ARTICLE 6 APPROACH PAPER SERIES

Considerations for CDM Methodology Concepts to Article 6.2 Mechanism

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Considerations for CDM Methodology Concepts to Article 6.2 Mechanism

Abstract

The Clean Development Mechanism (CDM) under the Kyoto Protocol has seen the development of over 250 project-based methodologies for establishing baseline emissions, assessing additionality, monitoring project activities, and measuring & verifying emission reductions. The implementation of these methodologies over the years has provided valuable experiences and lessons that could inform baseline-setting methods under Article 6 of the Paris Agreement (PA) to ensure environmental integrity, increased mitigation ambition, and the achievement of Nationally Determined Contributions (NDCs).

In this context, this approach paper delves into components of CDM methodologies that require reassessment for the transition from the Kyoto to the Paris regime. It draws from past CDM experiences to identify useful insights that can be applied to the new toolkit. It builds on lessons learned from baseline establishment under CDM and recent recommendations by the Article 6.4 Supervisory Body on the development of mechanism methodologies. It identifies the key risks (over-crediting/over-selling and risk of perverse incentives) that need to be addressed, and crucial elements (ratcheting-up of ambition) that need to be considered for robust Article 6 baseline-setting that aligns with new requirements under the Paris Agreement.

Furthermore, the approach paper explores how NDCs, sector targets, policies, and regulations can be factored into baseline considerations within the framework of Article 6. It assesses some of the broadly applied CDM baseline methodologies: (i) on-grid renewable energy (ACM0002); (ii) landfill gas activities (ACM0001); as well as (iii) grid extension (AMS-III.BB); and Tool 07 on emission factor for an electricity system, with regards to the adherence under the Paris Agreement Article 6 and provides recommendations for potential adjustments.

Overall, the paper concludes that while the portfolio of CDM methodologies can serve as a reference, baseline setting under Article 6 must go beyond the CDM baseline determination method that relies on historical practices and take a forward-looking approach that considers NDC targets and trajectories and ambition-raising.

1. Introduction & Objectives

Article 6.2 of the Paris Agreement aims to contribute to reducing global greenhouse gas (GHG) emissions by providing a cooperative structure to achieve mitigation. To achieve its intended aims, the Article 6.2 mechanism needs to become operational as soon as its rules, modalities and procedures are established. It is clear that there is a very brief period within which global emissions should peak and subsequently decrease, to achieve the global temperature goals of the Paris Agreement.

Unlike the availability of IPCC guidelines for GHG emissions accounting, no international guidelines currently exist for GHG mitigation accounting. However, over the past two decades, the baseline and monitoring methodologies developed under the Clean Development Mechanism (CDM) have provided a familiar and broadly accepted basis for baseline determination, additionality demonstration, and both ex-ante estimation and ex-post determination of emission reductions in mitigation projects and programmes of activities (PoA). Furthermore, these methodologies have not just been used under CDM but also in other compliance programmes (e.g., Joint Implementation-JI) and independent standards, (e.g., Gold Standard- GS and Verra Verified Carbon Standard- VCS).

According to the Paris Agreement text, Article 6.2 activities must contribute to Parties' Nationally Determined Contributions (NDC) achievement, ambition raising, and sustainable development through cooperation while ensuring environmental integrity. Here, ambition raising is considered to mean that the mechanism could facilitate more progressive and higher-impact action. The CDM methodologies, although being the stronghold in the pre-2020 regime, do not appear to be fully aligned with Article 6.2 principles, particularly the considerations of NDC targets and trajectories and ambition raising. Many of the CDM methodologies have sought to define business-as-usual practices by considering historical practices against which project emissions are compared, with an approach that looks toward the past, rather than the future.

Nevertheless, many CDM methodologies are refined tools that could potentially contribute to the construction of Article 6.2 mechanisms and actions.

This approach paper examines some of the key aspects of CDM methodologies that need to be re-examined during the change in regime from Kyoto to Paris, and lessons learned from CDM methodologies.

Additionally, it examines how NDCs and sector targets, policies and regulations may be accounted for baseline considerations in the Article 6.2 context, and where CDM baseline determination methods might be adapted or adjusted for alignment with the requirements in the context of NDCs.

Mitigation Outcome Transfers and Climate Finance

The Paris Agreement establishes general methods for financing actions that contribute to its goals. The market approaches for transferring mitigation outcomes (MOs), which consider trading of MOs with similarities to ex-post, results-based carbon finance, are stated in Article 6. Non-market approaches have also been established, but are not discussed here. Article 9 establishes climate finance, which assists Parties with both mitigation and adaptation through a variety of instruments and sources, with a particular role for public funds. This approach paper relates to the first of these two categories of finance and is called "carbon finance" here. Apart from acting as an incentive instrument prompting climate friendly activity, some mitigation action types, or sectors may be better suited to using carbon finance; for example, where periodic results-based financing supports sustainable operation and maintenance. Other mitigation types may obtain more appropriate assistance from other climate finance instruments, for example, when a very large initial investment is required, and the impact quantification is complex (e.g. some public infrastructure development). In the case of carbon finance, it is especially pertinent to consider how to balance incentives for private sector investment with environmental integrity.

