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COMITE EXECUTIF
DU FONDS MULTILATERAL AUX FINS
D'APPLICATION DU PROTOCOLE DE MONTREAL
Soixante-seizième réunion
Montréal, 9 – 13 mai 2016

PROPOSITION DE PROJET : ÉGYPTE

Ce document contient les observations et les recommandations du Secrétariat du Fonds sur la proposition de projet ci-dessous :

Mousses

• Projet de démonstration sur les choix de reconversion à faible coût à des technologies sans SAO pour la mousse de polyuréthanne chez les très petits utilisateurs	PNUD

FICHE D'ÉVALUATION DE PROJET : PROJET NON PLURIANNUEL
ÉGYPTE

TITRE DU PROJET	AGENCE D'EXÉCUTION/BILATÉRALE
a) Projet de démonstration sur les choix de reconversion à faible coût à des technologies sans SAO pour la mousse de polyuréthanne chez les très petits utilisateurs	PNUD

AGENCE NATIONALE DE COORDINATION	Agence égyptienne des affaires environnementales, bureau national de l'ozone

DERNIÈRES DONNÉES DÉCLARÉES SUR LA CONSOMMATION DES SAO À ÉLIMINER GRÂCE AU PROJET

A : DONNÉES RELATIVES À L'ARTICLE 7 (TONNES PAO, 2014, EN DATE DE MARS 2016)

HCFC	320,3

B : DONNÉES SECTORIELLES DU PROGRAMME DE PAYS (TONNES PAO, 2014, EN DATE DE MARS 2016)

HCFC-22	174,5
HCFC-123	0
HCFC-141b	123,1
HCFC-142b	9,5
HCFC-141b dans les polyols prémélangés importés	13,2

Consommation restante de HCFC admissible au financement (tonnes PAO)	310,61

AFFECTATIONS DANS LES PLANS D'ACTIVITÉS DE L'ANNÉE EN COURS		**Financement ($US)**	**Élimination (tonnes PAO)**
	a)	S.o.	S.o.

TITRE DU PROJET :	
Consommation de SAO par l'entreprise (tonnes PAO) :	S.o.
SAO à éliminer (tonnes PAO) :	S.o.
SAO à introduire (tonnes PAO) :	S.o.
Durée du projet (mois) :	12
Somme demandée à l'origine ($US) :	340 000
Coût final du projet ($US) :	
Coûts différentiels d'investissement :	275 000
Imprévus (10 %) :	20 000
Coûts différentiels d'exploitation :	0
Coût total du projet :	295 000
Participation locale au capital (%) :	S.o.
Élément d'exportation (%) :	S.o.
Subvention demandée ($US) :	295 000
Rapport coût-efficacité ($US/kg) :	7,40
Coûts d'appui à l'agence d'exécution ($US) :	20 650
Coût total du projet pour le Fonds multilatéral ($US) :	315 650
Financement de contrepartie confirmé (O/N) :	N
Échéances de suivi incluses ? (O/N)	O

RECOMMANDATION DU SECRÉTARIAT	Examen individuel

DESCRIPTION DU PROJET

Contexte

1. Le PNUD a soumis à la 75e réunion un projet de démonstration sur les choix de reconversion à faible coût à des technologies sans SAO dans le secteur de la mousse de polyuréthanne chez les très petits utilisateurs, pour la somme initiale de 340 000 $US, plus les coûts d'appui à l'agence de 23 800 $US[1]. À l'issue des délibérations au sein du groupe de contact formé afin d'examiner tous les projets de démonstration des technologies à faible potentiel de réchauffement de la planète soumis à la 75e réunion, le Comité exécutif a décidé de reporter l'examen des sept projets de démonstration, y compris le projet du secteur des mousses en Égypte, à la 76e réunion (décision 75/42).

2. Le PNUD soumet de nouveau le projet mentionné ci-dessus à la 76e réunion, au nom du gouvernement de l'Égypte, pour la somme de 340 000 $US, plus les coûts d'appui à l'agence de 23 800 $US.

Objectifs du projet

3. Le secteur des mousses comprend un très grand nombre de très petits utilisateurs qui mélangent les formules à la main, ce qui crée des problèmes de santé et sécurité au travail attribuables à l'absence de dispositifs contrôle des émissions ou de protection personnelle. En général, le Fonds multilatéral fournit une assistance technique pour éliminer le HCFC-141b utilisé par les très petits utilisateurs, à cause de leur très faible niveau de consommation de HCFC (c.-à-d., de 100 à 200 kg par année). Dans le cas du plan de gestion de l'élimination des HCFC (PGEH) pour l'Égypte, des sommes ont été versées aux sociétés de formulation afin qu'elles fournissent de l'équipement de base de fabrication de mousse que les très petits utilisateurs pourraient louer afin d'éliminer leur consommation de HCFC-141b. Toutefois, aucune somme n'a été fournie pour la recherche et le développement de nouvelles applications dans le secteur des mousses.

4. Le projet de démonstration porte sur le développement d'une distributrice de mousse à faible coût dotée d'un compresseur d'air fonctionnant sans électricité pour les applications « couler sur place » ou encore, l'examen de solutions pour réduire le coût des distributrices de mousse vendues sur le marché que les très petits utilisateurs pourraient utiliser. Il propose également d'examiner la possibilité d'emballer préalablement les formules de mousse de polyuréthanne dans des emballages scellés, de longue vie et utilisables sur demande (elles sont utilisées en Colombie, au Mexique et aux États-Unis d'Amérique à l'heure actuelle, pour certaines applications).

