

FEDERAL OFFICE FOR THE ENVIRONMENT (FOEN)

NATIONAL CFC CONSUMPTION PHASE-OUT PLAN FOR INDIA FOCUSSING ON THE REFRIGE- RATION SERVICE SECTOR (NCCOPP)

FINAL REPORT ON TRAINING ACTIVITIES

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1. INTRODUCTION

The “Agreement between India and the Executive Committee of the Montreal Protocol for the National phase-out of CFC consumption in India focusing on the Refrigeration Servicing Sector” has been approved by the 42nd ExCom meeting of the Multilateral Fund in April 2004. This agreement targets the complete phase-out of CFC consumption in India by 1 January 2010 in compliance with Montreal Protocol schedules.

Based on this agreement, the National CFC Consumption Phase-Out Plan for the refrigeration service sector (NCCoPP) was launched with an overall funding of 6.3 million US\$.

NCCoPP encompassed the following components:

- › training of technicians of the refrigeration and air-conditioning sector,
- › equipment support,
- › measures in the foam sector, the refrigeration sector (production) and the transport refrigeration sector,
- › awareness component, customs and policy training.

The Government of India had the overall responsibility for the implementation of the programme. The Government of Germany was designated as the lead implementing agency under NCCoPP. UNDP, UNEP UNIDO and the Government of Switzerland were designated as cooperating implementing agencies (IA’s), under the lead of the Government of Germany. Each of these agencies was in charge of implementing one of the above mentioned programme components. Switzerland was the responsible implementing agency for training under NCCOPP.

The programme started in 2004 and implementation activities ended in 2009. Initially NCCoPP implementation activities were planned to continue until March 2010. However, due to non-compliance of India with the CFC consumption targets as per the MLF agreement and NCCoPP being the terminal phase-out project of India which will face eventual penalties, the ExCom decided in 2008 to reduce the allocated Multilateral Fund budget for the project¹. The decision resulted in a budget cut for the implementing agency Switzerland of 29% (for details see section 6). As a consequence the training activity level had to be reduced as compared to the initial planning and implementation activities related to training ended in 2009.

The present document reports on training activities implemented under NCCoPP, which were under the responsibility of the Swiss Government. The document summarises the goals of

1 Decision by ExCom54: UNEP/OzL.Pro/ExCom/54/59 (Decision 54/35)

these activities, the project organisation, the training approach, the outputs and the financials. A summary of the overall NCCoPP activities is found in the official report to the MLF (GTZ 2008).

2. PROJECT GOALS

Following the main components of the training activities under NCCoPP and the training targets are summarised. The training activities were designed to cater to the individual needs of different segments of the RAC service sector.

Standard Refrigeration Service Enterprises Training (RSE)

The standard RSE training was dedicated to technicians of the Refrigeration and Air Conditioning sector which typically handle servicing of domestic and commercial refrigerator but also other installations such as cold rooms, etc. This type of training program was designed as an effective, practical oriented 2-day session (see Annex 2 for details on the training program structure). The training covered:



- › Awareness on environmental impacts of CFC and substitute refrigerants (HFC, HC)
- › Good practices in handling of CFC refrigerants
- › How to handle new, CFC free technology such as Hydrocarbon (HC) and HFC refrigerants
- › Proper servicing and retrofitting of refrigeration appliances using alternative HFC and HC refrigerants.
- › How to recover and re-use CFC and HFC refrigerants.

The agreed target (not taking into account the budget cut decided by the MLF in 2008) for this programme type over the project period 2004-2009 was to train 9'270 technicians all over India. RSE standard training was planned as the “backbone” of the training activities, which was complemented with more specialised training programs as under.

Training on Mobile Air Conditioning (MAC)

A large population of vehicles in India, approximately 2 million, were depending on CFC-12 at the time of project start and still a large number of such units are in operation by end of 2009. If no retrofit option is available, this sector will still require a significant amount of CFC-12 for servicing beyond 2010. Specialised training programs for technicians involved in servicing of MAC introduced good servicing practices, including recovery and reuse of reclaimed refrigerant



during maintenance of MAC units, as well as retrofitting of CFC-12-based systems to either HFC-134a or Hydrocarbon blend HC-290/HC-600a (see Annex 2 for details on the training program structure).

The agreed target (not taking into account the budget cut decided by the MLF in 2008) for this programme component over the period 2004-2009 was to train 1'228 technicians all over India.

