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FINAL REPORT

Project No.: MP/CRO/06/001

Project Title: Monitoring of the Refrigerant Recovery and Recycling Scheme within the Framework of the Terminal CFC Phase-out Management Plan for Croatia

Contract No.: 16001374

Project Leader: Dean

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Zagreb, September 2009

SYNOPSIS

This paper presents the Final Report on performance of the obligations for "Monitoring of the Refrigerant Recovery and Recycling Scheme" as indicated in the Paragraph 1. of the Contract No. 16001374.

Basis for the provision of the contract services is Terms of Reference dated 01 March 2007 and the Contractor's Proposal dated and revised 04 October 2007.

Considering Contract No. 16001374 and Terms of Reference mentioned above, FMENA as the Contractor considers all services completed.

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1. INTRODUCTION

Final Report considers all relevant data for the execution of the Contract No. 16001374.

Activities that were involved in the project period are in accordance to the work plan and time schedule table and include:

- Update of the reporting system
 - Evaluation of the existing reporting system
 - Evaluation of the report forms
 - Update of the reporting system and report forms
- Setting up office facility including computer system and software development
- Collecting of CFC/HCFC/HCF data and analysis
- Establishment of a RRR centers in Zagreb and Rijeka
- Evaluation and update of training programme for technicians
- Revision of the licensing system
- Evaluation of the Code of Good Practice

2. EVALUATION AND UPDATE OF THE EXSISTING REPORTING SYSTEM

2.1. Custom

Monitoring scheme of ODS consumption (according to the Regulation on Substances Depleting Ozone Layer) is shown on Figure 1.

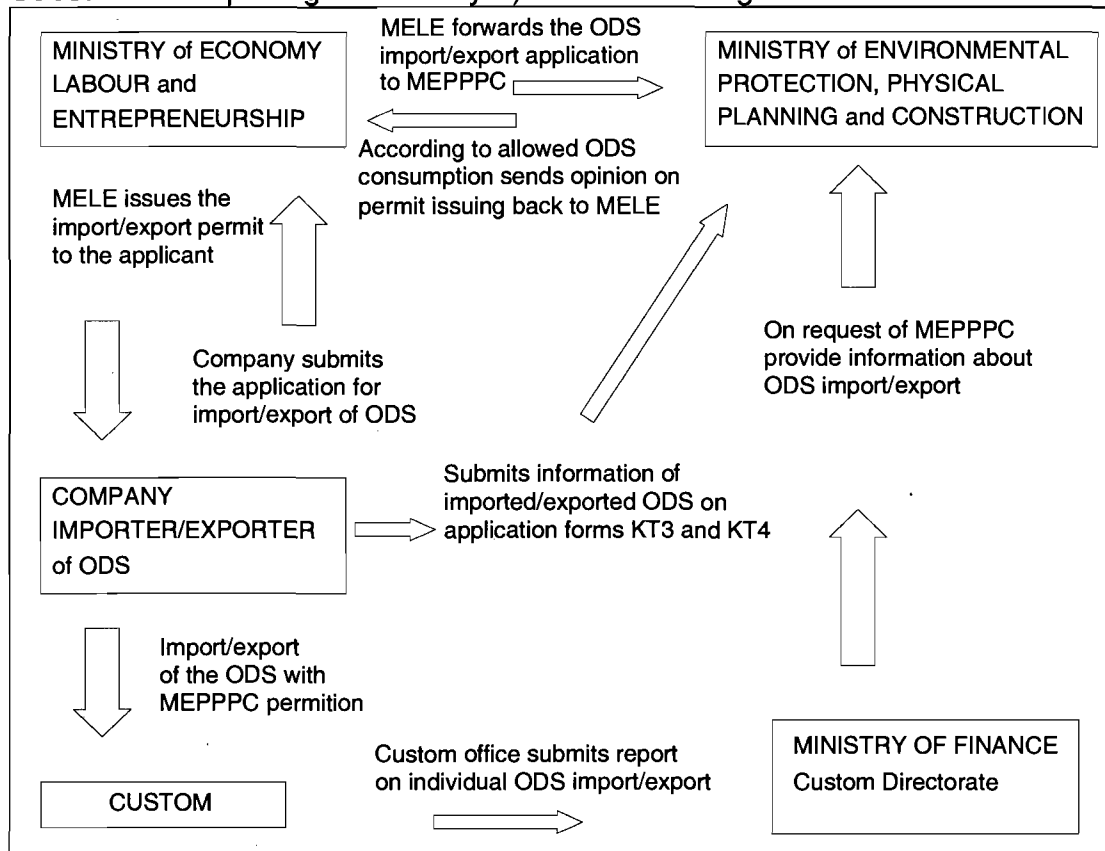


Figure 1 Monitoring scheme of ODS consumption

Croatia has no ODS production facilities, instead they are primarily being imported. Import procedure starts with submitting of application by company, previously accredited and registered by Ministry of Environmental Protection, Physical Planning and Construction (MEPPPC) for import/export activities, to Ministry of Economy, Labour and Entrepreneurship (MELE). Form in which the application for import/export of ODS is submitted is part of Regulation and is designated as KT1. The form consists of

- importer details,
- ODS details, i.e. ODS type, trade name, tariff code number and ODS state (new, recovered, recycled, reclaimed)
- desired amount and ODS chemical formula
- ODS origin and producer information
- domain of application and purpose

If ODS-using or containing equipment is being imported application form KT2 should be used. Beside information about ODS, form KT2 contains more details about equipment.

Upon acceptance of application for ODS or ODS using equipment import/export MELE forwards the application to MEPPPC. According to allowed annual ODS consumption level, predetermined by National Terminal Phase-out Management Plan and described in Regulation, MEPPPC sends opinion on permit issuing back to MELE. In case when the opinion is positive MELE issues the import/export permit to the applicant.

With permit applicant is allowed to import/export the desired amount and type of ODS. Since only several border crossings have qualified staff and necessary equipment to detect certain ODS type, transport of ODS is taking place there.

In addition, every year importers are obligated to submit detailed information (quantity, ODS type, state, application etc.) of imported/exported ODS and ODS using equipment to MEPPPC on application form designated as KT3 and KT4 respectively.

List of border crossings with adequate detection equipment and qualified custom officers is given in Attachment 1.

Each custom office submits report on individual ODS import/export to Custom Directorate.

At the beginning of the year Custom Directorate (which is department under Ministry of Finance) reports on imported/exported ODS to MEPPPC for entire Republic of Croatia.

If necessary on request of MEPPPC, Custom Directorate is obligated to provide information on specific ODS import/export activity.

Custom officers find reporting process of ODS import and export straightforward and clear. All information that are of interest to MEPPPC, MELE and Ministry of Finance are already contained in forms and there is no fields which could be considered obsolete.

Furthermore, annually reports on ODS import and export provided through forms KT1 to KT4 can be considered accurate.

Main problems which could effect operation of custom units are mainly of technical nature.

In order to find possible problems and loopholes in import/export procedure and reporting system several meetings with custom officers were held. Discussed issues could be summarized as follows:

Problems they have encountered during inspection of imported/exported substances and equipment containing it was:

- Before year 2007 there was no unique identification numbers for HFC substances and their mixtures. With implementation of unique tariff code numbers now it is possible to keep record of import/export for all HFCs and their mixtures.
- ODS detection equipment they have (acquired through previously conducted projects under TPMP program) is designed and limited to few CFC and HCFC substances and cannot be used to identify every single one that is being imported/exported. Furthermore it cannot be used to detect alternative refrigerants (HFC substances) and their blends which heavily hinder their operativeness.

- Even though certain number of custom officers already went through process of education they are still not fully competent and confident when handling with detection equipment.

In collaboration with MEPPPC and Custom Directorate to improve ability to detect and to control flow of ODS and drop in (alternative refrigerants) substances in and out of Republic of Croatia following recommendations/conclusions are made:

- To acquire equipment which allows detection of all types of substances (CFCs, HCFCs and HFCs) for larger border crossings/custom offices (approximately 35 units).
- In collaboration with MEPPPC to provide advanced training course for custom officers with emphasis on legislation and technical issues.

In organization of MEPPPC during 2007 booklet entitled "Suzbijanje nezakonite trgovine tvarima koje oštećuju ozonski sloj" (translated "Illegal Trade Prevention of Ozone Depleting Substances") was translated and published. It was developed under MEPPPC project "Institucijsko osnaživanje u svrhu provedbe Montrealskog protokola u Republici Hrvatskoj" by Environmental Investigation Agency. It contains numerous examples of ODS illegal trade attempts which should help custom officers to recognize and prevent such cases. Feedback from the field was excellent. Many officers acknowledged this publication as a highly valuable help.

