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Distr.
GENERAL

UNEP/OzL.Pro/ExCom/76/31
14 April 2016

CHINESE
ORIGINAL: ENGLISH

执行蒙特利尔议定书
多边基金执行委员会
第七十六次会议
2016 年 5 月 9 日至 13 日，蒙特利尔

项目提案：埃及

本文件包括基金秘书处就以下项目提案提出的评论和建议：

销毁

•	小型用户转型为非消耗臭氧层物质技术聚氨酯泡沫塑料的低成本备选办法的示范	开发计划署

项目评价表 — 多年期项目
埃及

项目名称	双边/执行机构
(a) 小型用户转型为非消耗臭氧层物质技术聚氨酯泡沫塑料的低成本备选办法的示范	开发计划署

国家协调机构：	埃及环境事务局，国家臭氧机构

最新报告的项目所涉消耗臭氧层物质消费数据

A: 第 7 条数据（ODP 吨，2014 年，截至 2016 年 3 月）

氟氯烃			320.3

B: 国家方案行业数据（ODP 吨，2014 年）

HCFC-22	174.5
HCFC-123	0
HCFC-141b	123.1
HCFC-124	9.5
进口预混多元醇中的 HCFC-141b	13.2

仍符合供资资格的氟氯烃消费量（ODP 吨）	310.61

本年度业务计划分配款		资金 美元	淘汰 ODP 吨
	(a)	不详	不详

项目名称：	
企业所使用的 ODS（ODP 吨）：	不详
将淘汰的 ODS（ODP 吨）：	4.4
将使用的 ODS（ODP 吨）：	不详
项目期限（月）：	12
原申请数额（美元）；	340,000
最终项目费用（美元）：	
增支资金成本：	320,500
应急费用（10 %）：	32,050
增支经营成本：	0
项目总费用：	352,550
地方所有权（%）：	不详
出口成分（%）	不详
申请赠款（美元）：	295,000
成本效益（美元/公斤）：	7.40
执行机构支助费用（美元）：	20,650
多边基金总共支付费用（美元）：	315,650
对应供资情况（有/无）：	无
所包括项目监测进度指标（有/无）：	有

秘书处的建议：	个别审议

项目说明

背景

1. 在第七十五次会议上，开发计划署提交了关于小型用户转型为非消耗臭氧层物质技术聚氨酯泡沫塑料的低成本备选办法的示范项目，原申请总金额为 340,000 美元，外加 23,800 美元的机构支助费用。[1] 为审议提交第七十五次会议的所有示范低全球升温潜能值技术的项目成立了联络小组。继该联络小组的讨论后，执行委员会决定将包括埃及泡沫塑料项目在内的 7 个示范项目的审议推迟到第七十六次会议进行（第 75/42 号决定）。

2. 开发计划署代表埃及政府重新向第七十六次会议提交了上述示范项目，金额为 340,000 美元，外加 23,800 的机构支助费用。

项目目标

3. 泡沫塑料行业包括数目众多的小企业，实行手工混合发泡操作，这种操作缺乏排放控制或个人保护，导致出现职业健康和安全问题。通常，多边基金提供技术援助淘汰小型用户所使用的 HCFC-141b，因为他们消费的氟氯烃数量很少（即每年 100 至 200 公斤）。就埃及的氟氯烃淘汰管理计划而言，配方厂家获得的资金主要用于提供基本的泡沫塑料设备，小型用户可租用这些设备淘汰其 HCFC-141b 消费量。不过，没有对泡沫塑料行业新用途的研究和开发提供过资金。

4. 示范项目建议，在不用电的空气压缩机基础上，研发一种就地倾注用途的低成本泡沫塑料喷涂器，或者，探讨降低市场现有泡沫塑料喷涂器成本的备选办法，供小型用户使用。示范项目还建议探讨一种封闭式、寿命较长并能根据需要使用（目前哥伦比亚、墨西哥以及美利坚合众国某些用途中使用）的简易包装的聚氨酯泡沫塑料器械的备选办法。

项目执行情况

5. 研发低成本的设备泡沫塑料喷涂器，要求：选择泡沫塑料喷涂器的进口商、安装者和提供维修者；审查现有设备和评估所要求的修改；签发建议制造新的低成本泡沫塑料喷涂器的请求；验证和优化喷涂器；举办一次介绍成果的讲习班。

6. 研发简易包装的成熟多元醇配方，要求：选择一家愿意参与项目的配方厂家；在其他具备聚氨酯泡沫塑料配方厂家的第 5 条国家之后评价埃及现有的配方；在选定的配方厂家安装本地生产设施；在一家或两家泡沫塑料企业进行试验或测试；举办一次介绍成果的讲习班。