Trainings on Retrofit of Open Type Compressor based systems (OTC)

There are a number of institutional users in India such as Railways or other wide spread industry such as ice-cream industries which use open type compressors. The refrigeration systems used in these applications are often based on CFC-12. Many of these installations which use open type compressors (OTC) can be retrofitted with small technical and financial effort. To establish a basis for such retrofit activities, special training programs on OTC retrofit were developed which covered good service practices and HCFC-22 based retrofitting of CFC-12 refrigeration systems. Each of the programs involved under this project component also included a practical retrofit of an installation as part of the training activities.

The agreed target (not taking into account the budget cut decided by the MLF in 2008) for this programme component was to train 240 technicians all over India in the period 2004-2009.



Domestic/Commercial Appliance Retrofit Demonstration

A fourth training component was targeting demonstration of retrofit of small CHC-12 based commercial and domestic refrigeration appliances using HC blend refrigerant (HC290/HC600a) as a drop-in refrigerant. These activities were implemented through the NCCoPP industry partner Godrej & Boyce. It also included development of retrofit kits which comprised of all electrical components required for the safe conversion of the appliances as well as the HC refrigerant.

Other activities

Various other activities were implemented around the above listed four core training components, such as Trainings of Trainers (ToT) programs which, which were planned for each of the above listed core training components and also aimed at increasing the number of competent trainers and thereby enhancing the diffusion of knowledge.

3. PROJECT ORGANISATION

Role of INFRAS

The Government of Switzerland through the Federal Office for the Environment (FOEN) had mandated INFRAS Consulting Group for Policy Analysis (INFRAS) with the implementation of the training component of NCCoPP. With regard to the service sector phase-out activities, INFRAS had the overall responsibility for identification and establishment of new training cells, development of training programmes and training materials for all the above listed types of training programs, and for carrying out training activities in all the States throughout the implementation of the NCCoPP.

National Service Provider (Regional Management Organisations)

For concrete, local implementation of the training activities, INFRAS collaborated in a first phase until March 2006 with IT Power, Pondicherry and Quest Consulting and Training, Secunderabad, India as Regional Management Organisations (RMO). With effect from March 2006 the local management setup in India was restructured and Quest Consulting and Training was acting as the sole Regional Management Organisation on a national level.



The RMOs were responsible for the management of the local training partners, the dispatching and maintenance of training material and equipment, the quality control and financial management of the training partners and the reporting to INFRAS.

Training Cells and Industry partners

Operational training activities were carried out by local Training Cells and by industry partners. In total, 15 Training Cells all over India were mandated with training activities (see Figure 1). The training cells were in charge of recruiting the service technicians for the training programs, organising training facilities and carrying out trainings based on material provided by INFRAS and Quest.

A significant share of the training activities was carried out directly by industry partners for their own technicians. Godrej & Boyce Mfg. Co. Ltd., Whirlpool of India and Kirloskar Copeland implemented training activities under NCCoPP. Industry training programmes followed exactly the same standards and used identical training materials as the programs implemented by the NCCoPP training cells.

Technical and Training Experts

Throughout the project duration, INFRAS collaborated with a number of experts in the technical and training field, e.g. for development of training curriculum and training materials. This included the Indian Institute of Technology Delhi, represented by Prof. R. S. Agarwal (faculty member in the Department of Mechanical Engineering), Dr. R.S. Iyer, Dr. Surinder Batra, CIMI, Dr. Sukumar Devotta and others.