Mise en œuvre du projet

5. Le développement d'équipement de distribution de mousse à faible coût exige le choix d'un importateur, d'un assembleur ou d'un fournisseur de service de distributrices, l'examen de l'équipement existant et l'évaluation des modifications requises, la publication d'un appel d'offres pour la fabrication d'une nouvelle distributrice de mousse à faible coût, la validation et l'optimisation de la distributrice et un atelier pour présenter les résultats.

6. Le développement d'une formule de polyol entièrement développée et préemballée exige le choix d'une société de formulation acceptant de participer à l'évaluation du projet, l'évaluation des formules vendues en Égypte et ensuite dans d'autres pays visés à l'article 5 possédant des sociétés de formulation pour la mousse de polyuréthanne, l'aménagement d'installations de production locale dans la société de formulation choisie, des essais et des prototypes dans au moins une ou deux entreprises de fabrication de mousse et un atelier pour présenter les résultats.

[1] UNEP/OzL.Pro/ExCom/75/45.

7. Plusieurs fournisseurs d'équipement et sociétés de formulation potentiels ont été recensés pour participer au processus.

8. Le projet devrait être mené à terme dans un délai de 12 mois.

Coûts du projet

9. Le coût total du projet à l'origine a été évalué à 340 000 $US, comme indiqué en détail ci-dessous.

Tableau 1. Coûts proposés pour le projet

Activité	Description	Coût ($US)
Gestion du projet	Expert local Expert international	30 000 30 000
Définition de la capacité locale	Visite d'étude technique pour l'équipement Visite d'étude chimique sur les produits chimiques	10 000 10 000
Développement et fabrication du prototype de l'équipement de production	Optimisation de l'équipement existant Développement de nouvel équipement Développement de formules préemballées	50 000 50 000 25 000
Validation/évaluation sur le terrain	Équipement existant optimisé Nouvel équipement Formules préemballées	20 000 20 000 10 000
Atelier de diffusion de la technologie	Combiné pour les trois approches	25 000
Examen par les pairs/analyse de la sécurité/préparation	Audit de sécurité, examen par des pairs, coûts de préparation	30 000
Imprévus	(10 pour cent, arrondis)	30 000
Total		**340 000**

OBSERVATIONS ET RECOMMANDATION DU SECRÉTARIAT

OBSERVATIONS

10. La proposition soumise à la 76e réunion, comparativement à celle proposée à la 75e réunion, fournit une raison supplémentaire pour approuver le projet au titre de la décision 72/40 et un engagement du gouvernement de l'Égypte à soustraire une quantité supplémentaire de HCFC-141b de la consommation restante de HCFC-141b admissible au financement. Le Secrétariat a pris note avec satisfaction des efforts du PNUD pour concevoir un projet qui fournirait une assistance directe aux très petits utilisateurs dans le secteur des mousses, sans l'appui financier du Secrétariat pour la préparation de projet.

11. Les conclusions des délibérations entre le Secrétariat et le PNUD sur le projet de démonstration soumis aux 75e et 76e réunions du Comité exécutif sont résumées ci-dessous, aux fins de commodité :

a) En ce qui concerne la raison supplémentaire justifiant la soumission et l'approbation de la soumission, le PNUD a expliqué que le projet contribuerait à une utilisation plus efficace des formules de mousse à faible potentiel de réchauffement de la planète (telles que le formiate de méthyle et le méthylal) en optimisant l'équipement et les formules, tout en ciblant les très petits utilisateurs qui reçoivent très peu d'assistance directe de la part du Fonds multilatéral. Malgré l'absence de garantie que le très petit utilisateur ne choisira pas une formule de mousse à potentiel élevé de réchauffement de la planète, l'existence de formules de mousse économiques à faible potentiel de réchauffement de la planète permet aux très petits utilisateurs de faire un meilleur choix ;

b) Le PNUD a expliqué qu'une nouvelle distributrice de mousse serait conçue. Elle offrirait deux têtes malaxeuses simplifiées et des boyaux plus courts, un compresseur intégré et des réservoirs de produits chimiques à même l'appareil, pour moins de 10 000 $US. Le projet a donc le potentiel d'intégrer des distributrices de mousse à faible coût sur le marché pour les très petits utilisateurs ;

c) Quant au choix d'une entreprise pour la mise en œuvre du projet, le PNUD a précisé que l'entreprise n'a pas encore été choisie, même si certaines d'entre elles ont manifesté de l'intérêt envers le développement de l'équipement, et que le choix de l'entreprise se ferait par appel d'offres ;

d) En ce qui concerne l'optimisation des formules de mousse existantes, le PNUD a indiqué qu'elles seraient destinées aux très petits utilisateurs dont les activités de fabrication sont de petite envergure et qui n'ont besoin que de très petites quantités de formules de mousse. Le projet entrevoit donc la fabrication de petits emballages bien fermés ayant une durée de vie pouvant atteindre deux ans. Au moment de l'utiliser, il suffit de perforer l'emballage. L'assistance fournie à l'heure actuelle aux sociétés de formulation en Égypte ne comprend pas la possibilité d'actualiser ces innovations ;

e) Quant à la réduction du coût du projet[2], le PNUD a modifié le budget de 340 000 $US à 295 000 $US, comme expliqué en détail dans le tableau 2.

