figure 2: Key factors affecting CER supply potential

2.3.1. Project implementation and operation status

The initial implementation and subsequent operation of a project is a key prerequisite for issuing CERs. Most CDM projects are known to have been implemented; yet some projects were registered but never implemented, due to low CER prices or other reasons such as technical implementation problems. Many projects also faced delays in implementation which affects the amount of CERs they can generate until 2020. Most implemented projects continue GHG abatement, whereas some have either discontinued abatement or are at risk of discontinuing abatement. Importantly, even if projects have not been in contact with the UNFCCC secretariat for many years – sometimes referred to as “dormant” projects – these projects may still be able to issue CERs, as there is no obligation for project participants to maintain contact with the UNFCCC secretariat.

To assess the implementation status of projects, both models draw on an extensive survey of registered CDM projects that was conducted by NewClimate Institute in 2014 and 2015 (Warnecke et al., 2015). The survey data was used to estimate the probability that CDM projects were initially implemented and that they continued GHG abatement thereafter (Schneider et al., 2017; Warnecke et al., 2019).

Both models use this data source in a similar way, by adjusting the PDD estimates downwards in order to account for projects that were never implemented or discontinued operation. The main difference between the models is that the IGES/MURC model applies the same average probability to all projects,

whereas the NewClimate/Öko model applies the adjustments at a more granular level, taking into account differences between project types and countries, as well as drawing on the most up-to-date information on the status of individual projects as published by the UNFCCC.

Another difference is that the NewClimate/Öko model applies these adjustments only to projects that were registered by the end of 2015. The main rationale is that the survey data – collected in 2014 and 2015, when the CDM market had already collapsed – may not necessarily apply to projects that were registered thereafter. By contrast, the IGES/MURC model applies an adjustment to all projects.

The different level of granularity and the difference in projects to which adjustments are applied are key reasons for differences in the CER supply potential between the two models.

2.3.2. Regulatory requirements on the renewal of crediting period

Under the CDM, project participants can choose between a fixed crediting period of ten years or a renewable crediting period of seven years which can be renewed twice, for PAs. A PoA has a duration of up to 28 years and has to be renewed every seven years. Each CPA has an individual crediting period which is, as for PAs, either a fixed ten-year crediting period or a renewable crediting period of seven years which can be renewed twice. For afforestation and reforestation projects, the fixed crediting period is 30 years, the renewable crediting period is 20 years, and their maximum total duration is 60 years.

The CDM requires that project participants, through designated operational entities, submit a request for a renewal of a crediting period no later than one year after the expiry of the previous crediting period. If this deadline is missed, the crediting period of a PA or CPA can no longer be renewed.[5] When this requirement was introduced in August 2018,[6] the CDM Executive Board granted a grace period for registered PAs for which the crediting period had expired but not yet been renewed. The grace period initially ran to 31 December 2019, but was prolonged to 30 September 2020.[7] Both models consider that PAs and CPAs that missed this deadline can only issue CERs for emission reductions occurring until the end of their most recent crediting period, but not for reductions that occur thereafter.[8] In practice, this rule has no effect on our results for projects that registered since 2013 as these projects remain within one year of the end of their first crediting period. However, it does reduce the estimated supply potential for scenarios that include CERs from projects that registered prior to 2013.

At the renewal of the crediting period, project participants must use methodologies and methodological tools that are valid at the time of renewal. In some instances, methodologies have been substantially revised over time, affecting the amount of CERs that projects can claim. This holds in particular for projects abating waste gases in industrial plants (HFC-23 abatement from HCFC-22 production and N_2O abatement from nitric or adipic acid production). The NewClimate/Öko model uses detailed estimates for these projects, drawing on a plant-specific analysis (Schneider & Cames, 2014). The IGES/MURC model does not differentiate these projects and estimates the CER supply potential in the same way as for other project types; the model uses updated values of estimated emission reductions or removals in PDDs for each crediting period, sums them up to derive the project's total ex-ante PDD estimate for the whole

[5] See, for example, paragraph 278 of the CDM project cycle procedure for project activities, version 02 (https://cdm.unfccc.int/Reference/Procedures/index.html).

[6] See paragraph 32 of the meeting report of the 100th meeting of the CDM Executive Board.

[7] See paragraph 28 of the meeting report of the 105th meeting of the CDM Executive Board.

