OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

23225

Fondo de Reconversión Industrial
FONDOIN

NATIONAL CFC PHASE-OUT PLAN
VENEZUELA

FINAL REPORT

Project No. MP/VEN/04/033 – Contract. N° 2004/193

First Tranche - Venezuela

UNIDO

June, 2006

Fondo de
Reconversión Industrial
FONDOIN

NATIONAL CFC PHASE-OUT PLAN
VENEZUELA

FINAL REPORT

Project No. MP/VEN/04/033 – Contract. N° 2004/193

First Tranche - Venezuela

June, 2006

CONTENTS

National CFC Phase-Out Plan of Venezuela. Final Report

1. BACKGROUND

The national CFC phase-out plan was approved at the 42nd Executive Committee meeting in April 2004 with the following phase-out target.

Table 1. CFC Phase-out target for Venezuela

Year	2003 estimate	2004	2005	2006	2007	2008	2009	2010
Montreal Protocol Reduction Schedule	3,322	3,322	1,661	1,661	498	498	498	0
CFC Consumption as Article 7 data	1,410	3,322	1,661	1,661	498	0	0	0
Change in stockpiling	-623	1,239	-172	83	-665	-763	-363	0
Total CFC demand, all sectors	2,032	2,083	1,833	1,578	1,163	763	363	0
Total reduction by on-going activities, all sectors	36	100	200	0	0	0	0	0
Total reduction by new activities, all sectors	0	0	50	255	415	400	400	363
Total annual reduction, all sectors	36	100	250	255	415	400	400	363
Aerosol sector demand	16.0	16.0	16.0	16.0	0.0	0.0	0.0	0.0
reduction by on-going activities	0	0	0.0	0.0	0.0	0	0	0
reduction by new activities	0	0	0	0.0	16.0	0	0	0
Foam sector demand	286.3	186.6	19.1	19.1	0.0	0.0	0.0	0.0
reduction by on-going activities	36.4	99.7	167.5	0	0	0	0	0
reduction by new activities	0	0	0	0	19.1	0	0	0
Refrigeration sector demand	1,730	1,880	1,798	1,543	1,163	763	363	0.0
reduction by on-going activities	0	0.0	32.3	0	0	0	0	0
reduction by new activities	0	0.0	50.0	255.0	380.0	400.0	400.0	362.7

In order to achieve the phase-out targets, a series of measures are included in the NPP to reduce production of CFC as well as to reduce consumption in the manufacturing sector such as aerosol, foam and refrigeration manufacturing sectors. The project implementation timeframe and the approved costs are given in Table 2 and Table 3, respectively. The project cost for the 2004 tranche was transferred to UNIDO. Depending on the achievement of the 2004 program, the fund in the 2005 may be requested at the first Executive Committee meeting in 2005 for their approval.

Table 2. Timetable for implementation of the NPP, Venezuela

Year	2004		2005		2006		2007		2008		2009		2010	
	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
Approval	*													
Project management														
Coordination group set up														
Training of national experts														
Monitoring														
Annual report			*		*		*		*					
Technical support component														
Awareness promotion														
Aerosol sector program														
Refrigeration manufacturing Sector program														
Foam sector program														
Customs training, with UNEP														
Service technician training														
Supplementary recovery and recycling scheme														
Assessment of the R&R system already established by UNDP project														
Determination of specification of additional equipment														
Equipment delivery to centres														
training of centre staff														
Delivery of equipment to shops														
Incentive program														

Table 3. Approved costs of the CFC NPP, Venezuela (in US$)

Project component and activity	**Sub total**	**2004 tranche**	**2005 tranche**	**2006 tranche**	**2007 tranche**
Project management	567,323	141,831	141,831	141,831	141,831
Technical support component (including support for the aerosol and refrigeration manufacturing sectors)	416,731	366,731	30,000	20,000	0
Foam sector program	201,500	201,500	0	0	0
National project for training service technicians	317,900	317,900	0	0	0
Supplementary national recovery and recycling project	4,237,100	867,100	1,460,000	1,910,000	0
Incentive program for retrofitting and replacement	500,000	0	0	0	500,000
TOTAL PROJECT COST	**6,240,554**	**1,895,062**	**1,631,831**	**2,071,831**	**641,831**

3.1 Project management

3.1.1 Establishment of an office to coordinate the NPP implementation

A new branch was established in FONDOIN to perform and coordinate the activities related to the NPP implementation. For this purpose and in order to achieve the objectives in a satisfactory manner, activities like redistribution of office space, new layout, new technical and cleric staff contracted were done, as follows:

- Remodeling the office creating and furnishing a working module with capacity for two people, the new working place was equipped with the appropriate furniture according to the established norms.
- Recruiting of two technical staff (Annex I).
- Purchasing of the following IT equipment:
  - Three (3) personal computers: model AMD-2.2, with 256 MB RAM memory and a hard disc of 40 GB.
  - One (1) Xerox laser printer model 3120, plus one (1) Epson printer model LX300.
  - Two (2) LG SVGA 15", monitors
  - One (1) Toshiba portable computer model satellite Celeron
  - One (1) Epson portable digital image projector, model Powerlite S1+.

3.1.2 Monitoring system for service sector activity.

An information and monitoring system including a remote communication system via Internet will be developed for the activities related to the control of the national recovery and recycling project in the refrigeration and air conditioning service sector, the terms of reference are being prepared. The objective of this system will be the control and follow up to the activities related to:

- Equipment and tools distribution to different service workshop and certified technicians;
- Control the amounts of recovered refrigerant during the services;
- Keep record of the recycled refrigerant and also the amounts of refrigerant taken to the storage and reclaiming centers.

This monitoring system will process a high volume of information, therefore a system will be designed and developed of an IT-system based on internet technology, that generates the different modules as 'Basic data entry' including information as name or trade name, federal taxpayer registration number (RFC), activities regarding the refrigeration service, address, telephone and fax numbers, email address, as well as data on other contact persons. A second module 'Daily information follow up' including task, data, amount recovered and recycled or reclaimed, etc. Other modules related to follow up activities and equipment distribution will also be included.

The system is being developed based on a preliminary survey of the different components of the recovery and recycling system as described in the item 3.3.

The monitoring system will be developed in parallel with the recovery and recycling system. The terms of reference for this system are being also prepared it is expected to request offers for technical services in Jun 2006.