2. Considerations for Article 6.2 baselines

In the CDM, one of the central components of methodologies was the baseline determination procedure. Baseline determination will be equally important in the Article 6.2 mechanism, and the procedures to do so are still to be defined. However, the RMP encourages the implementation of mechanism methodologies that remove barriers to the deployment of clean technologies and encourage ambition over time. This can be achieved by increasing the stringency of baselines and developing Baseline Contraction Factors (BCFs). Mechanism methodologies should also be real, transparent, conservative, credible, and below business as usual, ensuring that the results of activities represent actual reductions in GHG emissions and provides credible methods for estimating emission reductions. Baselines should be demonstrated as being below business as usual, and mechanism methodologies should help equitably share the mitigation benefits between participating parties. This can be achieved through robust, transparent, and user-friendly measurement, reporting, and verification systems that avoid double-counting risks and use data-driven and publicly available performance standards.

In the draft recommendations on requirements for the development and assessment of mechanism methodologies submitted for the 6th meeting of Article 6.4 Supervisory Body, a performance-based approach for setting baselines is highlighted. Each mechanism methodology is required to choose one of the following performance-based approaches:

(i) Best available technologies that represent an economically feasible and environmentally sound course of action, where appropriate.

(ii) An ambitious benchmark approach where the baseline is set at least at the average emission level of the best performing comparable activities with similar outputs and services in a defined scope in similar social, economic, environmental, and technological circumstances.

(iii) An approach based on existing actual or historical emissions, adjusted downwards to ensure alignment with paragraph 33 of the RMP. The application of the BCFs may be required.

Mechanism methodologies must justify the appropriateness of their chosen baseline approach and consider guidance from the Supervisory Body. Host Parties may specify baseline approaches and determine more ambitious baseline requirements at their discretion.

In light of the above recommendations proposed by the Supervisory Body and the lessons learned from CDM methodologies, Article 6.2 baselines should contribute towards and address the following issues:

- **Controlling the risk of over-crediting/ over-selling**: The seller/host country may inadvertently transfer its mitigation outcomes internationally in excess, potentially jeopardizing its ability to meet its own set NDC target(s) due to overselling. Alternatively, the buyer country may unwittingly purchase an excess of internationally transferred mitigation outcomes (ITMOs) without considering whether the seller country will meet its own NDC target. In either of these cases, the baseline setting could help abate the risk of the host country overselling and impart confidence to the buyer country.

- **Ratcheting up ambition**: All Parties to UNFCCC are requested to submit new rounds of NDCs (new NDCs or updated NDCs) every five years (e.g. by 2025, 2030), regardless of the respective implementation time frames.[1] Further to this, the successive NDCs should be more progressive than the previous NDC and the baseline setting should be progressive too. The management of a situation when the baseline period of an Article 6.2 action straddles two NDCs needs to be considered

- **Avoid penalizing climate-friendly government pledges and policies**: The baseline setting should not incentivize short-term gains over long-term decarbonization and should rather support implementation of climate-friendly policies (fiscal or non-fiscal) and pledges.

[1] As per the NDC synthesis report by UNFCCC, almost all Parties communicated an NDC implementation period until 2030.

Furthermore, Article 6.2 baseline setting may be part of a two-step process to promote unit quality:

- Baseline setting references the stringent NDC, or other criteria if stringency of the NDC is not ensured (related criteria potentially may be defined in Article 6.2 RMP), and
- Environmental integrity is checked through an NDC assessment.

The former relates to the volume of mitigation outcomes (crediting) being generated, and the latter is linked to the suitability of the mitigation outcome being transferred between Parties.[2]

At the same time, the nature and level of detail of NDCs vary greatly. Many NDCs do not lend themselves to forming the direct basis for a numerical baseline for a site-specific or sector-wide mitigation action. However, it would be counterproductive for the variations in NDCs to prevent the cooperative actions made possible by the provisions of Article 6.2. Methodologies for baseline determination methods may play a role in determining the procedure for setting baselines that address the needs of this mechanism. For example, the baseline methodology could provide some default values that would eschew the need for the NDC to be the basis for baseline determination, where the NDC is general, or its stringency cannot be determined. In other cases, the NDC still could be a reference point for the baseline setting.

NDCs also vary in the nature of the targets they contain. NDCs have differentiated unconditional targets, conditional targets, and some NDCs include economic sectors or areas of the economy completely outside the NDC. One of the difficulties in capturing conditionalities in the baseline is that Parties have defined conditionality differently. In this approach paper, the following standard characterizations of conditionality are proposed:

Unconditional target: the Party considers the target attainable using its own resources (financial, capacity, technology) in the time-frame defined in the corresponding NDC.

Conditional target: The Party considers it unfeasible to attain the target on its own, but identifies that with support, which includes financial, capacity, and/or technology support, the target is attainable. Conditional targets may be seen as aspirational targets.

Under these definitions, while NDCs are the starting point for the application of Article 6.2, it may not be feasible or necessary to consider the NDC impacts in baselines for all Article 6.2 actions, in particular, mitigation actions toward conditional targets or mitigation beyond the NDC. Here, three potential ways to consider unconditional versus conditional targets in Article 6.2 baseline setting are presented.