[8] In doing so, both models also consider requests for renewal of crediting periods that were submitted by 30 September but that are still being processed by the secretariat and for which the renewal is still pending. Both models assume that all these requests will be approved.

crediting period, and applies other adjustment factors to estimate the supply potential. The difference between the two approaches affects the overall CER supply potential from all CDM projects, but the impact for projects that were registered after 1 January 2013 is negligible.

2.3.3. Unavailability of monitoring data

Monitoring emission reductions is a further prerequisite for issuing CERs. Some projects may continue GHG abatement but have abandoned monitoring. However, CDM procedures also allow project participants to request for post-registration changes or deviations if some monitoring data is not available.

Based on an assessment of the relevant CDM regulations and the monitoring data required for different project types, the NewClimate/Öko model categorises which project types are likely to have sufficient monitoring data available to continue issuance and which project types may lack such data. The CER supply potential is adjusted downwards to account for projects that may have abandoned monitoring and lack sufficient data to issue CERs (Schneider et al., 2017).

The IGES/MURC model also applies a downward adjustment to account for data unavailability, referring to the same discussion paper as the source, but applying a similar adjustment to all projects uniformly.

2.3.4. Project performance

The amount of CERs actually issued to a project also differs from the ex-ante forecast set out in PDDs because projects operate differently than anticipated. This may occur due to various reasons, including delays in project implementation or variations in key factors affecting emission reductions such as wind availability or fuel prices. The project performance is different across project types and PAs/PoAs. Most project types tend to issue less CERs than expected in PDDs, while some (e.g. industrial gas projects) issue more in a given period than the PDD values.

Both models incorporate adjustments that account for project performance, by calculating the ratio of emission reductions or removals actually achieved by projects to those expected in the PDDs. These adjustments are calculated separately for different types of projects based on historical project data and issuance records, and applied to all projects of that type. For project types without any issuance records, both models apply the global average across all projects with issuance data. The classification of project types used to derive and apply the adjustments differ between the two models: IGES/MURC uses its own classification while NewClimate/Öko uses the classification of project types from NewClimate's 2015 survey of CDM projects (Warnecke et al., 2015). Another difference is that the IGES/MURC model calculates and applies the performance rates separately for PAs and PoAs, whilst the NewClimate/Öko model calculates the performance rates for PAs and applies these to both PAs and PoAs. The project performance rate on average across all PAs is approximately 86% in the IGES/MURC model and 76% in the NewClimate/Öko model, respectively. For PoAs, the average is approximately 31% in the IGES/MURC model.[9]

2.4. Summary comparison of models

Table 1 provides a summary comparison of the IGES/MURC and NewClimate/Öko modelling approaches. The scope of the analysis is the same in both estimations. Both models rely on data sourced from the

[9] The estimated average performance rate for PoAs is much lower than that of PAs. An implicit assumption in the calculation step for both PAs and PoAs is that each issuance request covers all emission reductions achieved by the project(s) over the relevant monitoring period. One possible reason for the low PoA estimate is that their issuance requests may in some cases only cover a subset of all the CPAs active during the monitoring period.

UNFCCC with a few differences attributed to the data status and any minor discrepancies in data inputs. Both models are similar in their overall approach, but still have some differences in the consideration of factors affecting the CER supply potential.

Table 1: Comparison of modelling data and methods

MODEL	IGES/MURC	NewClimate/Öko
SCOPE OF ANALYSIS		
Timeframe	CERs issued for emission reductions occurring from 2013 to 2020	
Projects	Registered CDM PAs, PoAs and CPAs included by October 2020	
CDM PROJECT DATABASE		
Database	IGES PA/PoA Databases	UNFCCC PA/PoA Database
FACTORS AFFECTING CER SUPPLY POTENTIAL (✓ denotes "considered in the model")		
Project implementation & operation rate	✓ Applies an average adjustment to all projects	✓ Applies different adjustments, based on project types, host countries and individual project status, to all projects registered before 2016
Regulatory requirement on renewal of crediting period	✓ Considers effects of methodology revisions in the same way for all projects	✓ Considers effects of methodology revisions incorporating bespoke data for industrial gas projects
Unavailability of monitoring data	✓ Applies a single average adjustment to all projects	✓ Applies an adjustment only to projects with high risks of abandoning monitoring activities
Project performance	✓ Calculates and applies respective performance rates for different project types with differentiation between PAs and PoAs	✓ Calculates respective performance rates for different project types of PAs and applies them to both PAs and PoAs

2.5. Options for restricting eligible CERs for transition

This paper considers two options for possible restrictions on the use of CERs towards NDCs:

1. **Registration date**: Only CERs from projects (PAs and PoAs) registered on or after a certain date are eligible for transition;
2. **Start date of the first crediting period**: Only CERs from projects (PAs and CPAs) for which the first crediting period starts on or after a certain date are eligible for transition.