3.1.3 Monitoring the program.

The training program to certified technicians in good refrigeration practices through the selected and upgraded training centers is a priority for FONDOIN. The program has been implemented in two phases, the first one included the training of trainers, which was monitored by the FONDOIN's technical staff directly and the second part being implement is the National Program for the training of technicians in good refrigeration practices, directly monitored by a staff contracted for this purpose.

Every training center is weekly monitored by FONDOIN to follow up results, number of trainees trained, tests, lessons learned and all the relevant information. FONDOIN is updating the statistics and following up the training courses. For the monitoring purpose software is planned a database is used, for the time being.

3.1.4 Awareness program

Since the public information and awareness program is the most important aspect of the National CFC Phase out Plan, FONDOIN has been working to reach different targets through several diffusion media.

For the public awareness different kind of printed material like brochures, leaflets and fliers (copies inserted into the report), has been distributed in different events related to the environment and refrigeration activities. Didactic videos about the ozone layer importance and its protection were made and have also been distributed. The videos made by UNEP have also been distributed.

FONDOIN has also participated in different national radio network and television programs, and has been invited to commercial refrigeration and fire control fairs. FONDOIN has also given conferences about the ozone layer and the ODS elimination programs in universities, technical institutions, private institutions and other educational and cultural centres.

3.1.5 Institutional video and printed material for public information

A documentary video: "La Capa de Ozono en un tubo de ensayo" (The Ozone Layer in a Test Tube), was produced in collaboration with Los Andes University and La Salle Foundation. The video was shown to the public on the Ozone Layer day in 2004, and were broadcasted on the national television channels at least three times a week during September, October, November, and December 2004 and January and February 2005. Additionally, about 80 copies have been donated to schools, NGOs and government agencies.

Two informative triptychs were designed, edited and a total of 5,000 copies of each one printed. One of the triptychs has information on the ozone layer and other on the Decree 3228. This material has been distributed during different events about the ozone layer that have taken place from January 2005. Events like the informative campaign of the Decree 3228, celebration of the Ozone Layer Day in 2005, the Latin-American Network meeting in October 2005, and the training courses for the refrigeration technicians. Additionally a self-explanatory leaflet of Decree 3228 was designed and 4,000 copies were printed and distributed during the information campaign on the Decree.

The previous material has served as a support for the disclosure campaign on Decree 3228 related to the consumption, production, import, export and use of the ozone depleting substances. The campaign was carried out in eight cities through the invitations to people involved in the divulgation of public information. Although this activity was not included in this project, its impact on the information about the national phase-out plan was direct.

3.1.6 National plan for service technicians training

Considering that the training of the service technicians is fundamental for this phase of the national plan, and the positive impact of its disclosure, a strategy for massive broadcasting of the message on the media was implemented. The strategy consisted on the promotion of this training as a tool to inform about the benefits of the programme together with the message on the preservation of the ozone layer. This work was undertaken by a specialized firm which make up the image, the message to be broadcasted and the established of contacts with the media. The detailed work, the presentations, and articles published on newspaper and on the media were inserted in the last report.

3.1.7 Institutional video of national plan for service technicians training

A video was recorded to support the training plan with the objective of reaching the technicians and instructors with audiovisual media, and to create awareness on the ozone layer issue and the contribution that they can do with their activities

As a result a 12-minute video with the training in good refrigeration practices program proposal including the contribution of the preservation of the ozone layer was recorded. The video shows in a dynamic and simple way the basic information of the ozone layer and the consequences of its destruction. Additionally, the video is oriented to the service technician and shows the consequences of mishandle of the substances. Finally, the message is directed to improve the sector through professional advancement of the people handling CFC substances. A sample copy was sent in previous report.

3.1.8 The international day for the preservation of the ozone layer – 16th September 2005

On the occasion of the celebration of this Ozone layer Day, FONDOIN launched the training programme on good refrigeration practices with the presentation of the education centres involved. At the same time, people from the different sectors related to refrigeration and air conditioning, service workshops, refrigerant traders, governmental agencies, and the media were invited for the occasion.

3.2 Training of trainers for service technicians training

3.2.1. Training material in Spanish.

In order to provide the corresponding training for the different stages of the National Phase-out Plan, three training manuals were developed:

1. Training Manual for Good Refrigeration Practices

   This manual is the basic tool for the courses in Good Refrigeration Practices, it is a reference for technicians and instructors. It was developed by FONDOIN together with Eng. Jorge Puebla (Engineer) from the firm *Biosfera + Segura Consultores* and its content summarize the most important aspects for the good management of refrigerant in the service of refrigeration systems.

   A total of 4,000 copies of the manual were printed and are already been distributed. This manual of 155 pages includes drawings, graphics, tables, inserts and other has been distributed to each participant in the courses for trainers and for technicians. A copy is included in this report.

2. Training Manual for the recovery and Recycling Centers operation (or operators)

   This Training Manual was prepared to provide the guidelines to be followed by future operators of R&R centres in order to keep control and record of the recovered refrigerant and recycling process. The manual is focused on the importance of the recovery and recycling centres as a guidance to follow the instructions related to data collection, and also in the complexity of the operation of such centre where different types of refrigerants are handled.

3. Training Manual for the Refrigerant Recovery and Recycling Centres

   This manual was developed to provide the necessary information to the managers of the recovery and recycling centres (R&R) in order to perform a good operation minimizing the risks of failure and avoid mishandling the material, the manual includes also the necessary information to monitor the plan.

3.2.2 Selection of national training institutes for technicians training

The identification of the potential training centres to be selected to participate in the programme was based on the technical schools that offer refrigeration in their regular curricula. After a national research a total of 51 institutions (official and privet) willing to participate in the programme were found and evaluated with the survey. The situation was analysed, aspects as location and programmes from every potential training center bring a total of 43 centres with the capability to carry out the courses on Good Refrigeration Practices according to the criteria for the implementation of the strategy.

The selected centres are located throughout the country allowing the training of the majority of technicians within the different regions. The majority of the technicians are concentrated where the centres are located.