Tableau 2. Coûts révisés du projet

Activité	Description	Coût ($US)
Gestion du projet	Expert local Expert international	30 000 30 000
Définition de la capacité locale	Visite d'étude technique pour l'équipement Visite d'étude chimique sur les produits chimiques	7 500 7 500
Développement et fabrication du prototype de l'équipement de production	Optimisation de l'équipement existant Développement de nouvel équipement Développement de formules préemballées	50 000 50 000 25 000
Validation/évaluation sur le terrain	Équipement existant optimisé Nouvel équipement Formules préemballées	20 000 20 000 10 000
Atelier de diffusion de la technologie	Combiné pour les trois approches	0
Examen par les pairs/analyse de la sécurité/préparation	Audit de sécurité, examen par des pairs, coûts de préparation	25 000
Imprévus	(10 pour cent, arrondis)	20 000
Total		**295 000**

12. Le projet proposé à l'origine à la 75e réunion avait pour objet d'éliminer 2,4 tonnes PAO (22,7 tonnes métriques (tm) de HCFC-141b, alors que le projet proposé à la 76e réunion propose d'éliminer 4,4 tonnes PAO (40,4 tm) et comprend l'engagement du gouvernement de soustraire cette consommation de la consommation restante admissible au financement à la deuxième étape du PGEH pour l'Égypte. La proposition de projet révisée est jointe à l'annexe I au présent document.

[2] Le Comité exécutif, dans sa décision 74/21 c), prie les agences bilatérales et d'exécution de réduire le coût des projets de démonstration afin de permettre l'approbation d'un plus grand nombre de projets pour la somme de 10 millions $US, conformément à la décision 72/40, et d'examiner d'autres sources de financement supplémentaire.

Conclusion

13. Le Secrétariat reconnaît que la mise en œuvre de ce projet serait bénéfique aux très petits utilisateurs de formules de mousse en réduisant le coût des distributrices et en fournissant des formules préemballées de mousse à faible potentiel de réchauffement de la planète à utiliser au besoin, mais la proposition ne fait pas la démonstration au sens strict de nouvelles solutions de remplacement à faible potentiel de réchauffement de la planète pour les HCFC, car il a recours à une technologie déjà offerte sur le marché. Le Secrétariat reconnaît également que le PNUD a réduit le coût total du projet de 340 000 $US à 295 000 $US et que le gouvernement s'engage à soustraire 4,4 tonnes PAO de HCFC-141b de la consommation restante admissible de l'Égypte qui sera financée à la deuxième étape.

RECOMMANDATION

14. Le Comité exécutif pourrait souhaiter :

a) Tenir compte du projet de démonstration sur les solutions à faible coût pour la reconversion à des technologies sans SAO dans la fabrication de mousse de polyuréthanne chez les très petits utilisateurs en Égypte, dans le contexte de ses débats sur les propositions de projets de démonstration de solutions de remplacement à faible potentiel de réchauffement de la planète pour les HCFC, comme décrit dans le document sur l'Aperçu des questions recensées pendant l'examen des projets (UNEP/OzL.Pro/ExCom/76/12);

b) Approuver le projet de démonstration sur les solutions à faible coût pour la reconversion à des technologies sans SAO pour la mousse de polyuréthanne chez les très petits utilisateurs en Égypte, pour la somme de 295 000 $US, plus les coûts d'appui à l'agence de 20 650 $US pour le PNUD, conformément à la décision 72/40;

c) Exhorter le gouvernement de l'Égypte et le PNUE à mener le projet à terme dans 12 mois comme prévu et à remettre un rapport final complet peu après l'achèvement du projet; et

d) Soustraire 4,40 tonnes PAO de HCFC de la consommation restante admissible au financement à la deuxième étape du plan de gestion de l'élimination des HCFC pour l'Égypte.

Annex I

COUNTRY: Egypt	**IMPLEMENTING AGENCY: UNDP**
PROJECT TITLE:	**Demonstration of Low Cost Options for the Conversion to non-ODS Technologies in PU Foams at Very Small Users (VSUs)**
PROJECT IN CURRENT BUSINESS PLAN:	**Based on ExCom Decision 72/40**
SECTOR:	**Foams**
Sub-Sector:	**Rigid and Integral Skin PU Foams**
ODS USE IN SECTOR:	**227.95 ODP (including 98.34 ODP as polyols)**
BASELINE ODS USE:	**484.61 ODP**
PROJECT IMPACT (ODP targeted):	**4.4 ODP (demonstration project)**
PROJECT DURATION:	**12 months**
PROJECT COSTS:	**US$ 295,000**
LOCAL OWNERSHIP:	**100%**
EXPORT COMPONENT:	**n/a**
REQUESTED MLF GRANT:	**US$ 295,000**
IMPLEMENTING AGENCY SUPPORT COST:	**US$ 20,650**
TOTAL COST OF PROJECT TO MLF:	**US$ 315,650**
COST-EFFECTIVENESS:	**7.4 US$/kg**
PROJECT MONITORING MILESTONES:	**Included**
NTL. COORDINATING AGENCY:	**Egypt Environmental Affairs Agency (EEAA), National Ozone Unit**

PROJECT SUMMARY

The objective of this project is support very small PU users in a cost-effective way by:
- optimizing, validating and disseminating easy to use low cost PU metering equipment and
- introducing pre-packaged systems

While the earmarked technologies will be applicable to VSUs anywhere in the world, the country selected for implementation is Egypt. Egypt is a Party to the Vienna Convention and the Montreal Protocol and ratified the London, Copenhagen and Montreal amendments. The country is fully committed to the phaseout of HCFCs and willing to take the lead in assessing and implementing new HCFC phaseout technologies, particularly in the foam sector—as it did for CFCs in 1992 when it submitted and completed the first foam sector investment projects ever under the MLF. Egypt has local PU system houses that frequently combine importations and distributions for major international chemical and equipment manufacturers with local blending for SMEs. In addition, most international PU chemicals suppliers are represented with offices or their own system houses. Its existing HCFC phaseout program has a section dedicated to VSUs that is in need for the outcome of this demonstration project but will not require additional investment funding. Similar projects in Brazil, Mexico and Nigeria are also in need to address its VSU customers.

