Country: **Uzbekistan**
Firm: **SINO - Samarkand**
Type: **Conversion of CFC-12 Appliance Manufacturing to HFC-134a**
Date: **January 1998**

RTU-UNWB-LK-980012-dl

Scope
The project under review covers the conversion of CFC-12 appliance manufacturing to HFC-134a and the conversion of CFC-11 foaming operations. Only the HFC-134a part of the project is reviewed here.

1. Project Description
The project proposal describes the domestic refrigeration sector background adequately, i.e. apart from one manufacturer there are only small -probably non-organised- service workshops in Uzbekistan. The background of the enterprise is also given in a clear way; the fact that the enterprise was founded in 1973 could imply that the equipment used for the production of refrigerators is out-of-date; however, given the fact that production has been continued at the 210,000 level through 1991 implies that the quality is good, and that certain new equipment has been bought or equipment has been refurbished in the 1980's. It is remarkable that the production level has dropped from 210,000 pieces in 1991 to 28,000 averaged over 1994-96 (probably mainly due to a collapsing export). It must be assumed that the 28,000 production level will increase in future once more stable domestic market conditions have been reached (expectation is that user demand will be increasing.

The description of the changes in the production if the new refrigerant HFC-134a is introduced is in order. The list of relevant existing equipment is complete (section 5.2.3. page 15). It seems acceptable that a gradual change to isobutane will be made in the future with increasing availability of compressors, redesign prescriptions etc.

2. Technology
The proposal gives an overview of two candidates for domestic refrigerators, i.e. HFC-134a and the hydrocarbon isobutane. In case of the hydrocarbon isobutane, the reasons given why conversion to isobutane is appropriate are correct. Indeed, the right purity may not be locally available at present, and may be difficult to obtain in the CIS states; isobutane is "easy" to handle only when using certain equipment, and conversions to isobutane may be very cost-ineffective if the layout of a factory is such that safety costs are high. Nevertheless, isobutane is preferred by many manufacturers in Western Europe where 35-40% of the present (1997) production is on isobutane.

The reasons given why HFC-134a is selected over isobutane for SINO to date are valid. It should also be clear that for short- to mid-term conversions no isobutane compressors from the Baranovitch or Sumgait compressor plant (project proposal for Sumgait reviewed in December 1997) will be available. It does not seem acceptable to outsource isobutane compressors (Western Europe) since imports will be expensive and availability is questionable. HFC-134a technology seems to be the logical choice not only in the timeframe given, but also for reasons of investment when changing to flammable refrigerants at present.

3. Environmental impact
The refrigerant proposed HFC-134a has no ODP and acceptable other environmental aspects, which includes a global warming potential of 1300 (100 years time horizon), which is about 15% of that of CFC-12.

4. Project costs
No major comments to the incremental investment costs mentioned. It might have been possible to retrofit charging machines, however it is likely that new equipment will be needed. The retrofitting of almost all existing vacuum pumps is in order. The training component as well as technology transfer, is rather cheap; however, given the in-house experience plus the additional experience from local component suppliers it seems normal. No comments to prototyping and testing costs.

5. Implementation time frame
No comments.

6. Operating costs (not requested)
No comments; the increase in the costs is within the range observed in many project proposals.

7. Recommendations
The conversion project (at least the HFC-134a part) as proposed **is recommended.**

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Uzbekistan -SINO

This review refers to the foam elements of the project only

TECHNOLOGY

The enterprise manufactures domestic refrigerators and freezers and proposes to replace the CFC 11 blowing agent in the rigid polyurethane insulating foam by cyclopentane.

Cyclopentane is now a mature technology for this sub-sector and is widely used as a zero ODP blowing agent. It is a permanent solution, unlike HCFC 141b which the enterprise also considered.

Its use does, however, require extensive modifications to the production line to ensure safe operation with the highly flammable hydrocarbon. There is provision in the project for hydrocarbon storage, premixing & processing equipment, jigs and the provision of ventilation and detection systems.

Both the current polyurethane processing equipment and jigs were supplied by manufacturers who no longer exist and current manufacturers are unlikely to undertake their retrofitting (even if it were possible). The current six dispensers will be replaced by two new machines, one for cabinets and one for doors.New jigs for the cabinet line are included. There is provision for a new rotary, water heated door system.

SAFETY AND ENVIRONMENTAL ISSUES

The main concern is safe handling of cyclopentane. In addition to the equipment listed above, there must be expert auditing of the operation and extensive training of the operators. These are generally covered in the project but training of operators must be explicitly covered.

PROJECT COSTS

Since Uzbekistan is a low consuming country the normal threshold limits do not apply. That said there are two further comments. In the first place, cyclopentane is not the most cost-effective technology for a factory producing ca. 28,000 units per year. HCFC141b has that distinction but is only an interim solution. Secondly, the existing foaming lines produced over 200,000 units per year in 1991 and the project does, in reality, cater for a much larger production volume that that produced in the interim. On a 1991 basis the project would have been much more cost effective.

The capital and other one-off costs are supported. The costs for the dispensers (template ammows for retrofitting only) and jigs exceed the guidelines in the current template but these are supported for the reasons given above.

The other items broadly follow template guidelines and are supported.

The incremental operating costs are included in the project document but funding is not requested.

IMPLEMENTATION TIMEFRAME

This is acceptable.