The centres are classified in three types of education institutions:

1. *Centres that belong to the National Institute for Educational Cooperación (INCE).*
   The INCE is a public institution aimed to prepare people with technical skills to work with the industry. The INCE has training centres all over the country and a good number include refrigeration and air conditioning in their curricula.
2. *Fe y Alegria Educational Centres*
   Fe y Alegría is an education institution socially oriented dedicated to the formal education to the poorer sector. The institution provides high quality technical courses including refrigeration and air conditioning courses to young people all over the country. Some of the schools include the refrigeration courses in their regular studies.
3. *Other educational institutions*
   Include independent, public and private education centres.

The following table shows the final list of selected centres according to the established classification and geographical location

Table 4. Selected Training Centres

State	City	Education Centre	Designation	
			Training Centre	Support
INCE				
Miranda	Caracas	Centro de Formación Industrial Electricidad y Electrónica	E2	

State	City	Education Centre	Designation	
			Training Centre	Support
Carabobo	Valencia	Centro de Formación Industrial La Isabelica- Valencia	E2	
	Puerto Cabello	Centro de Formación Puerto Cabello	E2	
Aragua	Maracay	Centro Nacional de Mecánica Automotriz	E2	
	Maracay	Centro de Formación Polivalente Bermúdez- INCE Maracay	E1	
Falcón	Coro	Unidad Móvil Coro	E1	
Lara	Barquisimeto	Instituto Nacional de Cooperación Educativa	E2	
Portuguesa	Guanare	Centro Polivante Guanare	E1	
	Araure	INCE Regional, Araure	E1	
Yaracuy	San Felipe	Centro de Formación Industrial	E1	
Zulia	Maracaibo	Centro de Formación Industrial Maracaibo	E2	
	Cabimas	Centro de Formación Industrial CFI Cabimas	E1	
Amazonas	Puerto Ayacucho	Centro de Formación Industrial Nieves Cuyare	E1	
Bolívar	Ciudad Bolívar	Centro de Formación Industrial Ciudad Bolívar	E2	
Apure	San Fernando de Apure	Centro de Formación Industrial San Fernando. Edo. Apure	E1	
Nueva Esparta	Porlamar	Centro Polivalente Inoemar Los Cocos	E2	
Anzoátegui	Puerto La Cruz	Centro de Formación Profesional INCE-Puerto la Cruz.	E2	
Sucre	Cumaná	Centro de Formación Industrial INCE-Cumaná	E1	
Monagas	Maturín	Centro de Formación Industrial INCE-Monagas	E1	
Trujillo	Valera	INCE Polivalente Industrial Valera	E1	
Mérida	El Vigía	Centro de Formación Profesional INCE El Vigía	E1	
Barinas	Barinas	Instituto Nacional de Cooperación Educativa	E1	
Táchira	San Cristóbal	Centro de Formación Industrial San Cristóbal	E1	
		Subtotal	23	0
Fe y Alegria				
Distrito Capital	Caracas	San José Obrero		E1
Miranda	Cúa	Escuela Técnica Monseñor Juan José Bernal	E2	
Zulia	Maracaibo	Escuela Artesanal Cristo Rey de Fe y Alegria	E1	
Zulia	Maracaibo	Unidad Educativa La Chinita	E2	
Sucre	Cumaná	Unidad Educativa Fé y Alegría Madre Alberta	E2	
		Subtotal	4	1
Other Instutionss				
Miranda	Caracas	Universidad Simón Bolívar	E2	
Distrito Capital	Caracas	Universidad Central de Venezuela	E2	
Distrito Capital	Caracas	Instituto Universitario de Tecnología Industrial Caracas – IUTI	E2	
Carabobo	Guacara	Instituto Universitario de Tecnología Industrial Valencia – *IUTI*	E1	
Zulia	Maracaibo	Instituto Universitario de Tecnología Industrial Maracaibo – IUTI	E1	
Tachira	San Cristóbal	Instituto Universitario de Tecnologia Industrial San Cristóbal – IUTI	E1	
Aragua	Maracay	Instituto Universitario de Tecnologia Industrial Maracay-IUTI	E1	
Distrito Capital	Caracas	ATEMA	E2	
Distrito Capital	Caracas	Universidad Metropolitana	E2	

State	City	Education Centre	Designation	
			Training Centre	Support
Distrito Capital	Caracas	UNEXPO	E2	
Falcón	Punto Fijo	Instituto Universitário Tecnológico Jose Leonardo Chirinos	E2	
Bolívar	San Félix	Fundación La Salle - San Félix	E2	
Nueva Esparta	Punta de Piedras	Fundación La Salle – Punta de Piedras	E1	
		To be determinate	2 E1	
		Subtotal	15	0
Total			42	1
			43	

Note: E1 and E2 see table 4.

In summary 41 centers have signed the agreements, from those, 40 will be monitored under the National CFC Phase-out Plan. Additionally, and as part of the reinforcement programme, an additional institution has been included. Even though this institutions does not fulfill the conditions for the programme, it is part of the strategy to obtain the cooperation agreement with *Fe y Alegria*. This additional centre will support the selected training centres and was equipped with the required tools to be used for the training in good practices in their courses. However, it will not be monitored as it is considered of low impact for the programme.

The rest of the equipment not delivered (2) will be stored in FONDOIN while a new destination is determined, which depends on the performance of the centres and their courses.

3.2.3 Planning of the whole program of service technicians training

The training of the technicians in good refrigeration practices was planned to qualify a total of 3000 technicians in a year period. To reach this goal FONDOIN has made a strategic alliance with 10 different educative institutions at national level with 40 centers specialized in refrigeration. All the centres have been already upgraded with the latest technology and the trainers have been trained and are ready to train and help FONDOIN to reach this goal. All the courses have been monitored and supervised, by FONDOIN and will continue throughout this period.

Each training centre has the commitment to dictate up to 10 courses in a year at the rate of 15 participants by course as long as it has students.

Considering the number of registered technicians and those that could be incorporated soon, a preliminary estimation of 4200 technicians to be trained can be achieved. Based on that, the Annex I shows how this number of technicians was determinate and the distribution of the planned courses per training centre according the actual requirements.

3.2.4 Training of trainers

The distribution and number of training centres selected for the programme generated an important number of trainers to be trained in good refrigeration practices. This situation obliged FONDOIN to change the original idea from national course to regional plan of courses grouped according to the geographical location. The number of participants was limited to two instructors per centre.

