Ethically Bankrupt: World Bank Defense of the HFC-23 Scandal

Executive Summary: The United Nations Clean Development Mechanism (CDM) was created in 2003 to allow emission-reduction or removal projects in developing countries to earn carbon credits, each equivalent to one tonne of CO_2. These certified emission reduction (CERs) can be traded and sold, and used by industrialized countries to a meet part of their emission reduction targets under the Kyoto Protocol. Since that time, CDM projects have generated almost 430 million offsets or CERs.[1]

The World Bank's Umbrella Carbon Facility is invested in two of the most lucrative HFC-23 incineration projects.[2] In 2006, the Carbon Facility contracted to purchase almost 130 million CERs, worth 775 million Euros (US $ 980 million) from two HFC-23 incineration projects in China - Jiangsu Meilan Chemical Co. Ltd. (CDM project #11) and Changshu 3F Zhonghao New Chemicals Material Co. Ltd (#306).[3] Both of these plants have been identified as operating to maximize generation of HFC-23 up to the level that it receives CERs, resulting in superfluous (fake) carbon credits as detailed in the Revision Request for the HFC-23 Destruction Methodology and as set forth below.[4]

In April 2010, a Revision Request was submitted to the CDM Methodologies Panel that provided strong evidence that HCFC-22 manufacturers are likely to manipulate their operations to increase the amount of HFC-23 generated for destruction and subsequent crediting with CERs. Using the plants' own submissions to the CDM, the Revision Request documented that for many plants the amount of HCFC-22 and HFC-23 generated corresponds to the amounts that are eligible for gaining carbon credits. Two plants produced lower rates of the HFC-23 waste product during periods where no carbon credits could be claimed, and increased their waste production once carbon credits could be gained. In several plants, the HCFC-22 production corresponded each year to the amount that is eligible for crediting, while lower or more variable amounts were produced before the carbon credits could be generated. Subsequent letters and public statements from environmental organizations have protested the CDM sanction of tens of millions of phony carbon credits and insisted that the HFC-23 Methodology be revised to remove the perverse financial incentives responsible.

In response, the World Bank posted a Q & A on their website,[5] defending the HFC-23 Destruction Methodology, and by association their investment in HFC-23 CERs, and dismissing the entire body of evidence documenting the widespread abuse among CDM HFC-23 projects. The World Bank Q & A fails to provide the information needed to understand the HFC-23 controversy, ignores some key findings by relevant institutions such as the CDM Methodologies

[1] CDM Pipeline overview, accessed 23rd August 2010. http://www.uneprisoe.org/
[2] See http://cdm.unfccc.int/Projects/DB/JQA1144312006.34/view and ttp://cdm.unfccc.int/Projects/DB/JQA1144312898.95/view
[3] http://wbcarbonfinance.org/Router.cfm?Page=UCF&ItemID=9715&FID=9715
[4] Methodology 0001 Revision Request, F-CDM-Rev. ver.01, 8 March 2010. Submitted by CDM-Watch www.cdm-watch.org
[5] http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/HFC-23_Q&A_final_8_5_10.pdf

Panel and the Montreal Protocol's Technical and Economic Assessment Panel (TEAP), and does not address or discuss many of the issues identified in the revision request. The World Bank Q & A is based on an astonishing amount of false or misleading information, and utterly fails to examine any of the wider issues at stake.

The dismissive nature of the World Bank's statement is surprising in light of the fact that the UN CDM Executive Board has started an investigation of the key concerns that has not yet been finalized. On 18 August 2010, the World Bank's Changshu Zonghao project's request for the issuance of 3,260,020 CERs was delayed pending a detailed investigation of the exact issues that the World Bank has cavalierly dismissed. As of 25rd August, in total six HFC-23 CDM projects are under investigation, questioning the issuance of more than 9 million CERs.[6]

I. BACKGROUND

The CDM is intended to stimulate sustainable development and emission reductions, while giving industrialized countries flexibility in how they meet their emission targets. Although more than 2000 projects have been registered by the CDM, more than half (51%) of all CERs ever produced have come from just 19 projects that destroy HFC-23, a super greenhouse gas thousands of times more powerful than CO_2, created as a by-product in the manufacture of HCFC-22.[7] HCFC-22, used primarily for refrigeration, air conditioning and polymer production, is also a potent greenhouse gas as well as an ozone depleting substance that is scheduled for phase-out by 2030 under the Montreal Protocol.[8]

The 19 registered CDM HCFC-22 projects use Methodology AM0001 for HFC-23 Destruction (HFC-23 Destruction Methodology), which establishes the criteria for crediting the destruction of HFC-23 that was historically vented into the atmosphere. Depending upon how the plant is equipped and operated, the amount of HFC-23 that is produced for every tonne of HCFC-22 can vary dramatically. Destruction of HFC-23 can be carried out at a cost of just €0.17 per tonne of CO2-eq. However when commoditized and sold as CERs on the EU carbon market it can easily command as much as 70 times more than it costs to destroy the gas.[9] Therefore, depending on the waste ratio of HFC-23 to HCFC-22 produced (also known as the 'w' ratio) and the CER price, CDM revenues from HFC-23 destruction can easily and significantly exceed the value of the HCFC-22 production.

