

# CDM Methodologies for Manufacturing of Climate Friendly Refrigerators

**The Clean Development Mechanism (CDM) of the Kyoto Protocol struggles to deliver emission reductions from climate friendly end user technologies in buildings or consumer durables such as refrigeration appliances. To provide innovative solutions to this purpose, UNIDO and SECO under their Clean Technology / Clean Production programme supported the development of two new CDM methodologies which cover manufacturing of energy efficient refrigerators and manufacturing and servicing of refrigerators with climate friendly refrigerants.**

In many countries of the world, consumer goods such as domestic refrigerators and freezers account for a significant share of the overall electricity consumption. In countries with carbon intensive electricity grids such as India or China, the energy consumption of operating refrigerators results in significant emissions of CO<sub>2</sub>. Moreover, in developing countries the most widely used refrigerants for refrigerators are Fluorinated Gases (F-Gases) with a high global warming potential. Emissions of F-gases are rapidly growing on a global scale and already account for a single digit percent share of the overall greenhouse gas emissions in many countries. Therefore, the use of energy efficient refrigerators and of refrigerators with low global warming potential (GWP) refrigerants can lead to substantial reduction of greenhouse gas emissions.

In order to promote technology change in developing countries, the generation of tradable emission reduction certificates under the Clean Development Mechanism of the Kyoto Protocol may provide interesting financial incentives. The CDM allows UN-registered emission-reduction projects in developing countries to earn certified emission reduction (CER) credits. These CERs can be sold and traded for use in industrialised countries to

meet emission reduction targets under the Kyoto Protocol.



Manufacturing of refrigerator cabinets in India

## **Phase 1: Development of new CDM Methodologies**

The prerequisite for implementing any CDM activity is the availability of a suitable UN-approved Methodology with which a project can be developed. From the approx. 110 currently existing CDM methodologies none was applicable for the manufacturing of consumer goods. However, targeting technology change at manufacturer level rather than at end user level of consumer goods has the potential to achieve much better leverage for triggering a rapid market change, and with much lower transaction cost. Under the Clean Technology / Clean Production programme in India, UNIDO and SECO therefore supported the development of two new CDM Methodologies

to overcome this prevailing barrier and to generate innovation in the field of CDM. The work was contracted to a team of Consultants lead by INFRAS, Zurich, including also South Pole Carbon Asset Management, Zurich and Winrock International India, New Delhi, as consortium partners.

In a joint effort with large industry partners in India, namely Godrej & Boyce Mfg. Co., Mumbai and Videocon Appliances Ltd., Aurangabad, two new methodologies were developed and submitted to the Executive Board of the CDM in phase 1 of the project. Both the proposed new methodologies received final approval in October 2008 as under:

- **AM0070** Manufacturing of energy efficient domestic refrigerators
- **AM0071** Manufacturing and servicing of domestic refrigeration appliances using a low GWP refrigerant.

The methodologies contain a number of innovative elements utilised for the first time under the CDM and they open new perspectives for CDM in other areas:

- CDM revenue goes to the manufacturer of the consumer goods (AM0070, AM0071)
- A market benchmark approach is utilised to cover energy efficiency of the consumer goods (AM0070)
- Additionality is covered by the market benchmark. No additional further proof of “additionality” is required (AM0070)
- Monitoring approach provides a choice between application of conservative default factors (limiting monitoring transaction cost) and detailed field monitoring of performance of refrigerators in the field (optimising CER output) (AM0070)

With successful approval, the methodologies now have become public domain and can be utilised globally by refrigerator manufacturing industries in all countries without own reduction targets under the Kyoto Protocol (so called non-Annex 1 countries). They add a second category of consumer end products to the CDM, following the earlier approved methodology on distribution of energy efficient light bulbs to households (AM0046).

## **Phase 2: Implementation of Projects**

The planned next step under the project is the development of CDM implementation projects with the two Indian industry partners Godrej & Boyce Mfg. Ltd. and Videocon Appliances Ltd. In a first step the expected output is a project design document (PDD) that can be submitted for validation and registration in the UN-system. As the commercial risk for project participants for a first time application of the new methodologies is high, it is foreseen to provide limited public funding, particularly for the establishment of sector benchmarks and for further steps until the registration is successfully completed. After registration, implementation of the projects will lead to real and measurable emission reductions. The CDM revenues then will lead to net savings in production cost of green products which can be passed on to the consumers. Continued implementation of the projects will then be taken on under responsibility of the respective manufacturers alone.

## **Expected emission reduction from project implementation in India**

Based on the annual production volumes of the two industry partners in India of close to 1 million household refrigerators per year

each, emission reductions from implementation of the CDM projects by the industry partners are estimated as follows:

- 350'000 tons of CO<sub>2</sub> for the first 7 year crediting period from manufacturing of energy efficient refrigerators by Godrej & Boyce. Over the technical lifetime of the appliances produced under the project, emission reductions in the order of 2 to 3 million tons of CO<sub>2</sub> are expected.
- 250'000 tons of CO<sub>2</sub> equivalent for the first 7 year crediting period from manufacturing and servicing of refrigerators with Hydrocarbon R600a in place of R134a refrigerant in case of Videocon Appliances Ltd. Over the technical lifetime of the appliances produced under the project, emission reductions in the order of 0.5 to 1 million tons of CO<sub>2</sub> are expected.

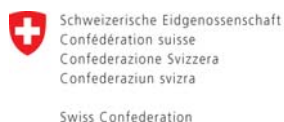


Production line for charging of refrigerant

## Project Team



## Project Sponsors



Swiss Confederation

Federal Department of Economic Affairs FDEA  
State Secretariat for Economic Affairs SECO

**Project Country** India

**Team of Consultants** INFRAS (Zurich), South Pole Carbon (Zurich), Winrock International India (New Delhi)

**Industry Partners** Godrej & Boyce Mfg. Co. Ltd., Videocon Appliances Ltd., Aurangabad

**Reference to CDM Methodology documents**

- Manufacturing of energy efficient domestic refrigerators (AM0070)
- Manufacturing and servicing of domestic refrigeration appliances using a low GWP refrigerant (AM0071)

For details see:

<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>

**Duration of Phase 1** July 2007 – August 2008

**Expected Emission Reduction from Implementation Projects**

- AM0070/Godrej & Boyce  
1<sup>st</sup> crediting period (7 years): 50'000 tons of CO<sub>2</sub> per year  
Over lifetime of appliances: 2 – 3 million tons of CO<sub>2</sub>
- AM0071/Videocon Appliances Ltd  
1<sup>st</sup> crediting period (7 years): 35'000 tons of CO<sub>2</sub> equivalent per year  
Over lifetime of appliances: 0.5 – 1 million tons of CO<sub>2</sub> equivalent

**UNIDO/SECO contribution for Phase 1**  
100'000 EUR

**Contact** Stefan Kessler, INFRAS, Zurich  
[stefan.kessler@infrass.ch](mailto:stefan.kessler@infrass.ch)