The centres selected to provide training to the trainers were chosen among the centres included in the

programme, bearing in mind equipment supplied, infrastructure, availability and location. Working groups of maximum 18 instructors-students were assigned per course. As a result five courses distributed in Maracay, Caracas, Maracaibo, Barquisimeto and Cumaná were organized and carried out.

The new planning of courses demand more teachers in order to meet the programme requirements. For this purpose, a group of experts in the area was hired to train the instructors. A total of five professionals were hired, named Jorge Puebla, Edgar Oropeza, Rodrigo Rengifo, Cesar Oronel and Rafael Álvarez all with experience in this kind of courses and the advantage of having collaborated with the revision of the manual.

The programme and duration of the courses were structured in such a way that can be dictated in 32 class academic hours (4 days) with theoretical and practical sessions. A sample copy was sent in previous report.

For the lessons the teachers were divided in groups of two to dictate the lessons in Good Refrigeration Practices. Additionally, two of FONDOIN technicians presented the subject related to the ozone layer, legal frame, nomenclature and illegal trade of refrigerants. FONDOIN staff also organized, coordinated and supervised every event. The table No. 2 shows the course venue, date, teachers, participating institutions and total number of participants.

Table 5. Calendar of Courses for Instructors

Centre	Date	Teachers	Institutions	Attending Instructors
CEMA- Maracay	17-20 october 2005	Jorge Puebla Edgar Oropeza Carmelina de Lombardi Pedro Sallent	CEMA CFI Maracay, CFI San Felipe CFI Pto. Cabello CFI Valencia IUTI Maracay IUTI Valencia	15
USB Caracas	24-27 october 2005	César Oronel Rafael Álvarez Carmelina de Lombardi Gianfranco Ruggiero	USB UCV ATEMA UNIMET CFI Amazonas CFI Los Cortijos Fe y Alegría de Antímano IUTI Caracas	14
CFI Maracaibo	01-04 november 2005	César Oronel Edgar Oropeza Carmelina de Lombardi Lara Noguera	CFI Maracaibo CFI Cabimas CFI Táchira CFI Falcón IUTI Maracaibo IU J. Leonardo Chirinos Fe y Alegría La Chinita	15
CFI Barquisimeto	15-18 november 2005	Rodrigo Rengifo Edgar Oropeza Carmelina Lombardi Gianfranco Ruggiero	CFI Barquisimeto CFI Guanare CFI Valera CFI El Vigía CFI Barinas CFI Apure IUTI Táchira	14
CFI Cumaná	6-9 December	Jorge Puebla Edgar Oropeza Carmelina de Lombardi	UNEXPO, Fundación La Salle Fe y Alegría Madre Alberta	17

3.2.5 Support material

For every courses support material were prepared and included in order to facilitate and complement the studies of every subject material that can be used as a reference. Each participant received a folder with this material with the following:

- Good Refrigeration Practices Manual
- Instructive material
- Leaflet about Decree 3228
- Ozone layer triptych
- Course programme
- CD with the material and presentations in electronic version
- Stationary and pens

The Manual for Good Refrigeration Practices serves as a reference text. Additionally the instructive material includes some recommendations for dictating the courses, which help the instructor for the preparation of the courses. The leaflet about Decree 3228 is a summary of the most important provisions for the refrigerants traders, technicians and users.

Additionally, the course information was compiled in a CD to give support to the teachers; this CD includes additional technical information for trainers not printed, also the regulations and the control formats for the monitoring of the programme. Additionally, there is also the group of presentations given in the course with which the instructor can visualize every aspect of the course and should use for the preparation of his own courses.

3.2.6 Results of the National training of trainers programme.

The instructors training stage finished with very positive results. From a total 75, 45 participants the 60% of the total evaluated using the test especially prepared, obtained satisfactory results with a minimum of 70% of the total. This percentage of instructors corresponds to 68% (27) of the institutions where the courses for technicians will be initiated.

On the other hand, the instructors who did not reached the reference level attended a second phase of training, especially organized in order to improve their knowledge of weak areas, this reinforcement combines non-classroom and classroom instruction.

With the aim of reinforce the knowledge of the instructors, for the second phase a summary guidance including a set of questions were prepared, including all the course subjects. This guidance has been prepared to used as a base for the course preparation, additionally an updated version of the program was also given including the time frame for every subject and the list of existing tools in every center and consumable materials to be used for the courses.

In the specific case of instructor with low grade, a special training course was organized to level and to reinforce. Three special training courses were carried out, one in Caracas, one in Valencia and one in Barquisimeto, every one of one day from 8:30 to 6:00pm with the instructors Jorge Puebla and Carmelina Flores de Lombardi. A total of 32 instructors from 21 training centers attended the leveled journals with the follow schedule:

Table 6. Reinforcement training courses

City	Venue	Date	Instructors invited	Assistance
Caracas	FONDOIN	February 18	12	10
Valencia	IUTI	February 21	11	9
Barquisimeto	Hotel Principe	March 2	9	7
Total			32	26

The results of the leveled courses were excellent having reached the expected level and over in the majority of the cases. The trainees who did not attend this special course will be treated case by case to find the most proper solution.

3.2.7 Determination of the specification of training equipment required for selected training centers

The quantity of equipment and tools has been determined considering the work programme proposed for the courses. The equipment selected to upgrade the training centres were divided in two groups (one includes recovery machine). Each training center has received a set of equipment as shown in Table 4.

The set with recovery machine has been assigned as reinforcement to the centres with the more technicians to be trained.

Table 7. Equipment and Tools selected for the Training Centers

Description	Equipment type		Total Qty.
	E1	E2	
Recovery Machine		1	20
Recovery and Recycling Machine (R&R)	1	1	43
Vacuum pump (2 cfm)	2	2	86
Hand held leak detector	1	1	43
Ultra Violet Leak detector (kit)	1	1	43
Service Manifold (hoses Included)	2	3	
R-12, R-22 y R-502	1	2	63
R-134a	1	1	43
Vacuum gauges	1	1	43
Electronic scale (Balance)	1	1	43
Cylender (Recovery bottle)	2	3	
R-12, WC: 26,2 lbs (11,9 kg)	1	1	43
R-134a WC: 26,2 lbs (11,9 kg)	1	2	63
Ratchet Wrench			
Service wrench (3/8"-5/16" x 1/4"-3/16" sq)	1	1	43
Service wrench (1/4"-3/16" sq x 9/16"-1/2" hex)	1	1	43
Other tools			
Tube piercing Pliers	1	2	63
Pinch off Pliers	1	2	63
Valve core tools	2	2	86
Multimeter	1	1	43

The technical specifications for the equipment and tools required for the training centres are shown in the last report. This information has been used by UNIDO for the bidding and purchasing of the equipment.