The Methodologies Panel reviewed the Revision Request in July 2010[10], and confirmed that there are different ways that the HFC-23 Destruction Methodology could result in an overestimation of CERs. The Methodologies Panel detailed a number of issues requiring further investigation in its report to the CDM Executive Board (EB).[11] The EB agreed, and requested that the Methodologies Panel conduct an investigation of the HFC-23 projects to identify "developments of supply and demand in the global HCFC-22 market, clarifying whether CDM HFC facilities are increasing their production and whether more HFC-23 had or could have been generated than would have happened without the CDM." The EB also requested clarification on

[6] See list of projects to be reviewed at http://cdm.unfccc.int/Issuance/review.html
[7] CDM Pipeline overview, accessed 23rd August 2010. http://www.uneprisoe.org/
[8] http://ozone.unep.org/Meeting_Documents/mop/19mop/Adjustments_on_HCFCs.pdf
[9] IPCC & TEAP, IPCC/TEAP Special Report on Safeguarding the Ozone Layer and the Global Climate System: Issues Related To Hydrofluorocarbons And Perfluorocarbons (2005)
[10] http://cdm.unfccc.int/Panels/meth/meeting/10/044/mp44_an02.pdf
[11] EB55 Report Annex 19

the "technological and operational possibilities and economic impact of influencing the ratio between HFC-23 generation and the HCFC-22 production (w-factor)" and the impact of lifetime of HCFC-22 plants on the w ratio.[12]

Five days after the Executive Board requested this comprehensive investigation, the World Bank posted "Q&A for CDM HFC-23 Incineration Projects" on its website,[13] giving its view of the controversy. The World Bank failed to disclose its involvement in the purchase of almost 129,000,000 CERs from HFC-23 destruction projects worth 775 million Euros (US$980 million)[14], and tellingly, 1.76 billion Euros ($2.24 billion) at current secondary market rates.[15]

The Environmental Investigation Agency has prepared this analysis to provide a full discussion of the HFC-23 Methodology and demonstrate how it has allowed the creation of millions of fake CERs and how it is working in direct contravention to the goals of the Montreal Protocol. EIA presents the case for a massive revision in the HFC-23 methodology and/or an entirely different approach to HFC-23 destruction.

II. CDM METHODOLOGIES PANEL REVIEW AND CDM EXECUTIVE BOARD MANDATED INVESTIGATION

A. CDM Methodologies Panel

In July 2010, the CDM Methodologies Panel identified three major issues that require special attention:

- Effectiveness of the cap for the waste generation ratio (w);
- Effectiveness of the cap on HCFC-22 production;
- Issues related to lifetime of HCFC-22 CDM plants.[16]

The Panel noted that HFC-23 Destruction Methodology does not contain any adjustment for technological advances that may result in a decrease in the HFC-23/HCFC-22 co-production or w ratio over time. The Panel stated that "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".

The increased HCFC-22 production by CDM facilities has the collateral effect of displacing production from non-CDM plants in developing (non-Annex-I) countries or plants in developed (Annex-I) countries where studies indicate that plants have lower/HFC-23/HCFC-22 co-production ratios (also referred to as the w ratios) than the CDM plants, resulting in additional excess production of HFC-23 and CER issuance.

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[12] EB55 Report Annex 19

[13] http://siteresources.worldbank.org/INTCARBONFINANCE/Resources/HFC-23_Q&A_final_8_5_10.pdf

[14] http://wbcarbonfinance.org/Router.cfm?Page=UCF&ItemID=9715&FID=9715

[15] Are Chemical Companies Gaming the Carbon Credit System?, Reuters, August 23, 2010 www.reuters.com/article/idUS271914704820100824

[16] CDM-Meth Panel. Forty-fourth meeting Report Annex 2. Note on AM0001 "Incineration of HFC-23 Waste Streams"

The Methodologies Panel suggested a reconsideration of a cap in w ratio values at a level representing the current Best Available Technology (BAT) was possible. They also noted that 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 newer non-CDM plants with lower w values and operating costs. The Panel is investigating this issue in the current time frame and for future renewal periods, as it will become a more pronounced problem as the CDM plants age.

The Methodologies Panel also noted that the HFC-23 Destruction Methodology creates strong incentives to prolong the operation of HCFC-22 CDM plants beyond their normal lifetime and to not improve the efficiency of the plant during refurbishment as it would reduce the CDM benefits. This means that less efficient plants reaching the end of their normal lifetime will be able to continue a profitable operation on the basis of CDM revenues. The Montreal Protocol has already noted its concerns regarding the effect of CDM revenues on the HCFC production phase-out, with it's Multilateral Fund Secretariat stating "credits are more valuable than the resulting HCFC production thereby making it difficult to provide an incentive for closure of production facilities."[17]

Similarly, because of the enormous financial incentives inherent to HCFC-22 production at CDM plants, which represent the majority of HCFC-22 production in developing nations, low-GWP refrigerants and alternatives to HCFC-22 that are not supported by CDM subsidies operate at an extreme disadvantage with respect to development and market penetration.