In December 2007 national expert Vladimir Soldo, PhD participated as an international consultant in implementation of four courses held under project The National ODS Phase-out Plan for Bosnia and Herzegovina – Custom Empowerment Program MP/BiH/04/123 in four BiH Custom Regional Centres Mostar, Sarajevo, Tuzla and Banja Luka. Since by that time refrigerant identifiers ordered by BiH National Ozone Unit haven't arrived yet, one unit (model RI-2002PA Neutronics) was borrowed with consent of Custom Directorate, border crossing Bregana, Croatia.

In addition, on request of Custom Directorate, Republic of Croatia head Zlatko Jurina, Vladimir Soldo held one day practical training course on detector handling at border crossing Bregana. The training was held on 26 of February 2008 in front of twenty custom officers. He demonstrated way to detect and identify the type of ODS R12 and R22 and HFC refrigerant R134a respectively. Each one of the participants had chance to test the equipment.

Curriculum of the training:

- most common refrigerants and their impact to the ozone layer,
- basics of the vapour compression refrigeration processes,
- colour, size and weight of the refrigerant containers,
- methods and prevention of illegal imports of ODS
- using the refrigerant identifier, testing the refrigerants R12, R22 and R134a in the cylinders, print-out for confirming of type and percentage of refrigerant.

Due to the fact that this training course was held only for one border crossing and that majority of questions were addressed to issues regarding legislation and current Regulation on Substances Depleting Ozone Layer it was recommended to initiate organization of larger workshop in collaboration with MEPPPC. This training course is planned to be organized for custom officers from larger border crossings (approximately 35) and with help of staff from National Ozone Unit, MEPPPC.

2.2 Importers/distributors

List of Companies accredited for ODS import/export and distribution is given in Attachment 2.

Basically, in Republic of Croatia there is one major and few smaller importers of ODSs and alternative refrigerants (HFCs). On the other hand there is much more importers and distributors which handle equipment that contains those substances. According to the key staff of National Ozone Unit and Directorate for Inspection, MEPPPC in the recent years there was no problem or incidents recorded connected to illegal activities of importers/distributors. Since there is no production of ODS or HFCs in Republic of Croatia there is no direct export to neighbouring or other countries. If certain amount of ODS or HFCs are being exported those quantities usually present annually surplus which cannot be sold on domestic market due to miss-estimation made by importer.

According to the Regulation on ODS importers/distributors are obligated to submit reports on imported or exported ODS and alternative refrigerants (HFCs) quarterly and annually. When asked about reporting system and reporting forms they had no major objections and are generally satisfied with the current status of the system and its implementation.

Forms are easy to understand and to fill and contain no superfluity information.

For the time being they submit reports in hard copy format. In the near future this is to be changed. To save the time and working hours for both importers and National Ozone Unit electronically submitting of reports in standardized form will be possible.

One issue where importers/distributors are in disagreement with workshops/service shops is whether the new ODS or HFCs should be distributed in re-usable cylinders. Obviously, reasons are pure economical and neither side wants to bear the costs. The current situation where importers/distributors are selling refrigerants in irreclaimable cylinders is easy way for them but heavy burden for service shops. In order to carry out the job properly beside the cylinders with new refrigerants technicians have to buy several re-usable cylinders as well (at least one recovery cylinder per refrigerant they work with) which is with the price of around 120 Euro per unit significant investment. Furthermore, when the cylinder is empty of refrigerant they have to deposit it to waste disposal yard and pay for it. For the time being importer/distributors are not active party of RRR scheme, instead they are making profit from the system but are not giving anything in return.

To impose the regulation where distributed cylinders are of re-usable type would in a first place lead to reduction of illegal waste disposals and in a long term would be economically beneficial for the system in whole.

According to the Regulation on ODS distributors are not allowed to sell ODS, alternative refrigerants or equipment containing it to the parties which are not certified by MEPPPC. It seems that this rule is generally obeyed and that the system is functioning in this field. To enable transparent and fast check of licensed service shops, traders and distributors National Ozone Unit have put the register on a official MEPPPC web page under address:

http://www.mzopu.hr/doc/Registar_osoba_12022008.pdf

2.3 Service workshops

According to the Regulation on ODS technicians and service workshops are obligated to record every single manipulation and handling with ODSs, alternative refrigerants and equipment containing it by filling the forms KT6 and KTZ1.

These records should be submitted to MEPPPC on annual basis. Monitoring over report submission is conducted by Directorate for Inspection, MEPPPC.

For the time being forms are submitted in hard format even though some of them would like to submit the reports in electronic form. Quality of information provided in forms vary from case to case. Some of them are eager to report correctly while other take less care and fill the forms scarce. It is questionable whether is it possible to fully believe to results acquired by reporting at this stage. It is believed that the reason for poor reporting is partly incompetence of technicians, lack of time and motivation and partly because the forms are to complicated to be filled.

The form KTZ1 is used in case when the equipment containing ODS or alternative refrigerant is found empty. To prevent law abuse technician as well as the owner of the equipment are obligated to signing the form.

The form KT6 consists of company and technician details that is handling ODS or alternative refrigerant, information about ODS/alternative refrigerant being treated and ten columns designed to be filled with specific information regarding treatment of equipment and/or refrigerant.

Current KT6 form is given by Attachment 3.

Explanation of each column when translated from Croatian to English and modified is given as follows:

- In the first column name of the equipment owner, type of the unit and capacity in kW is to be filled in,
- Second column contains initial refrigerant filing in kg,
- Third column presents annually loss of refrigerant in kg,
- Fourth column - amount of recovered refrigerant to be re-used in kg,
- Fifth column - amount of old refrigerant feed to the unit in kg,
- Sixth column - amount of reclaimed refrigerant feed to the unit in kg,
- Seventh column - amount of new refrigerant added to the system in kg,
- Eight column - amount of reclaimed refrigerant added to the system in kg,

- Ninth column - amount of waste refrigerant in kg,
- Tenth column - way of waste treatment (recycling, reclaiming, submitted to RRR center for disposal)

Unfortunately, the designations and terms used for description of the fields (columns) in the present KT6 form are not straightforward and clear (when written in Croatian language), i.e. they are not harmonized to the terms and expressions used through out the Regulation on ODS. Very often this leads to misinterpretation and misunderstanding of the certain query and finally to inaccurate entries. During each training course this problem was stressed out and thoroughly explained while the existing terms were replaced with correct ones.

Therefore, update of the KT6 form is proposed and can be found in Attachment 4. Changes made on KT6 form are as follows:

- Row *Naziv servisera* is changed to *Naziv tvrtke*,
- Second column – amount of refrigerant filing declared on product tag in kg,
- Third column - amount of recovered refrigerant in kg
- Fourth column - loss of refrigerant in kg,
- Fifth column - amount of recovered refrigerant filed in kg,
- Sixth column - amount of recycled refrigerant filed in kg,
- Seventh column - amount of reclaimed refrigerant filed in kg,
- Eighth column - amount of new refrigerant filed in kg,
- Ninth column - amount of refrigerant to be carried/disposed to RRR center in kg,
- Tenth column - Comment.

During the course of the project several contact have been established and visits organized to service workshops, small and large scale in order to find how they practice Code of good practice (COGP) on field and how they have accepted and adapted to Regulation on ODS. Basically, the larger the workshop is the more organized they are. Report data and all relevant information to recovery and recycling activities are filled accurately and with care. On the other hand in a smaller workshops where the maintenance of refrigeration equipment is not primary business (e.g. car repair service shop) handling the ODS equipment and reporting procedure is often not professionally approached. It is believed that the reason could be lack of knowledge and competence. Namely, to acquire the licence for handling ODS and other alternative refrigerants, service workshop should have at least one technician employed that have attended the training course and passed examination at National Training Centers. Unfortunately to maintain professional level when handling ODS and their related equipment and to behave in accordance to COGP this is not sufficient. In the same workshop there may be other technicians who have no experience and knowledge on the matter but still practice the repair and maintenance activities.

