Note on AM0001 "Incineration of HFC 23 Waste Streams"

I. Background

1. Currently there are 22 registered project activities using the methodology. These are some of the largest CDM projects in terms of CER; CER issued from these projects comprise 52% of issued CER up to now,[1] though its proportion may decline since AM0001 is currently limited to existing HCFC-22 plants.[2] Depending on the waste generation rate HFC-23/HCFC-22 (w) and CER price, the CDM benefits due to the destruction of the HFC-23 generated during the HCFC-22 production can exceed the value of production of HCFC-22. The high profitability of this type of projects is sometimes reduced due to the taxation regime in the host countries.

Methodology AM0001

2. 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.

3. 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.

4. The IPCC / TEAP report (2005) states that formation of HFC-23 depends upon the conditions used in the manufacturing process, and varies from 1.4 – 4.0%. According the IPCC / TEAP report the best practice for w is 1.4%.

Phase-out of HCFC-22

5. The 2007 Montreal Adjustment on Production and Consumption of HCFCs establishes the accelerate phase out HCFC-22 for non-feedstock uses. The phase out for developing countries defines the base year as the average of the years 2009 and 2010, a freeze in production for the year 2013 and starting to reduce production since year 2015, by year 2030 the production of HCFC-22 for emissive uses will be completely phase-out.

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[1] UNEP CDM Pipeline 2010 June

[2] Plants with 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.

6. From the monitoring reports of CDM project activities destroying HFC-23 it can be noted that:

7. Regarding HCFC-22 production:

- Twelve plants stop the production when the HCFC-22 cap is reached;
- Two HCFC-22 facilities produce less than their HCFC-22 cap;
- Six HCFC-22 facilities produce more than their HCFC-22 cap.

8. Regarding the waste generation rate (w)

- It appears that the average weighted value for w is decreasing over time;
- The w values vary from plant to plant, and w varies in the same plant over time. This is among others because w varies according of the load factor of the plant and the type and age of the catalyst and operating factors.

9. It is important to note that as HFC-23 is an undesired by-product there is an incentive to optimize the w rate. A HCFC-22 production plant with lower w will have lower fluorine losses.

II. Further methodological issues

10. Taking into consideration the concerns raised on AM0001 in AM_REV_186, the Meth Panel decided to provide information to the EB on the issue. The Meth Panel has identified three major issues that require special attention:

- Effectiveness of the cap for the waste generation rate (w);
- Effectiveness of the cap on HCFC-22 production;
- Issues related to lifetime of HCFC-22 CDM plants.

Effectiveness of the cap on w

11. The methodology assumes that the normal operation of the plant during the period between the years 2000 - 2004 is reflected in a the cap for w. Thus, the possible variability of w in time during the production of HCFC-22 after the implementation of the project activity cannot result in an extra generation of HFC23 eligible for claiming CERs.

12. However, the methodology does not take into consideration any possible decrease for w due to possible technological improvements at the plant level.

Effectiveness of the cap on HCFC-22 production

Current situation

13. It is possible that CDM HCFC-22 plants that produced up to the maximum level allowed by the methodology would have produced less in the absence of the CDM, because of the incentive from CER revenues. This means that they would have displaced production from non-CDM plants (recent plants in non-Annex-I countries or plants in Annex-I countries).

14. Most plants in non-Annex-I countries constructed before 2000 receive benefits from the CDM. Additional capacity has been implemented after 2002 in non-Annex-I countries. It is probable that recent plants in non-Annex-I countries would have lower w than the CDM plants.

15. In situations where overcapacity in the market exists, it is possible that some of the existing CDM plants with higher w may displace production of more recent non-CDM plants with lower w value and lower operating costs.

16. On the other hand the monitoring reports show that some CDM plants destroy HFC23 generated above the cap and these reductions would at least partially not occur in the absence of the CDM project activity.

Future developments

17. There are two major sources of demand for HCFC-22: for emissive use (e.g. HCFC-22 is used in refrigerators, air conditioners) and as a feedstock in the chemical industry. The use of HCFC-22 in emissive use is subject to the Montreal Protocol.

18. It is possible that a situation of long-term over capacity in the market could occur due to the phasing out of HCFC-22 as agreed in the Montréal Protocol.

19. Assuming the implementation of the Montreal Protocol, the (accelerated) phase out of the HCFC-22 for emissive use may fall below the installed capacity in the next decade. This possible situation would lead again to the displacement of production of more recent HCFC-22 plants by CDM HCFC-22 plants. The effect of this situation could be mitigated if the plants producing for emissive use can also supply the market for feedstock use (The TEAP report in 2007 assumes that HCFC-22 production for feedstock will increase in the next ten years).

20. If the Montreal Protocol is not implemented as foreseen or the overall HCFC-22 demand continues to increase for other reasons then the displacement of production from non CDM plants is not an issue.

21. Assuming a decreasing demand for HCFC-22, at some point in time the demand for HCFC-22 could fall below the sum of the production caps of CDM HCFC project activities. In this situation, CDM HCFC-22 plants could have an incentive to produce HCFC-22 up to their cap, because of the CER revenues. In the absence of the CDM, the demand for HCFC would determine their production level which would be lowered below their cap. This issue may be further investigated to determine if there is a possibility that this situation could occur before the end of the 2nd or 3rd crediting period of registered CDM Project activities.

