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Addendum

PROJECT PROPOSALS: ARGENTINA

Please insert the attached Annexes to document UNEP/OzL.Pro/ExCom/28/24 as follows:

Sector: Foam

Please insert Annex I after page 4.

Sector: Refrigeration

Please insert Annex I after page 12.

Sector: Foam

Annex I

JUSTIFICATION FOR THE USE OF HCFC-141B
(Extract from the Project Document)

(a) Phasing out CFC-11 by conversion to HCFC-141b as a blowing agent in the manufacture of rigid P.U. blocks and tank spraying at Polwer S.R.L.

The possible alternative blowing agents for blocks and spray rigid foams are:

Blowing agent	***ODP***
100 % CO_2 (water – isocyanate reaction)	0
HCFC-141b	0.11
Cyclopentane	0
N-pentane	0
HFC-356	0

The major advantages and disadvantages of the various alternatives are as follows:

100 % CO_2 - Advantages Environmentally attractive	- Disadvantages Poorer physical properties Poorer foam adhesion 20-25 % increase in initial λ-factor (thermal conductivity) Fast foam ageing, due to gas diffusion, if foam not protected Higher exotherm limits production of thick elements Significant cost increase (+30%) Polyol viscosity limitations
HCFC-141b - Advantages Low flammability impact 10% more efficient blowing agent than CFC-11 λ-factor comparable to CFC-11, when good foam quality is achieved Good foam ageing characteristic Cost effective	Disadvantages Transitional substance Higher solvency effect

Pentane - Advantages Zero ODP Halogen free Low cost Liquid at room temperature Good foam ageing characteristics Foam properties acceptable	- Disadvantages Highly flammable Plant modifications required Low solubility in most of the polyols 20 % increase in initial λ-factor (cyclo-...pentane) and 27 % increase in initial λ-...factor (n-pentane)
HFC-356 - Advantages Environmentally attractive Boiling point 24 °C Non flammable Relatively soluble in standard PU materials λ-factor similar to CFC-11 Good foam ageing characteristics	- Disadvantages Toxicity unknown Cost unknown Availability uncertain

Although from the environmental point of view the use of a totally CO_2 blown system is an attractive solution, it has not been considered as an alternative technology for the production of block foams due to the potentially excessive foam exotherm. It is anticipated that further developments may make this approach commercially viable in the not too distant future.

Pentane technology is another possible solution. It requires extensive precautionary measures due to the flammable and explosive character of pentane. Its use requires the installation of expensive safety features which would significantly increase investment cost and make the project prohibitively expensive. In this case it is not a viable option.

The technologies for application of HFC-356 and other new foaming agents (e.g. fluorinated ethers) are not yet mature.

The counterpart (POLWER S.R.L.) was briefed about the main technical, commercial and other issues related to the available technological options and has decided that HCFC-141b is the technically and economically acceptable one as a transitional solution. The company has decided for a zero ODP solution employing only carbon dioxide generated from the water/isocyanate reaction or the use of HFCs as an ultimate solution. No further investment is foreseen to convert to either technologies. HCFC-141b will be used as an interim step to the final solution.

Sector: Refrigeration

Annex I

JUSTIFICATION FOR THE USE OF HCFC-141B
(Extract from the Project Document)

(a) Phaseout of CFC-11 by conversion to HCFC-141b techn., and of CFC-12 by conversion to HFC-134a in the manufacture of com. ref, display cabinets and polyurethane panels for cold stores at Perito Moreno Ref.

The presently preferred ODS phase-out technologies for rigid polyurethane insulating foams are:

CLASSIFICATION	LIQUID TECHNOLOGY	GAS TECHNOLOGY
LOW ODP TECHNOLOGIES (“INTERIM”)	HCFC-141b HCFC-141b/22	HCFC-22, -142b HCFC-22/142b
ODS-FREE TECHNOLOGIES (“PERMANENT”)	(CYCLO)PENTANE WATER, HFC-365, HFC-245fa	HFC-134a

The selection of the alternative technology would be governed by the following considerations:

a) Proven and reasonably mature technology
b) Cost effective conversion
c) Local availability of substitute
d) Acceptable processing
e) Critical properties to be maintained in the end product
f) Meeting established standards on environment and safety

HCFC-141b has an ODP of 0.11. Its application is proven, mature, relatively cost-effective and systems that fit the enterprise’s applications are locally available. HCFC-141b can, however, be destabilizing in higher concentrations, being a strong solvent, which would lead to the need to increase the foam density. As an interim option, its application would only be recommended if permanent options do not provide acceptable solutions.

HCFC-22 has an ODP of 0.05 and is under ambient conditions a gas. It is not offered in the applicable regional area as a premixed system and would require an on-site premixer.

HCFC-141b/HCFC-22 blends can reduce the solvent effect of HCFC-141b alone and therefore allow lower densities while maintaining acceptable insulation values. The blends are, however, not available in Argentina or neighbouring countries. On-site multi-component blending would significantly increase the one-time project costs. Being an interim option, the same restrictions as for HCFC-141b would apply.

(CYCLO-)PENTANE is not an acceptable alternative. The use of hydrocarbons is a preferred solution only when feasible from a safety and cost effectiveness standpoint. The relatively high investments for safety costs tend to limit pentane use to relatively large CFC users. In addition, the use of pentane is limited to those enterprises whose facilities can be adapted to meet safety requirements, and can be relied on to maintain safe operations.

WATER-BASED systems are more expensive (up to 50%) than other CFC-free technologies due to reductions in insulation value (requiring larger thickness) and lower cell stability (requiring higher densities). They are also currently not available in the Argentina, although this may change in the next two years based on MLF-sponsored activities. Water-based formulations tend to be most applicable in relatively less critical applications, such as in situ foams and thermoware.

LIQUID HFCs do not currently meet requirements on maturity and availability.

HFC-134a is under ambient conditions a gas. It is not offered in the applicable regional area as a premixed system and would require an on-site premixer. It is also less energy efficient, and expensive compared to most other technologies.

The investment costs to convert to pentane are prohibitive, based on the fact that there are three production lines to be converted. In addition, the enterprise is located in a residential area, where the use of hydrocarbons would present a serious safety risk. The company will use either water based or HFC systems as the permanent technology when they become commercially available. Until the commercial availability of one of the permanent solutions (expected time 3-5 years), the company will employ HCFC-141b as an interim technology to maintain product standards.