These options for restrictions are derived based on the ongoing Article 6 negotiations and a decision taken by the ICAO Council. The draft texts proposed by the President at COP25 for Article 6 stipulate that only CERs from projects registered after a certain date are eligible for use towards NDCs, with 1 January 2013 and 1 January 2016 considered among the possible dates during the negotiations. In contrast, the ICAO Council has already decided to apply the first crediting period start date as a cut-off for CORSIA

eligible units. Units issued from projects whose first crediting period started on or after 1 January 2016 and issued for emission reductions or removals up to 31 December 2020 can be used by airplane operators to fulfil their offsetting requirements in CORSIA's pilot phase from 2021 to 2023. ICAO further clarified that this restriction refers to the first crediting period start date as communicated in the *original* PDD. This aims to prevent projects from retroactively changing the start date of their first crediting period to become eligible under CORSIA.

Against this background, both models estimate the CER supply potential under different cut-off dates for the registration and the start of the first crediting period. We assess cut-off dates starting from 1 January 2013 and from the beginning of every year until 1 January 2020. The registration date restriction applies a cut-off date based on the date either the PA or PoA registered with the CDM, as applicable. The first crediting period start date restriction applies a cut-off date based on the start date of the first crediting period of either the PA or CPA, as applicable.

The ICAO Council has not defined whether the start date of the first crediting period is assessed for each PoA, or for each individual CPA. Under the terminology of the CDM, only CPAs have a "crediting period" while PoAs have a "PoA period". This may suggest that the cut-off date – 1 January 2016 – is applied at the level of each CPA. On the other hand, the CDM does not identify for which CPA a CER has been issued. This could make it difficult in practice to apply the restriction at the level of CPAs.[10] If the start date of the first crediting period option applies a cut-off date based on the "PoA period", rather than the start date of each CPA's first crediting period, this would reduce the CER supply potential for a given cut-off date; a CPA's first crediting period starts either at the beginning of the PoA period, or in many cases, at a later date.

[10] The serial number of CERs includes a unique identification code for the PA or PoA in which the emission reductions were achieved, but no identifier for the CPA. However, it is possible to identify which CERs belong to which issuance request. Moreover, the CDM allows project participants to bundle groups of CPAs into different issuance requests. To identify CORSIA-eligible CERs it would be necessary to bundle CORSIA-eligible CPAs in terms of their crediting period in separate issuance requests from non-eligible CPAs; otherwise, eligible and non-eligible CERs are mixed up at the time of issuance and no longer distinguishable afterwards.

3. Results

3.1. Global analysis

Our analysis indicates that, in the absence of any restrictions, the overall supply potential for CERs for emission reductions from 2013 to 2020 is in excess of 4 billion. The figures below provide estimates of the cumulative CER supply potential under the registration date cut-off restrictions (Figure 3) and those applied to the start date of the first crediting period (Figure 4). The results cover all projects registered with the CDM as of the beginning of October 2020, to the extent they meet the respective restrictions.

Projects registered in or after 2013, namely during the second commitment period of the Kyoto Protocol, could potentially supply more than 300 million CERs for emission reductions up to the end of 2020. If eligibility is limited to projects that registered in or after 2016, the supply potential would be on the order of 46 – 63 million CERs.

