Executive summary of Methodology Panel Report on HFC-23 Issues (AM0001)

Executive Summary, Conclusions and Recommendations

Introduction - Approved methodology AM0001

Methodology AM0001 is applicable for project activities that destroy HFC-23 generated during the production of HCFC-22. HCFC-22 is a product globally used as refrigerant in different applications and as a chemical feedstock for manufacturing synthetic polymers. HFC-23 is a by-product formed during the manufacture of HCFC-22. The HFC-23 has a Global Warming Potential (GWP) of 11700.

The Meth Panel has discussed in the early stages of the CDM and in the context of the revision of AM0001, which resulted in version 3 of the methodology, that this type of project activity can cause incentives to increase baseline emissions through change in the production pattern of HCFC-22. The current version of methodology AM0001 has two caps to address the issue. The methodology sets:

- A cap for the amount of HCFC-22 production that can be credited which is based in the maximum yearly production achieved between the beginning of the year 2000 and the end of the year 2004;
- A cap for the waste generation rate HFC-23/HCFC-22 (w) that is determined as the minimum between 3% and the minimum rate obtained for a year between the beginning of the year 2000 and the end of the year 2004.

There are several factors such as: (i) The waste generation rate HFC-23/HCFC-22 (w); (ii) The amount of HCFC-22 production that can be credited; and (iii) The normal lifetime of HCFC-22 production facility, which can affect the amount of CERs claimed by a project activity registered under the CDM.

Currently there are 19 registered project activities using the methodology. These are some of the largest CDM projects in terms of CERs. The CERs issued from these projects comprise 52% of issued CERs up to now, though its proportion may decline since AM0001 is currently limited to existing[1] HCFC-22 plants.

[1] The HCFC-22 production facility should have an operating history of at least three years between beginning of the year 2000 and the end of the year 2004 and has been in operation from 2005 until the start of the project activity.

Background of the study

Continuing the work on issues regarding AM0001 raised in the Note in the MP 44 meeting report (Annex 2) and based on the "Request for the Meth Panel to continue work on HFC Projects" by the CDM Executive Board (the Board) (EB 55, Annex 19) and on its mandate to develop guidance on methodological issues for consideration by the Board, the Meth Panel prepared the following study.

The study is based on available literature,[2] information provided by project participants (PPs) in the monitoring reports of AM0001 projects, responses of PPs' to questions sent to them, and inputs from consultants.

Objective

The main objective of the study is to provide the Board with answers to their request specified in Annex 19 of EB 55 and from this to answer the question "Does the baseline emissions calculated under AM0001 in its current version provide for an accurate description of what would have happened in the absence of CDM".

The present report does not consider the following issues, as they are not within the scope of the Meth Panel:

- Whether CDM is the most cost effective international mechanism to reduce GHG emissions from HCFC-22 production;
- To make a judgement about the behaviour by PPs to optimize CER revenues under AM0001. However the report provides detailed information about individual plants.

Overview of study and main results

This study explores technological as well as market aspects of the approved baseline methodology AM0001 as by the EB 55 request and on that basis explores the questions "Does the baseline emissions calculated under AM0001 in its current version provide for an accurate description of what would have happened in the absence of CDM". The study follows the structure of the methodology, for which three parameters are central for the baseline

[2] For complete reference, see the reference list at the end of this paper.

determination: (i) The waste ratio of HFC-23 vs HCFC-22 produced (w ratio); (ii) The level of production of HCFC-22 (*Q_HCFCy*); and (iii) The lifetime of equipment.

(i) Impact of the CDM on w ratio

As the methodology caps the maximum eligible w ratio, increasing w above the historical threshold does not increase the amount of CERs for PPs. However, it appears that the w factor can be controlled and decreased over time in many plants by operational measures, which is demonstrated in the stability and convergence of w across the CDM plants towards the level of 3% for most CDM plants. With the current version of the methodology, the CER revenues form a strong disincentive for any further reduction of w. In fact in CDM plants w values develop in such a way that the w threshold is rarely undercut. The disincentive to undercut the threshold w value may lead to cases where the baseline scenario overestimates actual w and therefore emission reductions.

Another issue which could explain the convergence in the w value is that, according to AM0001, there is no provision to prevent PPs from conducting multiple measurements of the concentration of HFC-23 of the waste stream and choosing the value which, in their view, is most attractive.