Purchase of equipment and DDU delivery was executed according UNIDO's rules and regulations with international bidding conditions. Two companies were selected to provide the equipment and tools, one provided

recovery and recycling machines and other one the rest of the tools. The delivery process started in November 2005 and completed in January 2006. The equipment arrives September, 27th 2005

3.2.8 Technicians training including selection of trainers, trainers training, selection of technicians, execution of training and issuing certificates

The information of technicians selected to participate in the good practices courses comes from the survey conducted to the services workshops. Based on this information FONDOIN notified the companies of the starting of the courses and invite to register their technicians in the closer training centre involved in the program.

The good refrigeration practices courses started on the 9 February 2006 and to the 30 June 2006 a total of 19 courses have been already dictated.

Table 8. Summary of courses.

Training Centre	City	State	Courses dictated until June 30, 2006	Technicians trained
Universidad Simón Bolívar	Caracas	Distrito capital	2	68
Instituto de Tecnología Industrial IUTI	Caracas	Distrito Capital	2	
Instituto de Tecnología Industrial IUTI	Maracaibo	Zulia	1	48
Fe y Alegría Zulia	Maracaibo	Zulia	2	
Fé y Alegría Sucre	Cumaná	Sucre	1	12
Fundación la Salle	San Félix	Bolívar	1	18
Instituto de Tecnología Industrial IUTI	Valencia	Carabobo	1	16

Altogether until 30 June 2006 a total 255 technicians have been trained, 199 have obtained the accreditation emitted by FONDOIN when approving the final examination of the course. The program has benefited and enabled the personnel from 55 companies.

In terms of call capacity the expectations have been fulfilled as established. The attendance has been 78%, 85% of technicians complete the courses and 70% reach the certification.

The scope of the technicians training activity described in the terms of reference has had an important variation. The number of training centers proposed has increased to 40. This difference shows an increment in the associated cost, which must be considered in the following project phase in order to cover the obligations acquired.

3.3 Supplementary refrigerant recovery and recycling project

Within the activities planned by UNIDO, a system of recovery and recycling was established taking into consideration the different resources existing in the country, like the refrigerant reclaiming machine, which was acquired in 1997 through a project developed together with UNDP.

This reclamation equipment and the plant were managed under a concession by firm INGARSICA (refrigeration services company) until December 2004. Due to the inoperative condition of the system, the agreement was finished and the equipment was stopped and has been transferred to a warehouse and will be finally transferred to PRODUVEN.

A survey of the current situation of the recovery equipment delivered for the project implemented by UNDP was contracted and carried out by the firm UBAJAY, C.A. As a result of the survey a total of 216 potential candidates workshops ready to participate in the new plan for recovery and recycling were found. In order to draw the attention of the owners of these workshops, to improve their capacity and have their commitment with the programme, an additional tool kit was purchased. The quantity and details of the tool kit are shown in section 3.3 of this report.

In relation to the refrigerant recovery and recycling project, a little progress has been achieved so far. The firm *Biosfera + Segura Consultores (B+S)* was hired to develop a plan of recovery and operation of the reclamation equipment adapted to the national market, as well as to asses the potential actors for the proposed plan. B+S also has the responsibility to develop the support material for the training courses, which was required to implement the program.

Important aspects resulted from the work done by this consultant company:

- The only producer of CFC, PRODUVEN at national level has been involved as potential operator of the reclamation plant.
- At the same time and in order to take advantage of the capacity and transport logistics of refrigerant distributors, they are considered as potential storage centres using their main customers as suppliers of the recovered gas to be finally regenerated with the reclamation plant within PRODUVEN premises.
- From the previous item, the following question comes to our mind: What can be done with the contaminated gas that reaches the storage centers and cannot be regenerated. No satisfactory answer has been found.
- The recovery and recycling plan developed and implemented in other countries is not suitable for Venezuela due that the reclamation plant has a large capacity (12,000 tons/years). For this reason the recycling centres should not be considered, the regenerating plant might be affected directly and also opens the opportunity for the illegal commercialization of virgin gas.

Considering the plan proposed by B+S, a meeting was held in order to inform them about the project and to know their comments and willingness to participate in this initiative as per the structure suggested by B+S, PRODUVEN showed a real interest in the program and in their participating in the project. Several important aspects remained to be discussed; however, the lack of active participation has reduced the progress on this subject.

Finally, the firm *Protocol Resource Management* in Canada, the reclamation centre supplier and installer was contacted, with the objective of evaluating their willingness and possible costs of the reinstallation and operation of the plant, as well as the training of the operation staff.

3.3.1 Re-survey of the inventory of 2,000 service workshops

A list of the relevant activities for this first part of gathering information about target public on which there will be actions taken within the frame of the present project. The sequential order of the of activities does not necessarily reflex a order of events, some are being implemented simultaneously.

- Revision and adjustment of the model questionnaire to be used for gathering information from the potential beneficiaries of this project.
- Design of the database to process all the information surveyed will be processed.
- Collection of general information (name of the business / company, location, phone and contact name) of establishments, which could be potentially eligible beneficiaries of this project.
- Entering data into the database of the general information on establishments that could be potentially eligible beneficiaries of this project.
- Printing questionnaires. It was deemed convenient to print initially 5,000 copies all of them were distributed.
- Contact with establishments located in the Capital Region for the information collection.
- Telephone contact with small and big distributors of spare parts and refrigerant gases related to the refrigeration sector in the Capital Region and nearby cities (especially Cúa, Maracay and Valencia).
- Questionnaires distribution in the country's major cities (Maracaibo, Porlamar, Puerto la Cruz, Cumana, Puerto Ordaz, Ciudad Bolívar, Maturín, Higuerote, Río Chico, Gran Caracas, Valles del Tuy, Maracay, Valencia, Puerto Cabello, Barquisimeto, San Juan de los Morros, Calabozo, Acarigua, Araure, Guanare, Valera, San Cristóbal, Mérida, Punto Fijo, Coro) through compromise and agreement with small and large distributors of spare parts and refrigerant gases related to refrigeration sector which operate at national level.
- Delivery of questionnaire lots to small and big distributors of spare parts and refrigerant gases related to the refrigeration sector, operating in the country's main cities.
- Follow up of the support work performed by small and big distributors of spare parts and gases at national level.
- Processing of all the questionnaires duly filled in.
- Negotiation of an advertising space in a Web page devoted to refrigeration sector.