IMPACT OF PROJECT MONTREAL PROTOCOL OBLIGATIONS RELATED TO VSUs

This project is a pilot project aimed to optimize PU sector technologies and will contribute indirectly to the fulfillment of Montreal Protocol obligations in any country with a VSU subsector. In Egypt, Mexico and Nigeria this will facilitate existing, approved programs and NOT lead to additional funding—just better implementation because, if successfully validated, the optimized technology will contribute to availability of better and cost-effective phaseout options.

Prepared by: Bert Veenendaal **Date: March, 2016**

PROJECT OF THE GOVERNMENT OF EGYPT
DEMONSTRATION OF LOW COST OPTIONS FOR THE CONVERSION TO NON-ODS TECHNOLOGIES IN PU FOAMS AT VERY SMALL USERS (VSUs)

1. PROJECT OBJECTIVES AND RATIONALE

The objectives of this project are to:

- Optimize and validate low cost chemical and equipment options for ODS phaseout at VSUs;
- Demonstrate these in downstream operations;
- Transfer the technology to interested system houses and other users around the world, and
- Use the outcome in existing projects thus, at no additional costs, improving the success of these projects.

2. CONTEXT

2.1 MARKETS/APPLICATIONS

While VSUs are not limited in applications—rather in size—there are typical applications. They are:

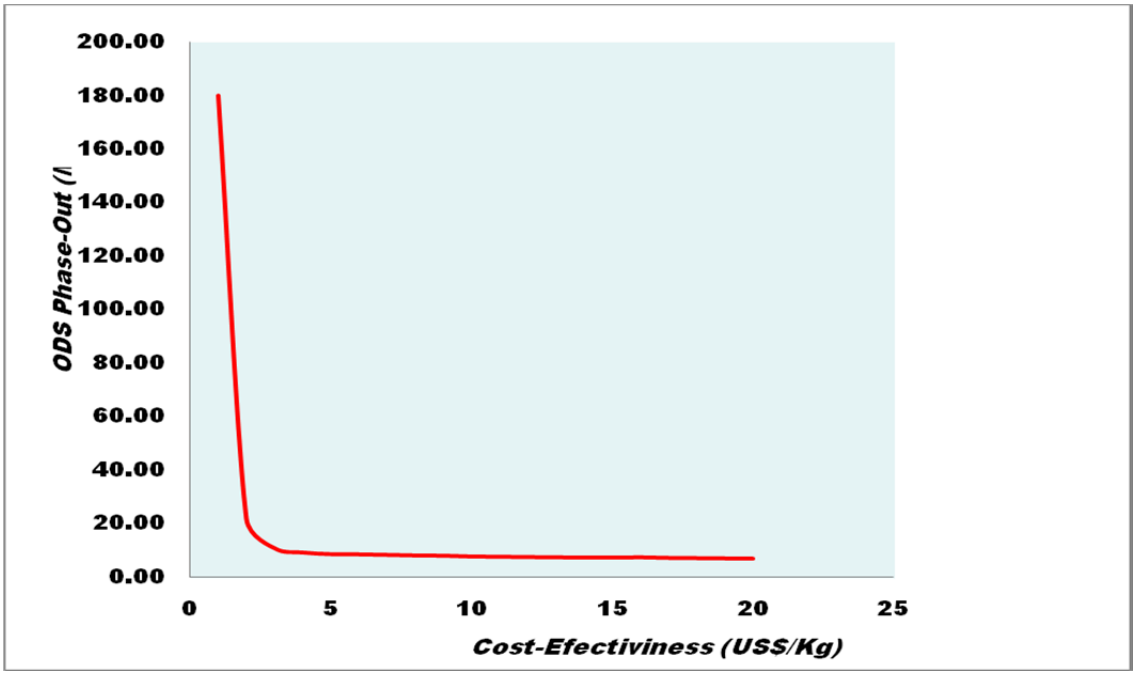
For Rigid PU Foam	- boat insulation
	- repair of existing insulation
	- home insulation improvement
	- making disposable molds (mostly in ceramic applications)
	- marine fenders
	- concrete replacement
For Integral Skin Foam	- bicycle saddles
	- safety coatings in exercise equipment
	- fenders
	- furniture parts

2.2 PREVIOUS WORK WITH VSUs

MLF projects are since 1993 subject to Cost-Effectiveness (C/E) Thresholds. These thresholds are not taking consumption volumes into account and therefore are frequently difficult to meet by very small users (VSUs). Many VSUs practice hand-mix, an operation deemed an industrial hygienic concern as no emission control or personal protection is used. These companies need low cost/easy to use equipment that meets applicable limits on cost-effectiveness. Others use infrequently PU foams and have problems with inventories in view of the relatively short life time of existing systems (3-6 months).