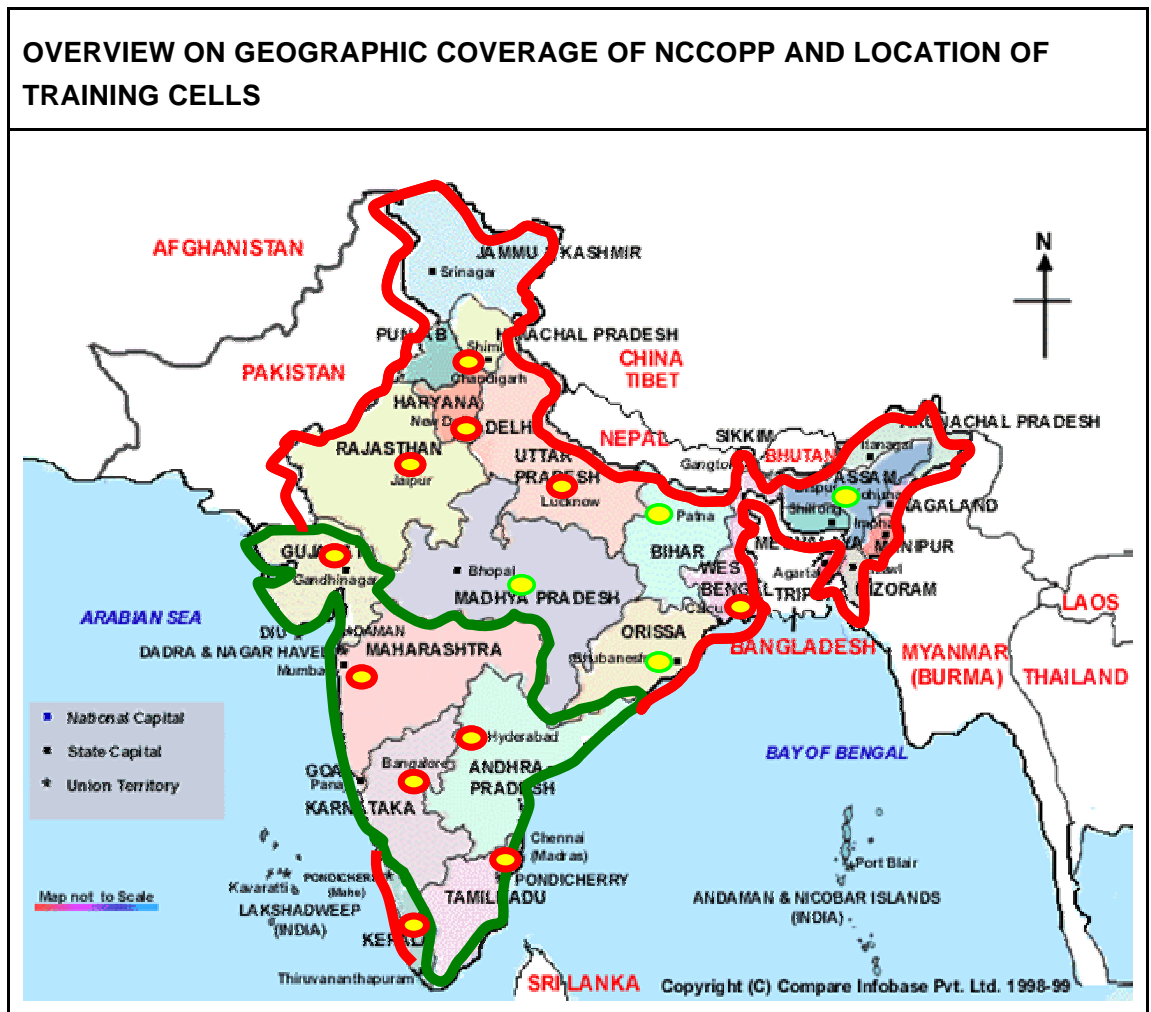


Figure 1 Red line: NCCoPP coverage. Green line: HIDECOR coverage (forerunner programme of NCCoPP). Circles: Location of NCCoPP training cells.

Implementation and Technical Advisory Committee (ITAC)

An Implementation and Technical Advisory Committee (ITAC) for training under NCCoPP was established, which formed the main steering and advisory body for planning and implementation of the training activities. Members of the ITAC were the Government of India, INFRAS as the implementing agency for training, GTZ as the lead agency, the industry partners and technical and training experts. In the period 2004 – 2009 the ITAC conducted eight meetings.

4. TRAINING APPROACH

To fulfil equity criteria in providing training to the sector, one main objective of NCCoPP was to conduct training programs in all areas of the country with relevant population of RAC service technicians. To achieve geographical equity training programmes were organised both in the major towns and in remote areas. In order to illustrate these efforts, Figure 2 shows the share of in-city and outreach trainings during operational year 08/09. Over the whole implementation period of NCCoPP, all major States of India were covered (for details see GTZ 2010). About 60% of the programmes took place outside the major cities.