Based on the information collected thorough the survey and having visited and analyzed the actual situation of the reclaim equipment purchased through UNDP for the refrigeration recovery project it is planned a overhaul to this machine and the installation in PRODUVEN premises as a base for a recovery and recycling system. The terms of reference for the overhaul of the reclaim equipment is being prepared with the help of UNIDO.

3.3.2 Investigation of status of already distributed service equipment under the UNDP project.

- Total received gas recovery equipment: 471.
- Distributed gas recovery equipment: 421. (see note 1)
- Faulty recovery equipment: 50

Note 1:
Notwithstanding, some workshops have disappeared, some equipment has been discontinued and some other is difficult to find.

After analyzed the situation, it is believed that NOT all the potential companies could be considered to be included in the new project due to the fact that 215 companies were included before year 2004; - information about company INGARSICA, (see table 6).

Considering the above, and in order to avoid creating false expectations, it is expect to work with **206 companies adequate** for the new project, which are the ones included in 2004 and 2005, most of them, by FONDOIN promoting team.

Table 10. Distribution of Equipment by Year (1999-2004) PROJ. VEN/REF/22/TAS/58-PNUD

	1999	2000	2001	2002	2003	2004	2005	TOTAL.
INGARSICA	18	87	39	19	52	68	0	283
FONDOIN promotional team	Not operative	Not operative	Not operative	Not operative	Not operative	127	11	138
Companies included by year	**18**	**87**	**39**	**19**	**52**	**195**	**11**	**421**
						Total I		**421**

	1999	2000	2001	2002	2003	2004	2005	TOTAL.
Damaged equipment								50
Equipment to be asigned								0
						Total II		**50**
						Total (I+II)		**471**

3.3.3 Specification of additional equipment for service shops

The first part was the definition of the kind of equipment to be provided to the beneficiaries of the programme. Two options were analysed, the first one was complementing the existing equipment and the second to providing a kit with a set of standard equipment.

After the analysis of the two options along with the strategy for the national plan the conclusion was that the best option is supplying the workshops with a kit with the necessary equipment and tools according to the sector they in which they are working. This decision was taken considering that the technicians are able to use the knowledge acquired in the courses using the adequate tools allowing them to fill the requirements for the refrigerant recovery programme included in the national phase-out plan.

Considering the diversity of the sector, FONDOIN worked with two possible types of beneficiaries:

- Domestic and/or commercial refrigeration workshops
- Automotive air conditioning service workshops

Additionally, this sector was divided in two: new beneficiaries and the participants of the previous UNDP refrigerant recovery and recycling project, with the intention to include them to the new plan of recovery and regeneration.

The next step was to determine the number of kits required according to this classification. For this purpose the database on workshops and technicians collected by UBAJAY Consultants in 2004 were used. An analysis of the number of workshops and technicians separated by application in the sector was done with these data. At the same time, a financial analysis of the costs against the available funds from the first tranche was made; the results obtained are shown in table 7.

In total 8 different kits were prepared taking into consideration the different requirements of each segment in the sector and also the connection of this programme with previous ones:

Kit 1: Domestic refrigeration
Kit 2: New automotive workshops
Kit 3: Automotive UNDP program
Kit 4: Commercial high consumption
Kit 5: Commercial low consumption
Kit 6: Commercial UNDP program
Kit 7: Reposition from UNDP program
Kit 8: Reposition from UNDP program

Table 7. Kits for Workshops and Technical Service

It	Name and required parameters	Qty	Kit 1	Kit 2	Kit 3	Kit 4	Kit 5	Kit 6	Kit 7	Kit 8
1	Refrigerant recovery machine	**350**				350				
2	Refrigerant recycling Machine	**120**		120						
3	Vacuum puma	**550**	50	120	30	350	50	50		
4	Hand held leak detector	**400**	50			350	50	50	50	
5	Ultra Violet Leak detector.	**150**		120	30					30
6	Service Manifold	**470**	50	120		350	50			
7	Service Manifold	**550**	50	120	30	350	50	50		
8	Vacuum gauges	**550**	50	120	30	350	50	50		
9	Electronic scale (balance)	**550**	50	120	30	350	50	50		
10	Cylinder with capacity of 11.9 kg	**620**	50	240	30	350				
11	Cylinder with capacity of 5.4 kg	**800**	100			700	100	100		
12	Ratchet wrenches square	**400**				350	50	50		
	Ratchet wrenches hexagonal	**400**				350	50	50		
13	Tube piercing pliers ¼"	**350**	50			350	50	0		
14	Pinch off pliers up to 8 mm	**400**	50			350	50	50		
15	Valve core tool	**550**				350	50	50		
16	Multimeter (clamp-on meter)	**400**	50			350	50	50		
	Total kits		50	120	30	350	50	50	50	30

The specifications corresponding to the equipment and tools described here are included in last report.

3.3.4 Selection of recipient service shops

The selection of recipient service shops is linked with the implementation of the recovery and recycling system to be developed in the country. It is based on a scheme of operation like the illustrated in the annex V of the Draft Final Report, which is being considered by the CFC producer PRODUVEN, the refrigerant distributors and FONDOIN in order to achieve a consensus that ensure the success and the sustainability of the system.

The proposal is based on the study elaborated by consulting B+S with the union of refrigerant distributors in the country. A diagram of this proposal was included in last report.

Finally, the recovered refrigerant recipient will be the service shops which belong to the association of the refrigerant distributors of the country that show disposition and conditions to carry out this activity. Once concluded the phase of analysis and negotiation, the distributors interested to participate in this recovery system will be selected as well as the centers of refrigerant storage will be select.