2.1. CDM methodologies and experience contributions to Article 6.2 baseline setting methods

It is widely recognized that the development of CDM methodologies has been complex and time intensive. Furthermore, its application was hampered by its complexity and substantial data requirements for individual private companies or governments with capacity constraints. These challenges were experienced in the context of a mechanism that frequently focused on the use of historical data and baseline conditions for a single location. There is a risk that the Article 6.2 mechanism could become overburdened with complex requirements for baseline setting related to interpretation of highly variable NDCs, thereby hampering the application of the mechanism and its potential to contribute to NDC achievement, ambition raising and sustainable development. Therefore, one of the goals for Article 6.2 baseline setting could be simplicity. Simplicity in baseline setting could be achieved by enabling a greater trade-off between accuracy and environmental integrity of

[2] As discussed in the Article 6 Approach Paper 1, Ensuring Environmental Integrity under Article 6 Mechanisms.

baselines, where appropriate. Lower accuracy but higher environmental integrity in simplified baseline setting methods could provide the basis for growth of the number and scale of mitigation actions. This approach could be suitable for sectors or project types where it is challenging or prohibitively expensive to obtain measurements, such as some household energy use improvements, aerobic waste management methods and transportation modal-shift. For other cases, however, both environmental integrity and accuracy can be achieved simultaneously. Examples of such project types are forest carbon stocks measured using satellite and artificial intelligence (AI) monitoring, high-precision metering of renewable energy electricity generation, among others.

Table 1: Alternatives for incorporating conditionality of NDC targets in Article 6.2 baselines

Example: Electricity sector NDC

Unconditional goal: Add 100 MW of renewable capacity
Conditional goal: Add 400 MW more renewable capacity

Alternative to consider conditionality of targets in the baseline	Example actions	Example baselines	Mitigation outcomes	Indicative incentives or financing[3]
Baseline considers absolute achievement of unconditional NDC	First 100 MW of new renewable capacity installed	Baseline emission factor equal to project	No mitigation outcomes for international transfer achieved	National sources
	Next 400 MW renewable capacity installed	Baseline emission factor set at a static or dynamic reference level	Mitigation outcomes achieved	Carbon finance, climate finance
Baseline considers proportional achievement of unconditional NDC	First 500 MW of new renewable capacity installed	Baseline emission factor set at four-fifths reference level	Mitigation outcomes achieved for proportion of achievement that is conditional	National sources[4] + Carbon finance
Baseline considers achievement of both unconditional and conditional NDC	First 500 MW of new renewable capacity installed	Baseline emission factor equal to project	No mitigation outcomes for international transfer achieved	National sources + climate finance
	Any further renewable capacity installed	Baseline emission factor set at a static or dynamic reference level	Mitigation outcomes achieved	Carbon finance, climate finance

[3] This list is non-exhaustive

[4] The host country could consider domestic incentive schemes to avoid “early mover” disadvantage for the first 100 MW that would not receive international carbon finance benefits.

3. Managing risks with Article 6.2 baselines

3.1. Consideration of policies

There is consensus that regulatory requirements be considered when establishing a baseline for Article 6.2 mitigation. However, there are questions regarding whether or how to incorporate *policies* promoting climate-friendly technologies and practices, especially those that have not yet been regulated. There may be concern from governments if the approval of more ambitious policies mean Article 6.2 actions in their countries will lead to lower crediting of mitigation outcomes, and this concern could influence countries to reject policies that would support increased ambition.

However, research and experience on CDM impacts showed that the risk of perverse incentives was considerably lower than expected, while the risk of over-crediting was substantial (Spalding-Fecher 2014). These cases may have similar levels of risk under Article 6.2, which may even be lessened since all countries now have contribution targets to meet and over-crediting could impede NDC achievement.

The baseline for mitigation outcomes may be set in such a way that if emissions would follow the project's baseline scenario, the host country's unconditional contribution could still be reached. In other words, the baseline scenario could be constructed considering the future impacts of some policies indicated in the country's NDC. Since the NDC baseline setting may tend to look toward future circumstances, unlike CDM baselines that tend to consider past practices, it could be consistent to include the intended future impacts of some policies in the baseline determination. Other national policies, such as planned regulation relevant to the activity, and carbon pricing schemes in place, may also play an important role in capturing the host country context reasonably in the baseline.

For example, if the government has defined a 2035 target emission factor for grid electricity, then potentially, the emission factor in 2025 should be consistent with a path toward achieving the 2035 target.

Regardless, baseline setting should not factor in new regulations or policies that *increase* emissions, unless there are circumstances where basic human needs are not being met, similar to "suppressed demand" circumstances applied under the CDM and some voluntary programs. When considering planned regulations for determining the crediting baseline, it is important to examine the rationale and exclude those that would increase emissions. Strive to attain the most realistic view possible of the likely baseline emissions. If obtaining this view proves overly burdensome, apply simplifications that prioritize environmental integrity.

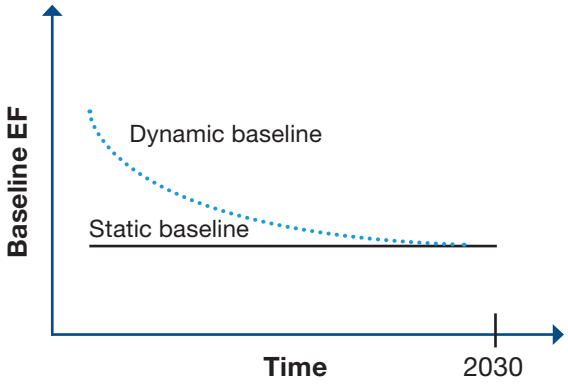
Policies directly related to achieving unconditional NDC targets

Expected policy impacts should be accounted for in mitigation baselines. Potentially, a dynamic baseline could reflect the anticipated change in impact of a policy over time, which could incentivize early movers. Alternatively, a static baseline could assume uniform policy impact, for simplicity. Assuming that the baseline emission factor would be higher in the earlier years, as opposed to a static factor, may incentivize early action in some circumstances.