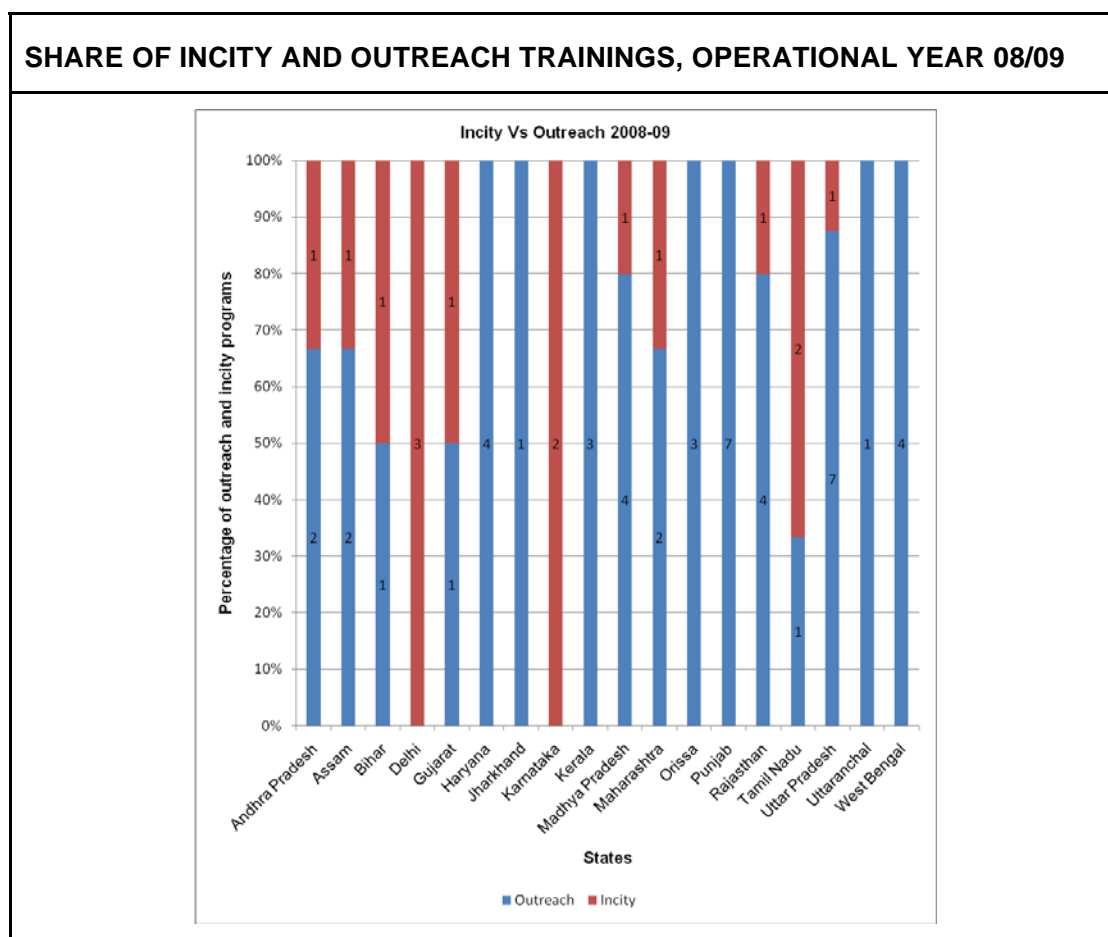


Figure 2 Share of in-city and outreach training illustrated for the operational year 2008/2009

The planning process also included annual analysis of the actual coverage reached as compared to state wise overall population of RAC technicians. On this basis, annual state wise training output targets were decided by the Implementation and Technical Advisory Committee (ITAC).

5. OUTPUTS

Following a summary of the main achievements of NCCoPP is given. A table with detailed data on targets and outputs can be found in Annex 1.

Standard RSE Trainings

In the period 2004 - 2009, almost 364 No's of standard training programmes were carried out under NCCoPP. In total, 9'086 technicians attended the trainings, which correspond to an average of 26 participants per training program. Thus the activities in this training category almost reached the original target (before budget cut) of 9'270 trained technicians, despite the reduction of 26% in funding for the training activities. This corresponds to 98% achievement of the original target. This is seen as an excellent output achievement. Figure 3 shows the geographic allocation of the trained technicians.