B. CDM Executive Board

The Executive Board at its 55th meeting considered the Methodologies Panel report of its 44th meeting including its Note on AM0001 "Incineration of HFC-23 Waste Streams". In response, the Board requested that the Meth Panel provide additional information to the Board on: 1) the development of supply and demand in the global HCFC-22 market, clarifying whether CDM HFC facilities are increasing their production and whether more HFC-23 had or could have been generated than would have happened without the CDM; 2) evaluating the technological and operational possibilities and economic impact of influencing the ratio between HFC-23 generation and HCFC-22 production for existing facilities, for CDM and non-CDM HFC facilities and new facilities; 3) describing any technological developments that have led to a marked improvement in the w-ratio in operating plants; and 4) the design lifetimes of HCFC-22 facilities and whether the CDM HFC-23 CERs have impacted the length of time that HCFC-22 plants are being kept open.[18]

The CDM Executive Board is investigating not only whether the HFC-23 Destruction Methodology should be revised, but also whether it has been victim to manipulation of the HFC-23 Methodology to generate surplus credits in the past.[19]

Three members of the Executive Board have also requested a review of the issuance of all CERs from five HFC-23 projects, and requested from the Project Participants (verified by the

[17] UNEP (2009) FURTHER ELABORATION AND ANALYSIS OF ISSUES PERTAINING TO THE PHASE-OUT OF HCFC PRODUCTION SECTOR (Decision 56/64(a) and (b)) Document UNEP/OzL.Pro/ExCom/57/61

[18] EB 55 Report Annex 19. Request for the Meth Panel to Continue Work on HFC Projects

[19] EB 55 Report Annex 19 requests information on 'developments of supply and demand in the global HCFC22 market, clarifying whether CDM HFC facilities are increasing their production and whether more HFC23 had or could have been generated than would have happened without the CDM.

Designation Operation Entity) the following information from 2000 to present:

1. The (monthly and annual) production levels of HCFC-22 at the plant;
2. Describe the demand of HCFC-22 in the market since 2000 and specify the sales (monthly and annually) of HCFC-22, produced by the registered project activity after January 2000; was all produced HCFC-22 sold or has a part been stored, or destroyed?
3. If the production of HCFC-22 has increased more or more rapidly than the average increase of the market demand, then provide proper justification and explain why this should not be considered as inflating the baseline.
4. Provide clarifications for any unbalance in demand and supply in the market relevant for the registered project activity
5. Explain the development of the w-factor (ratio of HFC23 generated/amount of HCFC-22 produced) over time since the start of production of HCFC-22. In case there are changes, justify reasons.

The information requested could provide additional evidence on the extent to which HCFC-22 manufacturers have manipulated the system and created excess HFC-23 merely to destroy it for the HFC-23 credits.

Five days after the Executive Board requested the Methodologies Panel to initiate its investigation, the World Bank issued its Q&A dismissing the whole issue.

Six requests for issuance of HFC-23 CERs have since been suspended, and consequently millions of dollars worth of CERs from one of the World Bank's HFC-23 projects are now being held. It is extremely likely that the World Bank's other HFC-23 project and all other CDM HFC-23 projects will also face requests for review on the issuance of future CERs.

III KEY ISSUES REGARDING CDM HFC-23 PROJECTS

A. The HFC-23/HCFC-22 Ratio – The 'W Factor'

(i) Best Available Technology to Optimize HFC-23/HCFC-22 Ratio

The World Bank Q&A disingenuously attempts to address multiple concerns over the waste or w ratio by asking whether HFC-23 facilities are less efficient than plants not covered by the CDM. The World Bank states that scientific reports show that "*HCFC-22 plants not covered by CDM Projects are less efficient in both developed and developing countries [emphasis added]: the average HFC-23/HCFC-22 ratio for non-CDM projects is on average 3.7±0.3%.*"

However, it is clear from the scientific report in question[20] that this is not a w ratio that has been measured directly from those facilities. The 3.7±*0.3%* value is an extrapolation based on global HCFC-22 production and HFC-23 atmospheric readings, and calculated using reported data on Annex 1 emissions of both gases, and CDM plant emissions. According to the lead author of the paper,[21] they did not try to verify actual w ratios in non-CDM facilities and indicated that the

[20] Montzka, et al., Recent Increases in Global HFC-23 Emissions, *Geophysical Research Letters*, December 2009
[21] EIA *Pers Comm* with Stephen Montzka, 18 August 2010

estimated HFC-23/HCFC-22 ratio reported does not account for a number of factors that could alter this value dramatically, including:

> 1) inaccuracies in atmosphere-derived global HFC-23 emissions;
> 2) inaccuracy in the HFC-23 emissions reported by Annex 1 countries to the UNFCCC (these were subtracted from the atmosphere-derived global total to yield total emissions from developing countries);
> 3) the efficiencies of HFC-23 destruction in plants covered by the CDM (100% was assumed so that the total developing country emission value derived was attributed in total to plants in developing countries NOT operating under the CDM which is questionable since, for example, the last HCFC-22 plant to capture and incinerate HFC-23 in the US did not begin doing so until 2009);
> 4) the possibility that HCFC-22 production could have been/is higher than reported for non-CDM plants.

A recent report from the Montreal Protocol's Executive Committee suggests that new non-CDM plants in fact do have lower w ratios. Document UNEP/OzL.Pro/ExCom/55/45 states that most HCFC-22 production covered by the CDM is from older, less technologically advanced factories, and that new firms employing state of the art technology tend to have "better yields, fewer leaks and lower emissions than older enterprises." In the IPCC/TEAP 2005 report 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"[22] which indicates that values of w in the range 1-1.4% may be possible." Comments submitted by DuPont to the Methodologies Panel in 2004 noted that DuPont's w ratio was 1.374%. Since 2005, the technology and operation of plants may have been further optimized and w ratios using BAT may have further improved.