Some of the comments acquired from service sector are summarized below:

- When performing repair and maintenance activities on ODS and alternative refrigerants using equipment it is unwritten rule among service workshops to charge 100 kn (13 EUR) per 1 kg of recovered and disposed refrigerant.
- Usually they keep their own record on each refrigerant type. Information on quantities recovered, recycled and disposed are registered on custom made reporting forms and archived in computer data base.
- Since many of larger workshops keep their own record stored in computer database it would be more convenient for them to annually submit the reports to MEPPPC in electronically format. That would save time to prepare reports and finally would save working hours for NOU to process and analyze reported materials.
- They all agree that main obstacle for functional RRR scheme are non reusable cylinders in which new refrigerant is distributed.
- Furthermore, very high prices of recovery equipment hinder most of the small to medium size workshops to have more than one unit (the quantity which is obligatory according to the Regulation on ODS and one of the requirements to acquire accreditation) which in turn may lead to refrigerant venting during maintenance or decommissioning of ODS and alternative refrigerant based equipment.

2.4 National trainers and training centers

In Republic of Croatia four National training centers are operative, in Osijek, Rijeka, Split and Zagreb with thirteen certified national trainers in total.

List of certified National Trainers and institutions where the education is taking place is given in Attachment 5.

Education of technicians that handle the ODS and other alternative refrigerants, and provide repair and maintenance services, decommissioning and retrofitting of ODS based equipment is carried out according to the curriculum and program established through UNIDO projects "Refrigerant Management Plan", Project No. MP/CRO/99/097 and "Terminal Phase out Management Plan for CFCs – TPMP Croatia", Project No. MP/CRO/03/033. Over the years program was modified to meet the current standards and trends in industry.

Up to this moment approximately 2400 technicians attended the training course and passed the examination. They were all awarded by Certificate of Training issued by the institution where the course was taken.

Database of all attendees and their records for entire Republic of Croatia is made and is kept in Training Center Zagreb.

Reporting toward National Ozone Unit, MEPPPC on persons who successfully finished training is being prepared and submitted on a regular basis. In this way control is twofold, Certificate of Training as a document (which has to be attached to application when issuing licence at MEPPPC) and list of graduated specialists provided by Training Center Zagreb. Up to now this system of reporting showed no flaws.

The example of Certificate of Training is given in attachment 6.

2.5 End users

Obligations of the end users in RRR scheme and Monitoring system is to report any illegal activity or an authorized handling the ODS or ODS/alternative refrigerant using equipment to Directorate of Inspection, MEPPPC. By the end of the year 2007 end users had legal possibility to dispose equipment containing ODS (refrigerators, vending machines, ice makers etc.) to landfill without any fee except transportation which had to be organized by owner. Since for most of the households this presents a problem and with option to dispose all bulk waste in front of the house in certain days twice a year, old refrigerators would usually end on streets waiting for a waste truck to take it to the landfill. During that period most of the refrigerators, i.e. compressors would be dismantled with refrigerant being vented into the atmosphere. To prevent this according to Regulation on electronic waste (NN 74/07) it is possible to make a free call and a request for disposal of equipment which contains ODS. For small household appliances number is 0800 444 110, and for larger equipment 0800 0204. Call, transportation and disposal are free of charge. Since refrigerators, vending machines, ice makers and other ODS using equipment beside refrigerant contain also electrical parts which are according to mentioned Regulation considered as special waste, certified company will take responsibility and dispose it to the specialized landfill without any charge to owner. One of the obligation of the certified company is to recover the refrigerant and oil from the unit and to deliver it to local RRR center.

More information can be found on official MEPPPC web page: <http://www.mzopu.hr/>.

In addition, procurement of equipment which is able to extract refrigerants from insulation is in progress.

Furthermore great effort is put in public education and awareness through workshops, public forums, TV commercials and pamphlets.

3. SETING UP OFFICE FACILITY

3.1 Directory of technicians

Database of technicians and their records for entire Republic of Croatia, i.e. national training center Osijek, Rijeka, Split and Zagreb has been developed (Figure 2). Directory was developed in Microsoft Office Access environment and is being updated on a regular basis.

FAKULTET STROJARSTVA I BRODOGRADNJE
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Podaci o polazniku RMP seminara

Broj:	1285	Županija:	KOPRIVNIČKO-KRIŽEVAČKA	Uspjeh na ispitu:	0 %
RMP Centar:	ZAGREB	Adresa:	Krunoslava Heruca 60		
Ime i prezime:	Marko Novosel	Mjesto:	Križevci		
JMBG:	0910985330073	Poštanski broj:	48260		
Stručna sprema:	SSS	Telefon:	048/712-302;091/5831-069		
Funkcija:	serviser rashladne opreme	Telefax:	048/712-302		
Tvrtka:	ELEKTRO I FRIGO SERVIS	e-mail:	info@elektrofrigo.hr		

Izveštaj sa seminara

Poslana obavijest	<input checked="" type="checkbox"/>	Datum seminara:	11. svibanj 2007	Netocno:	6
Potvrđen dolazak	<input checked="" type="checkbox"/>	Certifikat broj:	66Z/1089	Uspjeh:	82,9 %
Odsustvo seminar	<input checked="" type="checkbox"/>	Datum izdavanja:	11. svibanj 2007	Komentar:	mjesto rod.Zagreb

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Figure 2 Example of technician database record

Each record consists of following queries:

- Attendee details
 - Technician identification number
 - RMP Center – place of training course attendance
 - Name and surname
 - Unique identification number
 - Technician vocation
- Company details
 - Company name
 - County
 - Address
 - Place
 - Postal code
 - Telephone
 - Fax
 - E-mail
- Report from training course
 - Information sent to attendee

- Attendance confirmed
- Completed a course (entire curriculum)
- Date of course
- Unique certificate number
- Certificate issue date
- Exam results
- Comments

3.2. Computer system for analysis of collected data

Up to now all collected information and data on ODS and alternative refrigerant consumption/treatment as well as directories of technicians, service workshops, importers, distributors, custom officers etc. were kept and analyzed under Microsoft Office Excel environment. This system was proved to be adequate in recent years when the number of certified service shops and reporting obligations were on a low level. From year 2006 amount of information and data that are being collected is immense and is still growing which now surpasses capabilities of simple Microsoft Office Excel based database. Therefore new database system was proposed and is currently in development. It is designed to provide fast and accurate access to information of any kind. Furthermore it enables easy input of data (now manually) which will be automative in future, information will be submitted in electronically form and directly uploaded in database. The system is to be setup at National Ozone Unit, MEPPPC.

4. ANALYSIS OF COLLECTED DATA

As indicated in paragraph 2 according to the Regulation, data and information on ODS and alternative refrigerant import, export, consumption, treatment and manipulation are to be submitted to MEPPPC by parties who are handling those substances on an annual basis, i.e. before 1 of February for the previous year.

Therefore, data and information that are presented and analysed in this report refers to year 2007.

List and quantities of manipulated ODS and alternative refrigerants is shown in Table 1.

Second column presents total amount of refrigerant that should be contained in refrigeration units on which some sort of handling was carried out by technicians in accredited service workshops and companies. This quantity is usually indicated on product tag and doesn't have to present real amount of refrigerant which the unit is actually filled with.

An exact amount of refrigerant filling in certain unit could be determined only if all refrigerant is first recovered and then weighted. Since there is no need for this operations to be carried out for all manipulation procedures, e.g. refrigerant addition, this quantity does not represent real amount of refrigerant contained in units rather it represents some sort of nominal refrigerant quantity which the units should be filled with. On the other hand it indicates current state and progress made so far in the phase out project.

As stated in Table 1 total nominal refrigerant quantity of ODS and alternative refrigerants for year 2007 is 125.825,49 kg. If it is plotted against refrigerant categories CFC (R11, R12, R500, R502), HCFC (R22) and HFC (R134a, R404a, R407c, R410a, R507) interesting observations can be made.