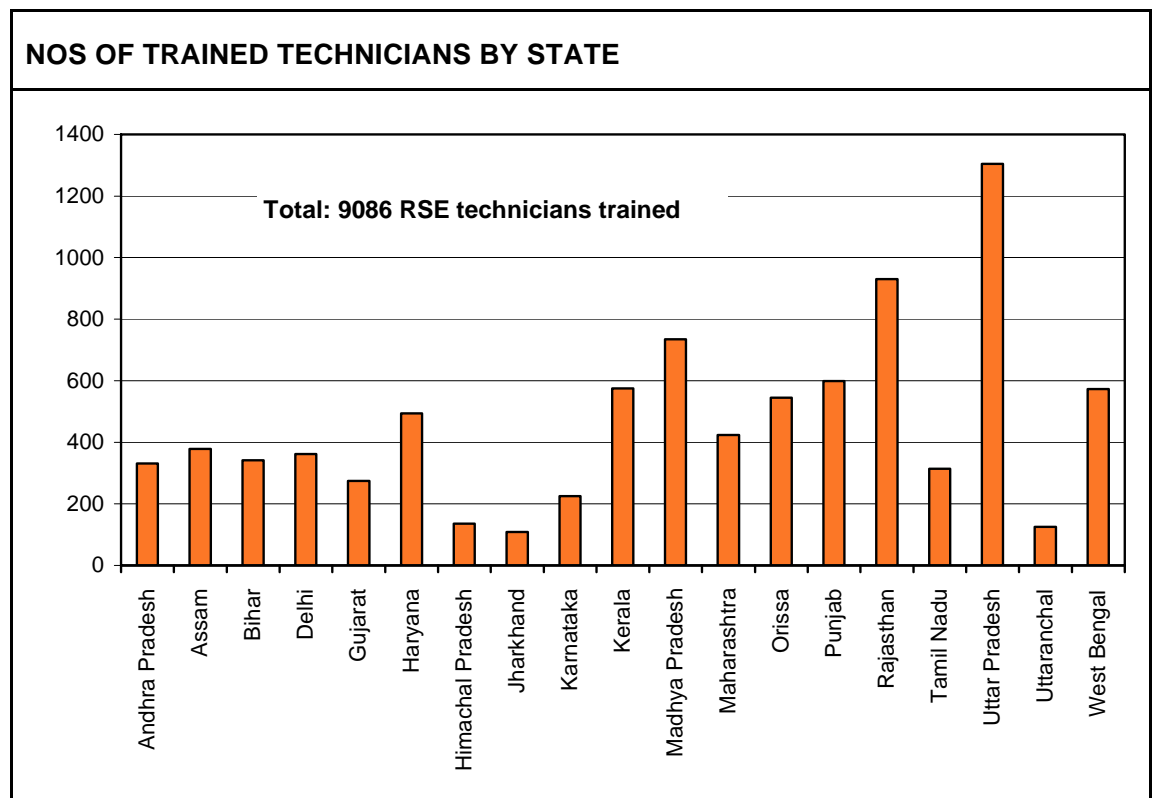


Figure 3

MAC Trainings

MAC training activities were conducted in 14 states of India. Over the period 2004-2009, 33 MAC training programs were carried out under NCCoPP, with a total of 741 participants (average of 22 participants per training). The output target (656 technicians) could not be fully achieved due to the budget cut faced. This resulted in a prioritization of the output planning towards the standard RSE training. Nevertheless it was possible to achieve 89% of the original output targets under this category.

OTC Trainings

Under NCCoPP 12 OTC training programs with a total of 230 participants were implemented (average of 19 participants per training). The initially set output target (240 technicians) could not be fully achieved due to the reduced budget and the prioritization of the output planning towards the standard RSE training. With the reduced budget it was still possible to achieve 96% of the original output targets under this category.



Other activities

Beside the three main programme components as mentioned above (RSE, MAC and OTC training), various other training activities were implemented under NCCoPP. A summary of these activities is given in Table 1.

OTHER TRAINING ACTIVITIES UNDER NCCOPP		
Training activities	Nos of trainings	Nos of participants
Training of Trainers programs	5	48
MAC Training of Trainers programs	3	46
ITI Instructor training	3	66
Technical Meeting for staff from Indian Railways	2	30

Table 1

Further, in order to recognize and encourage the trainers for their contributions to impart training and to motivate them to enhance their training skills and quality, an “Excellence award for

trainer of the year” was introduced in calendar years 2007-2008 and 2008-2009. The training cells and the industry partners had the opportunity to nominate trainers with outstanding training skills. In both the years, five grants of a value of up to 10’000.- INR were awarded.

6. FINANCIAL SUMMARY

The Multilateral Fund to the Montreal Protocol approved a total budget of USD 6’338’120 for the overall activities under the NCCoPP project. The budget earmarked to Switzerland for implementing training activities under NCCoPP was USD 1’119’751. This is the budget figure as per the initial agreement between the Government of India and the implementing agencies. However, as per ExCom decision due to failing compliance with targets², a budget cut for the training component was imposed by the MFL Secretariat in 2008. By this decision the total budget for training in the period 2004 – 2010 was reduced to USD 796’572, which corresponds to a budget cut of 29% compared to the initial figure. The budget cut exclusively affected the training component as this was the final and single remaining activity under NCCoPP which therefore had to absorb the full penalty invoked by the MLF on India.