The w ratio using BAT is substantially lower than all the cut-off w ratios allowed in the CDM projects. Cut-off w ratios in the 19 CDM projects range from 1.64% to 3% (which is the maximum allowed) with an average w ratio of 2.75%. Given that a ratio 1% to1.4% was stated best practice five years ago,[23] it can be assumed that approximately half to two-thirds of the HFC-23 production occurring at CDM plants is unnecessary, and therefore half to two-thirds of the credits generated are not legitimate offsets and of no real mitigation value. The World Bank Q&A deliberately ignores this key issue raised by the CDM Methodologies Panel; that the methodology does not require an adjustment of the w ratio or the amount of CERs issued to account for improvements in technology or achievable process optimization.

(ii) **Are CDM Projects Producing Unnecessary HFC-23 to Generate CERs**

The methodology revision request shows that 13 CDM HFC-23 projects (including both of the World Bank facilities) maintain their w ratio at or slightly in excess of the allowable crediting ratio, which indicates that the facilities are managing their processes to ensure the maximum CER generation possible. There is very forceful economic motivation for this activity, as the CDM provides strong financial incentives not to lower the HFC-23/HCFC-22 ratio below the cut-off value for crediting. It is statistically very unlikely that all these plants operate by chance at a HFC-23/HCFC-22 ratio just above the cut-off value, especially given that the variation in the

[22] Irving and Branscombe, 2002 p.410
[23] http://www.unep.ch/ozone/Assessment_Panels/TEAP/Reports/TEAP_Reports/teap-supplement-ippc-teap-report-nov2005.pdf

HFC-23/HCFC-22 ratio over time for most plants was much larger in the period from 2000 to 2004 before the CDM began awarding CERs for HFC-23 destruction.

It is interesting to note that the World Bank's Changshu 3F plant, Project 306, anticipated destroying substantial amounts of HFC-23 in excess of that which was credited, suggesting that it would be difficult to achieve the registered w ratio. The PDD of project 306 states:

"*Since the value of w in 2002, 2003, and 2004 are all higher than 2.88%, it is likely that the project will decompose more HFC23 than the quantity of HFC23 that can be certified. The additional decomposed HFC23 will make extra contribution to the global environment.*"…

However, the monitoring reports for this and other plants repeatedly show that the facilities, after obtaining CDM approval, quickly managed to reduce the w ratio to almost exactly the level at which CERs can be credited and no more. Project # 306 reduced its w ratio almost immediately upon CDM approval and operated with w ratios of 2.90 in 2007, and 2.89% in 2008 and 2009 and 2010, almost precisely the 2.88% permitted.[24]

The Methodologies Panel noted there is an incentive to optimize the w rate as HFC-23 is an undesired by-product, and an HCFC-22 production plant with lower w will have lower fluorine losses and hence be less costly to operate. These savings are however extremely modest in comparison to the revenues derived from credits from destruction of surplus HFC-23, and particularly in China which has the largest fluorspar deposits in the world.

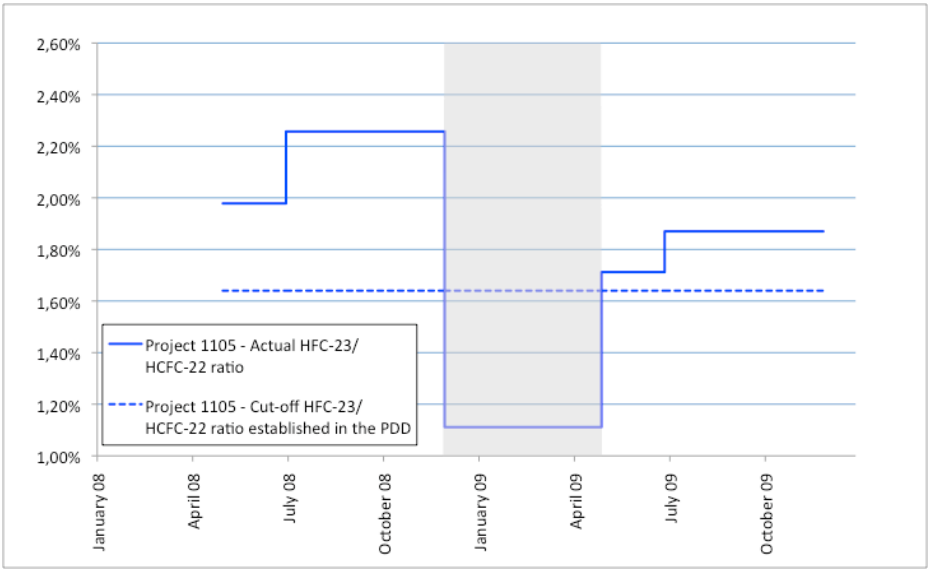
A telling result from the Methodology Revision Request evaluation of data from registered projects is an assessment of the few monitoring periods where project participants could not claim CERs. In the case of monitoring reports from two CDM HFC-23 projects, no CERs were issued for an entire monitoring period because the maximum eligible amount of HCFC-22 production for that year had already been reached by the plant. During these monitoring periods, the plants could not claim CERs irrespective of their HFC-23/HCFC-22 (w) ratio. In both cases (Projects 0151 and 1105), the w ratio was significantly lower than the cut-off ratio during the period of time when CERs could not be claimed. During these periods the CDM did not provide any incentives to operate the plant in any particular manner and the plant operations were adjusted accordingly.

