UNITED NATIONS

EP

United Nations Environment Programme

Distr.
Limited

UNEP/OzL.Pro/ExCom/28/27/Add.1
28 June 1999

ORIGINAL: ENGLISH

EXECUTIVE COMMITTEE OF
THE MULTILATERAL FUND FOR THE
IMPLEMENTATION OF THE MONTREAL PROTOCOL
Twenty-eighth Meeting
Montreal, 14-16 July 1999

Addendum

PROJECT PROPOSALS: COLOMBIA

Sector: Foam

Please insert Annex I after page 4 of UNEP/OzL.Pro/ExCom/28/27.

Sector: Refrigeration

Please insert Annex I after page 8 of document UNEP/OzL.Pro/ExCom/28/27.

Sector Foam:

Annex I

JUSTIFICATION OF SELECTION OF ALTERNATIVE TECHNOLOGY (HCFC-141B)

(Extract from the Project Document)

Elimination of CFC-11 in the manufacture of rigid polyurethane foam through the use of HCFC-141b technology at ROJAS HNOS LTDA.

Currently, there are four technically feasible replacement technologies for CFC-11 as blowing agent in the production of rigid polyurethane foams for construction and insulating purposes: (a) HCFC-141b, (b) HCFC 22, (c) HFC-134a, and (d) cyclopentane.

The first technology is comparable to the CFC-11/water system used currently, but it is a transitional solution due to the presence of HCFC-141b. Due to its ozone depleting potential (ODP) of 0.1, this option needs to be replaced in the future, most probably by HFC-245 fa, a promising substance yet not available at commercial scale. About a 10% increase in density is normally required to compensate for the lower dimensional stability of the foam. This solution can technically be implemented in the shortest time and the best chance of success in the enterprise because it is closest to the current technology. Commonly associated investments in HP foaming equipment are made to ensure excellent foam quality, compensating for the decreased solubility of the HCFC-141b vs. CFC-11 and loss in thermal insulation quality, as well as the elimination of methylene chloride as the flushing agent.

The second system, also a transitional solution with a lower ODP (0.05) uses a foaming gas. It requires a HP foaming equipment that includes an in-line pre-mixing device (already available in the market); or a conventional HP dispensing machine plus a pre-blending unit. Its advantage resides in that the same equipment may operate with other gaseous solutions such as HFC-134a. As with HCFC-141b, this technology requires about a 10% increase in density to compensate for the gains in thermal conductivity.

The third system is similar to the HCFC-22 option, although it does not have ODP, and can be considered as a definitive technology. Notwithstanding, the high price of HFC-134a vs HCFC-141b or HCFC-22, does not make this technology economically feasible for the moment being. Also, requiring more water than the other alternatives, it may present potential dimensional problems if not handled properly.

The fourth solution is cyclopentane, a technology that has successfully been introduced in various European Countries. The use of pentane in this case would be prohibitive from the safety cost standpoint, both at the foaming head and where electrically heated fixtures are used.

The interim HCFC-141b solution seems to be the simplest option at a relatively moderate investment cost. It is commercially available in Colombia, and there is some experience in pre-blended HCFC-141b/polyol at the local market as the recently converted domestic refrigeration companies have also opted for this technology. For these reasons, ROJAS HNOS LTDA. will use:

a) HCFC-141b as an intermediate option; and
b) HFC-134a or HFC-245fa as final solutions.

The enterprise has been informed that HCFC's are transitional substances. The enterprise has also been informed that under the present rules of the Multilateral Fund, no additional funding can be requested for a final conversion to a non ODS substance. The enterprise is well aware of all issues around HCFC-141b. The enterprise has decided to use HCFC-141b for its foam operation. The final solutions will need some time to implement, and the final decision would be taken according to the ultimate trends in the Colombian market. ROJAS HNOS LTDA is aware that it will bear the costs of these final solutions

Sector: Refrigeration

Annex I

JUSTIFICATION FOR THE USE OF HCFC-141B

(Extract from the Project Document)

Justifications for the choice of HCFC's as the replacement technology are identical for the following two projects. The justification for one the projects is provided below as a sample.

(a) Replacement of CFC-11 foam blowing agent with HCFC-141b and CFC-12 refrigerant with HFC-134a in the manufacture of commercial refrigerators and polyurethane sandwich panels at Polares Ltda.