2 Decision by ExCom54: UNEP/OzL.Pro/ExCom/54/59 (Decision 54/35). Non-compliance of India was due to inadequate consideration of CFC imports and CFC use for Metered Dose Inhalers (MDI) in the reporting by Gol.

7. LESSONS LEARNT AND RELEVANCE OF NCCOPP TRAINING SETUP FOR HCFC PHASE-OUT IN INDIA

The NCCoPP project demonstrated successfully that training activities in the refrigeration service sector in India can be organised effectively and efficiently. Some key features which also will be highly relevant for addressing the challenge in phasing out HCFCs as targeted under the Montreal Protocol by the Government of India inter alia include the following:

- › Through NCCoPP a training network was established which was able to reach out to the informal segments of the RAC service trade. This is an asset which can be used by the Government of India under future activities towards the RAC service sector.
- › The NCCoPP training network was capable to cover the Indian Territory with a high level of geographic equity.
- › The training network successfully partnered with the refrigeration appliance industries. This provided a significant leverage for Government activities under a private public partnership (PPP). The result of the PPP was a significant increase in outreach to the sector (w.r.t. geographical as well as numerical coverage).
- › The foundation of the training network was formed by the 15 NCCoPP training cells and industry training networks with highly motivated managerial staff and more than 60 trainers trained by NCCoPP. This was the nucleus for successful geographical outreach and a cost effective implementation structure. With this training organisation it was possible to reach very close to the original output target despite a cut in total budget of 29%.
- › Working through regional management organisations (RMOs) was a major success factor for the project. The RMOs were highly effective in managing the training cells, monitoring training activities and providing logistical and planning support. The fact that Quest Consulting and Training was highly motivated and also had a past working record in the RAC service sector was most helpful in building up a highly effective training network and implementing the activities with high cost effectiveness and quality.
- › INFRAS as the implementing agency representing Switzerland under NCCoPP could build on past project experience in the sector in India and the bilateral Indo-Swiss predecessor project HIDECOR. Together with a high readiness of FOEN to provide flexibility to INFRAS in organising the activities as per the actual project needs these were crucial elements for effectively managing the training activities.

- › The high quality standards of training inputs provided under the NCCoPP programs was very well received by the sector. This made recruiting for the programs successful despite the participant fee of INR 200 per participant. The limit of an average of 25 technicians per programme (maximum 32 participants) made it possible to get a significant amount of practical hands-on training in all the programmes which was most effective to train the technicians from the informal sector target group.
- › Adaptation of the oral presentations during the training sessions and the translation of training materials into several local languages was a prerequisite to reach out effectively to the informal sector target group.
- › The high quality training material which was developed for the trainings was repeatedly used as reference material for other international activities on CFC phase out. The training material also was made available through the NCCoPP website (www.nccopp.info).
- › With respect to the organisational structure the Implementation and Technical Advisory Committee (ITAC) with representatives of the Government of India, INFRAS as the implementing agency for training, GTZ as the lead agency, the industry partners and technical and training experts proved to be very effective for planning and designing the training activities and developing training materials.

ANNEX

ANNEX 1: TRAINING TARGETS AND OUTPUTS

More details on the achieved outputs are given in the MIS report by GTZ (GTZ 2010).

OUTPUT ACHIEVEMENTS NCCOPP, PER YEAR						
Activity	YPO 2004	YPO 2005	YPO 2006	YPO 2007	YPO 2008*	YPO 2009*
RSE Standard GP Training						
Agreed Target MLF	1'500	1'270	1'440	1'810	1'850	1'400
Achieved	1'614	1'685	1'809	1'881	1'716	381
<i>Balance</i> (- = below target)	114	415	369	71	-134	-1'019
MAC Training						
Agreed Target MLF	44	80	180	352	374	198
Achieved	29	199	238	275	0	0
<i>Balance</i> (- = below target)	-15	119	58	-77	-374	-198
OTC Training						
Agreed Target MLF	32	16	16	64	64	48
Achieved	0	64	53	113	0	0
<i>Balance</i> (- = below target)	-32	48	37	49	-64	-48

* Targets as per original plan, not taking into account the budget cut as decided by the MLF

Table 2 Targeted and achieved training outputs per program type as per the yearly plans of operation (YPO). YPO planning reflects the period of 1.April. to 31 March of the respective year (e.g. YPO 2004 = 1.4.04 to 31.3.05).