For example, according to project monitoring reports, over the five months between December 2008 and April 2009, the Changshu Haike Project (#1105) operated at an average w ratio of 1.1%, while the production level of HCFC-22 was in a typical range for the plant, demonstrating that plants covered under the CDM can achieve significantly reduced w values with process optimization. During the time Project 1105 achieved this w ratio it was not eligible for HFC-23 CERs, however, during the remainder of the year when the plant was eligible for credits, the w ratio was approximately 200% higher. It therefore received around twice as many CERs during this time than it would have had the plant operated under optimized conditions. Clearly, for this project, it is questionable whether any of the CERs generated in excess of w ratio of 1.1% represent real emissions offsets, and therefore, have legitimate climate mitigation value.

[24] http://cdm.unfccc.int/UserManagement/FileStorage/KXSATJ34EGN28VHBI159FQMYDWRUL6

As this plant was originally owned and operated by the French fluorochemical giant Arkema, which still maintains partial ownership in the plant, presumably they have the expertise and resources to optimize production in a way that reduces the w ratio, as clearly seems to be the case when there is no financial benefit involved in surplus HFC-23 production.

HFC-23/HCFC-22 ratio during the crediting period for project 1105



Source: Methodology 0001 Revision Request, F-CDM-Rev. ver.01, 8 March 2010

B. Effectiveness of the Cap on HCFC-22 Production - are CDM Projects Producing HCFC-22 Primarily to Generate CERs?

The Methodologies Panel found that:

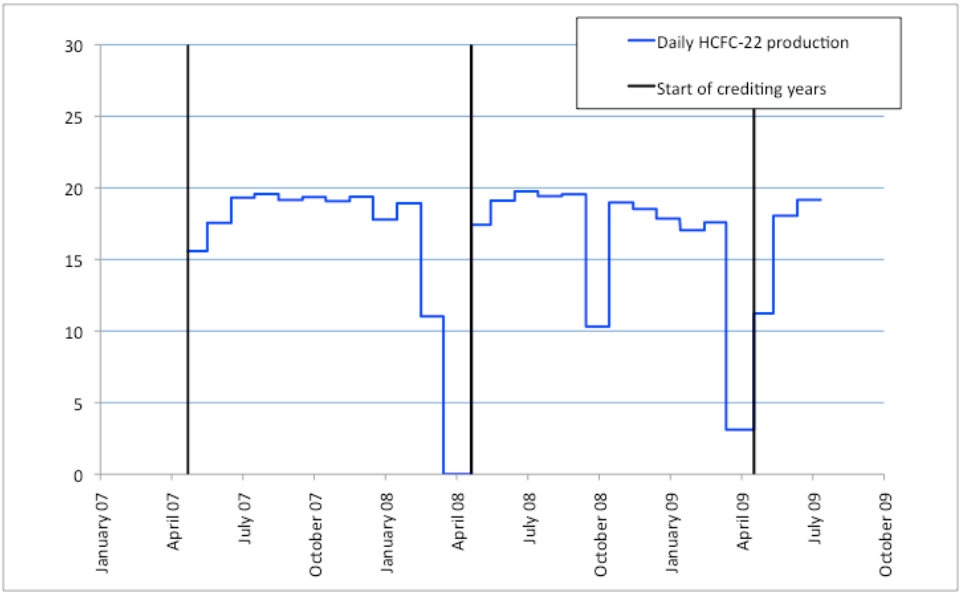
- Twelve CDM plants stopped production when the HCFC-22 cap was reached, and HFC-23 was no longer eligible for crediting;
- Only two HCFC-22 facilities produced less than their HCFC-22 cap;
- Six HCFC-22 facilities produced more than their HCFC-22 cap.

The Methodologies Panel concluded that the 12 CDM HCFC-22 plants that produced almost exactly the amount of HCFC-22 that qualified for HFC-23 crediting may have "…produced less in the absence of the CDM, because of the incentive from CER revenues." The Methodologies Panel further concluded that these CDM plants may have displaced production from newer non-CDM plants which would probably have lower waste ratios.

An interesting case in the Methodology Revision Request is the Decomposition Project at Zhonghao Chenguang Research Institute of Chemical Industry (CDM Project 767). The plant had a relatively constant HCFC-22 production of about 15-20 tons per day until the HCFC-22 amount eligible for crediting was reached. From that point onwards, the production was reduced or the plant was even shut down (in April 2008). Production was then taken up again on the first day of the next crediting period (May 1 of each year). Apparently the plant operators had no incentive to produce HCFC-22 unless CERs could be gained from generating and destroying

HFC-23. This raises the question whether all of the HCFC-22 produced by the plant is produced for the market or whether a lower amount of HCFC-22 would have been produced in the absence of the CDM.