Long-term strategies and Article 6.2 baselines

While the mid-century long-term low GHG emissions development strategies are expected to be important instruments for guiding the long-term trajectory to low GHG emissions, it may be more realistic not to require these to be considered initially in Article 6.2 baseline setting, but rather begin by determining baselines that support neither overselling, nor over-crediting and are consistent with the NDC, prioritizing a quick-start to the operation of Article 6.2. The appropriateness of incorporating long term strategies in Article 6.2 baseline definition can be reconsidered in the future.

Figure 1. Example alternatives for incorporating policy impacts in baseline definition



It may not be necessary to account for expected policy impacts in mitigation baselines when the policies are related to achieving conditional NDC targets. This relates to the future consensus on the nature of the conditionality of targets. The alternatives presented in Table 1, above, provide an example of some of these alternatives. Similarly, in mitigation baselines, it may not be necessary to account for policies promoting lower emissions for sources unaddressed in the NDC.

3.2. Controlling the risk of over-crediting or over-selling

To abate the risk of host countries overselling and impart confidence to buyer countries, some alternatives include:

- setting the baseline at a level below business-as-usual, leading to reduced crediting of reductions
- curtailing the amount by which mitigation outcomes accrue (credit discounting)
- limiting the period that mitigation outcomes accrue (shortened crediting period)
- restricting the transfer of mitigation outcomes (credit set-aside/reduced transfer).

With respect to the potential role for CDM methodologies, there is the possibility to adapt or adjust them to set baselines at below business-as-usual levels. The other three alternatives for controlling these risks could be defined by host country policy or be addressed directly in the baseline methodologies. For example, in CDM methodology AMS-II.G for energy efficiency measures in thermal applications of non-renewable biomass, a net-to-gross discount of 5% is applied to the emission reductions, to avoid over-crediting. Or, for example, under AMS-III.AR for substituting fossil fuel-based lighting with LED/CFL lighting systems, the default crediting is limited to two years, effectively using a shortened crediting period to abate the risk of over-crediting. The role of methodology is to ensure the accuracy of the mitigation outcomes, or if accuracy is difficult to achieve, it must at least ensure that the mitigation outcomes are not overestimated. The methodology will not define the price of the mitigation outcomes. However, it can generate accurate baselines and allow the host country to make the most informed decision regarding the number and price of mitigation outcomes to be transfered, while taking the opportunity cost into account.

3.3. Frequency of baseline update/ validity of baseline

It may be appropriate to relate Article 6.2 baselines to the timeframe of NDC target updates. Baseline setting may be based on the most recently published NDC. In other words, every five years, the policy context would be reviewed for updating the baseline.

While aligning the crediting period with the NDC implementation timeframe may mitigate the risk of overselling, the importance of investment security for private sector investors is also relevant. A longer crediting period with less frequent baseline adjustment provides more investment security. For some project types, especially those with a longer payback duration, this may make a significant difference in terms of commercial viability. It may be that carbon finance will be more suitable for project types that require shorter payback times, whereas those with long payback times may be more suited to other climate finance instruments.

With respect to the frequency of baseline updates, some of the alternatives are to:

- maintain the baseline for five years or longer, providing better predictability but, potentially, lower ambition;
- require projects with crediting periods that straddle an NDC update, to update the baseline once a new NDC is published, providing higher ambition but lower predictability and potentially discouraging investment;

- apply dynamic baseline emission factor setting, accounting for evolving conditions annually, with low predictability but higher ambition, or
- apply a static baseline emission factor, with a value that is forward-looking to the end of the target period, providing predictability, higher ambition, but possibly lower potential incentives due to the generation of fewer mitigation outcomes. However, the level of incentive would also depend on mitigation outcome pricing, which could be driven higher by lower availability.

4. Testing Article 6.2 concepts with CDM methodologies

A variety of baseline setting approaches have been discussed in the Article 6 negotiations; for example, in the context of Article 6.4, the discussed approaches include best-available-technology (BAT), economically feasible BAT, performance-based approaches, benchmarks, and projected emissions. The experience of the CDM shows that all these types of approaches may be appropriate, in different country and sector circumstances. To draw insights from the CDM, there is an option to develop a rulebook that offers a diverse set of approaches tailored to different countries and, possibly, sector circumstances. In Annex 1, three CDM methodologies are analyzed, and areas where changes would be required to adapt them to the Article 6.2 context are identified. The analysis shows that a significant portion of each methodology could be retained. Apart from editorial changes for consistency with the new context, key changes would be required in the baseline approach.

The baseline setting approaches could consider two priorities suggested previously: simplicity, by prioritizing environmental integrity over accuracy when relevant, and predictability of mitigation outcomes. These priorities may be considered while also catering to the common but differentiated responsibilities (CBDR) and respective capabilities (RC) of the parties to participate in Article 6.2.

The following examples test how some of the most broadly applied CDM methodologies,[5] ACM0002 and AMS-I.D, along with the Grid Tool to calculate the emission factor for an electricity system, could be adapted to define baseline emission factors for various country circumstances and NDC characteristics within the context of Article 6.2. Further, Annex 2 provides an example of how the current Grid Tool could be adjusted to include baseline emission factor determination methods, and Annex 3 gives a justification of the proposed changes.