OUTPUT ACHIEVEMENTS NCCOPP, CUMULATIVE						
Activity	YPO 2004	YPO 2005	YPO 2006	YPO 2007	YPO 2008*	YPO 2009*
RSE Standard GP Training						
Agreed Target MLF	1'500	2'770	4'210	6'020	7'870	9'270
Achieved	1'614	3'299	5'108	6'989	8'705	9'086
<i>Balance (- = below target)</i>	114	529	898	969	835	-184
MAC Training						
Agreed Target MLF	44	124	304	656	1'030	1'228
Achieved	29	228	466	741	741	741
<i>Balance (- = below target)</i>	-15	104	162	85	-289	-487
OTC Training						
Agreed Target MLF	32	48	64	128	192	240
Achieved	0	64	117	230	230	230
<i>Balance (- = below target)</i>	-32	16	53	102	38	-10

* Targets as per original plan, not taking into account the budget cut as decided by the MLF

Table 3 Cumulative figures for Targeted and achieved training outputs per program type as per the yearly plans of operation (YPO). YPO planning reflects the period of 1.April. to 31 March of the respective year (e.g. YPO 2004 = 1.4.04 to 31.3.05).

ANNEX 2: TRAINING PROGRAMME SCHEDULES

A) RSE STANDARD TRAINING (2 DAYS)

WORKSHOP ON SERVICING & RETROFITTING OF REFRIGERATION APPLIANCES USING ALTERNATIVE REFRIGERANTS

PROGRAMME SCHEDULE

DAY 1		
Time	Topic	Duration (minutes)
09:00 - 09:30	Registration and Inauguration	
09:30 -12:30	First Technical Session: Environmental Impact & ODS Phase-out in India Alternatives to CFC and their Characteristics Handling of HFC-134a Refrigerants Servicing of HFC Appliances Retrofitting of CFC Appliances with HFC-134a Questions and Answers	30 45 15 30 15 30
12:30 - 13:00	Video on Ozone Depletion	30
13:00 - 14:00	Lunch Break	
14:00 - 16:00 & 16:15 - 18:15	Practical Session – 2 Rounds Servicing of HFC Appliances Tools and Equipment for Servicing Recovery of Refrigerants	120 45 75
DAY 2		
09:00 - 13:00	Second Technical Session: CTC & Its alternatives Selection & Safe Usage of Solvents Service Practices Do's and Don'ts Handling of HC Refrigerants Servicing of HC Based Appliances Retrofitting of CFC Appliances with HCs Questions and Answers	30 30 45 20 30 45 30
13:00 - 14:00	Lunch Break	
14:00 - 15:30 & 15:45 - 17:30	Practical Session – 2 Rounds Servicing of HC Appliances Retrofitting of CFC Appliances with HCs Cleaning of refrigeration system with CTC alternatives Feedback by Participants	90 30 45 30
17:30 - 18:00	Wrap up session and distribution of Certificates.	30

B) MOBILE A/C TRAINING (1 DAY)

**WORKSHOP ON GOOD SERVICING PRACTICES AND RETROFITTING
OF MOBILE AIR – CONDITIONING SYSTEM USING HFC AND
HC REFRIGERANTS**

ONE DAY TRAINING PROGRAMME SCHEDULE

Time	Programme
09:30 – 10:00	Registration and Introduction
10:00 – 10:20	Environmental Impact of Refrigerants
10:20 – 10:40	Alternative Refrigerants for Mobile Air-Conditioning
10:40 – 11:10	Good Servicing Practices for MAC
11:10 – 11:25	Questions and Answers
11:25 – 11:40	Tea / Coffee
11:40 – 12:20	Retrofitting of MAC using HFC-134a
12:20 – 12:50	Retrofitting of MAC using HC Blend
12:50 – 13:00	Questions and Answers
13:00 – 14:00	Lunch
14:00 – 14:30	Introduction to practical and group formation
14:30 – 15:30	Practical Session – Group 1 <ul style="list-style-type: none"> • Servicing of HFC based MAC Unit • Retrofitting of MAC using HFC-134a • Retrofitting of MAC using HC Blend
15:30 – 15:45	Tea / Coffee
15:45 -16:45	Practical Session – Group 2 <ul style="list-style-type: none"> • Servicing of HFC based MAC Unit • Retrofitting of MAC using HFC-134a • Retrofitting of MAC using HC Blend
16:45 – 17:45	Practical Session - Group 3 <ul style="list-style-type: none"> • Servicing of HFC based MAC Unit • Retrofitting of MAC using HFC-134a • Retrofitting of MAC using HC Blend
17:45 – 18:00	Valedictory

