

Analysis and guidance on consideration of greenhouse gases not included in Annex A of the Kyoto Protocol

The new proposed methodology NM0197-rev is for project activities that replace existing chillers by more efficient chillers. The methodology credits emission reductions only due to the reduction in electricity consumption from use of more efficient chillers. Any emissions in the baseline or project due to use of refrigerant (used as cooling agents in chillers, e.g., CFCs, HCFCs, HFCs, etc.), are proposed not to be considered. However, in order to ensure that project activity does not result in increased emissions from use of refrigerants, an applicability conditions is added to the methodology, which requires:

- (a) The refrigerant in the chillers used in the project activity has a lower Global Warming Potential (GWP) compared to the refrigerant used in baseline chillers; and
- (b) The refrigerant in the replaced chillers is recovered and either reutilized or destroyed, which ensures that the release of refrigerants from the replaced chillers is not increased beyond levels that would occur without the project activity.

The key issue is that such an approach to account for GHG emissions from use of refrigerants may not be in accordance with the CDM modalities and procedures. But in order to account for emissions from the use of refrigerants there is some need for clarity on whether greenhouse gases not included in Annex A should be considered under project and leakage emissions if CDM project activities lead to an increases of such GHG emissions.

Background Information on Refrigerants used in the Chillers

The following types of refrigerants can be used in chillers:

- Gases controlled under the Montreal Protocol, which are also GHGs but are not listed in Annex A of the Kyoto Protocol: This includes CFCs (which were quiet commonly used in the past and being replaced as per the phase out schedule under the Montreal Protocol) and HCFCs;
- Gases included in Annex A of the Kyoto Protocol which are not controlled by Montreal Protocol (HFCs, CO₂), or
- Other gases, i.e. gases that are neither greenhouse gases nor ozone depleting substances (e.g., hydrocarbons).

CFCs have very high ozone depleting potentials (ODPs) and global warming potentials (GWPs). HCFCs are often used as replacement for CFCs in developing countries, which have to phase out the production of CFCs by 2010. They have lower GWPs and and ODPs than CFCs. Both these gases are not listed in Annex A of the KP. Though, the production of HCFC-22 leads to generation of HFC-23, which is a very high GWP gas and is listed in Annex A of KP.

HFCs are greenhouse gases but are not ozone depleting substances. Their GWPs are generally comparable to that of HCFCs or somewhat lower. They too are often used to replace CFCs and are a substitute for HCFCs.

There is a third category of refrigerants, which are neither ozone depleting substances nor greenhouse gases and which are partly still under development (e.g. hydrocarbons).

For example, the project underlying NM0197-rev replaces CFC chillers by new chillers that use HCFCs or HFCs.

Analysis of the issue

As per CDM modalities and procedures, “all anthropogenic emissions by sources of greenhouse gases under the control of the project participants” and “net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity” should be accounted in estimating the emissions reductions.

Paragraph 44 of the Modalities and Procedures for the CDM requires that “a baseline shall cover emissions from all gases, sectors and source categories listed in Annex A within the project boundary“. The Modalities and Procedures do not provide any such provision for project emissions and leakage emissions.

According to paragraph 1 of the Convention, which also applies to the Kyoto Protocol, greenhouse gases are defined as “those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation”. This includes both gases included in Annex A of the Kyoto Protocol and gases that are controlled by the Montreal Protocol. Hence, a key question is whether greenhouse gases not included in Annex A should be considered under project and leakage emissions if CDM project activities lead to an increase of such GHG emissions.

The situations described below explain some of the implications of the difference in consideration of GHG not included in Annex A of KP for the baseline situation and for project and leakage situations:

- 1. The project activity replaces existing chillers using CFCs by new chillers using HFCs:** The project activity does not result in an increase of release of CFCs in the replaced chillers, as these are recovered and reutilized or destroyed. In the baseline, the use of CFCs in chillers would have resulted in emissions, due to leakage from chillers, as well as from production of CFCs. The project activity results in emissions of GHGs included in Annex A due to an increased production of HFCs and due to leakage of HFCs from chillers during the crediting period. From the perspective of the net effect of all GHGs, the project activity is likely to lead to a reduction of refrigerant GHG emissions (including gases in Annex A of the Kyoto Protocol and GHGs not listed in Annex A but controlled under the Montreal Protocol). However, if only GHGs listed in Annex A are considered, the project activity results in an increase of refrigerant GHG emissions, as HFCs are a gases included in Annex A whereas CFCs are not included in Annex A.
- 2. The project activity replaces existing CFC chillers by new HCFC-22 chillers:** As stated in situation 1 above, the project activity does not result in an increase of release of CFCs and reduces baseline emissions from CFC leakage from chillers. The project activity results in an increased production and consumption of HCFC-22. The increased production of HCFC-22 results in an increased generation of HFC-23, which could be considered as leakage¹ due to project activity. Again, if only gases listed in Annex A are considered the project activity results in increased GHG emissions.²
- 3. The project activity replaces existing CFC chillers by chillers using CO₂ or other gases:** As stated in situation 1 above, the project activity does not result in an increase of release of CFCs and reduces baseline emissions from CFC leakage from chillers. The use of CO₂ or other gases in project activity results in no or negligible GHG emissions.