4.1. Example 1: NDC with exclusively conditional target for mitigation in the electricity sector

In this example, the country has set a target of reduced emissions per MWh, which is unattainable without assistance, or is conditional. In this hypothetical scenario, which reflects the goals of some least developed countries and Small Island Developing States, the current electricity coverage is so limited that the country needs to significantly increase generation to fulfill the energy requirements of its population. Thus, the electricity sector policies may prioritize expanding coverage over expanding renewable generation.

Under such circumstances, the existing provisions of ACM0002/AMS-I.D + the Grid Tool could be used to determine a combined margin baseline emission factor for electric energy. This would require regular adjustments to, first, update the baseline emission factor (e.g. yearly), and second, include new carbon-finance driven generation in the baseline emission factor, instead of excluding carbon-financed projects as in the CDM. A baseline emission factor derived this way would show ambition, due to its regular update and inclusion of carbon-financed plants, while also acknowledging the stated need for assistance to reach the target by resulting in mitigation

[5] The methodologies 'ACM0002: Grid-connected electricity generation from renewable sources' and 'AMS-I.D.: Grid connected renewable electricity generation' have been used in more than 58 percent of the CDM projects.

outcomes for all new renewable energy plants.

4.2. Example 2: NDC with exclusively unconditional target for mitigation in the electricity sector

Under this example, the country sets a target of reduced emissions per MWh and considers the target attainable using its own resources. To support NDC achievement, only action going beyond the unconditional target would be suitable for transferring mitigation outcomes via Article 6.2 participation.

One alternative to define the baseline emission factor could be based on the expected future emission factor at NDC target attainment, calculated using the same CDM Grid Tool methods, via a top-down calculation to be applied by all users, with the following adjustments:

- Existing grid tool with modified application for determination of future emission factor to avoid over-crediting/over-selling, for example
    - Operating margin is based on expected value in the year of NDC target attainment, and
    - Build margin is based on the anticipated development of technologies in the interim for target attainment.

Further, based on the respective NDC and associated roadmap for achieving the contributions, the host country may:

- Differentiate domestic mitigation actions for meeting national contributions from those for international transfer, by setting a positive list for technologies for mitigation outcomes in this sector;
- Provide a top-down crediting baseline based on sectoral modeling using criteria different to the Grid Tool; and/or
- Allow only a percentage share of the mitigation outcomes to be transferred internationally from an activity.

4.3. Example 3: NDC with both conditional and unconditional electricity sector targets

In this case, a country has indicated in its NDC an *unconditional* target to increase the renewable energy (RE) share in the power sector to 10% by 2030 based on an existing RE policy prior to 2015, plus a *conditional* target to further increase penetration of RE in the generation matrix. After the NDC submission, the RE development targets and power system master plan are published, although the country's previous RE policy targets have not been met.

In such a case, the baseline emission factor could be determined as follows:

- By applying the existing grid tool, particularly if basic human needs regarding energy access are not being met in the country, with the adjustments proposed in Example 1;
- Modifying the existing grid tool for determination of a future emission factor to avoid over-crediting and over-selling, with the adjustments proposed in Example 2;
- Developing a top-down defined emission factor for the grid based on modeling; for example, like the EU INNOVFUND value that determined a modelled (targeted) 2030 grid emission factor of 0.15 tCO_2e/MWh in the 'methodology for GHG emission avoidance calculation'; or
- an independent, default factor across regions that provides parity among countries for RE projects, neither penalizing countries with clean grids nor rewarding countries with polluting grids, akin to the default fraction of non-renewable biomass (fNRB) of 0.3 under the CDM Tool30 Calculation of the fraction of non-renewable biomass, version 3.0.[6]

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-30-v3.0.pdf

4.4. Comparison of some options for defining baselines under Article 6.2

The following table compares a typical CDM baseline determination method, referencing historical practices, with two potential Article 6.2 baseline determination methods presented in the earlier examples. The point of reference is a CDM method referencing site-specific historical practices to define the baseline emission factor, and the two potential Article 6.2 example methods are:

- Baseline example 1: NDC with exclusively conditional target for mitigation, where the baseline emission factor is based on the annual average sector practices and updated each year.
- Baseline example 2: NDC with exclusively unconditional target for mitigation, where the baseline emission factor is based on the targeted future emissions intensity level, pegged to the year of NDC attainment in 2030.

Table 2: Pros and cons of Article 6.2 baseline options

	CDM point of reference: Historical practices	Baseline example 1: Average sector practices with regular update	Baseline example 2: Pegged to targeted 2030 level
Simplicity	Yes, since methods are site-specific	Somewhat, since method may be tied to annual inventory reporting. However, there is usually a lag in reporting and the aggregate sectoral data might be difficult to interpret for project-based activities, but may apply for sectoral level activities.	Somewhat, since the future emissions intensity level at year of NDC attainment could be defined once top-down and applied throughout the compliance period.
Information/ data requirements	Low to medium, since site-specific data may be readily accessible.	High, since data requirements would go beyond published inventory data and would be ongoing since update would be yearly.	Medium, since one future year would need to be analysed in terms of projected emissions intensity level, including demand projections and impact of NDC and policies.
Top-down or Bottom-up	Bottom-up	Either bottom-up or top-down, the latter case being like the example of national governments setting the national baseline emission factor for CDM by applying the Grid Tool.	Top-down and made available by a government or academic entity to ease the application by mitigation actions.
Ensuring environmental integrity	Unlikely, only if historical practices at site were already beyond business as usual.	Perhaps, if the evolving emissions intensity includes an uptake of mitigation, and the baseline gets lower over time.	Likely, since the emissions intensity level in the year of NDC attainment is likely lower than historical and current emissions.
Other remark(s)	N.A.	May provide incentives for early movers, in case of a trend toward decreasing baseline emissions.	Static factor would not provide incentives for early action, but could provide simplicity and predictability.