Daily HCFC-22 production during the crediting period for project 767 (tons per day)



Source: Methodology 0001 Revision Request, F-CDM-Rev. ver.01, 8 March 2010

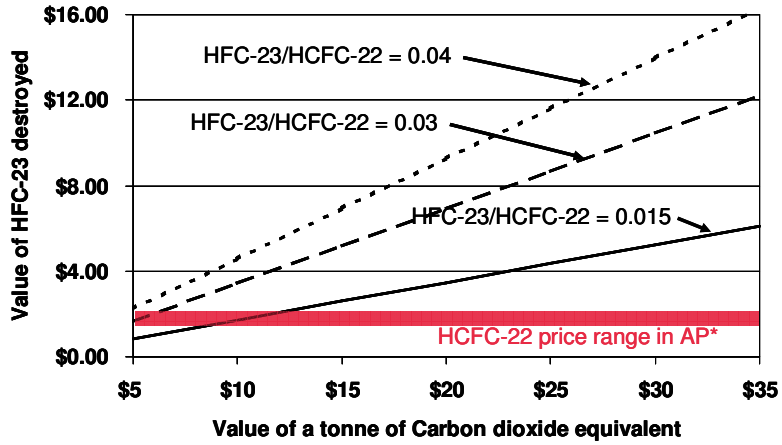
C. Perverse incentives

The World Bank Q&A states "*Concerning the issue of high revenues associated with HFC-23 incineration projects, it is first important to point out that revenues from CDM do not exceed the revenues associated with HCFC-22 itself.*" The statement is referenced to an unpublished draft report prepared by China in connection with the HCFC phase-out under the Montreal Protocol that is not available to the public, and no basis for this statement is provided in the World Bank Q&A.

However, the fact that CDM revenues exceed HCFC-22 production revenues has been extensively documented, including by the Montreal Protocol's Technical and Economic Assessment Panel and its Executive Committee. A document produced by the Montreal Protocol's Multilateral Fund Secretariat for the Executive Committee's 55th raises concern that CDM HFC-23 credits "… *are more valuable than the resulting HCFC production thereby making it difficult to provide an incentive for closure of production facilities.*"[25]

[25] ibid

In its response to Decision XVIII/12[26] the TEAP showed how CER prices as low as US$3 would mean CER revenues would still exceed the market value of HCFC-22. The figure reproduced from the TEAP report shows value of CER credits per kg of HCFC-22 produced as the carbon price increases.[27]



Even with the current and historically all-time high market value for HCFC-22 in China of 14,000 yuan (€1,626/tonne),[28] the €56,422 earned for selling approximately 35 tonnes of HCFC (based on a 2.88% HFC-23/HCFC-22 ratio) is significantly less than the €93,600 generated from the sale of 11,700 CERs at €8 each.[29] The gross revenues from HFC-23 destruction, assuming an €8 CER price, equate to about €2,695 per tonne of HCFC-22 produced, which is significantly higher than the all-time high current market value of €1,626/tonne of HCFC-22.[30]

In fact, the disparity in revenues can be greater when costs of raw materials are considered. Between 2009-2010 the market value of HCFC-22 in China rose from about 7,000 yuan or €813/tonne to the all-time high value 14,000 yuan[31] or €1,626/tonne. However the costs of raw materials required to produce HCFC-22 also rose to about €1,026/tonne, such that at 2010 prices the revenues less material costs generated from HCFC-22 production equated to €600/ tonne.[32]

Even with the Chinese government imposing a 65% tax on CER revenues manufacturers are still set to gain considerably more from CDM revenues than they do from HCFC-22 production.

It should be noted that the actual prices negotiated for primary sales of CERs to investors is generally secret, and while the wholesale price of CERs in March, 2010 was €9 apiece[33], this is likely to be greater than the price agreed to for older CDM projects. The World Bank contracted

[26] TEAP (2007) "Response to Decisions XVIII/12: Report of the Task Force on HCFC Issues (with particular focus on the impact of the Clean Development Mechanism) and Emissions Reduction Benefits Arising From Earlier HCFC Phase-out and other Practical Measures" (TEAP 2007)

[27] Taken from Figure 3.1 in TEAP 2007.
[28] http://industry.frbiz.com/China-Chemical/2010_forecast_the_future_development_of_the_refrigerant_industry-31955.html)
[29] the GWP of HFC-23 is 11,700 therefore 11,700 CERs are generated from the destruction of one tonne of HFC-23. At a 2.88% ratio, 1 tonne of HFC-23 is produced for every 34.7 tonnes of HCFC-22.
[30] Assuming a w ratio of 2.88% and a GWP for HFC-23 of 11,700
[31] http://industry.frbiz.com/China-Chemical/2010_forecast_the_future_development_of_the_refrigerant_industry-31955.html)
[32] Expert Opinion supplied by Mr D. Sherry
[33] Kyoto carbon offset (CER) issuances picking up/Rueters, March 4, 2010 - http://www.reuters.com/article/idUSTRE6233P420100304

for 129.3 million CERs from its two HFC-23 projects for the sum of €775 million, which yields a per unit CER price of almost €6.[34] Using these values, the total revenues from HFC-23 CERs at these projects would currently be approximately €70,200/tonne of HFC-23, significantly higher than the €56,422 that might be derived from the sale of 35 tonnes of HCFC-22. If the World Bank contracts contain escalation clauses or have the CER price tied to the carbon market, with the recent increase in the value of CERs, the CER revenues could even be higher.