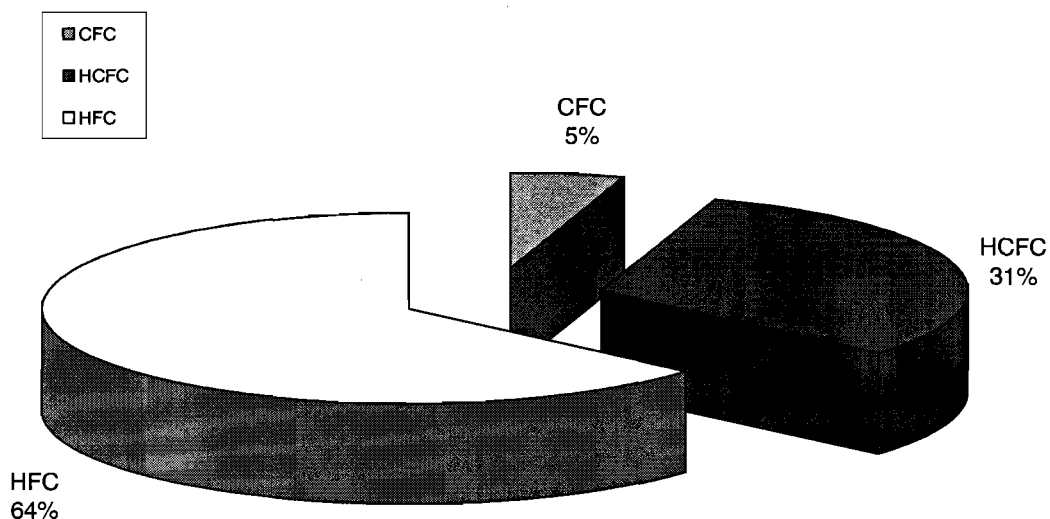


Figure 3 Portion of initial refrigerant filling versus refrigerant category

Table 1 List of ODS and alternative refrigerant quantities in Republic of Croatia for year 2007

Year 2007.								
Refrigerant type	Amount of refrigerant filling declared on production tag [kg]	Amount of recovered refrigerant [kg]	Refrigerant loss [kg]	Amount of recovered refrigerant filled [kg]	Amount of recycled refrigerant filled [kg]	Amount of reclaimed refrigerant filled [kg]	Amount of new refrigerant filled [kg]	Amount of refrigerant to be disposed to RRR center [kg]
R11	880	0	220	0	0	60	162,71	0
R12	5288,26	1468,02	3746,19	827,65	455,82	59,43	7090,41	293,81
R500	103,1	0	59,3	0	0	30	29,3	0
R502	149,47	74,75	134,2	10	41,8	0	695,27	18,5
R22	39299,92	4361,95	23655,54	2329,41	1904,98	652,06	38331,06	290
R134a	12476,12	3182,59	8405,02	1940,6	2165,75	161,58	18642,66	252,98
R404a	54301,34	1255,56	22276,85	696,87	636,64	36,11	44911,46	1052,22
R407C	9749,36	363,1	3254,55	393,24	193,43	32,55	8424,6	281,33
R410A	3559,06	177,13	992,22	86,6	128,79	0,35	4534,06	34,74
R507	18,86	42,23	7,86	0	20	0	643,85	0
TOTAL	125825,49	10925,33	62751,73	6284,37	5547,21	1032,08	123465,38	2223,58

Figure 3 shows share of certain refrigerant category contained in refrigerant using/containing equipment, while Figure 4 shows portion of initial refrigerant filing versus certain type of refrigerant.

As it can be seen from Figure 3 quantity of CFC using/containing equipment presents only 5 percent while the largest part of 64 percent corresponds to HFCs using/containing equipment. HCFC, i.e. R22 is participating with share of 31 percent. From this figures it is evident that technology transfer from substances with high ozone depleting potential i.e. CFCs and HCFCs to environmentally acceptable alternative refrigerants HFCs has taken big leap in phase-out process and is firmly progressing forward according to short and long term objectives.

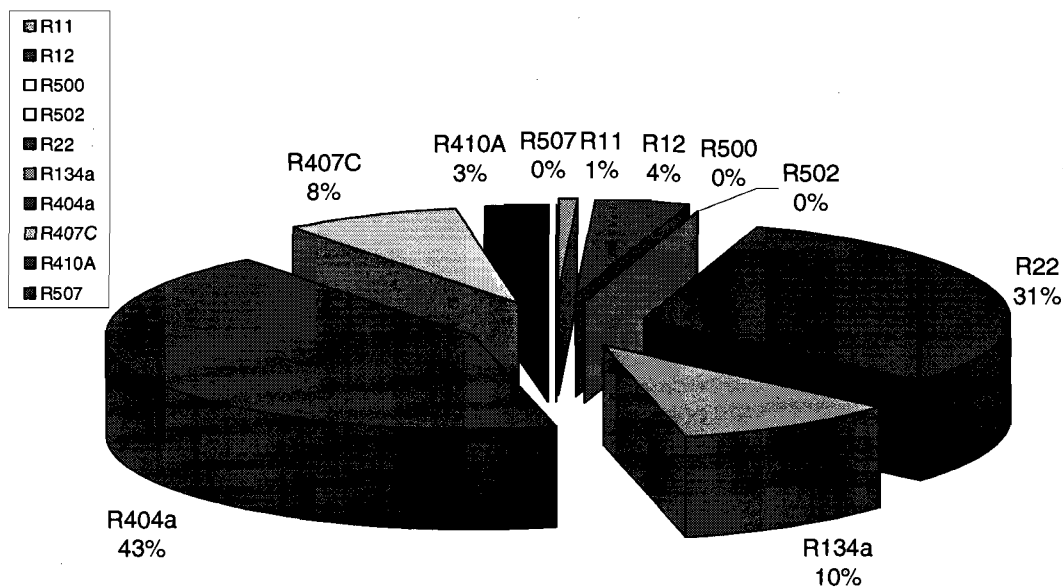


Figure 4 Portion of initial refrigerant filing versus type of refrigerant

Furthermore, if the Figure 4 is inspected closely one can conclude following. The HFC, R404a and HCFC, R22 take the largest parts in total sum of initial refrigerant filings with 43 and 31 percent respectively, then follows HFC, R134a with 10% and R407c with 8%. CFC refrigerant R12 takes part with 4% and HFC refrigerant R410a only with 3%.

Refrigerants R404a and R22 are mainly used for cooling and freezing applications in medium and large scale industry installations such as in systems for fast chilling and freezing of food, distribution and storage of chilled and frozen food, supermarkets, chemical industry etc.

Since R404A is environmentally acceptable alternative for R22 it may be concluded that new installations that are being built or are built in last few years are exclusively based on HFC technology. Existing installations already built on HCFC technology are only maintained and serviced with R22. Approximately 40% more installations are operating with HFC refrigerant R404a then with R22. This ratio of R404a to R22 is expected to be higher in the following years.

Furthermore, these results reveal that more attention in terms of maintenance and servicing is given to medium and larger scale refrigeration systems, i.e. those operating with R404a and R22. Since they operate in heavier conditions (low evaporation temperatures) they are more demanding and require maintenance and service activities more frequently than refrigeration systems for air-conditioning applications.

Second group of refrigerants R134a, R407c, R12 and R410a are basically used for air-conditioning purposes mainly in small scale refrigeration systems, e.g. household refrigerators, split air conditioning units and car air conditioning units. Immediately one can observe that systems with CFC refrigerant R12 are scarce and almost fully phased out. Replacement refrigerants R134a, R407C and in recent years R410A have taken primacy.

In a last few years immense number of these systems has been installed. Despite huge number of individual installations according to figures from Table 1 and Figure 4 it seems that systems with these refrigerants are not serviced so frequently. The reasons could be twofold:

1. either these systems are well made and they require no special care and maintenance or
2. the reporting system is not working properly and reported data and information's are not reliable.

First assumption is true for household refrigerators and partially true for split air conditioners which are made to operate without malfunction for number of years, but it is certainly not true for car air conditioners which are more liable to damages caused by vibrations and unpredicted venting due to car crashes. Second assumption could be true but mainly for small service workshops and car garages since larger companies are more organized and more often controlled by Directorate of Inspection.

Third column in Table 1 shows amount of recovered refrigerant. In year 2007, 10.925,33 kg of refrigerant was recovered in total. This presents only 9 percent of initial refrigerant filling.

Figure 5 shows share of recovered refrigerant versus refrigerant categories. As expected the refrigerant with highest percentage of recovery is HFC with 46%, then follows HCFC with 40% and then CFC with 14%.