3.3.5 Training of staff of recycling centres

The training of the personnel for the refrigerant recycling has not started because a system for the recovery and handling of the refrigerants has not been established. Nevertheless, an operation manual for the recovery centers equipment has been finalized, as well as a manual for the operators of these centres.

4. Monitoring of foam and refrigeration manufacturing sectors

4.1 Re-survey of the inventory of remaining small companies in the foam and refrigeration manufacturing sectors

Based on the activities in the program detailed in the proposal, FONDOIN's staff updated a list of small manufacturing firms in the refrigeration and foaming sector which were originally included in the NPP as CFC consumers. The object of this up-date was to know the operation status of the firms as well as the verification of their CFC use in the production lines.

The data were collected by FONDOIN by telephone and direct visits to the installations of the firms. In summary 15 small enterprises were found still using CFC in their production lines, as a blowing agent for foam production or refrigerant substance.

Tables 8 and 9 show a summary of the firms with their respective technical recommendation for the acquisition of polyurethane injection equipment, and non ODS refrigerant filling equipment where applicable.

Table 8. Polyurethane Injection Equipment by Company

	COMPANY	11 Kg./min Spray - Inyection	15 Kg./min.	30 Kg./min.	40 Kg./min.	60 Kg./min.	80 Kg./min.
1	CAFRICA				1		
2	DEINBO **						
3	DEINCOPA			1			
4	FRIGE HERVEN		1				
5	FRIMETAL			1			
6	MERCANTIL SOL Y AIRE		1				
7	METALCENTRO				1		
8	REFRICENTRO				1		
9	REFRIG. DURAN						1
10	REFRISERVICE		1				
11	RSM						1

	COMPANY	11 Kg./min	15	30	40	60	80
12	SIHERNA			1			
13	AISLANTES TERMICOS	1					
14	DURECA REFRIG.					1	
15	REFRIG-TUY S.A.	1					
	TOTAL	2	3	3	3	1	2

**Mold Manufacturing Technical Assistance

Table 9. Refrigerant Gases filling equipment by company

Company	R-134 Filling and Exhaustion Equipment	Leak detector
FRIGE HERVEN	1	1
MERCANTIL SOL Y AIRE	1	1
METALCENTRO	1	1
REFRIG. DURAN	1	1
REFRISERVICE	1	1
FRIMETAL	1	1
REFRICENTRO	1	1
SIHERNA	1	1
TOTAL	8	8

4.2 Equipment distributed

The work related to the manufacturing sector is in progress. All firms have received the equipment although not all have been installed.

The purchase and assignment of equipment had some changes from the initial plan. This situation was generated by a mistake in the purchase order issued by UNIDO for the procurement of the charging boards and foam machines. The specifications and quantities assigned did not have any relation with the corresponding project. As a consequence, the strategy for distribution was redesigned by evaluating the feasibility of each and every firm to use the available equipment.

These mistakes affected the available funds for the execution of the project as it was planned and generated a change in the scope of the project. As a consequence the firms *Deinbo* and *Cafrica* could not be benefited. *Deinbo* was rejected as they have reconverted by their own resources and the financial aid only corresponded to the production of molds for manufacturing in compensation to their reconversion. *Cafrica* on the other hand, due to the need of the equipment and the time passed from the beginning of the project, advanced the purchase of the foam machine.

4.2.1 Foaming machines

The acquisition of nine machines with a capacity of 15Kg./min obligate FONDOIN to reconsider the distribution plan prior to the functional evaluation of the equipment capacity against the production process of each company. Finally, it was managed to redistribute this equipment among the companies using smaller injection molds. The requirements of the remaining four companies the requirements did not fit the characteristics of the equipment. As a result a new purchase order with the new parameters was issued. However, the equipment with higher capacity was subject to a revision due to budget limitations.

In table 10 the final distribution of this equipment is shown.

Table 10. Foam Machines Distribution

N°	Company	Spray Capacity (Kg./min)	Inyection Capacity (Kg./min)			
		11	15	30	40	60
1	DEINCOPA		1			
2	FRIGE HERVEN		1			
3	FRIMETAL		1			
4	MERCANTIL SOL Y AIRE		1			
5	METALCENTRO		1			
6	REFRICENTRO		1			
7	REFRISERVICE		1			
8	SIHERNA		1			
9	DURECA		1			
10	FRIGI-TUY	1				
11	REFRIGERACION DURAN					1
12	RSM					1
13	AISLANTES TERMICOS	1				

4.2.2 Charging board Machines and leak detectors

In this case there was also a difference between the equipment purchased and the equipment required for the Project. The purchase order issued requested 12 Charging Board Machines and Leak Detectors, and for the project only 8 were needed.

The eight machines programmed were delivered and installed satisfactorily. The four remaining are waiting for assignment to firms that qualified for its use. FONDOIN is working on the identification of the beneficiary firms. In table 12 the final distribution of this equipment is shown.

Table 12. Refrigerant Gases Filling Equipment by Company

N°	Company	R-134 Filling and Exhaustion Equipment	Leak detector
1	FRIGE HERVEN	1	1
2	MERCANTIL SOL Y AIRE	1	1
3	METALCENTRO	1	1
4	REFRIGERACION DURAN	1	1
5	REFRISERVICE	1	1
8	FRIMETAL	1	1
9	REFRICENTRO	1	1
10	SIHERNA	1	1
11	OTHER REQUIREMENT *	4	4
	TOTAL	**12**	**12**

* Consigned to FONDOIN

The project cannot be considered complete. The installation monitoring of the remaining equipment is pending and so the final inspection of the firms in order to issue the completion report.

4.3 Elaboration plan of action on CFC regulation and industrial standards

In the Interim Report was presented an action plan proposed and executed to date, in the course of the time some changes have been undertaken as described:

The Decree N° 3228 was reformed by the Decree N° 4335, published in the 'Gaceta Oficial' N° 38392 6 of March 2006. This reform modifies the elimination calendar of the CFC-11 and CFC-12, allowing the country to have more production during the years 2005 and 2006 with the purpose produce an excess to take care of the internal demand until the 2010, keeping the same conditions placed in the Closing of the CFC Production Plant of PRODUVEN, the consumption levels stay without change.