Lifetime of HCFC-22 plants

22. There is a strong incentive to prolong the operation of HCFC-22 CDM plants beyond their normal lifetime or not improve the efficiency of the plant in the w ratio during any refurbishment because of the CDM benefits. With this incentive, plants reaching the end of lifetime would continue to operate with a w ratio that is potentially higher than the w ratio of new plants which would be implemented in the absence of the CDM to replace old plants.

III. Possible actions in order to address the issues outlined above

23. Further investigation is required in the following issues in order to identify situations in which overestimation of CERs occurs in AM0001 and improve the methodology accordingly:

- Possible undesirable effects notably by controlling operational parameters to increase the value of w;
- Rate of autonomous technical progress related to w;

- Normal lifetime of HCFC22 plants; and
- Development of HCFC22 markets, feedstock use (and the link between markets for emissive use and feedstock use). In particular situations where overcapacity in the market exists and possible decrease of demand for HCFC-22 could occur.

24. A reconsideration of a cap in w ratio values at a level representing the best available technology and / or where displacement of lower emitting plants is not deemed to occur.

For example in IPCC/TEAP 2005 the w value that represented the BAT was 1.4%. However, the same report mentions that "To reduce the emissions below the 1% level, thermal oxidation is required (Irving and Branscombe, 2002)." (p.410) which seems to indicate that values of w in the range 1% < w < 1.4% may be possible. Since the values quoted in the 2005 report, the technology and operation of plants may have been further optimized and w BAT values may have further improved. According to the monitoring reports, CDM project 1105 reached over the five months between December 2008 and April 2009 on average a w ratio of 1.1% (while the production level of HCFC-22 was in a typical range for the plant; see figure below).

25. The use of a lower w level fixed at the BAT level may not be effective to mitigate the overestimation of CERs in the case that the demand of the market is below the sum of total caps of CDM registered project activities. The use of a lower w level fix at the BAT level may also not be effective enough to mitigate the overestimation of CERs in the case that the installation of HFC-23 abatement technology would become common practice with new (non-CDM) plants.

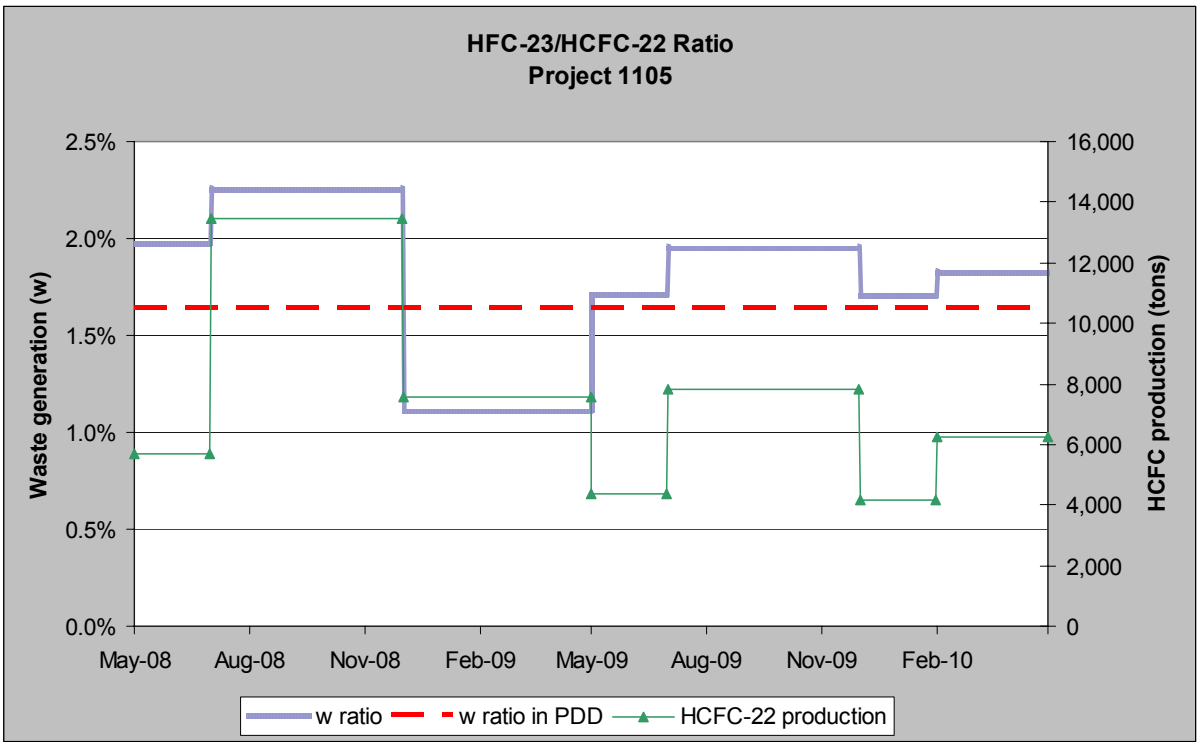

Figure: Ratio of HFC-23 to HCFC-22 production and HCFC-22 production for the registered CDM project activity No. 1105. Source: UNFCCC/Monitoring reports

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