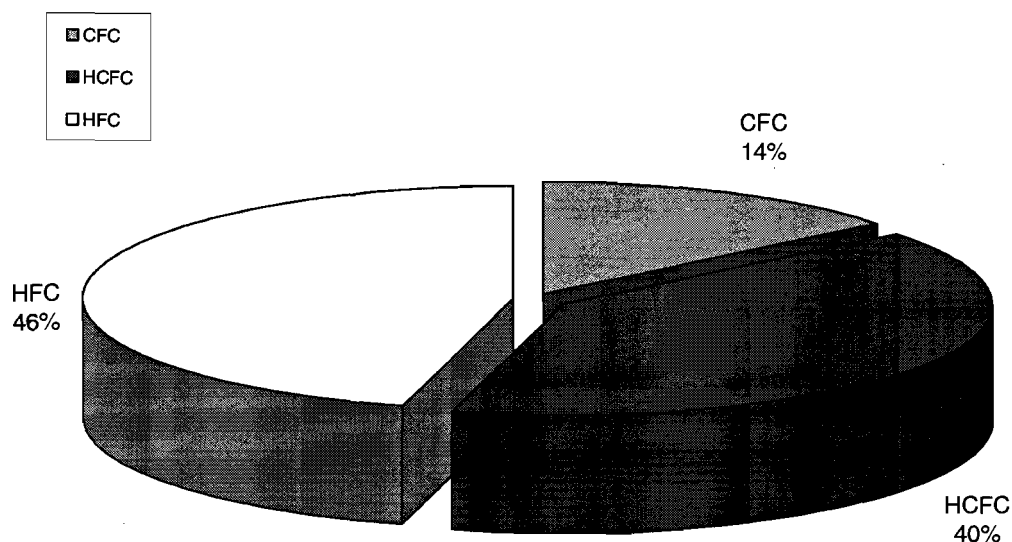


Figure 5 Portion of recovered refrigerant

More interesting is to observe ratio of recovered to initially filed refrigerants against certain refrigerant category. This ratio is shown in Figure 6. The highest rate of recovery is made for refrigerants of CFC category with share of 58%, then for HCFC with 27% and only 15% for HFC. The reason for such peculiar results is lack of CFC refrigerants on markets, therefore they are more valuable and operation of recovery is imperative.

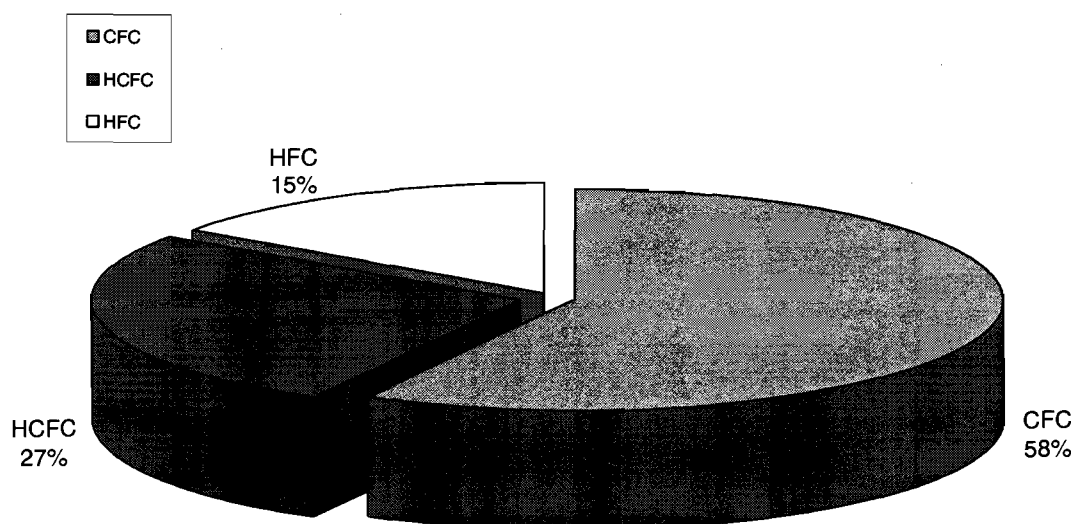


Figure 6 Ratio of recovered refrigerant to initial filing versus refrigerant category

Similar conclusion could be drawn for HCFC refrigerants. On the other hand, since HFC refrigerants are available they have lowest rate of recovery.

Furthermore it has been noticed that reports from car workshops usually don't contain recovery figures. The reason is following. When they perform service activities on car air conditioners, equipment which they use for recovery, recycling, vacuuming and filling is operated easily, usually all of the mentioned activities are initiated with one button click. After the procedure they don't fill report forms properly. They usually mark in amount of refrigerant added to the system but they don't fill other columns (recovery, recycling, reclaiming, disposing columns).

This has been noticed approximately one year ago. Since this was recognized as a potentially major obstacle in a reporting process curriculum of a training course has been modified. Now, during the course of education, technicians are thoroughly instructed how to fill the forms properly.

Third column in Table 1 shows quantity of lost refrigerant. In year 2007 62.751,73 kg of refrigerant was lost in total. This presents 50 percent of initial refrigerant fillings. Figure 7 shows percentage of lost refrigerants versus refrigerant category. Out of total 55% of lost refrigerants are HFC refrigerants, 38% HCFCs while only 7% make CFCs.

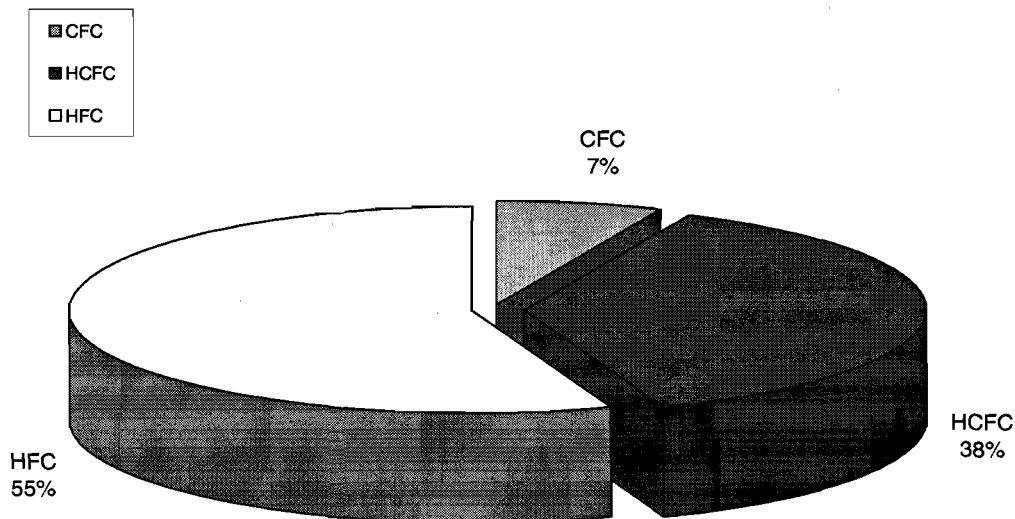


Figure 7 Lost refrigerant versus refrigerant category

Figure 8 shows lost refrigerant versus refrigerant type. As indicated R22 has the largest loss percentage, followed by R404a, R134a and rest of the refrigerants.

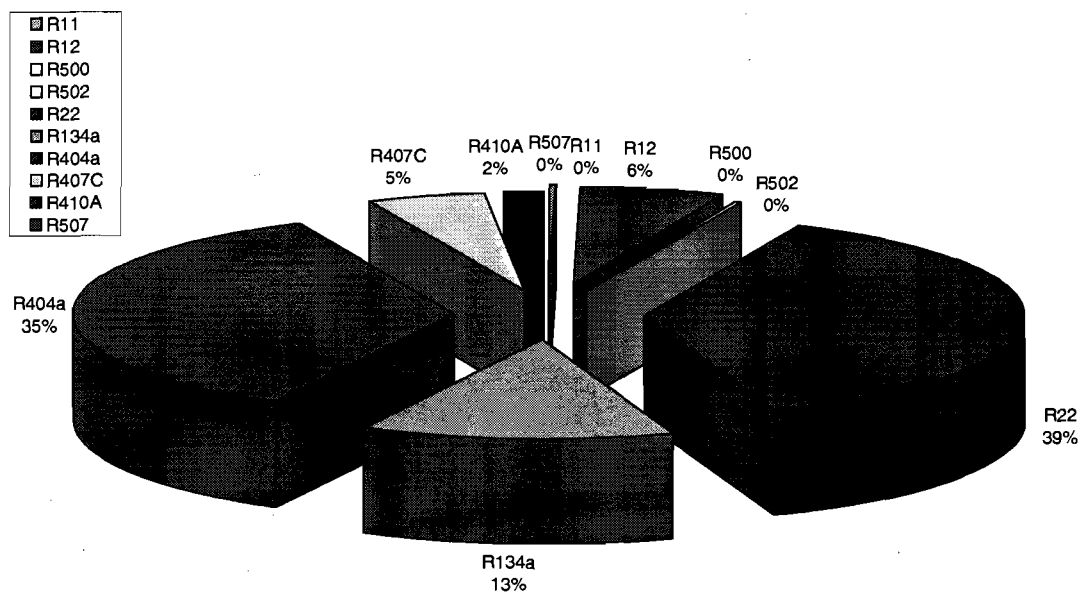


Figure 8 Lost refrigerant versus refrigerant type

On the other hand if calculation for relative loss of refrigerant (in relation to the initial filings) is made it might be observed that CFC and HCFC refrigerant categories exhibit approximately the same loss rate around 60% while HFC category has relative loss around 40%. This is quite reasonable since the systems with HFCs are quite new.