7. 已确定了几家设备供应商和可能的配方厂家为潜在的投标人。

8. 预期项目将在 12 个月内完成。

项目费用

9. 如表 1 所示，估计原申请的项目总费用为 340,000 美元。

[1] UNEP/OzL.Pro/ExCom/75/45。

表 1. 建议的项目费用

活动	说明	费用（美元）
项目管理	本地专家 国际专家	30,000 30,000
确定地方能力	关于设备的技术考察旅行 关于化学品的化学品考察旅行	10,000 10,000
生产设备研发和原型设计	优化现有设备 研发新设备 研发简易包装配方	50,000 50,000 25,000
验证/实地评价	经优化的现有设备 新设备 简易包装配方	20,000 20,000 10,000
技术推广讲习班	所有三种办法的结合	25,000
同行审查/安全审查/筹备工作	安全审计、同行审查、准备费用	30,000
应急费用	（10%，四舍五入）	30,000
共计		**340,000**

秘书处的评论和建议

评论

10. 与提交第七十五次会议的项目提案相比，提交第七十六次会议的提案提出了依照第 72/40 号决定核准项目的进一步理由，同时提出了埃及政府所作自剩余的符合供资条件的氟氯烃消费量中扣除更多 HCFC-141b 的承诺。秘书处赞赏地注意到开发计划署在多边基金未提供编制资金的情况下，为设计一个能够向泡沫塑料行业小型用户提供直接援助的项目所做的努力。

11. 为便于参阅，现将秘书处与开发计划署就提交第七十五次和第七十六次会议的示范项目的讨论结果归纳如下：

(a) 关于提交和核准提案的进一步的理由，开发计划署解释说，项目将有助于通过设备和配方的优化，更高效地利用低全球升温潜能值的泡沫塑料配方（例如甲酸甲酯和聚胺脂），项目的对象是不经常获得多边基金的直接援助的小型企业。尽管项目无法保证不选择高全球升温潜能值的泡沫塑料配方，但有机会可以获得较廉价的低全球升温潜能值的泡沫塑料配方，将为小型用户提供一种较好的选择；

(b) 开发计划署解释说，将设计一种配有简易混频头和较短导管、带内置压缩机和连接化学品罐的泡沫塑料喷涂器，其总费用低于 10,000 美元。因此，该项目有可能为拥有小型企业的国家提供低成本泡沫塑料喷涂器；

(c) 关于选择可能实施项目的一家企业的问题，开发计划署澄清说，虽然一些制造商对研发设备表示了初步的兴趣，但现阶段无法挑选企业，因为挑选需要通过投标过程进行；

(d) 关于优化现有泡沫塑料配方的问题，开发计划署指出，这将适用于具有小型发泡操作且只需要少量泡沫塑料配方的小型企业。因此，项目预期将制造两年寿命的小型、封闭良好的成套设备；需要时，这些成套设备开封后即可以

使用。目前提供给埃及配方厂家的援助并不包括落实这些创新的可能性；以及

(e) 关于使项目的费用合理化的问题，[2] 如表 2 所示，开发计划署将项目预算从 340,000 美元调整至 295,000 美元。

表 2. 经修正的项目费用

活动	说明	费用（美元）
项目管理	本地专家 国际专家	30,000 30,000
确定地方能力	关于设备的技术考察旅行 关于化学品的化学品考察旅行	7,500 7,500
生产设备研发和原型设计	优化现有设备 研发新设备 研发简易包装配方	50,000 50,000 25,000
验证/实地评价	经优化的现有设备 新设备 简易包装配方	20,000 20,000 10,000
技术推广讲习班	所有三种办法的结合	0
同行审查/安全审查/筹备工作	安全审计、同行审查、准备费用	25,000
应急费用	（10%，四舍五入）	20,000
共计		**295,000**

12. 提交第七十五次会议的项目提案还连带淘汰 2.4 ODP 吨（22.7 公吨）HCFC-141b，同时，提交第七十六次会议的提案中包括的淘汰增加到 4.4 ODP 吨（40.0 公吨），政府并承诺自埃及氟氯烃淘汰管理计划第二阶段的剩余的符合资助条件的消费量中扣除这些淘汰量。经修订的项目提案载于本文件附件一。