5. Conclusions

The baselines that will be defined for Article 6.2 actions will need to go beyond CDM baselines, since most CDM baseline methodologies do not materialize the ratcheting-up of ambition, and they may pose a risk for over-selling by focusing on historical practices.

Nevertheless, Article 6.2 may learn from the portfolio of CDM methodologies that has varied approaches to different country and sector circumstances. As in CDM, under Article 6.2, it is unlikely that "one size fits all". Further, some existing CDM methodologies and tools could provide the structure for setting Article 6.2 baseline emission factors with some adaptations or adjustments. As a specific example, ACM0002 and AMS-I.D and the Grid Tool could be adapted to set baseline emission factors for Article 6.2 actions under NDCs of different characteristics.

The concept of a ladder of approaches to baseline setting could be applied. At the beginning of Article 6.2 implementation, it may be appropriate to apply simpler approaches based on existing CDM concepts while there is development of capacity and resource constraints are overcome. Whereas moving forward, a transition toward more ambitious or more complex approaches could be implemented over time.

As a final consideration, the following areas for exploration were identified during the development of this approach paper:

- Coherency of mitigation outcomes: how might coherence between baselines and MOs be achieved across countries and across different mechanisms under Article 6?

- Links to the voluntary market: how would activities under voluntary markets impact baseline setting under Article 6.2?

ANNEX 1

Example: ACM0002: Grid-connected electricity generation from renewable sources

Methodology Element	Explanation	Example case	Adherence under Paris Agreement or changes anticipated
Title	Indicative for project types	**ACM0002: Grid-connected electricity generation from renewable sources**	No change anticipated.
Applicability	Pre-conditions to be met for application to a project	Grid connected RE (excluding biomass) projects including greenfield, capacity addition and rehabilitation or retrofit or replacement	No change anticipated.
Normative references	Reference to other tools	E.g., TOOL01 for additionality; TOOL07 for grid emission factor	Changes to the tools and reference to other tools might be needed.
Baseline approach	Selected approach from paragraph 48 of the CDM modalities and procedures	48(a): actual or historical emissions; or 48(b): economically attractive course of action	Not well aligned with potential baseline approach options under the Paris Agreement (PA). Different criteria are required to define PA baseline.
Baseline methodology			
Project boundary	Spatial boundaries, sources of emissions and GHGs included	All power plants connected to the grid and associated CO_2 emissions	No change anticipated.
Baseline scenario	Likely scenario to prevail in absence of project activity impacting emissions, linked to baseline approach	Emissions from grid connected plants, emission intensity factor computed based on TOOL07 for grid emission factor	Changes are needed to the tool to define a PA appropriate emission factor aligned with the PA baseline approach and NDC accounting among other aspects that need to be incorporated.
Additionality	Basis to indicate that the project is not business-as-usual	Reference to other tools: TOOL01 for additionality; TOOL32 for positive lists	The concept of additionality may be replaced by environmental integrity of mitigation outcomes (MO), or alternative methods of demonstrating additionality may be developed.
Baseline emissions	Emissions associated with the baseline	Based on net electricity generation by the project activity and the grid emission factor	The calculation of the grid emission factor based on the tool might need revision to align with eligible baseline scenarios.
Project emissions	Emissions associated with the project	Emissions in case of hydro and geothermal projects	No change anticipated.

Methodology Element	Explanation	Example case	Adherence under Paris Agreement or changes anticipated
Leakage	Emissions associated outside the project boundary	No leakage	No change anticipated.
Emission reductions		Baseline minus project minus leakage	No change anticipated.
Monitoring methodology			
Ex-ante parameters	Parameters fixed		Linked to baseline approach for EF determination.
Ex-post parameters	Parameters to be monitored	Net electricity generation	Linked to baseline approach for EF determination.

Example case: ACM0001: Flaring or Use of Landfill Gas

Methodology Element	Explanation	Example case	Adherence under Paris Agreement or changes anticipated
Title	Indicative for project types	**ACM0001: Flaring or Use of Landfill Gas**	No change anticipated.
Applicability	Pre-conditions to be met for application to a project	Capture of LFG and destruction by flaring or by energy generation	No change anticipated.
Normative references	Reference to other tools	E.g., TOOL01 for additionality; TOOL08 for mass flow in a GHG stream	Changes to the tools and reference to other tools might be needed.
Baseline approach	Selected approach from paragraph 48 of the CDM modalities and procedures	48(a): actual or historical emissions	Not well aligned with potential baseline approach options under PA. Different criteria required to define PA baseline.
Baseline methodology			
Project boundary	Spatial boundaries, sources of emissions and GHGs included	Location where LFG is captured and flared or used and associated CH4 emissions.	No change anticipated.
Baseline scenario	Likely scenario to prevail in absence of project activity impacting emissions, linked to baseline approach	Must be a history of atmospheric release of LFG, except to comply with regulation; continued release of LFG at the rate permitted by regulation.	If this sector or this type of action is included in the NDC, then NDC impacts would need to be considered. If not, could be applied as is. If energy is generated, then NDC impacts on the baseline for electricity or heat would also need to be considered, or excluded from the project and only LFG destruction needs to be considered.