Fifth, sixth, seventh and eight column give information on amount of refrigerant filed. Amount of refrigerant that was recovered, recycled and reclaimed prior to filing was 12.863,66 kg which is only 10 % of initial filing quantity. On the other hand, everything what was collected in process of recovery was either filed back to systems either recycled or reclaimed. Filing with recovered and recycled refrigerant was approximately the same around 6.000,00 kg while the reclaimed refrigerant was only filed in quantity of 1.032,08 kg. The reason for low rate of refrigerant reclaiming is still not functional RRR scheme, i.e. out of four initially established RRR centers during year 2007 only one was operational (FRIGOMOTORS in city of Split). New refrigerant was used in amount of 123.465,40 kg what approximately corresponds to amount of initial refrigeration filing.

Amount of refrigerant designated for disposal to RRR centers in year 2007 was 2.223,58 kg or app. 2% in relation to quantity of initial filings.

The largest part of disposed refrigerant was of HFC category and the lowest of HCFC category. These poor results are an outcome of non functional RRR scheme in year 2007. The technicians had no place to bring refrigerants for disposal.

As long as the RRR system is not fully operational statistic numbers on quantity of reclaimed and disposed refrigerant will be low. Some of technicians will try to keep refrigerants in workshops and wait for centers to be

operational but many of them will be forced to vent a refrigerant in to the atmosphere to free very needed (and expensive) cylinders.

Quantity of refrigerants scheduled for disposal plays important role in determination of taxes on each kilo of imported refrigerant. To this date for purposes of disposal tax in amount of 3 kn (0,40 EUR) is imposed on each kilo of imported refrigerant. With such low quantity of collected refrigerant to be disposed in year 2007 tax could be recalculated for the next period.

4.1. Analysis Summary

Current status in phase-out project:

- Only 5% of CFC, and 31% of HCFC based equipment is still in operation.
- R404a and R22 based equipment make together approximately 74% of all equipment maintained (installed).
- Only 9% of all refrigerants are recovered relative to reference quantity. Highest relative rate of recovery is accomplished for CFC refrigerants, then for HCFCs and at last for HFCs.
- More than 50% of all refrigerants are lost into the atmosphere. Highest quantity of lost refrigerants is of HFCs category (R404a with 35%, R134a with 13%) then HCFCs (R22 with 39%) and CFCs category (R12 with 6%). On the other hand, lowest relative loss rate exhibit HFCs, while HCFC and CFC have approximately the same.
- Only 10% of refrigerants (in relation to reference quantity) are returned back to the refrigeration systems after some sort of treatment (recovery, recycling, reclaiming).
- Quantity of new refrigerant used is approximately the same as amount of total reference quantity.
- Only 2% of refrigerants are designated for disposal in relation to reference quantity.

5. ESTABLISHMENT OF A RRR CENTERS IN ZAGREB AND RIJEKA

Due to decision of MB Frigo (official Reclaim Center Zagreb), Electrolux (Reclaim Center Rijeka) and Konikom (Recovery center Osijek) to pull out from the Re-use scheme, during last three years Republic of Croatia had no operational RRR system. Only company FRIGOMOTORS in city of Split performed RRR activities on professional level. With decision to pull out from Reuse scheme final part of Terminal phase-out management plan in Croatia came into question.

In order to finally close the Re-use system and make it functional it was of highest priority to find potential companies as soon as possible which will carry out duties as a regional reclaim center.

Pre requirements that these companies have to fulfil to be of interest as a potential reclaim center are as follows:

- their basic activities and professional interests are in refrigeration and/or air conditioning sector,
- they offer service of refrigeration and air-conditioning equipment,
- are daily handling with refrigerants,
- are affirmed as a reputable company in refrigeration sector,
- have good relations with other service enterprises in region,
- have skilled educated technicians,
- investing in new technologies, education of staff,
- location of the service. Service should be located near highway or state roads node.
- have enough place at disposal to perform activities required RRR scheme
- is fully Croatian company,
- have strength and will to become example and to disseminate the Code of Good Practice in the region.

In December 2007 MEPPPC announced request for proposal for potential regional reclaim centers. Two companies were selected:

- 1) company CIAK d.o.o. as a regional Reclaim Center Zagreb,
- 2) company IND-EKO d.o.o. as a regional Reclaim Center Rijeka.

For regional center Osijek no company showed interest, therefore the request for proposal for that region is still open.

At this moment equipment for reclamation (GC – gas chromatograph, reclaim and moisture content measurement equipment) is deployed to CIAK in Zagreb, and to IND-EKO in Rijeka. The companies are fully equipped and are ready to perform RRR activities.

6. EVALUATION AND UPDATE OF THE TRAINING PROGRAMME FOR SERVICE TECHNICIANS

As already mentioned in paragraph 2.4, four National training centers are operative in Republic of Croatia, namely in city of Osijek (Faculty of Electrical Engineering in Osijek, FER), Rijeka (Faculty of Engineering Rijeka, TFR), Split (Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, FESB) and Zagreb (Faculty of Mechanical Engineering and Naval Architecture, FSB) with thirteen certified national trainers in total.

Education of service technicians that handle ODS and other alternative refrigerants is carried out on a basis of the curriculum and program established through UNIDO projects "Refrigerant Management Plan", Project No. MP/CRO/99/097 and "Terminal Phase out Management Plan for CFCs – TPMP Croatia", Project No. MP/CRO/03/033.

The training curriculum and materials are unique for all four training centers.

Two-day training course is periodically organized with group of 10 to maximum 15 attendees. Generally the course is held during Thursday and Friday. The training starts at 9 AM in the morning and lasts for 8 school hours (8x45 minutes) each day, i.e. to 6 PM including one hour for lunch break.

Over the years program was modified to meet the current standards and trends in industry. Moreover the programme was updated according to changes in local and international legislation.

Training curriculum is divided to theoretical and practical part. Lectures itself were presented by means of power point presentation (attachment 7) while the attendees were provided by a PP presentation in a form of an interactive seminar script (attachment 8) and by a Handbook for service technician (attachment 9). All materials are prepared in a manner to accommodate previous knowledge of the service technicians from the professional schools, and to give general idea about the importance of the environmental protection applying recent technology achievements. All materials are written in a Croatian language.

Hand on training is performed in laboratory on the training rig with recovery, recycling, vacuum units and supplementary equipment. Each attendee has to demonstrate recovery, vacuuming and recycling procedures in line with the Code of the Good Practice.

The actual program of the training course covered during 16 hours in total is as follows:

- Presentation of RMP Croatia,
- Introduction of Ozone issues,
- International and local regulations,
- Basic principles of refrigeration,
- Refrigeration technology with new alternative refrigerants, retrofitting and drop-in refrigerants, lubricants,
- Redesign and reconstruction of the existing units with respect to change of refrigerant,
- Installation technologies, safe maintenance services, hand-on training,
- Recovery and recycling technologies, hand-on training on training rig with recovery and recycling machines,

- Exchange of the refrigerant in the existing unit, hand-on training,
- Reclaiming technology, theoretical issues,
- Discussion on certificates and developing of national code of good practice.

