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Addendum

PROJECT PROPOSALS: TURKEY

Sector: Foam

Please insert the attached Annex I at the end of the document UNEP/OzL.Pro/ExCom/28/45.

Annex I

JUSTIFICATION FOR THE USE OF HCFC-141B

(Extract from the Project Document)

Phasing out of CFC-11 by conversion to HCFC-141b in the manufacture of rigid polyurethane panels for thermal insulation for cold rooms and cold storage at Izotek.

Currently the TWO leading technologies for the replacement of CFC-11 in the rigid polyurethane insulation foams applications are:

(a) CFC Technology	(b) Interim HCFC Technology	**Alternative non- ODS technology**
CFC-11	HCFC-141b	C-pentane, liquid HFCs, water/CO_2
CFC-11		pentane

Gaseous physical blowing agents (e.g. HCFCs 22/142b and HFC-134a), can also be used but this technology always requires new equipment and extensive adjustments. It has, therefore, found only limited use on a commercial scale. In addition, some domestic refrigerator manufacturers have introduced vacuum panels but the technology is still being developed, it is expensive, and its scope of application remains to be determined.

The **first technology option** is closely related to the existing CFC-11 technology. In this option CFC-11 can initially be replaced with the low-ODP HCFC-141b. This technology is technically mature and commercially viable. It provides acceptable insulation and energy efficiency values and the lowest investment and operating costs vis-à-vis other options. No major changes are required in the auxiliary equipment, tooling, mold design, etc. However, the final step to non-ODS technology in this process is not yet decided. Potential solutions are the use of liquid HFCs such as HFC 356 or HFC 245, but full water blown foam with improved cell structure remains another option.

Zero-ODP liquid HFC based systems are being extensively evaluated by chemical and foam systems suppliers, and the end-user industries. Preliminary results indicate that HFC 245fa is the preferred candidate as a technically feasible replacement for HCFC-141b in a number of applications. Preliminary results from toxicological studies on HFC 245fa are also encouraging. Commercial availability of this technology by 2003 is anticipated, subject to satisfactory results from the ongoing toxicological and environmental impact studies.

Whilst water based systems would constitute a permanent zero-ODP/zero-GWP solution with minimal health and safety risks, at present such systems are still under development and

insulation values are not yet satisfactory. Acceptable fully water blown foam systems are, however, expected to be commercially available in the near future.

The **second option**, using pentane technology, is commercially proven and is now extensively used in Europe, and it has also been adopted in several developing countries. However, pentanes are flammable and this means a careful review of manufacturing operations with respect to the safe handling of a flammable foam blowing agent. Conversion to pentane technology necessitates implementation assistance and UNIDO further requires an independent safety review prior to, and after, equipment installation and commissioning. Whilst for larger scale enterprises pentane technology provides a cost effective solution to CFC-11 replacement, this technology may not always be a practical or cost effective option in the existing work-place environments at many smaller scale enterprises due to the safety modifications required.
Namely because of industrial safety requirements, the project, approved in 199...for conversion of Barlan metal CFC-11 technology to pentane was canceled in 199....It was found that the selected technology option cannot be applied at the existing premises and has to be relocated to a new place.

During the project, the different technology options described above were discussed in detail with the enterprise. In it's evaluation of the technology options to replace CFC-11, IZOTEK considered the following criteria:

- Environmental acceptability
- Physical properties
- Maturity of the technology
- Safety and applicability in the enterprise factory environment
- Price, product availability, and cost-effectiveness
- Energy efficiency impact
- CFC-11 replacement technology selected by competitors
- MLF EXCOM decisions relating to HCFC and hydrocarbon technologies

To assist the enterprises in the selection of a CFC-11 replacement technology, separate project budgets were prepared for the HCFC-141b and cyclopentane technology options.

Whilst recognizing the environmental benefits of cyclopentane versus HCFC-141b, IZOTEK selected HCFC-141b as a first stage, interim, replacement for CFC-11. The decision in favor of HCFC-141b were based on the better insulation value, lower investment and operational costs, and the fact that it is more appropriate to the existing skill levels of the work forces at their enterprise.

IZOTEK understands the implications of the selection of HCFC-141b technology, and the potential cost of subsequent replacement of HCFC-141b at an undetermined future date. They accept and commit to a future change from HCFC-141b to a zero-ODP technology, and that they will have to bear all of the associated costs.

Other factors also influenced the enterprise decisions in favor of HCFC-141b technology:

- HCFC-141b is the technology adopted by most of their existing, or potential, competitors in Turkey.

- Whilst the Executive Committee's decisions relating to CFC-11 replacement technology selection may "presume" against the use of HCFCs, such HCFC based technologies are not prohibited and may still be considered eligible for MLF assistance. The Ministry of Environment of Republic of Turkey, the responsible Turkish Government authority, supports the selection of HCFC-141b as an "interim" CFC replacement technology at IZOTEK.

- IZOTEK expressed concerns regarding the longer term safety issues related to the introduction of a flammable blowing agent technology into their factory environment and their choice at the present time is a non-flammable CFC replacement.

- IZOTEK factory is situated in the area, which is foreseen to become residential area in the near future and no more industrial activities will be allowed. Therefore, they do not see realistic and commercially feasible to construct a complicated building and utility systems required for the cyclopentane installation for interim term, which IZOTEK should soon move to the other not known yet site.

Water blown foam formulations do not yet represent a commercially available option and technically this technology does not meet IZOTEK's and their clients' requirement on insulation value/energy efficiency for cold room insulation applications.

At the present time, **liquid HFC technology** does not meet the criteria on maturity and commercial availability of the technology. However, liquid HFC technology is considered a likely zero-ODP candidate to replace HCFC-141b in the time frame of 2003 – 2005 subject to successful results from ongoing toxicological and environmental impact studies.

The selection of HCFC-141b technology by the enterprise in this project as the immediate replacement for CFC-11 is a realistic and sensible choice under the prevailing circumstances. The enterprise understands that HCFC-141b is an interim solution that will require a change to an appropriate zero-ODP technology at some future date. Based on the present status of non-flammable zero-ODP technologies, it expects to utilize HCFC-141b technology until approximately 2005.