For 2013 – 2015 cut-off dates both sets of estimates are similar, remaining within 10% of each other. Where the supply potential is limited to projects registered from 1 January 2016, the IGES/MURC estimates tend to be lower (on the order of 30%), with the exception of the estimates of supply potential from projects registered in 2020. The higher NewClimate/Öko estimates are likely largely due to two key differences in the application of factors affecting the CER supply potential. The NewClimate/Öko model does not apply downward adjustments to account for project implementation and operation status for projects registered since the beginning of 2016, unlike the IGES/MURC model which applies such adjustments for all registered projects. Additionally, the IGES/MURC model calculates and applies notably lower performance rates for PoAs than the NewClimate/Öko model. As PoAs account for a greater share of the overall CDM portfolio volume for more recent registration date cut-offs, this difference is more pronounced for later years.[11]

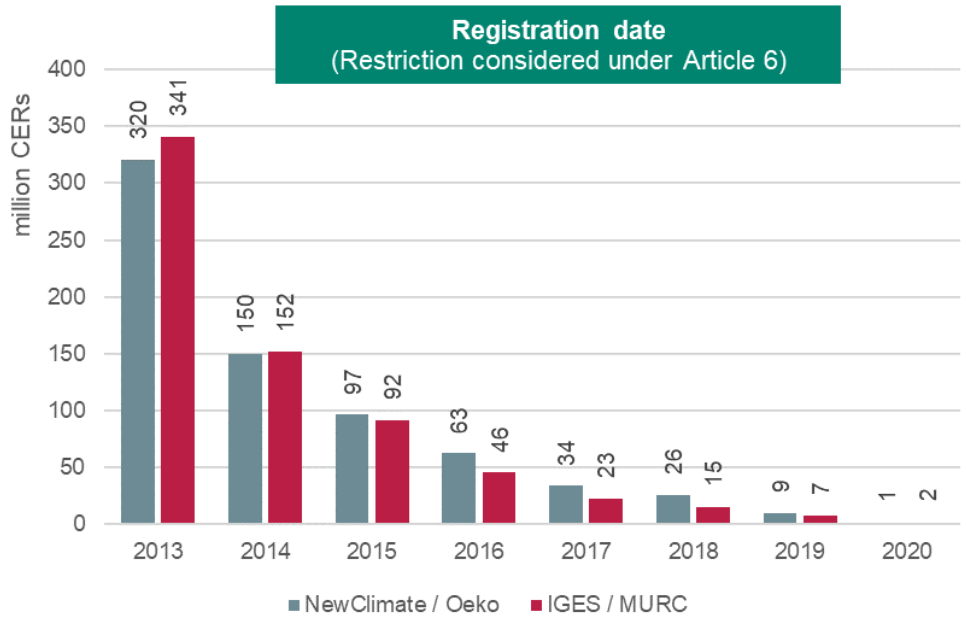

Figure 3: Cumulative CER supply potential under registration date restriction for different cut-off dates

[11] See sections 2.3.1 and 2.3.4, above, for a more detailed explanation of the different approaches used in the two models.

Under restrictions applied to the start date of the first crediting period, the supply potential is higher, for a given cut-off date, than if the cut-off is applied to the registration date. This is because the start of a project's first crediting period is typically either the same as the registration date or later than it. A 1 January 2016 cut-off applied to the start of the first crediting period – aligned with the ICAO Council decision for CORSIA's pilot phase – implies a supply potential of approximately 140 – 179 million CERs. If the cut-off date were set to the beginning of 2013, in excess of 1.4 billion CERs could be eligible for use against NDC targets.

The pattern of differences between the two models is broadly similar to that under registration date restrictions. For cut-off dates prior to 2016 the differences in the estimates (of IGES/MURC, compared to those of NewClimate/Öko) remains under 10%, increasing to approximately 30% for more recent cut-off dates. The NewClimate/ Öko estimates are the higher of the two in all but the 2013 scenario, largely explained by the different assumptions taken with regard to adjusting the supply estimates as per the registration date restrictions.