The more detailed outline of the training course and discussed topics is as follows. The first day of the program starts with a general presentation of refrigerant management plan in Croatia, its short and long term objectives. After general introduction focus is placed on:

- introduction to Ozone issues. The principles of natural way of Ozone formation and disintegration is discussed. Reasons for preservation of Ozone layer, its impact to environment, i.e. flora, fauna and all mankind is given,
- discussion on artificially made Ozone depleting substances and their application fields in industry. Explanation of origin of ozone depleting substances and alternative refrigerants that are used in field of refrigeration, i.e. CFCs, HCFCs, HFCs compounds. Moreover chemical processes which lead to Ozone depletion are shown,
- Croatian and international legislation, their obligations and responsibilities,
- basic principles of refrigeration; terminology, technical refrigeration (basic and advanced theoretical cycles, compressors, evaporators, condensers, throttling valves, examples of stationary and mobile air conditioning systems, system arrangements for process refrigeration, heat pumps, energy efficiency of refrigeration systems with respect to operating parameters and refrigerant type), identification of refrigerants, alternative and drop-in refrigerants, refrigerant evaluation criterion (ODP, GWP and TEWI numbers),
- refrigeration system commissioning, pressure tests, vacuuming, recovery, recycling and reclaiming technologies (with respect to size of the systems and refrigerant type), supplementary equipment, gas leakage detectors, vacuum meters, hand oil pump etc.,
- hand-on training in laboratory (recovery, vacuuming and recycling procedures), handling the supplementary equipment

Curriculum of the second day is as follows:

- oil as a part of the refrigeration system, compressor lubrication, passive and active ways to return the oil into compressor, recommended oil types with respect to refrigerant type, principles of oil change due to change of refrigerant type, absorption of refrigerant in oil, oil heaters,
- presence of acid in refrigeration systems, origin and type of acids, malfunctions caused by presence of acids in the system, acid tests, selection and instalment of filter-dryer in the system,
- system filling, discussion on filling practice with respect to refrigerant and system type, how to properly fill the system,
- system filling, hand-on training in laboratory,
- refrigeration system failure detection,

- examination test with 35 questions which cover programme curriculum, pass threshold is placed at 75%.

If the test was not successful, an additional training is being organized so that at the end all attendees successfully complete the course with required knowledge gained.

On the other side, excellence is orally awarded.

Although very reserved at the beginning of the programme, due the challenge they face, after completing the course the response of the service technicians is highly positive. They all show high motive for implementation of the knowledge gained.

Before the closing session, discussion is being raised on the program curriculum in particular and on the RRR system in general. All of the suggestions are recorded and after revision used to improve the programme. Suggestions for RRR system improvement are submitted to the MEPPPC.

Up to this moment approximately 2400 technicians attended the training course and passed the examination.

7. REVISION OF THE LICENSING SYSTEM

Up to this moment approximately 2400 technicians attended the training course and passed the examination. They were all awarded by Certificate of Training issued by the institution where the course was taken.

Database of all attendees and their records for entire Republic of Croatia is made and is kept in Training Center Zagreb.

Reporting toward National Ozone Unit, MEPPPC on persons who successfully finished training is being prepared and submitted on a regular basis. In this way control is twofold, Certificate of Training as a document (which has to be attached to an application when issuing licence at MEPPPC) and list of graduated specialists provided by Training Center Zagreb. Up to now this system of reporting showed now flaws.

8. EVALUATION AND UPDATE OF THE CODE OF GOOD PRACTICE

In discussion with International consultant Mr. Klas Berglöf and MEPPPC representatives on several occasions, it is concluded that it would be reasonable to postpone activities of evaluation and update of the last version of Code of Good Practice for some time due to fact that:

- in this moment revision and harmonization of the latest Croatian Regulation on Substances that Deplete the Ozone Layer (Official gazette NN 120/05) from 2005, to the new EU Regulation No 1005/2009 on Substances that Deplete Ozone Layer from 16 September 2009, is in progress,
- the last version of the Code of Good practice was published before introduction of the Regulation in October 2005 and therefore it doesn't contain key elements from the present Regulation (this should be avoided in future),
- new regulations regarding certification and leakage are adopted by European Parliament:
 - Regulation No 842/2006 on minimum requirements and the conditions for mutual recognition for the certification of companies and personnel as regards stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases,
 - Regulation No 1516/2007 of 19 December 2007 on standard leakage checking requirements for stationary refrigeration, air conditioning and heat pump equipment containing certain fluorinated greenhouse gases,
 - Regulation No 307/2008 on minimum requirements for training programmes and the conditions for mutual recognition of training attestations for personnel as regards air-conditioning systems in certain motor vehicles containing certain fluorinated greenhouse gases

New revised Code of Good Practice will be therefore prepared according to the information and resolutions contained in those documents.

9. CONCLUSION

It is considered that obligations deriving from the Contract No. 16001374 have been fulfilled. Also it may be considered that the purpose of the project as well as quality of performed services have met the contract requirements.

Att. 1. List of border crossings and qualified custom officers, June 2002

No.	Name	Border crossing	Custom office
1.	Damir Šimunec	GP Macelj	Zagreb
2.	Sanja Lončar	Carinski laboratorij Zagreb	Zagreb
3.	Miho Arbulić	Carinska ispostava Karasovići	Dubrovnik
4.	Stanko Telebar	Carinska ispostava Varaždin	Koprivnica
5.	Sonja Stašić	Carinski laboratorij Rijeka	Rijeka
6.	Dolores Barešić	Carinska ispostava Luka Rijeka	Rijeka
7.	Hrvoje Mataja	Carinska ispostava Pasjak	Rijeka
8.	Sanjin Vrkić	Carinska ispostava Pasjak	Rijeka
9.	Alen Frlan	Carinska ispostava Rupa	Rijeka
10.	Dušan Štembeljer	Carinska ispostava Rupa	Rijeka
11.	Vale Antić	Carinska ispostava Luka Rijeka	Rijeka
12.	Josip Ružić	Carinska ispostava Bajakovo,	Osijek
13.	Zvonimir Matokanović	Carinska ispostava Stara Gradiška	Osijek
14.	Ivan Grozdanović	Carinska ispostava Stara Gradiška	Osijek
15.	Jure Matanić	Carinska ispostava Bajakovo	Osijek
16.	Blaž Franjić	Carinska ispostava Bregana	Zagreb
17.	Tomislav Špoljarić	Carinska uprava	Zagreb
18.	Raul Babić	Carinska ispostava Bregana	Zagreb
19.	Pero Knežević	Carinska ispostava Ličko Petrovo Selo	Zadar
20.	Klaudija Bakota	Carinski laboratorij Split	Split
21.	Radovan Perić	Carinska ispostava Ličko Petrovo Selo	Zadar
22.	Jurica Jakus	Carinska ispostava Luka Split	Split
23.	Darko Gregov	Carinska ispostava Gaženica	Zadar
24.	Juraj Gospodnetić	Carinska ispostava Luka Split	Split
25.	Tomislav Vukušić	Carinska ispostava Strmica, Knin	Šibenik
26.	Josip Blažek	Carinska ispostava Goričan	Koprivnica
27.	Zvonko Petrović	Carinska ispostava Luka Ploče	Ploče
28.	Samir Kolar	Carinska ispostava Trnovec	Koprivnica
29.	Zoran Novak	Carinska ispostava Trnovec	Koprivnica
30.	Gorana Matijević	Carinska uprava	Osijek
31.	Zlatko Vugrinec	Carinska ispostava Goričan	Koprivnica
32.	Željko Dobrošević	Carinska ispostava Donji Miholjac	Osijek
33.	Davor Glavota	Carinska ispostava Donji Miholjac	Osijek
34.	Flavio Kmet	Carinska ispostava Kaštel	Pula

Att. 2. List of Companies accredited for ODS import/export and distribution.

Comments: - Importers of ODS and alternative refrigerants are printed in red
- Distributors are printed in black

1	T. P. Usluge d.o.o., Augusta Šenoa 10, Donji Laduč, 10292 Šenkovec
2	AM Trade d.o.o., Čavle 238, 51291 Čavle
3	Brodokomerc d.d, Jelačićev trg 4, 51000 Rijeka
4	BHS-produkt d.o.o., Vrhovec 8, 10000 Zagreb
5	Linde plin d.o.o., Mahično bb, 47000 Karlovac
6	Trgostil d.d., Toplička c. 16, 49240 Donja Stubica
7	Plast-A, Šapjane 73. 51214 Šapjane
8	FRIGO SYSTEM-ZAGREB d.o.o., Industrijska 8, 10431 Sv. Nedelja
9	SIMAT PROM d.o.o., Rudeška c. 96, 10000 Zagreb
10	ALLES d.o.o., Industrijska 40, 34000 Požega
11	BATIS d.o.o., Jezerska 44, 10000 Zagreb
12	BITECHNIQUE d.o.o., J. P. Kamova 111, 51000 Rijeka
13	TRUS-PROM d.o.o., Ščitarjevska 56, 10000 Zagreb
14	ELABO-I.N.D. d.o.o., Andrije Hebranga 50, 20000 Dubrovnik
15	AUTOMEHANIKA SERVISI d.d., Lopašićeva 12, 10000 Zagreb
16	MET-COLOR, Stjepana Radića bb, 20350 Metković
17	PAVUŠIN d.o.o., Sv. Benedikta 19A, 10000 Zagreb
18	ŽIVIĆ-ELEKTRO, 204. vukovarske brigade 39, 32000 Vukovar
19	MAJCEN d.o.o., Varaždinska 339A, 42209 Sračinec