(ii) Impact of CDM on HCFC-22 production

Also with regards to the level of HCFC-22 production, the eligible production levels are capped by the threshold value (max. of three historic years before 2004) which cannot be exceeded (from version 3). The fact that 14 out of 19 plants have their highest production in the last year of the historic period (2000-2004) might indicate a certain degree of optimization of the baseline production level, however in a situation of growing demand there are also other explanations for this and the picture is not conclusive.[3]

It has been suggested by some that HFC-23 has become the main driver and HCFC-22, the main product, is produced for the purpose of producing HFC-23. Despite such possibility, this does not seem to be the case, due to factors such as: (i) production that is eligible for CDM is capped, and (ii) the eligible CDM HCFC-22 production is still far below the level of the demand. CDM plants are likely to have displaced some production of non-CDM plants, but this is not apparent

[3] Also, some plants are known to have converted from CFC to HCFC during this period.

in view of increased demand for HCFC-22. Following the rationale of supply and demand it may be possible that CDM has lead to a certain reduction in the price for HCFC-22 which may have lead to increased demand. If CDM would generate a new demand for HCFC-22 that would not exist in the absence of CDM, then the destruction of the associated HFC-23 would not result in emission reduction compared to the baseline situation. Whether this is occurring is not readily apparent.

An important question is whether there might be circumstances under which the plants would have *reduced* their production level below the threshold level in absence of the CDM. The strong increase in demand for HCFC-22 over the last decade might indicate that plants would not reduce their production level. However, for 2008 a significant overcapacity of HCFC-22 production in China has been observed (both CDM and non-CDM plants run at around 60 - 70% of their capacity). Under such circumstances, it cannot be ruled out that in absence of the incentives from the CDM, CDM plants (which tend to be older and of which many are less efficient swing plants) would have reduced their production and the load factor in newer (non-CDM) plants would be higher because of their higher efficiency.

As newer plants on average tend to have lower w values than older plants (including swing plants), this potential substitution of production in newer plants by old (CDM) plants may lead to an overestimation of baseline w and therefore emission reductions. If the CDM plants would displace production in Annex I-countries, the emission reductions would also be overestimated, as Annex I emissions are included in Kyoto-targets. However, displacing production in Annex I countries seems less likely because most of the trade seems to be between developing countries.

The scheduled accelerated phase out of HCFC-22 for emissive uses under the Montreal Protocol will have a significant implication on the HCFC-22 market, since developing countries will have to reduce significantly the production of emissive HCFC-22 starting from 2015, and overall HCFC-22 demand may decline (though due to increase in non-emissive use of HCFC-22, the production may not decline until 2020 if at all). This could lead to situations, depending on the market conditions, where the (on average older) CDM production lines would be shut down in absence of the CDM or be converted into HCFC-22 plants for non-emissive uses. Under the current provisions of AM0001, however, the whole plant may continue to be able to be eligible for CDM since AM0001 limits overall production and is not particular to any production line.

(iii) Impact of CDM on the lifetime of equipment

Under the current methodology, only existing HCFC-22 plants are eligible under the CDM. This could lead to a situation where CDM plants are operated above their operational lifetime. The methodology AM0001 does not require to restrict the crediting period to the operational lifetime of the plant and its components, as other methodologies do. In case the CDM plant is operated above its operational lifetime, in the absence of the CDM the plant would have been replaced by a new plant (new equipment) which tends to have lower w and emission reductions would be overestimated.

Another issue regarding lifetime concerns key plant equipment (catalyst, reactor, distillation column etc.), which is not explicitly considered in the present methodology. As the plant equipment design is a key factor determining the w ratio, the w value determined based on historical values may loose its validity. Moreover the PPs have no incentive to use state of the art equipment which would reduce the w ratio. A similar issue may occur when a plant undergoes other substantial changes such as the transformation from producing for emissive to non-emissive uses. This may lead to a situation where plant operators retire the "CDM production line" and operate a new production line (for which the historic w value is not valid anymore), which cannot be detected in the monitoring reports.

Analysis of individual plants[4]

The analysis of monitoring reports of individual CDM plants reveals that the allegations laid out by AM_REV_0186 "Revision to AM0001 to address methodological issues" are correct for the specific instance, but they are not universal behavior of all CDM plants since some projects behave in a contrary manner. Another allegation that most plants produce HCFC-22 just up to the CDM limit may reflect the fact that their production is capped by the highest annual production during the base year (a time when consumption of emissive HCFC-22 has been rising rapidly). However it may also be an indication of scheduling regular annual maintenance in the period after the cap is reached.

[4] While analyzing the entire AM0001 CDM project's monitoring reports, a significant lack of homogenization has been identified in the format of the report, nomenclature and the duration of the monitoring period, especially among reports of projects developed in different countries.

Conclusions and Recommendations

To conclude, the study has identified a series of circumstances under which the current methodology and its treatment of parameters HFC-23 waste ratio w, HCFC-22 production and lifetime may overestimate baseline emissions compared to the situation without the CDM.

It should be noted that information currently available to the Meth Panel does not with sufficient accuracy allow determining for which plants these specific circumstances occur. However, available information does not allow to rule out that these circumstances occur and with that an overestimation of baseline emissions by the methodology. These potential overestimations may be mitigated by the fact that some of the CDM plants appear to abate on a voluntary basis HFC-23 emissions that are not eligible for crediting or are unrelated to the CDM project.

The study identifies shortcomings in the present version of AM0001 that may lead to higher baseline emissions than in the absence of the CDM. The Meth Panel therefore recommends revising AM0001 to remove these shortcomings.

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