(b) Replacement of CFC-11 foam blowing agent with HCFC-141b and CFC-12 refrigerant with HFC-134a in the manufacture of commercial refrigerators and polyurethane sandwich panels at Industrias de Supernordico

Currently the two leading technology options for the replacement of CFC 11 in PU insulation foams for domestic and commercial refrigerators and freezers are: HCFC 141b or cyclo-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. Thus, it has found only limited use on a commercial scale. In addition, vacuum panels have been introduced by some domestic refrigerator manufacturers, but the technology is still being developed, it is expensive, and its application across the wide range of models of domestic and commercial refrigerators and freezers remains to be determined.

Hence, the first option is to replace CFC-11 with the low-ODP HCFC-141b. The technology used in this process is similar to the one used in CFC-11. This option should be viewed as a transition technology given that HCFCs also destroy the ozone layer. Potential action to follow up with the conversion to non-ODP substances may involve the use of liquid HFCs (i.e. HFC 356 or HFC 245) or the production of a full water blown foam with improved cell structure.

The second option, cyclo-pentane technology, is commercially proven and is now extensively used in Europe. However, cyclo-pentane is flammable and this means a careful review of manufacturing operations with respect to the safe handling of a flammable foam-blowing agent. Cyclo-pentane technology may not be a practical or cost effective option in the existing work-place environments at many smaller scale enterprises due to the safety modifications required.

In considering the principle technology options for CFC 11 replacement, POLARES used the following selection criteria: 1) Environmental acceptability, 2) Physical properties, 3) Maturity of the technology, 4) Energy efficiency impact, 5) Safety, 6) Cost effectiveness, and 7) Local availability of auxiliary blowing agents.

Whilst recognizing the environmental benefits of cyclo-pentane versus HCFC 141b POLARES selected HCFC 141b as a first stage, interim, replacement for CFC 11 as it provides

the best energy efficiency, and the lowest investment and operational cost. It is also most suited to the factory layout and present skill levels of the work force at the company.

Other considerations, which influenced the POLARES decision in favor of HCFC 141b technology, are:

HCFC 141b is the technology adopted by all of the other domestic and commercial refrigerator and freezer manufacturers in Colombia in projects approved by the MLF. With no local supplies, no other local demand, and its own very small requirements, POLARES is concerned about both product availability and the price of cyclo-pentane in Colombia.

POLARES management also has concerns regarding the safety issues related to the introduction of a flammable blowing agent technology into its factory environment. With a relatively inexperienced work force, the choice at the present time is a non-flammable CFC replacement.

The enterprise has been informed that HCFC's are transitional substances. The enterprise has also been informed that under the present rules of the MLF, no additional funding can be requested for a final conversion to a non ODS substance. The enterprise is well aware of all issues around 141b and other substitutes. The enterprise has decided to use HCFC-141b for its foam operation. The enterprise are not able to provide any information on when it will convert to a non ODS substitute.

In considering the principle technology options for CFC 11 replacement, POLARES used the following selection criteria: 1) Environmental acceptability, 2) Physical properties, 3) Maturity of the technology, 4) Energy efficiency impact, 5) Safety, 6) Cost effectiveness, and 7) Local availability of auxiliary blowing agents.

Whilst recognizing the environmental benefits of cyclo-pentane versus HCFC 141b POLARES selected HCFC 141b as a first stage, interim, replacement for CFC 11 as it provides the best energy efficiency, and the lowest investment and operational cost. It is also most suited to the factory layout and present skill levels of the work force at the company.

Other considerations, which influenced the POLARES decision in favor of HCFC 141b technology, are:

HCFC 141b is the technology adopted by all of the other domestic and commercial refrigerator and freezer manufacturers in Colombia in projects approved by the MLF. With no local supplies, no other local demand, and its own very small requirements, POLARES is concerned about both product availability and the price of cyclo-pentane in Colombia.

POLARES management also has concerns regarding the safety issues related to the introduction of a flammable blowing agent technology into its factory environment. With a relatively inexperienced work force, the choice at the present time is a non-flammable CFC replacement.

The enterprise has been informed that HCFC's are transitional substances. The enterprise has also been informed that under the present rules of the MLF, no additional funding can be requested for a final conversion to a non ODS substance. The enterprise is well aware of all issues around HCFC 141b. The enterprise has decided to use HCFC-141b for its foam operation. The enterprise are not able to provide any information on when it will convert to a non ODS substitute.