A first attempt to deal fairly and effectively with small users (SMEs) was a 1995 study by UNDP called *"Determination of Cost-Effective Phaseout Approaches for Enterprises with relatively Small ODS Use"*. The Multilateral Fund Secretariat (MFS) prepared, based on this study, Document 17/55 (June 30, 1995) called "Strategy Paper for Small Foam producing Enterprises". It recommended dividing projects by size and foam category; to assign to large and medium sized enterprises specific C/E thresholds and to make the approval of small projects subject to specific cost containment procedures. This would have addressed the issue. However, the study was not accepted at that time and was never transformed into a formal policy. Nevertheless, anybody who reads the document and is familiar with approval procedures will recognize later use of many of the proposed elements.

The cost effectiveness increases exponentially when the consumption decreases as following graph shows:



Following approaches have been tried by UNDP to obtain cost containment when dealing with SMEs:

- Management : Use local experts; work with group projects
- Technology : Evaluate and validate new technologies
- Equipment : Use more retrofit; develop low-cost equipment
- Trials/Tests : Get suppliers involved
- IOCs : Regardless of the technology applied, calculate IOCs based on the lowest cost (validated) technology

The largest success has been creating ODS projects using PU System Houses as project managers. This approach provided not only local project management but also larger economy of scale and supplier-arranged trials/tests.

The validation of new technologies was almost equally successful. UNDP conducted in the foam sector ten (10) demonstration projects to evaluate new—or to modify existing—technologies. Through this program, methyl formate (MF) and methylal (ML)—both oxygenated hydrocarbons or HCOs—are already approved in over 10 countries -- Brazil, Cameroon, Dominican Republic, Egypt, El Salvador, Nigeria, Russia, South Africa and Trinidad-Tobago and in several of these countries by now successfully completed. One system house in Mexico offers successfully preblended hydrocarbons, including smaller users in sprayfoam. While some of the demonstrated technologies suffer under economic constraints, such as high license fees (supercritical CO_2) or high operating costs (HFOs) the program in general has saved the MLF millions of dollars in project costs.

Attempts to decrease equipment costs had mixed results. UNDP has, as part of CFC as well as HCFC phaseout plans, consistently searched for lower cost equipment as described in detail above. Such attempts had mixed results:

- Retrofit of equipment has significantly decreased costs when using water, MF or ML technologies (Mexico, Dominican Republic, El Salvador);
- Renting out equipment to very small users (VSUs) failed because of frequent mishandling of equipment as well as chemicals (Egypt, Mexico);
- An attempt to import low cost equipment in one country (Colombia) failed because of lack of training and local equipment service;

- An attempt to lower costs of ISF equipment in Mexico was very successful but still is off UNDP's goal and requires further fine-tuning;
- Infrequent use leads to aging issues with chemicals.

2.3 PROPOSED EFFORTS RELATED TO THIS DEMONSTRATION PROJECT

a) One issue identified by UNDP was that all Pour-in-Place (PIP) equipment is based on sprayfoam equipment—being relatively low cost equipment and easily fitted for PIP operations. However, such spray-foam equipment has features that are not needed for PIP operations such as:

- High pressure pumps
- Long supply hoses, and misses features such as:
- Built-in compressor
- Two phase electrical hook-up
- Chemical tanks

UNDP therefore looked in the market for equipment that would fit better the purpose of PIP applications. Equipment found suitable—albeit not ideal—was equipment from Pumer/Brazil (see picture below):

Pumer-1000 DT medium pressure injector

While this dispenser cuts the current price of a PIP dispenser considerably, it still does not meet several of UNDP's criteria:

- It is still too expensive
- It has medium injection pressure rather than the desired low pressure
- It has no built-in compressor

UNDP has had discussions with the manufacturer and believes that further economizing and adaptation will be possible. Other companies have offered to prepare bids based on UNDP's design criteria which are

- Better efficiency in the use of chemicals;
- Economizing (cost reduction) of existent equipment or
- Developing new, low cost equipment;

- Easy in operation and maintenance
- Ready to use with just a two phase electrical connection.

b) For integral skin equipment a similar program will be based on a previous attempt to economize equipment in Mexico for that particular purpose:

Low cost ISF Foam Dispenser, developed by Zadro/Mexico

For this application, different properties are required:

- Variable chemical ratios
- Gear pumps allowing high viscosity
- Heating for chemicals

In addition, in both cases, the issue of local maintenance needs to be addressed. Emphasis will be put on local, sustainable capacity for training and equipment service to ensure the required level of sustainability of results.

c) Another issue is infrequent use of chemicals such as for setting poles for fences, electricity, etc. This application requires small, pre-determined amounts of chemical to set a pole—much like cement but much faster in solidifying. Because of irregular, in field use, users in this application have problems with chemical life time—now typically 3-6 months. A life time of at least one year is desired. UNDP located a US company that manufactures prepackaged chemicals for pole setting applications with a life time of up to 2 years and intends to bring this technology to existing system house in, initially, Egypt but later in any country that has system houses and is interested.

2.4. Estimated Potential Project Impact

Depending of the stage of development and the size of a country, VSUs' market share in foam applications can range from 5%--such as Egypt—to more than 30%-- such as Nigeria.

Indeed, the Egyptian HPMP mentions that "from available information it has been determined that "Micro Users" (=VSUs) account for 22.3 t HCFC-141b and, assuming an average use of 250 kg/y per company, include up to 100 companies."

The current demonstration project will contribute to a complementary phase-out of 4.4 ODP tons at VSUs unaccounted in HPMP-I and now being identified as additional VSUs under HPMP-II preparation process.

Other countries such as Brazil, India, Mexico and Nigeria will have much larger VSU sub-sectors and many more VSUs and the outcomes of this demonstration program are essential to ensure smooth HPMP implementation in VSU sector.

