



Capturing ozone-depleting substances and greenhouse gases from household refrigerators

# Introduction of a Comprehensive Refrigerator Recycling Programme in Brazil

## Background

Brazil has more than 50 million old household refrigerators. Most of these are energy-inefficient and still contain chlorofluorocarbons (CFCs) which are ozone layer depleting gases having also an extremely high global warming potential (GWP).

Currently, scrap collectors (so called catadores) collect old refrigerators from slum areas (favelas) and dismantle them in order to recover and sell any valuable materials such as metals and plastics. In this process, the CFCs from the refrigeration circuits and insulation foams are released into the atmosphere.

The government of Brazil, in cooperation with large electricity producers (utilities), is implementing nationwide refrigerator exchange programmes mainly for energy efficiency purposes. The collected refrigerators however need to be disposed of in an environmentally sound way to avoid emissions of the CFCs which are harmful to the global climate and the stratospheric ozone layer. The government is therefore very interested to develop a comprehensive waste management system for these old refrigeration appliances.

## Project Description

The purpose of this pilot project is to assist the Brazilian Ministry of the Environment with the development of a comprehensive recycling system for old household refrigerators and freezers. The project provides a state-of-the-art refrigerator recycling plant which reliably recovers CFCs and other fluorinated gases from the cooling systems and those contained

in the insulation foam. The plant operator REVERT offers recycling capacity for the processing of 350,000 – 400,000 old refrigerators and freezers per year.

Additionally, comprehensive training and skills development for the professional operation of the recycling plant is an integral part of the project.

Furthermore, the project supports the Brazilian government in introducing appropriate technical standards and regulations to ensure a high quality operation of this and future recycling plants for the environmentally sound disposal of old refrigeration appliances.

In order to secure sufficient supply of old refrigerators to operate the plant at profitable levels, the project also assists with the development of a take-back system. This will be based on, and eventually expand, the existing refrigerator exchange programmes of the Brazilian government currently implemented in favelas for the benefit of low income households.

The project involves all relevant stakeholders of the refrigerator recycling sector (e.g. refrigerator manufacturers and retailers, servicing technicians and scrap collectors as well as the utilities and any future operators of refrigerator recycling plants). A major concern of the government is to integrate the informal sector (e.g. the catadores) in the new waste management system in a way that secures their livelihood and even improves their skills and working conditions.

The catadores are to be trained to collect and deliver the refrigerators without damaging them, so that the CFCs contained do not escape before the appliances reach the recycling plant. REVERT BRASIL Soluções Ambientais Ltda, the plant operator, will be responsible for setting up the take-back system and has already started doing so.

On behalf of



Federal Ministry for the  
Environment, Nature Conservation  
and Nuclear Safety

of the Federal Republic of Germany



## Project Impact

A technical norm (ABNT) for recycling procedures has been adopted by the Brazilian government and will be adjusted according to future results. The Brazilian government has passed a law which demands the development of a WEEE (Waste Electrical and Electronic Equipment) take-back and recycling system. Discussions about how to design and implement this system are ongoing and involving all stakeholders.

The state-of-the-art recycling technology of the established plant significantly reduces ozone- and climate-damaging emissions originating from refrigerants and insulation foams in refrigerators. It is estimated that the recycling of annually 350,000 refrigerators captures up to 40 tonnes of CFC-12 from the refrigeration system and 98 tonnes of CFC-11 from the insulation foam, resulting in the reduction of direct emissions of 890,000 tonnes CO<sub>2</sub> equivalent.

The improved take-back and recycling system also creates new jobs and helps developing skills in the waste management and transport sector. The recycled products such as metals and plastics are highly valued raw materials sought after by the local industry. This is a step towards a modern recycling economy.

The substitution of old refrigerators with new energy-efficient equipment leads to significant energy savings nationwide and also contributes to a successful energy demand-side management in the country. Energy savings are particularly important for low-income households, as the significant decrease of their electricity bills improves their overall financial situation.

The development of such a sustainable recycling management system is also intended to provide a best-practice model for other countries.

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**Title** Introduction of a comprehensive refrigerator recycling programme

**Country** Brazil

**Sector** WEEE-Recycling, refrigeration

**Objective** Establishment of a pilot recovery and recycling system for CFC refrigeration appliances in Brazil

**Target Group** Recycling facilities; refrigerator manufacturers and retailers; servicing technicians; scrap collectors; utilities; private households

**Project Executing Organization** BMU (German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)

**Implementing Partner Organization** Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH; Brazilian Ministry of the Environment/Secretariat of Climate Change and Environmental Quality

**Local Partners** Recycling plant operator REVERT BRASIL

Soluções Ambientais Ltda.; utilities; manufacturers and retailers of refrigerators; related stakeholders

**Project Approval** November 2008

**Project Duration** Until April 2012

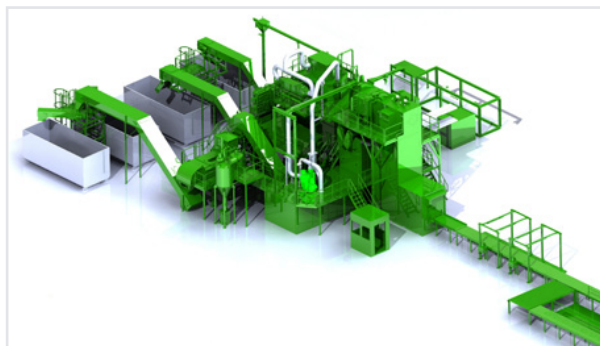
**Project Budget** EUR 5,000,000

**Funds** The project is funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety within the framework of the International Climate Initiative based on a decision of the German Federal Parliament.

**Impact on Ozone Layer and Climate Protection**

Destruction of about 138 ODP tonnes of CFC-11 and CFC-12 will prevent direct emission of approx. 890,000 tonnes of CO<sub>2</sub> e.

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Modern Recycling Plant