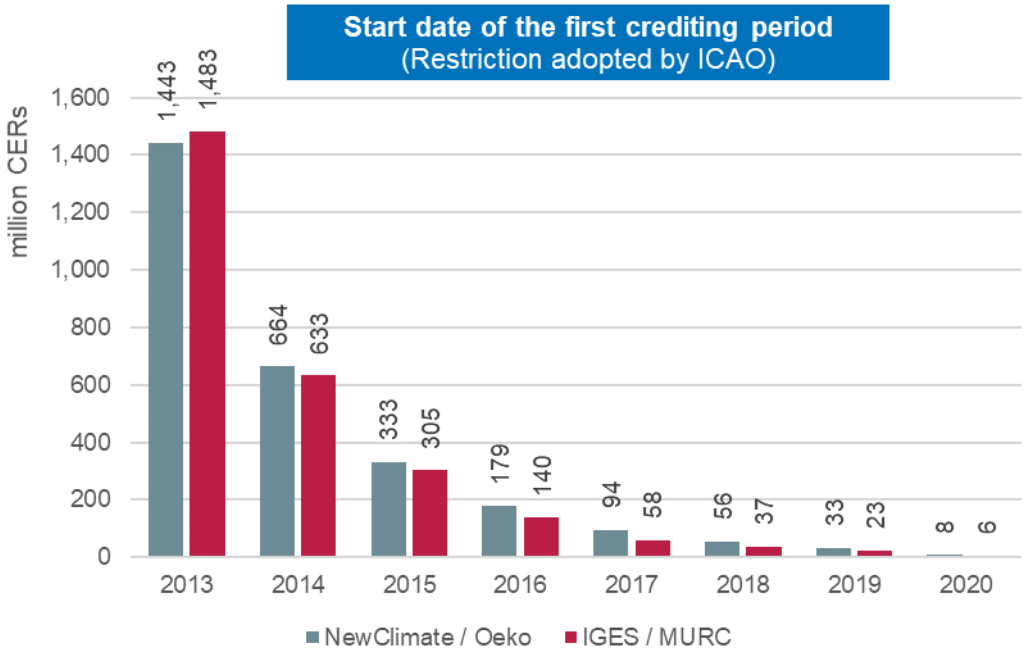

Figure 4: Cumulative CER supply potential under start date of the first crediting period restrictions for different cut-off dates

3.2. Analyses by host countries and regions

Finally, the paper shows which countries and regions are the main hosts of projects that make up the supply potential estimates under selected restrictions. Figure 5 below shows the CER supply potential by the main host countries and across the four UNFCCC CDM regional groupings under four restriction scenarios: 1 January 2013 and 1 January 2016 cut-off dates, applied to both the registration date and the start of the first crediting period. On the left-hand side, it shows estimates of the supply potential from the two models for the top-ten host countries, ordered in terms of their relative contribution to the total, as well as all remaining supply potential from other host countries.[12] On the right-hand side it shows the split of the total estimated supply potential between projects located in Asia and the Pacific, Latin America and the Caribbean, Africa and the grouping of "Economies in transition". Estimates from the NewClimate/Öko model are shown in the outer ring and compared to estimates from the IGES/MURC model in the inner ring.

Although the total amount of the CER supply potential significantly differs between the two types of restriction – by registration date, or by start date of the first crediting period – the distribution of the CER supply potential between host countries and across regions is relatively similar for a given cut-off date. It matters, however, which cut-off date is used: In the case of a 1 January 2013 cut-off date, CERs from Asia-Pacific countries account for around two-thirds of the total supply potential, with China and India making up the largest share. In the case of a 1 January 2016 cut-off date, the CER supply potential is more diverse and the portion of Asia-Pacific countries is lower than for a 2013 cut-off date.

Bangladesh makes up a larger share under a 2016 cut-off date, noting that a relatively material difference is seen in the estimates for Bangladesh between the NewClimate/Öko model and the IGES/MURC model. This is largely due to a PoA registered in 2018 with particularly high estimated emission reductions.[13] As the IGES/MURC model applies greater downward adjustments to supply estimates for projects registered since 2016, and for PoAs, compared to the NewClimate/Öko model, the IGES/MURC estimates are lower for Bangladesh.

A number of projects (2 PAs and approximately 40 PoAs) are spread across more than one host country. In the NewClimate/Öko model the supply from these projects is allocated to the country with the largest share of estimated emission reductions amongst existing CPAs or, where this information is not available, the first listed host country in the UNFCCC CDM database. In the IGES/MURC model supply potential for these projects is not allocated to any specific host country and is shown under the "Multiple countries" category in the regional breakdown on the right-hand side of the figure. This in part explains why the IGES/MURC country estimates on the left-hand side are lower, particularly for the 2016 cut-off date scenarios, where multi-country PoAs account for a larger share of the total supply potential.