¹ Net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity.

² Even if destruction of HFC-23 is undertaken as a CDM project activity, from where HCFC-22 is sourced, this will result in increased emissions, as credits for destruction of HFC-23 enables Annex B countries to increase their domestic emissions.

The inclusion or exclusion of greenhouse gases not included in Annex A in estimating project and leakage emissions may provide different incentives for project participants to select the refrigerant used in the chillers installed under the project activity, including HCFCs, HFCs, CO₂ and other gases.

If only greenhouse gases listed in Annex A are accounted as GHG source in project and leakage (Option A below), this may be an incentive to project participants to use

- (a) HCFC chillers, or
- (b) other chillers with other gases (e.g., hydrocarbons).

Thus, limiting the project and leakage emissions to Annex A gases could result in the perverse incentive for project participants to choose HCFCs as refrigerant instead of HFCs or gases without GWP. Hence, this accounting rule will favour use of HCFCs over HFCs or hydro carbons.

The significance of these perverse incentives depends on the significance of refrigerant emissions. The 2005 IPCC/TEAP special report suggests that HFC emissions can be a significant part of overall life cycle GHG emissions. For example, Table TS-7 indicates that HFCs emissions can amount to about 20%-50% of lifetime GHG emissions for commercial refrigerators. If only Annex A gases are considered, this will reduce the CERs if HFC chillers are used under the project, as HFC is Annex A gas and would be accounted for in project emissions. The effect on climate change would be neutral, as the use of HFCs as refrigerants would be considered in the calculation of emission reductions, whereas, the use of other gases would not need to be considered.

The potential perverse incentive identified above could be circumvented by

- Including also greenhouse gases not included in Annex A as project emissions (Option B below);
- Not including the refrigerant emissions in the project boundary (Option C below), but this option would remove an incentive to use no GHG emitting refrigerants like hydrocarbons instead of HFCs; or
- Limiting the applicability of the methodology to project activities that do not use gases controlled under the Montreal Protocol (Option D below).

In case of inclusion of gases not included in Annex of the Kyoto Protocol in project or leakage emissions, it is unclear which Global Warming Potentials (GWPs) should be used for that purpose. Paragraph 3 of decision 2/CP.3 reaffirmed that “global warming potentials used by Parties should be those provided by the Intergovernmental Panel on Climate Change in its Second Assessment Report (“1995 IPCC GWP values”) based on the effects of the greenhouse gases over a 100-year time horizon”. However, for some non-Annex A gases the IPCC has by that time not provided any GWP values.

Options to address the issue

In the context of the proposed new methodology NM0197-rev, the Meth Panel seeks guidance from the Board on the principles, which should be applied upon consideration of refrigerant gases, which are also greenhouse gases. Possible options are the following:

- Option A: Only greenhouse gases included in Annex A of the Kyoto Protocol, with GWPs specified in the IPCC Second Assessment Report, should be considered as project emissions or leakage emissions.
- Option B: Greenhouse gases, as defined in paragraph 1 of the Convention, but not included in Annex A of the Kyoto Protocol, should be included in project emissions and leakage emissions if a CDM project activity results in an increase of such emissions. In this case, the EB would need to clarify which Global Warming Potentials (GWPs) should be used for these greenhouse gases (e.g. GWPs as provided in the Fourth Assessment Report by the IPCC).

- Option C: Greenhouse gas emissions from refrigerants are neglected in the project and baseline situation, as long as the total GWP of refrigerant gases (including its upstream components) used in the project scenario is lower than those used in the baseline scenario.
- Option D: The applicability of the methodology is limited to project activities that do not use gases controlled under the Montreal Protocol. This means that under the project activity HFCs, CO₂ and non-GWP gases (e.g. hydrocarbons) may be used but that HCFCs may not be used. This option may also be used as an interim solution in order to have the methodology approved rapidly if the EB would choose option B but need some time to operationalize it.