RECOMMENDATION

Approval.

The comment on training must be followed through.

Country: **Uzbekistan**
Co-ordinator: **State Committee for Nature Protection**
Type: **Recovery and Recycling of ODS; Training of Service Technicians**
Date: **August 1998**

RTU-UNWB-LK-980346-dl

Scope
The project under review covers the recovery and recycling of CFC-12 from serviced equipment as well as a training course for good practice and hands on training of the R&R equipment.

1. Project Description; Sector Background and Justification

The project proposal describes the sector background in Uzbekistan and the project justification quite well. It is logical that the government would like to start efforts in recovery and recycling at short notice given the production and import situation of CFCs; the situation seems manageable given the fact that there are 700 workshops (260 ODP tonnes consumption mainly in servicing). It is an appropriate decision to give recovery and also the recycling machines to only the larger users and to check their operations during the first year. Training of technicians is directly related to proper handling of refrigerants and proper use of the R&R machines. It is several times stated in the proposal that this will contribute to an extra saving (but where it can be assumed that this saving can, in a next step not be realised via recovery and recycling, the CFC material is simply not used).

Where it concerns the servicing of domestic refrigerators, the proposal mentions the use of plastic bags which seems to be adequate. It is appropriate to give training to the most "qualified" technicians first; the principle of licensed technicians is OK, if the licensing determines whether or not one will receive the recovery equipment..

It is proposed that in the period after the first training (by a UNDP consultant to the best technicians) the training will be given following "the train the trainer approach". It should be safeguarded that the State Committee or one training institute will act as the focal point and as a demonstration centre during the entire project, in co-operation with the National Ozone Unit or Ozone Coordinator, or the State Committee.

The way of distributing the recovery equipment and the siting of the recycling centres is supported, as well as the conditions for the siting of the Recycling Centres.

2. Technology

As far as the recover and recycle technology introduced, no comments (the proposal mentions erroneously 350 recycling machines in the summary).

The only important questions one may ask is whether the assumption that 350 machines will recover 1 kg per day, and whether the recycling efficiency is 90%, which would yield a saving of 85 tonnes. It is furthermore just an assumption to state that one service technician with a bag recovers 85 grams a day, and a total -country-wise- of 6.5 tonnes. The figure seems to be somewhat random, and is at least not related to the repair operations. Very much will depend on how many systems are repaired, how many have leaked and what the leakage percentages are; the recycling efficiency may well be lower.

One should at this stage refer to the RMP that mentions the tonnages that are used in the repairs of the different types of equipment. With some assumptions for the influence of better practices, and an assumption which percentage of the systems will be serviced by technicians with equipment, it may ell be possible to recycle 91.5 tonnes compared to the 1996 national consumption of 260 tonnes. Although it is stated that domestic refrigerator repairs are important, it is only 6% in the total (in a first instance good practices and adequate repairs will reduce the consumption substantially.

The proposal mentions 700 workshops and 900 technicians, and that next to the 700, there are many smaller ones of different sizes (as far as can be observed most of the workshops identified are small, one person only ??).

However, an assumption that about 30% of the total consumption can be reused seems reasonable, given the fact that only half the workshops are equipped with recovery units, it may even be a bit too high, but it is an appropriate number to base the efficiency of the project upon.

It is correct to have the project monitoring done as part of the national RMP.

The training course is proposed for one day (10 courses, 20-30 participants). One may consider at least two days if not three, if it includes hands on training in small groups. Next to the UNDP experience, material developed by UNEP could/should be used (difficulty is here; which languages can be used since the material is not available in Russian); maybe UNDP or Uzbekistan could develop some material from material available in the English language. The training could also contain some information on new refrigerants, i.e. isobutane (flammables) in domestic appliances (since the domestic appliance factory may consider conversion to isobutane in the near future) and the use of HFCs in new equipment and for retrofits. As mentioned , the certificate proposed is an important element in setting up a good national framework.

3. Environmental impact

The project contributes to a decrease of emissions of CFCs and therefore has positive environmental aspects.

4. Project costs

There are no major comments to the incremental investment costs mentioned. Costs would somewhat increase if one would extend the duration of the seminars, but this would be in the order of USD 15--20,000 which keeps the cost effectiveness still below the threshold level.

5. Implementation time frame

Demonstration seminars could go during a longer period than only 1-2 months (within one quarter).

6. Recommendations

The R&R and training project as proposed for Uzbekistan for 350 recovery and 30 recycling centres is supported.

A derivation of the amount the be expected to be recycled should be calculated more accurately in a second way, particularly since the information is available from the RMP (make reference to the RMP). One may further consider extension of the duration of seminars and some changes in the monitoring.

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P.S.
The RMP May 1998 mentions tonnages that are involved in repair; can it be true that out of 265 industrial units 165 units are repaired per year which is the larger portion of the recovery. Or has this to do with certain practices which could easily be changed (e.g. a prescribed emptying of the system before the wintertime) and which would seriously affect the recovery recycling efficiency.

Apart from some questions in 4.1.3 of the RMP, section 5 of the RMP has some inconsistencies. Line 2 is not supposed to reduce consumption, lines 4 and 4b contain two different numbers for R&R, where only 51.53 tonnes are used in the reduction as a total. I think this needs to be once more properly looked at, also at the sequence of actions.