20	KEMIKA d.d., Heinzelova 53, 10000 Zagreb
21	KRČEK d.o.o., Stružečki put 10, 10000 Zagreb
22	ISKRA TEHNICS SERVIS d.o.o., Leonardo Da Vinci 7, 52100 Pula
23	LABELLE d.o.o., Creska 34, 52440 Poreč
24	LAGER d.o.o., Podgaj 4a, 20236 Mokošica
25	TRGOVAČKO TURISTIČKI OBRT ZORA, Hrvatske bratske zajednice 19, 20260 Korčula
26	A.K. AUTO MARKET d.o.o., Zeleni trg 3b, 10000 Zagreb
27	MONTKEMIJA d.o.o., Senjska cesta bb, 51222 Bakar
28	SILCO-AT d.o.o., Gorenska 62A, 10255 Gornji Stupnik
29	VE-TRGO d.o.o., Bukovačka 23, 10000 Zagreb
30	COSMO d.o.o., Drage Gervaisa 41, 51000 Rijeka
31	ELEKTRON d.o.o., Hrvatskih kraljeva 6, 32100 Vinkovci
32	MINIGO d.o.o., Željka Sabola 7, 43000 Bjelovar
33	BRODOMERKUR d. d., Poljička cesta 35, 21000 Split
34	TRGO - M. C. d.o.o., Zapoljska 16, 10000 Zagreb
35	ELEKTROOPREMA BADOVINAC, Zagrebačka 41, 44000 Sisak
36	WHIRLPOOL HRVATSKA d.o.o., Av. Večeslava Holjevca 40/III, 10000 Zagreb
37	KOCH SERVISNA OPREMA d.o.o., Ventilatorska 9, 10250 Lučko
38	UNUK ELEKTRO, Zvonimirova 2, 51000 Rijeka
39	MARITERM, Dražice 123d, 51000 Rijeka
40	LUMBERTRANS d.o.o, Popovićevo put 4, 51211 Matulji
41	JACERA d.o.o, Slobode 2A, 21000 Split

42	COPAN ZAGREB d.o.o., Karasova 9, 10000 Zagreb
43	LAKMUS d.o.o., Sjeverna ulica bb, 52420 Buzet
44	HOSPITALIJA TRGOVINA d.o.o., Vojvodići bb, 10431 Sveta nedelja
45	ARNIKA d.o.o., Sabljiceva 3, 10000 Zagreb
46	KUNA CORPORATION d.o.o., Draše 68, 49294 Kraljevec na Sutli
47	AVE-TEHNIKA d.o.o., Slavka Krautzeka 71/1, 51000 Rijeka
48	BEN SHIP SUPPLY d.o.o., Riva Boduli 1/VI, 51000 Rijeka
49	DEM d.o.o., Rastočine 4, 51000 Rijeka
50	EURO BUS d.o.o., Veli Kijec 2, 51513 Omišalj
51	BATER d.o.o., Kampanja 19, 51000 Rijeka
52	MEDIC d.o.o., Trg Dražena Petrovića 3/V, 10000 Zagreb
53	KATMET SIROVINA d.o.o., IV. Kozari put 100, 10000 Zagreb
54	"SOLARNE ĆELIJE " d.o.o., Težački put bb, 21000 Split
55	"ANET " d.o.o., Samoborska cesta 253, 10000 Zagreb
56	"INDUSTROOPREMA" d.o.o., CMP Obrtnička 1, 10000 Zagreb
57	"TIBRA" d.o.o., Donji Muć 0, Donji Muć
58	MB FRIGO Grupa d.o.o. Bani 81, 10010 Zagreb
59	FRIGOKOR
60	FRIGO PLUS

Att. 3. Current KT6 form for ODS manipulation and handling

Obrazac KT 6

Uredba o tvarima koje oštećuju ozonski sloj

OČEVIDNIK O UPORABLJENIM KOLIČINAMA KONTROLIRANIH I ZAMJENSKIH TVARI

Očevidnik za godinu:				Broj stranice/ukupni broj stranica:					
Naziv tvrtke:				Adresa (grad, ulica i broj):					
Matični broj:				Registarski broj ¹⁾ :					
Telefon:		Telefaks:		e-mail:					
Ime i prezime odgovorne osobe:									
Kontrolirana/ zamjenska tvar		Naziv:		Kemijska formula:				Oznaka:	
Naziv kupca/ rashladni kapacitet opreme	Početno punjenje u kg	Gubitak tvari u kg tijekom godine	Prikupljeno radi ponovne uporabe	Punjenje starom tvari	Obnovljena tvar vraćena u uređaj	Dopuna novom tvari	Dopuna oporabljenom tvari	Otpadna kontrolirana tvar	Način postupanja s otpadnom tvari
UKUPNO:									
Mjesto i datum:				MP					
Odgovorna osoba:				Potpis:					

1) Registarski broj dodjeljuje Ministarstvo zaštite okoliša, prostornog uređenja i graditeljstva

Att. 4. Update of the KT6 form: ODS manipulation and handling

Obrazac KT 6

Uredba o tvarima koje oštećuju ozonski sloj

OČEVIDNIK O UPORABLJENIM KOLIČINAMA KONTROLIRANIH I ZAMJENSKIH TVARI

Očevidnik za godinu:				Broj stranice/ukupni broj stranica:					
Naziv tvrtke:				Adresa (grad, ulica i broj):					
Matični broj tvrtke:				Registarski broj ¹⁾ :					
Telefon:		Telefaks:		e-mail:					
Ime i prezime odgovorne osobe:									
Kontrolirana/ zamjenska tvar		Naziv:		Kemijska formula:			Oznaka:		
Naziv kupca/vrsta uređaja/rashladni kapacitet opreme	Deklarirano punjenje, kg	Prikupljena radna tvar, kg	Gubitak tvari, kg	Punjenje prikupljenom tvari, kg	Punjenje pročišćenom ²⁾ radnom tvari, kg	Punjenje oporabljenom ³⁾ radnom tvari, kg	Punjenje novom radnom tvari, kg	Radna tvar za zbrinjavanje ⁴⁾ , kg	Napomena
UKUPNO:									
Mjesto i datum:				MP					
Odgovorna osoba:				Potpis:					

1) Registarski broj dodjeljuje Ministarstvo zaštite okoliša prostornog uređenja i graditeljstva.

2) Radna tvar pročišćena na uređaju za pročišćavanje (recycling uređaju).

3) Oporabljena radna tvar u Centrima za uporabu radne tvari.

4) Radna tvar koja više nije upotrebljiva. Predaje se Centrima za zbrinjavanje radnih tvari.

Att. 5. List of certified National Trainers and institutions

No.	National Training Center	Name	Function
1.	FMENA, Zagreb	Tonko Ćurko, Ph.D.	Center and project leader
2.	FMENA, Zagreb	Vlasta Zanki, Ph.D.	Leader assistant
3.	FMENA, Zagreb	Marino Grozdek, B.Sc.	Trainer-instructor
4.	FMENA, Zagreb	Vladimir Soldo, Ph.D.	Trainer-instructor
5.	ETF, Osijek	Antun Pintarić, M.Sc.	Center leader
6.	ETF, Osijek	Branko Škoro, B.Sc.	Trainer-instructor
7.	ETF, Osijek	Antun Plaščak, B.Sc.	Trainer-instructor
8.	TFR, Rijeka	Branimir Pavković, Ph.D.	Center leader
9.	TFR, Rijeka	Kristian Lenić, Ph.D.	Trainer-instructor
10.	TFR, Rijeka	Igor Wolf, M.Sc.	Trainer-instructor
11.	FESB, Split	Davor Lučin, M.Sc.	Center leader
12.	FESB, Split	Zlatko Jankoski, B.Sc.	Trainer-instructor
13.	FESB, Split	Zoran Mitrović, B.Sc.	Trainer-instructor

Att. 6. Certificate of Training

Certificate of training is printed on recognizable yellow paper, signed and stamped by authorized persons at National Training Center.

Fakultet strojarstva i brodogradnje u Zagrebu

izdaje

U V J E R E N J E

Nenad Bistrović

rođen 09.04.1974. u Čakovcu, pohađao je i s uspjehom završio program obuke za održavanje i rukovanje rashladnim i klima uređajima

“Gospodarenje rashladnim sredstvima”

sukladno programu međunarodnog projekta

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Voditelj projekta pri Fakultetu strojarstva i brodogradnje	Dekan
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