结论

13. 秘书处注意到，尽管本项目降低了泡沫塑料喷涂器的费用，提供了在需要时可方便使用的简易包装的低全球升温潜能值泡沫塑料配方，从而给泡沫塑料配方的小型用户带来好处，但提案并没有严格地示范低全球升温潜能值的氟氯烃的新代用品，因为它所使用的是已在市场上可获得的技术。秘书处还注意到，开发计划署将项目的总费用从 340,000 美元调整为 295,000，而政府承诺在审议第二阶段时从埃及剩余的符合资助条件的消费量中扣除 4.4 ODP 吨的 HCFC-141b。

[2] 第 74/21 号决定(c)段请各双边和执行机构将示范项目的费用合理化，以确保根据第 72/40 号决定，利用现有的 1,000 万美元资金核准数目众多的示范项目， 并进一步探讨额外供资的其他来源。

建议

14. 谨建议执行委员会考虑：

(a) 在讨论关于项目审查期间所查明问题概览的文件（UNEP/OzL.Pro/ ExCom/76/12）中所述氟氯烃的潜在的低全球升温潜能值代用品的示范项目提案时，审议埃及示范小型用户转型为非消耗臭氧层物质技术聚氨酯泡沫塑料的低成本备选办法的项目；

(b) 根据第 72/40 号决定，核准埃及示范小型用户转型为非消耗臭氧层物质技术聚氨酯泡沫塑料的低成本备选办法的项目，金额为 295,000 美元，外加给开发计划署的 20,650 美元的机构支助费用；

(c) 敦促埃及政府和开发计划署按计划在 12 个月内完成项目，并在项目完成后迅速提交一份全面的最终报告；以及

(d) 自埃及淘汰管理计划第二阶段的符合资助条件的剩余氟氯烃消费量中扣除 4.40 ODP 吨氟氯烃。

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:

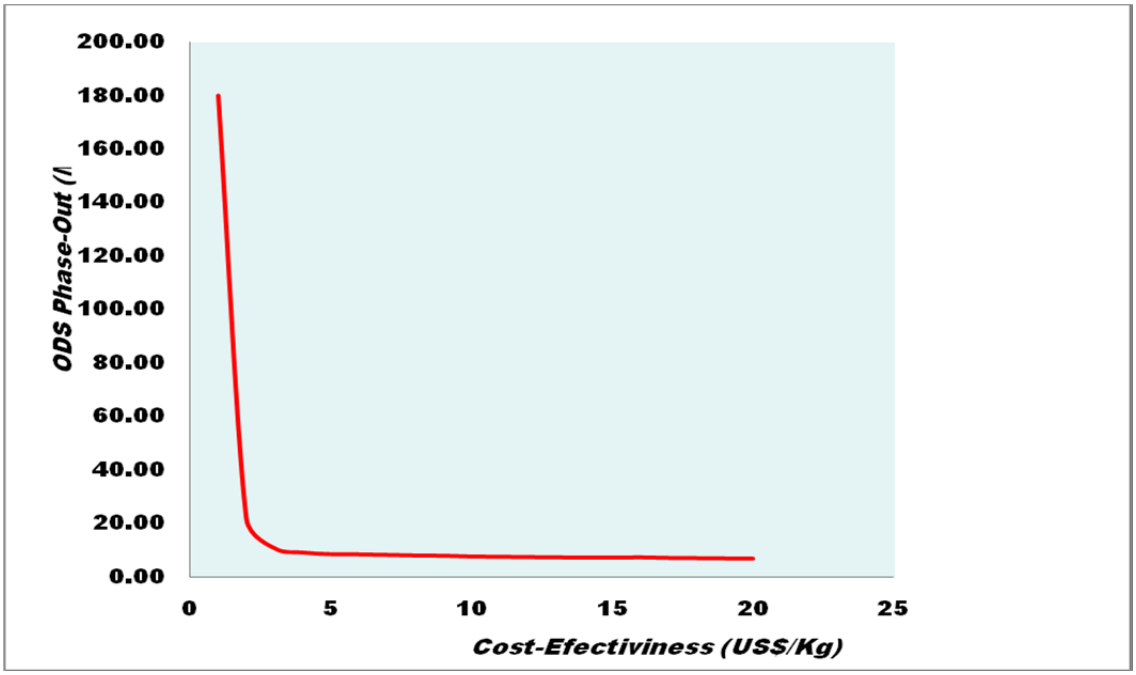
For Rigid PU Foam	- boat insulation
	- repair of existing insulation
	- home insulation improvement
	- making disposable molds (mostly in ceramic applications)
	- marine fenders
	- concrete replacement
For Integral Skin Foam	- bicycle saddles
	- safety coatings in exercise equipment
	- fenders
	- furniture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