[12] Note that, due to differences in the estimates between the two models, the top-ten countries are not fully aligned across all scenarios. The discrepancies in terms of which countries rank within the top ten are minimal and only affect those countries with relatively small shares of the total, so for simplicity we only show ten countries per chart.

[13] PoA 10431, named: Improved cookstove program in Bangladesh supported by the Republic of Korea.

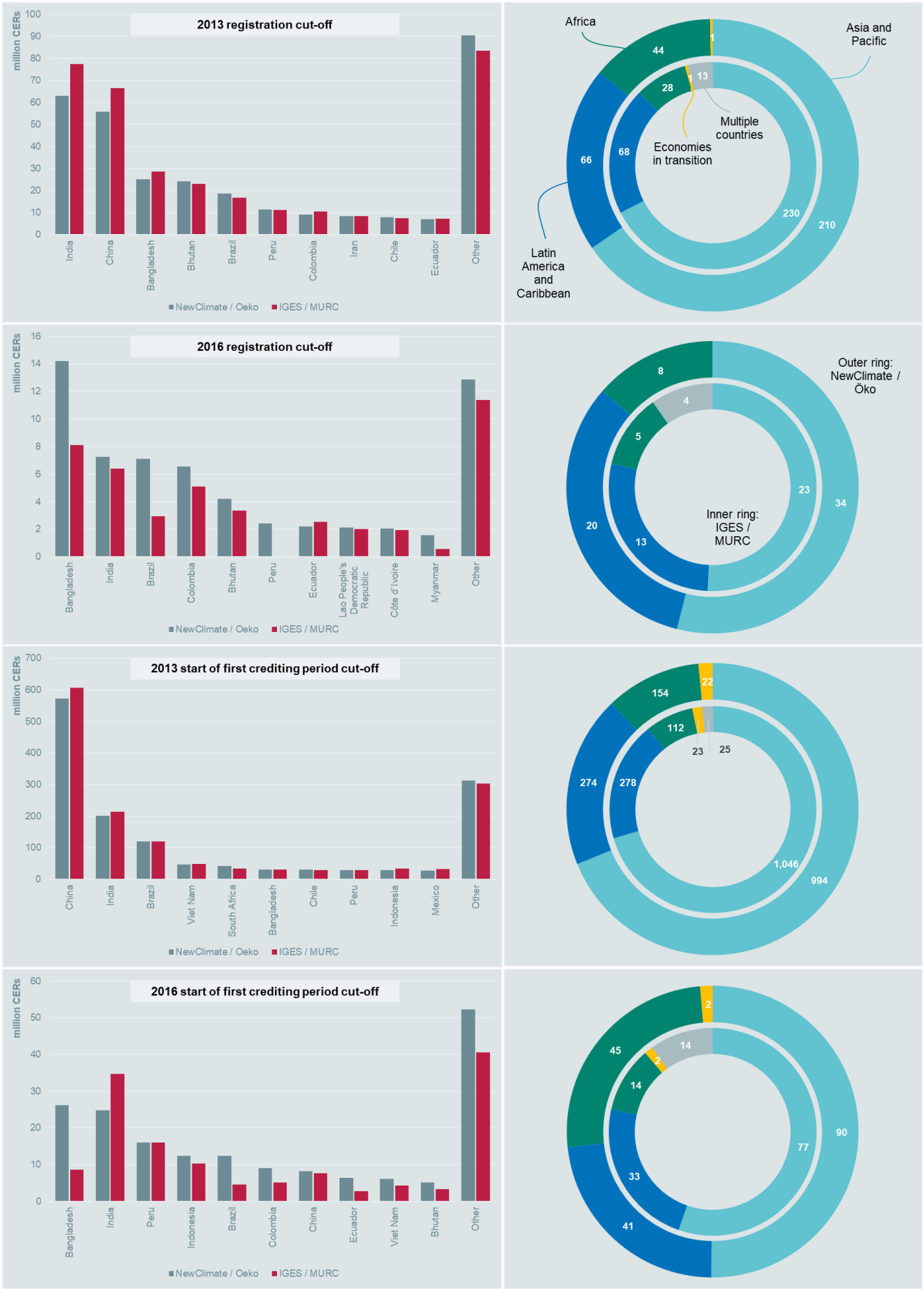

Figure 5: Cumulative CER supply potential for selected restrictions allocated to host countries regions

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