Methodology Element	Explanation	Example case	Adherence under Paris Agreement or changes anticipated
Additionality	Basis to indicate that the project is not business as usual	Reference to other tools: TOOL32 for positive lists; TOOL02 combined tool	The concept of additionality may be replaced by environmental integrity of the MO, or alternative methods of demonstrating additionality may be developed.
Baseline emissions	Emissions associated with the baseline	Based on measured methane destruction, adjusted to reflect regulation requirements.	Similar, with adjustment to comply both with regulation requirements and NDC/other baseline scenario aspects.
Project emissions		Emissions related to energy use for operation of the project	No change anticipated.
Leakage	Emissions associated outside the project boundary	No leakage	No change anticipated.
Emission reductions		Baseline minus project minus leakage	No change anticipated.
Monitoring methodology			
Ex-ante parameters	Parameters fixed	Expected LFG flow and methane content	No change anticipated.
Ex-post parameters	Parameters to be monitored	LFG flow and methane content	No change anticipated.

Example case: AMS-III.BB Electrification of communities through grid extension or construction of new mini-grids

Methodology Element	Explanation	Example case	Adherence under Paris Agreement or changes anticipated
Title	**Indicative for project types**	**AMS-III.BB Electrification of communities through grid extension or construction of new mini-grids**	No change anticipated.
Applicability	Pre-conditions to be met for application to a project	Community without grid connection, powered by stand-alone power generators and/or using fuel-based lighting system	No change anticipated.
Normative references	Reference to other tools	E.g., TOOL07 for grid emission factor	Changes to the tools and reference to other tools might be needed.
Baseline approach	Selected approach from paragraph 48 of the CDM modalities and procedures	Considers tiers of default energy use and emission factors, closest to 48(b): economically attractive course of action	Partially aligned with potential benchmark approaches.

Methodology Element	Explanation	Example case	Adherence under Paris Agreement or changes anticipated
Baseline methodology			
Project boundary	Spatial boundaries, sources of emissions and GHGs included	Location of end users and all power plants connected to the grid and associated CO_2 emissions.	No change anticipated.
Baseline scenario	Likely scenario to prevail in absence of project activity impacting emissions, linked to baseline approach	Community of end users were >75% households and was not grid connected. Assumption that the end users used stand-alone power generators and/or using fuel-based lighting system.	If this sector or this type of action is included in the NDC, then NDC impact on the baseline would need to be considered. If it is not part of the NDC, it may still be necessary to consider whether the projected emissions in the reference scenario of the country are aligned with suppressed demand assumptions, i.e. assuming increasing emissions from end-users such as those in the project.
Additionality	Basis to indicate that the project is not business as usual	General SSC guidelines for additionality	The concept of additionality may be replaced by the environmental integrity of the MO, or alternative methods of demonstrating additionality may be developed.
Baseline emissions	Emissions associated with the baseline	Based on measured grid electricity use and benchmark-type baseline emission factors	Adjustment may be needed to align with baseline scenario.
Project emissions	Emissions associated with the project	Emissions related to grid electricity use by the project	No change anticipated.
Leakage	Emissions associated outside the project boundary	From deforestation of transmission line construction	No change anticipated.
Emission reductions		No change anticipated	No change anticipated.
Monitoring methodology			
Ex-ante parameters	Parameters fixed	Estimates of ex-post parameters	Adjustment may be needed.
Ex-post parameters	Parameters to be monitored	Electricity use and electricity emission factor	No change anticipated.

ANNEX 2

Annex: Assessment and proposed recommendations for changes in 'TOOL07: tool to calculate the emission factor for an electricity system' under Article 6

NDC achievement, ambition raising and ensuring environmental integrity call for changes in the current tool. Following a comprehensive review of the existing tool with regard to the adherence under the Paris Agreement Article 6, the following changes are proposed.

Tool Element	Existing text	Adherence under **Paris Agreement** and proposed changes
Title	Tool to calculate the emission factor for an electricity system	Aligned, no change required.
Introduction		
1	This methodological tool determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "combined margin" emission factor (CM) of the electricity system.	The tool can be expanded to cover other GHGs too, such as CH4 and N2O. However, CH4 and N2O emissions factors for electricity generation are less than 0.3% and 0.4% when compared to CO_2 emissions, therefore it could still be excluded. This methodological tool determines the CO_2 emission factor, or no change. Although, the reference to the combined margin may be removed, there could be alternate approaches too.
Scope		
2	The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the "operating margin" (OM) and the "build margin" (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed CDM project activity. The build margin is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed CDM project activity.	Literature research has indicated that the average grid emission factor should not be used for calculating abatement by intervention. A marginal emission factor is more appropriate in these circumstances, because it is designed to take into account the change in electricity generation at the margins. The average grid emission factors published by IEA have generally been found to be much lower when compared with marginal grid emission factors quoted in registered CDM project(s) from the respective countries. As a result, the emissions reduction estimates from electricity saving or renewable energy power generation projects are bound to be underestimated with the average grid EFs. Further, the reference emission factors in case of Joint Crediting Mechanism (JCM) are derived corresponding to the respective grid mix in a conservative and simple manner to secure net emission reductions. Such a calculation takes into consideration the most advanced technologies being used in the currently operational power plants in the country.