CDM HCFC-22 manufacturers in other nations stand to profit even more than those in China where the Chinese government imposes the 65% tax on CER revenues. While it is often difficult to obtain data for assessing the value of CDM revenues to corporations and the contributory effect of these revenues on the lifetime of HCFC-22 plants and production levels, SRF Chemicals in India reported that CER revenues made up to 63% and 66% of their entire fluorochemical revenue in 2008 and 2009 respectively.[35] Similarly India's Gujurat Fluoro Chemical project reported that CERs accounted for 88% of corporate revenues in 2007.[36]

D. Montreal Protocol and Future Demand for HCFC-22

The Methodologies Panel also looked at potential future problems of over-production of HCFC-22 and determined that a situation of long-term over-capacity in the market could occur due to the phasing out of HCFC-22 as agreed under the Montreal Protocol. They concluded that assuming the implementation of the Montreal Protocol's accelerated HCFC phase-out, the need for HCFC-22 for emissive uses may fall below the installed capacity in the next decade. This situation would lead again to the displacement of production of more recent HCFC- 22 plants by older CDM HCFC-22 plants that have higher waste ratios. CDM HCFC-22 plants would still have an incentive (CER revenue) to produce HCFC-22 up to their cap, while in the absence of the CDM, the demand for HCFC would determine production.

Based upon their preliminary review, the Methodologies Panel also concluded that there is a strong incentive to prolong the operation of HCFC-22 CDM plants beyond their normal lifetime and not to improve the efficiency of the w ratio during any refurbishment because of the CDM benefits.

IV THE WORLD BANK DISMISSED EACH OF THESE ISSUES WITHOUT REASONED ANALYSIS OR SCIENTIFIC FACTS

The World Bank dismissed the suspicious fact that 12 of 19 CDM facilities stop production when the HCFC-22 cap is reached with the statement "*when carefully analyzing and comparing the cap value and technical capacity of plants (as reported in the project design documents of registered CDM projects), it is clear that [sic] plants have in fact operated **closer** to their capacity production*." (Emphasis added). It is not at all clear from this statement to what or whom the plants "operated closer" to. As such, "operated closer" is a completely vacuous term, particularly as the Bank provides no actual production data to demonstrate that the facilities that

[34] http://wbcarbonfinance.org/Router.cfm?Page=UCF&ItemID=9715&FID=9715
[35] www.srf.com/inv/Annual_Report_2008-09.pdf (pages 79-80)
[36] http://www.gfl.co.in/news%20clipping%20-%20dalal%20street%20journal%20-%20analysis%20-%20cdm%20business%20-%20july%2023-aug%205,%2007%20-%2025072007.pdf / http://www.gfl.co.in/Annual%20Reports/GFL%20Annual%20Report%202007-08.pdf

stopped production once they reached the amount of HFC-23 eligible for crediting did so because the plants operated at capacity all year long and could not produce any more HCFC-22. Looking at the figure of Project 767 above, the plant shut down HCFC-22 production for a month or more when it could no longer obtain CERs for HFC-23 destruction. The information does not support the World Bank's bald assertion that these 12 plants all shut down because they had reached their manufacturing capacity.

The Bank's analysis of the impact of the accelerated HCFC phase-out under the Montreal Protocol is even more cavalier. The Bank ignores that the baseline for the HCFC phase-out is established in 2009 and 2010 and that production and consumption must be frozen by 2013. These deadlines mean that the demand for HCFC-22 can expect to begin to decline this year as countries attempt to convert production to meet the 2013 freeze date. Under the funding guidelines adopted by the Montreal Protocol for the HCFC phase-out, developing countries do not get funded to reduce from their 2013 freeze level to their baseline, so from 2011 to 2013 countries will try to operate as closely as they can to 2010 levels so that they do not have to engage in unfunded conversions.[37]

The Montreal Protocol covers all emissive uses where the HCFC could be emitted such as use as a refrigerant, but does not cover use of HCFCs used for "feedstock" and consumed in the manufacturing process for polymers like Teflon.

No analysis is undertaken by the World Bank to determine when the need for HCFC-22 for emissive uses will drop below the cap which sets the amount of HCFC that can be produced and receive HFC-23 destruction credits. As most CDM HCFC-22 facilities cannot be converted to make the higher quality HCFC-22 needed for feedstock, the battle over the dwindling market for HCFC-22 for emissive uses will eventually reach a point of over-capacity. Likewise, due to the inability to convert many of the CDM HFC-23 facilities, the fact touted by the World Bank that the Montreal Protocol HCFC phase-out does not cover feedstock is of little consequence or comfort. It is therefore likely that older HCFC facilities like those covered by the CDM will be targeted for an HCFC phase-out. However, the Executive Committee of the Montreal Protocol Multilateral Fund has warned that "…CDM credits could provide an incentive to initiate and continue production because it is more profitable for enterprises to receive credits than to sell the HCFC-22."[38]

Why are HFC-23 facilities covered by CDM projects not using optimal HFC-23 reduction technologies?