The amount of HCFC-141b phase-out that may benefit from this project, or the number if VSUs that would apply the solutions proposed in sections A, B and C of the previous section 2.3 would be very hard to estimate, but may very well amount to over 600 metric tons of HCFC-141b and thousands of VSU enterprises globally.

2.5 CHOICE OF HCFC REPLACEMENT TECHNOLOGY

Foam dispensers in general—but small, low cost ones in particular—are based on blending two reactive components: isocyanate, and polyol blend. The polyol blend includes polyol as main component but also other, minor, components such as blowing agent(s), stabilizer, catalysts etc. When blended, this leads to a controlled blowing and polymerization reaction, resulting in polyurethane foam.

The foam dispenser poses in principle no restriction on the type of blowing agent. This implies that any HCFC replacement can be used. However, there are safety considerations to be taken into account. Based on such considerations, flammable systems have in general been avoided unless special safety features have been incorporated. However, one cannot take the flammability of a pure component to predict the flammability of a blend or mixture. If the blowing agents are water, methyl formate (up to 5.5%), methylal (up to 5%), HFCs or HFOs—or combinations of these—then the blend is non-flammable. If the blend contains hydrocarbons (HCs) then the result is as a rule flammable. Methyl formate and methylal blends, if properly prepared, can thus be treated the same way as water, HFCs and HFOs. As blends are prepared by System Houses these have to take safety precautions when blending the original components.

A new development might change this situation: preblending of HCs at system house level. Up to recently, the normal procedure would be that the end processor had to blend hydrocarbons in-house. UNDP discovered exceptions in the market where the end processor, to save the costly preblending installation, received preblended HC systems (Bayer) or injected HCs directly in the mixing head (Elastogran/BASF). UNDP analyzed both approaches in a previous pilot project in Egypt and concluded that both approaches are feasible and can save costs. One system house in Mexico has taken up this approach and is investigating its use, along with commercial refrigeration and panel applications, in sprayfoam and small injections (”pour-in-place” or PIP) with remarkable good and safe results. The equipment has to be pneumatic or, in case of electric, explosion proof. As this project envisions to include pneumatic equipment, it will therefore include this substance in the HCFC replacement technologies that will be evaluated on the selected equipment.

3. PROJECT DESCRIPTION

The concept of this project is to develop:

- Easy-to-use and maintain low-cost foam dispensing units for PIP Rigid Foam applications that include air compressors and is relying on two phase electrical power;
- Low-cost variable ration foam dispensers for integral skin applications Alternatively, look into lowering the costs of existing low-cost equipment already on the market; and
- For infrequent PU users, make available the option of prepackaging PU systems that are sealed, have a long lifetime and can be used upon demand.

The implementation of the equipment part of the project will be staged as follows:

1. The selection of an importer/installer/service provider – based on an open call bidding via requests for proposals (latter giving better flexibilities with previously untried approaches);
2. Review of existing offerings of low-cost equipment followed by negotiations with selected providers on required modifications and potential cost savings – on modifications it currently roughly estimated to be

below US$ 10,000 per PIP simplified machine (below US$ 10,000 for ISF and US$ 5,000 for RPF machine with modifications in electronics, removal of spray function and less hosing, gun cleansing mechanisms with simplified mixing heads and better local service for sustained operations), but yet to be tested on the actual costs below this target threshold;
3. Selection of equipment to be validated;
4. Purchase and validate the most promising equipment (1-2 different dispensers);
5. Workshop to present the outcome(s).

Interested equipment suppliers that can potentially meet requirements from the project are listed below as prospective bidders to provide such services (selection is subject to universal UN procurement procedures which apply to projects under implementation):

- Pumer	Belo Horizonte	Brazil	RPF only
- Cannon	Milano	Italy	ISF and RPF
- Zadro	Guadalajara	Mexico	ISF only
- Tec Mac	Milano	Italy	ISF and RPF
- FSI	St. Louis	USA	RPF only

The implementation of the chemical part of the project is envisioned as follows:

1. Selection of a system house willing to cooperate on this approach;
2. Identification of existing prepackaged systems with stable storage life-time/easy component perforation when in need for field application. One making these is “Foam Supplies, Inc. (FSI) in the USA but there might be more companies on the global market. Evaluate this technology at the selected system house;
3. If successful, install a local component facility and/or assembly facility;
4. Conduct trials/tests to assure that the equipment is suitable for the earmarked ODS phaseout technologies;
5. Include the outcome in the mentioned workshop in technology section.

VSUs currently use the — unprotected — hand-mix approach, opening and blending from containers delivered by system houses and mixing these with a stick or electrical mixer. The main issue is, of course, the unprotected use of PU chemicals, but also the issue of lifetime of the chemicals is important. Systems normally have a lifetime of 3-6 months and VSUs frequently exceed this. In addition, they do not properly protect chemicals from humidity, thus further lowering life time.

The project foresees the manufacture of small, properly sealed packages that, when needed, are punctured and used. This avoids exposure to emission and skin. That is not the case with current smaller system houses’ deliveries in, 200 l drums. Previous experience taught that local, knowledgeable service and availability of spare parts are essential to success. Therefore, the consideration for local production/assembly of selected equipment is essential. Likewise, prepackaged systems have only a chance in the market when produced and marketed —or at least backed-up—by a local system house.

While the project includes trials/tests, these will be conducted to the extent possible at system house development facilities and with one or two selected customers. Industrialization should take place through National Phaseout Plans.