* While one group is in Practical Session (from 14:30 to 17:45), the other two groups would be shown the Video on “Every Action Counts – Saving Ozone Layer” and “The world in our hands”. Also trainer would give the Trainee Information Sheet as well as Feed Back forms to be filled in from MAC training participants.

C) TRAINING OR TRAINERS PROGRAMME SCHEDULE (5 DAYS)**TRAINING OF TRAINERS PROGRAM under NCCoPP**

Time	Topic	Duration (minutes)
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DAY ONE

09:00 – 9:30	Registration And Inauguration	30
9:30 – 13:00	<ul style="list-style-type: none"> - Welcome, Course Overview, Introduction & Background - Introduction To NCCoPP - Environmental Impact Of Refrigerants - Video Film On Ozone Depletion - Indian Scenario For ODS Phase Out - International Scenario For ODS Phase Out 	210
13:00 – 14:00	Lunch	60
14:00 – 17:30	<ul style="list-style-type: none"> - Ozone Hole Experiment - Alternatives To CFC And Their Characteristics - Tools And Equipment For Servicing - Service Practices Do's And Don'ts - Q & A Session 	210

DAY TWO

09:00 – 13:00	<ul style="list-style-type: none"> - Standards For Domestic & Commercial Appliances - Recovery Of Refrigerants - Component Changes For Alternate Refrigerants - Refrigerant – Lubricant Combination 	240
13:00 – 14:00	Lunch	60
14:00 – 17:30	<ul style="list-style-type: none"> - Energy Efficiency In RAC Sector - Brazing - Q & A Session 	210

DAY THREE

9:00 – 13:00	<ul style="list-style-type: none"> - Conversion Of Pressure Measurement - Servicing Of HFC Appliances - Handling Of HFC134a Refrigerants - Retrofitting Of CFC Appliances With HFC134a 	240
13:00 – 14:00	Lunch	
14:00 – 17:30	<ul style="list-style-type: none"> - Hands-on Servicing Of HFC Appliances - Q & A Session 	210

DAY FOUR

09:00 – 13:00	<ul style="list-style-type: none"> - Handling Of HC Refrigerants - Servicing Of HC Based Appliances - Retrofitting Of CFC Appliances With HC - Hands-On Servicing Of HC Appliances 	240
13:00 – 14:00	Lunch	60
14:00 – 18:00	<ul style="list-style-type: none"> - Hands-On Servicing Of HC Appliances (Cond.) - Training Methodology - Q & A Session 	210

DAY FIVE

9:00 – 13:00	<ul style="list-style-type: none"> - Characterization of Trainees under NCCoPP Training - Presentation by Participants 	240
13:00 – 14:00	Lunch	60
14:00 – 16:00	<ul style="list-style-type: none"> - Presentation by Participants 	120
16:00 – 17:30	<ul style="list-style-type: none"> - Evaluation of Participants - Feedback by Participants - Valedictory Address / Distribution of Certificates. 	90

LITERATURE

Following a list of select reports is given which provide further information on all the different aspects of the NCCoPP project.

GTZ 2008: National CFC Consumption Phase Out Plan (NCCoPP) in India focussing on the Refrigeration Service Sector, IND/REF/42/INV/369 , PROGRESS REPORT ON THIRD PHASE IMPLEMENTATION APRIL 2007 - MARCH 2008, Prepared by GTZ-Proklima, INFRAS, UNDP and UNEP in accord with Ozone Cell, MoEF India

INFRAS 2004-2008: National CFC Consumption Phase-Out Plan for India Focussing on the Refrigeration Sector (NCCoPP). Annual reports for the attention of the Federal Office of Environment (FOEN). Various reports are available.

Quest 2006-2009: Financial reports on RMO activities for operational years. Quest Consulting and Training. Hyderabad.

GTZ 2010: NCCoPP Annual Report on Training Activities 2009-2010 Outputs generated from MIS – Training. Deutsche Gesellschaft für Technische Zusammenarbeit GTZ Proklima. January 2010.

For further information and download of training manuals see the project web page under www.nncoop.info.