The World Bank Q&A fails to ask the critical question: Why are HFC-23 facilities not using optimal HFC-23 reduction technologies? If HCFC-22 production facilities can produce HCFC-22 at or approaching a 1% HFC-23 by-product ratio, why are CDM HFC-23 destruction facilities not required to use some of their massive profits to install the best available technologies? HFC-23 emissions from HCFC-22 production can be reduced in two ways, either by process optimization, or by incineration of the waste HFC-23. The most effective way of reducing HFC-

[37] For example, if a country increases its use or production by 20% between 2010 and 2013, they will have to reduce their production and/or use by 30% to accommodate the 20% increase and the 10% reduction required by the HCFC phase-out. Since they will receive incremental funding for only the 10% reduction mandated by the Montreal Protocol, there is a strong incentive to begin transitioning this year

[38] UNEP (2009) FURTHER ELABORATION AND ANALYSIS OF ISSUES PERTAINING TO THE PHASE-OUT OF HCFC PRODUCTION SECTOR (Decision 56/64(a) and (b)) UNEP/OzL.Pro/ExCom/57/61

23 emissions is by not producing it in the first place as incineration is not 100% effective and creates hazardous waste in the form of highly toxic fluorine salts.

As discussed above in detail, in order to reduce the amount of HFC-23 by-product, it is possible to adjust the w ratio via process optimization with best available technology and process management techniques during HCFC-22 production. Process optimization can reduce the ratio of HFC-23 waste by-product by half resulting in w values of 1 to 1.5,[39] or lower. Process optimization is not a required part of the current methodology (AM0001) and the economics of CDM HFC-23 Projects provide enormous incentives against optimization as higher w ratios result in higher revenues.

Requiring all 19 CDM HFC-23 Destruction Projects to implement best available technologies and process management techniques would reduce the number of HFC-23 destruction CERs by as much as 66% and allow real mitigation of tens of millions of tones of CO_2 annually since it would result in a corresponding amount of needlessly or intentionally manufactured fake off-sets being taken out of the market.

V CONCLUSION

The approximately 218 million HFC-23 credits issued to date are conservatively worth €2.6 billion or more in the European carbon market.[40] However, the actual cost of destroying **all** HFC-23 (in both CDM project plants and non-CDM plants) in developing countries, estimated at 300 million tonnes CO_2-eq per year, is just €49 million.[41] This means that the market value of all HFC-23 credits issued to date could potentially abate all HFC-23 emissions for more than 42 years at current production levels, and for much longer given that emissive (non-feedstock) production and use of HCFC-22 is scheduled to be phased out by 2030.

The evidence that the HFC-23 Destruction Methodology is encouraging production of fake CERs is overwhelming. The evidence that some plants have been doing this intentionally is indisputable. The fact that no CDM HCFC-22 plant has implemented best available technologies and best HCFC-22 production management can be seen at each plant and in the monthly HFC-23 production reports. The fact that these plants have conservatively made a €1.8 billion profit, much of it from the sale of fake offsets, and not invested any of it back into the plants to reduce the production of the HFC-23 is a scandal, as is the displacement of capital that could be used to secure real offsets rather than being squandered on the destruction of unnecessarily created HFC-23.

The CDM Executive Board has recognized that the HFC-23 scandal threatens the integrity of the entire CDM and has launched a comprehensive investigation into the issues with the HFC-23 Destruction Methodology identified in the Methodology Revision Request. It is critical that this investigation is transparent, unbiased and fully implemented. Big investors in HFC-23 CERs,

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[39] CONCERNS ABOUT CDM PROJECTS BASED ON DECOMPOSITION OF HFC-23 EMISSIONS FROM 22 HCFC PRODUCTION SITES http://cdm.unfccc.int/public_inputs/inputam0001/Comment_AM0001_Schwank_081004.pdf
Rand, S., Ottinger, D.,Branscome, M. 1999: Opportunities for the reduction of HFC-23 emissions from the production of HCFC-22. Proceedings from the joint IPCC-TEAP expert meeting 1999.

[40] Assuming a conservative price of €12/CER.

[41] The SCOC estimates that destruction of HFC-23 from HCFC-22 production could, by 2015, lead to reductions of about 300 Mt CO2-eq per annum at a cost of less than US $0.20 per tonne of CO2-eq (a total cost of US $60 million). http://ozone.unep.org/teap/Reports/TEAP_Reports/TEAP-TaskForce-HCFC-Aug2007.pdf

like the World Bank have vested interests in protecting their investments. Producing a Q&A that provides partially wrong or misleading information can only be seen as an attempt to subvert the CDM Executive Board's investigation. Failure to halt the fake CERs associated with HFC destruction will only continue to divert the limited resources available to combat climate change into the coffers of a few chemical plant operators, big banks and their investors. As the World Bank has been chosen to manage the billions of dollars in the Climate Investment Funds that will be used to combat climate change, it cannot be permitted to have its own investment activities undermine these critical efforts, particularly when it involves the publication of specious and patently self-serving analyses aimed at sabotaging much needed and long overdue reforms within the CDM and carbon markets.

Governments and the UN should insist that the World Bank resolve the conflicts of interest between its public and private sectors by divesting itself from investments that undermine global efforts to combat climate change. The World Bank must reconcile its policies and practices so that all of its efforts are consistent with the goal of obtaining legitimate reductions of greenhouse gas emissions.

The Environmental Investigation Agency (EIA) is an independent NGO and campaigning organization committed to bringing about change that protects the natural world from environmental crime and abuse, and does not stand to benefit financially from any outcome regarding HFC-23 projects.

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