It should be noted that these plans for Egypt and Mexico have already funds dedicated to VSUs. More specifically, it should be emphasized that the results of this pilot project will be immediately applicable in already approved VSU projects in Mexico, Brazil, Egypt and Nigeria without rising costs to MLF (currently designed approach of renting equipment to VSUs does not work), as well as in future such programmes in other countries, as such optimized equipment can be then purchased from ready developer at lower cost.

In summary, a successful cost reduction program requires following features:

- An effective local commercial operation providing importation, sales as well as after sales support;

- Inclusion of auxiliaries such as an air compressor and a set of pour guns;
- Standard, two phase electrical requirement;
- A simple, built-in gun cleaning systems;
- A set of small chemical tanks with protection against humidity, to the extent possible consisting of commodity parts;
- A cost goal of US$ 5,000 for RPF and US$ 10,000 for ISF equipment;

4. PROJECT COSTS

Cost forecasts for demonstration projects are problematic as these projects are by nature unpredictable. UNDP has used to the extent possible guidance provided by the Secretariat in Document 55/47 Annex III, Appendix II. Applying this guidance leads to the following summarized cost expectations:

DEVELOPMENT/OPTIMIZATION/VALIDATION/DISSEMINATION				
#	**ACTIVITY**	**BUDGET (US$)**	**Description of sub-activities**	
1	Project Management	30,000 30,000	Local expert International expert	Local coordination, sourcing of service capacities International development coordination
2	Identifying local capacity	7,500 7,500	Study tour Study tour	For equipment development For prepackaged systems
3	Production eqt development	50,000 50,000 25,000	Optimize existing equipment Develop new equipment Develop prepackaged systems	
4	Validation/Field evaluation	20,000 20,000 10,000	Optimize existing equipment New equipment Prepackaged systems	
5	Workshop	0		This usual activity to disseminate results will be implemented under current/next phase of HPMP to help with funds optimization under current demo projects' window
7	Safety review	25,000	Operational safety Design safety	At manufacturer as well as enduser At manufacturer
8	Contingencies	20,000	10% of technical lines (3, 4 and 7)	Based on discussion for further costs optimization
TOTAL		**295,000**		

5. IMPLEMENTATION FRAMEWORK AND MONITORING

Following tentative implementation schedule applies:

TASKS	2016				2017			
	1Q	**2Q**	**3Q**	**4Q**	**1Q**	**2Q**	**3Q**	**4Q**
Project Start-up								
MF Project Approval				X				
Receipt of Funds				X				
Grant Signature				X				
Monitoring/oversight activities in place					X	X	X	
Implementation								
Selection of partner					X			
Identification, evaluation and optimization of existing and new approaches						X	X	
Industrialization, trials/tests							X	X
Dissemination Workshop								X

MILESTONES FOR PROJECT MONITORING

TASK	MONTH*
(a) Receipt of funds	2
(b) Project document signatures	3
(c) Bids prepared and requested	5
(d) Contracts Awarded	6
(e) Equipment Delivered	8
(f) Training Testing and Trial Runs	10
(g) Completion	11
(h) Dissemination/reporting	12

* As measured from project approval

The project document includes the customary implementation and milestones achievement plan and meets decision 72/40 requirement to be completed in one year. The project will be backed by two missions from assigned international expert during its lifetime of 12 months, and from UNDP MPU office to ensure progress is achieved in accordance with plan of actions.

With the team present on the ground (HPMP team) the daily supervision will be ensured. With respect to the equipment development process, since it being simpler than the three-way injection machine with SAIP in the previous project, it is not seen as a major barrier in delaying the project's outcomes.

6. PROJECT JUSTIFICATION

6.1 CONFORMACE WITH APPLICABLE POLICIES

The project is submitted in response to ExCom Decision 72/40. The relevant part of this decision states as follows, and the way UNDP has addressed them are added in **bold**.

(i) The following criteria would be applied when selecting projects:

a. The project offered a significant increase in current know-how in terms of a low-GWP alternative technology, concept or approach or its application and practice in an Article 5 country, representing a significant technological step forward;

While the first part of the condition recommends that the demonstration should relate to a low-GWP alternative, the second part of the sentence also allows for "applications and practices representing a significant technological step forward". This demonstration clearly falls under the latter category as described in paragraphs 2 and 3 above. As mentioned, it will save a significant amount of funds to the MLF by addressing very small users (VSUs).

That said, the project will also result in a conversion of HCFCs to low-GWP solutions in VSUs. While in theory, they may shift to HFCs, these alternatives would typically be more expensive than if they were to go to solutions involving low-GWP. It is anticipated in fact that a vast majority of the VSUs – if given the proposed technology solutions of this demonstration – would select water-blown technology, while others may use methyl formate, methylal, HFOs, etc. There would therefore be a positive climate impact, albeit hard to quantify. Having said that, the use of HCs for foams in VSUs is very unlikely due to safety concerns.

b. The technology, concept or approach had to be concretely described, linked to other activities in a country and have the potential to be replicated in the medium future in a significant amount of activities in the same sub-sector;

Paragraphs 2 and 3 above provide a detailed description of the context and the proposed approach, and linkages to the replication of VSUs in other article-5 countries are provided.

c. For conversion projects, an eligible company willing to undertake conversion of the manufacturing process to the new technology had been identified and had indicated whether it was in a position to cease using HCFCs after the conversion;

Despite being a demonstration project, certain complementary phase-out is expected. New equipment and systems will be developed with equipment suppliers, to be then used in a system house in Egypt, to ensure proper implementation of the VSU component which otherwise is likely to fail in other similar VSU programmes.