Tool Element	Existing text	Adherence under **Paris Agreement** and proposed changes
2 *cont.*		Therefore, apart from reference to the combined margin approach, the average and reference emission factors may also be included or embedded in the CM approach. For example, use of the published emission factor derived by International Energy Agency (IEA) is cited in the Global Carbon Council (GCC) methodology GCCM001; Use of reference emission factors in case of Joint Crediting Mechanism (JCM) methodologies for grid connected RE projects.
Applicability		
3	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, that is, where a project activity supplies electricity to a grid or results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	As per the above, may also include average and reference emission factors too, or embed in the definition of CM.
5	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	For post-2020 regime, this paragraph is not relevant. This clause can be removed.
Normative references		
8	This tool refers to the latest approved versions of the TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems". This tool is also referred to in the TOOL05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation ..."	The default values prescribed in TOOL09 may need to be revisited, following the example of the JCM approach with the reference emission factor. Changes to appendix with default efficiency factors in TOOL09 would be needed.
Definitions		No change required.
Parameters		
11	Table 1 Parameters	The parameters may be expanded with the average ($EF_{grid,Avg,y}$) and reference emission factor ($EF_{grid,Ref,y}$).
12	Table 2 Data requirements to determine OM and BM	The table needs to be amended for simplification and inclusion of other approaches too.
Baseline methodology procedure		
14	Project participants shall apply the following six steps:	Either the options can be included prior to the steps or certain steps can become optional and additional steps can be added.

Tool Element	Existing text	Adherence under **Paris Agreement** and proposed changes
Step 1: Identify the relevant electricity systems		
16	The project participants shall identify any connected electricity systems. If a connected electricity system is located partially or totally in Annex I countries, then the emission factor of that connected electricity system should be considered zero.	The following text can be removed 'If a connected electricity system is located partially or totally in Annex I countries, then the emission factor of that connected electricity system should be considered zero'.
26	For imports from connected electricity systems located in Annex I country(ies), the emission factor is 0 tons CO_2 per MWh.	This paragraph can be removed following changes to paragraph 16.
Step 3: Select a method to determine the operating margin (OM)		
42	Ex ante option: if the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required.	The ex-ante and ex-post options would need to be edited. Instead of mentioning the determination of the factor as an option once, it would necessitate ongoing monitoring and recalibration. Further, for ex-ante estimation, top-down defined emission factors for the grid based on modelling may be included.
Step 4: Calculate the operating margin emission factor according to the selected method		
46	The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (t CO_2/MWh) of all generating power plants serving the system, not including low-cost/ must-run power plants/units	The simple OM can be replaced with reference emission factor.
47	The simple OM may be calculated by one of the following two options: **Option A:** Based on the net electricity generation and a CO_2 emission factor of each power unit; or	The options are not necessary with the reference OM being calculated with respective share of type of fossil fuel power plants. Instead of 'unit' it would be 'type' of power plant.
47 *cont.*	**Option B:** Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.	Also, as part of simplification, options A1 and option B can be removed, as plant specific generation may not be needed.
48	**Option A:** Calculation based on average efficiency and electricity generation of each plant	Instead of average efficiency, consider the most advanced technologies being used in currently operational power plants in the country/region.

Tool Element	Existing text	Adherence under **Paris Agreement** and proposed changes
49	The emission factor of each power unit m should be determined as follows:	The emission factor of each power plant type m should be determined as … Further, option A1 can be removed.
50	Where several fuel types are used in the power unit, use the fuel type with the lowest CO_2 emission factor for $EF_{CO2,m,i,y}$. **Option A3** – If for a power unit m only data on electricity generation is available, an emission factor of 0 t CO_2/MWh can be assumed as a simple and conservative approach.	Option A3 can be removed for simplification and to avoid reliance on historic efficiency data.
54	6.4.1.2. **Option B:** Calculation based on total fuel consumption and electricity generation of the system	This option can be removed for simplification and to avoid reliance historic fuel consumption data.
55	For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/ must-run power plants/units.	This paragraph can also be removed, as this has been covered earlier.
67	The CO_2 emission factor of the grid power units n ($EF_{EL,n,y}$) should be determined as per the guidance for the simple OM, using the Options A1, A2 or A3	Reference to options to be removed following earlier changes.
71	When following the guidance of calculation of the simple OM, Option B should only be used if the necessary data for Option A is not available.	Following earlier point, since option B is being removed, this paragraph should also be removed.
Step 5: Calculate the build margin (BM) emission factor		
72	In terms of vintage of data, project participants can choose between one of the following two options:	The option 1 fixing the BM ex-ante should be removed.
75	…excluding power units registered as CDM project activities…	This clause can be removed.
76	The following diagram summarizes the procedure above:	The flow diagram to be edited as per above point.
78	The CO_2 emission factor ... using the Options A1, A2 or A3	Reference to options should be removed following earlier changes.

Tool Element	Existing text	Adherence under **Paris Agreement** and proposed changes
79	If the power units included in the build margin … only Option A2 from guidance in Step 4 …	This paragraph can be removed as option A2 is the only option after the above changes have been made and the efficiency also corresponds to the most advanced technologies being used in currently operational power plants in the country/region.
Monitoring methodology		
103	Some parameters listed below under “data and parameters” either need to be monitored continuously during the crediting period or need to be calculated only once for the crediting period, depending on the data vintage chosen …	Some parameters listed below under “data and parameters” need to be monitored continuously during the crediting period.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