From the year 2007 included, no more production is allowed. In the new Decree the dead lines for the companies and workshops using CFC to be registered to the Ministry of the Environment are eliminated. The companies that has not been registered cannot receive equipment to recover refrigerant and have their personnel trained in Good Practices. These modifications obey to the reality showed by FONDOIN around the development of the program of qualification of technicians and equipment that just is beginning. A new article is added that it establishes that FONDOIN must conclude the National Plan of Elimination of CFC at the beginning of the 2010.

The rest of the measures of prohibition of imports of CFC-11 and CFC-12, Methyl Bromide, TCA and Halones, as well as devices and equipment that containing these products have not been changed.

The Reforms of the Decree do not invalidate the divulged material, but new flyers and informative brochures with the new information will made, nevertheless this information is available only in Spanish.

The importation figures from the National Institute of Statistics, whose source is the Customs, indicate that there were no imports of any product identified with the tariff codes of the prohibited substances, but however if were a seizure of 200 tons of CFC12 that they tried to enter like HCF134a.

In the year 2005, two days workshop was done addressed to the authorities of the Main Customs and State Directions of the MARN, National Guard and Office of the public prosecutor, among others, on illicit traffic and falsifications of CFC. This year local journeys will be made to present/display the changes of the Decree and to tie the control of the traffic of CFC with the Project of Green Customs that is developing by Customs.

As far as the Beijing Amendment, it is in the National Assembly, but there have priorities for the internal laws that have delayed the ratification process, nevertheless Decrees 3228 and 4335 incorporate the dispositions of the Amendment, so that functionally the country is fulfilling all effective mandates in the Protocol of Montreal and its Amendments.

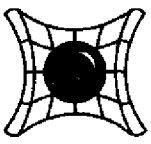
Annex I

Good Practices in Refrigeration Courses Estimation

Estimation and distribution of courses and technicians training

State	City	Institution	Training Center Name	Number of Courses	Technicians summoned	Attendance	Technicians certificated
Amazonas	1			3	60	**42**	**32**
	Puerto Ayacucho	INCE	CFI Puerto Ayacucho	3	60	42	32
Anzoategui	1			10	200	**140**	**105**
	Puerto La Cruz	INCE	CFI Pto. La Cruz	10	180	140	105
Apure	1			3	60	**42**	**32**
	San Fernando de Apure	INCE	CFI San Fernando	3	60	42	32
Aragua	3			12	200	**168**	**126**
	Maracay	INCE	CEMA	4	67	56	42
	Maracay	INCE	CFI Maracay	4	67	56	42
	Maracay	IUTI	IUTI Maracay	5	67	70	53
Barinas	1			3	60	**42**	**32**
	Barinas	INCE	CFI Barinas	3	60	42	32
Bolivar	2			20	360	**280**	**210**
	Ciudad Bolivar	INCE	CFI Ciudad Bolivar	5	90	70	53
	San Félix	La Salle	La Salle Bolivar	15	270	210	158
Carabobo	3			27	409	**378**	**284**
	Valencia	INCE	CFI La Isabelica	9	163	126	95
	Puerto Cabello	INCE	CFP Pto. Cabello	9	163	126	95
	Valencia	IUTI	IUTI Valencia	9	163	126	95
Distrito Capital	8			100	2000	**1400**	**1050**
	Caracas	UCV	UCV	13	234	182	137
	Caracas	IUTI	IUTI Caracas	13	234	182	137
	Caracas	ATEMA	ATEMA	12	216	168	126
	Caracas	UNIMET	UNIMET	13	234	182	137
	Caracas	UNEXPO	UNEXPO	13	234	182	137
	Caracas	INCE	CFI Los Cortijos	10	180	140	105
	Caracas	USB	USB	13	234	182	137
	Caracas		To be determinate	13	234	182	137
Falcón	2			10	180	**140**	**105**
	Coro	INCE	UNIDAD Móvil Coro	5	90	70	53
	Punto Fijo	Leonardo Chirinos	Leonardo Chirinos	5	90	70	53
Lara	1			10	200	**140**	**105**
	Barquisimeto	INCE	CFI Barquisimeto	10	180	140	105

State	City	Institution	Training Center Name	Number of Courses	Technicians summoned	Attendance	Technicians certificated
Mérida	1			10	200	140	105
	El Vigía	INCE	CFI El Vigía	10	180	140	105
Miranda	1			7	225	98	74
	Cúa	Fe y Alegría	Fe y Alegría Cúa	8	126	98	74
Monagas	1			4	72	56	42
	Maturín	INCE	CFI Maturín	4	72	56	42
Nueva Esparta	2			20	360	280	210
	Porlamar	INCE	CFP Porlamar	10	180	140	105
	Pta. De Piedra	La Salle	La Salle Margarita	10	180	140	105
Portuguesa	2			6	300	84	63
	Guanare	INCE	CFP Guanare	3	54	42	32
	Araure	INCE	INCE Araure	3	54	42	32
Sucre	2			8	200	112	84
	Cumaná	INCE	CFI Cumaná	4	72	56	42
	Cumaná	Fe y Alegría	Madre Alberta	4	72	56	42
Táchira	2			10	180	140	105
	San Cristóbal	IUTI	IUTI San Cristóbal	5	90	70	52
	San Cristóbal	INCE	CFI S. Cristobal	5	90	70	52
Trujillo	1			6	300	84	63
	Valera	INCE	CFI Valera	6	108	84	63
Yaracuy	1			3	60	42	32
	San Felipe	INCE	CFI San Felipe	3	60	42	32
Zulia	5			28	300	392	294
	Maracaibo	INCE	CFI Maracaibo	7	126	98	74
	Cabimas	INCE	CFI Cabimas	7	126	98	74
	Maracaibo	Fe y Alegría	Fé y Alegría Cristo Rey	3	54	42	32
	Maracaibo	Fe y Alegría	Fé y Alegría La Chinita	4	72	56	42
	Maracaibo	IUTI	IUTI Maracaibo	7	126	98	74
TOTALS	41			300	3000	4200	3150



Fondo de
Reconversión Industrial
FONDOIN

Av. Libertador, Centro Comercial Los Cedros, piso 5, La Florida Sur, apartado postal 1050.
Caracas – Venezuela.
Telfs. (58-212) 7313932 – 7312992 / Fax: 7310015 / mail: fondoin@cantv.net
July-2006