That said, section 2.4 above tries to estimate the potential impact that this project may have in Egypt and worldwide, if it succeeds to address the VSU problematic being tackled in this demonstration.

d. The project proposals should prioritize the refrigeration and air-conditioning sector, not excluding other sectors;

This demonstration falls into the latter category (VSUs in foams). While the first category of project proposals seem to allow to test newer technologies in selected enterprises before these can be replicated elsewhere, the current proposal reaches out to very small users level with low GWP solutions to comprehensively cover PU foam sector from largest to smallest companies. This ensures a full sector coverage which in UNDP view is considered the intended end result of testing new non-ODS/low GWP technologies as in foams so in other sectors.

e. They should aim for a relatively short implementation period in order to maximize opportunities for the results to be utilized for activities funded by the Multilateral Fund as part of their stage II HCFC phase-out UNEP/OzL.Pro/ExCom/72/47 36 management plans (HPMPs);

Implementation time for this project is considered 12 months as required by the decision 72/40.

f. The project proposals should promote energy efficiency improvements, where relevant, and address other environmental impacts;

The relevance of this aspect for foam projects may be linked to the insulation value as compared to HCFCs baseline, and incremental improvements could be achieved.

The other fact that the use of high-pressure spray foam equipment would be replaced by low-pressure simplified machines may result in some energy savings, but these would be minor and hard to quantify in a short timescale of a demo project. The use of small-packaged systems of chemicals would result in a decrease of chemical waste and unwanted chemical emissions as well.

While the current window for these projects prefers demonstration projects for the HVAC sector, it does clearly not exclude other sectors. Therefore UNDP requests to consider this project in the foam sector based on:

- **UNDP's success rate in demonstration projects for this sector that has led to**
  - **Lower project costs (MF, ML, pre-blended/direct injected HCs with low GWPs)**
  - **New or modified ODS phaseout technologies that decrease cost thresholds**
- **Despite of past successes, there is still need to find solutions for very small users (VSUs);**

- **There is a need to redirect funds already approved and earmarked for VSUs that were based on approaches that proved untenable such as the provision of rental of equipment through system houses – this will help spread the existing low GWP technologies in this sector to a wider clientele to ensure more comprehensive uptake of these on national levels.**

The projects includes some elements that could be seen as project preparation but most of that preparation—i.e. the basic outline of requirements for systems as well as equipment—has been finalized and the submittal of just a project preparation request would delay the eventual outcome unnecessary.

The project further cannot be seen as resulting in HCFC reduction targets being not associated with direct phase-out at any recipient system house, but is more geared towards optimization of general costs of equipment and preparing easy-to-use formulations for VSUs to assist in implementation of already approved VSUs sub-projects in the mentioned countries, as well as in future programmes of this type elsewhere.

6.2 SELECTION OF IMPLEMENTATION LOCATION

Egypt has been selected for this project because it has in its HPMP a sub-project for VSUs using rental equipment for very small users. After this approach has shown in Mexico to be untenable (rental equipment is damaged by inappropriate use, despite provision of application instructions; chemical are not cleaned out, causing clogging….), UNDP plans to redirect the funds to a low equipment cost approach. However, such an approach needs a proper and comprehensive study.

Several potential importers/service providers have already been located—which will speed up the implementation. For the systems, a system house that is willing to cooperate has also been identified.

Finally, overall, provided accumulated experience with the low cost HC technology optimization via three-way injection and preparation of pre-blended HC polyols in Egypt, the main technology report was submitted expediently (decision 66/15 approved it) for consideration of the Executive Committee where this technology further recommended for replication. Follow-on political changes in the country did not allow to make a complementary investigation study on density optimization at UNDP's initiative; which is now complete and complementary report was submitted to the Executive Committee at its 75th meeting (decision 75/21). Nonetheless, with the restoration of stable situation end of 2014, UNDP is confident that the current demonstration project is implementable, aided by the fact that less complex equipment, compared to the low cost HCs, is in focus of the current project.

7. RISKS AND BARRIERS

There have already been several successful attempts to address the needs of SMEs. This has led to adjustment in approaches (group projects around system houses, alternative, more affordable technologies). No approach, however, has been successful with VSUs. While this approach addresses past shortcomings such as local service, it is an uncharted way and therefore success is not secure. However, UNDP has shown in other demonstration projects that by and large, success of its approaches in more likely than not.

A potential barrier is the attitude of VSUs. For these companies, PU foam is often a very small part of their production—even a necessary evil—and changes do not always get the required attention and dedication. Working with local system house of distributors—very small users frequently do not buy directly—can reduce this barrier.
Users are always considered a barrier for any project's successful implementation—in terms of not inclined to change, lacking financial means, not looking for additional work, etc. VSUs are not different. MLF-financed projects are designed to counter that attitude with a mixture of Government regulations, technical support and financial assistance. This is the case with MF, ML and low-cost HCs programmes.

VSUs are included in foam sector plans in programmes such as Mexico, Egypt, Nigeria and other countries, and the outcomes of this proposed project will help address HCFC consumption in such approved and future funded foam

sector plans here in the former group there are now challenges discovered with the rental of equipment to VSUs as described in the current project document. This sector was accepted as eligible by the MLF Secretariat and then by the Executive Committee in approving such sector plans, and it needs, based on current HPMP implementation experience, a better approach from the chemical and equipment side, as proposed in this project.

If no remedies are obtained such as being proposed in this project, the situation in current sector plans will be left unaddressed with resulting non-compliance prospects.

8. REPORTING

A final report can be expected 12 months after project approval. Interim reporting will follow existing reporting guidelines.