الأمم المتحدة

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برنامج الأمم المتحدة للبيئة

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اللجنة التنفيذية للصندوق المتعدد الأطراف لتنفيذ بروتوكول مونتريال
الاجتماع الرابع والثمانون
مونتريال، من 16 إلى 20 ديسمبر/ كانون الأول 2019

تقرير عن نظم المستخدمين النهائيين الممولة بموجب خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية (المقرر 54/82)

خلفية

1. أثارت اللجنة التنفيذية خلال اجتماعيها الثمانين والحادي والثمانين شواغل تتعلق بخطط حوافز المستخدمين النهائيين للترويج لتحويل قطاعي التبريد وتكييف الهواء الى بدائل المواد الهيدروكلوروفلوروكربونية المتضمنة في العديد من طلبات شرائح التمويل المتعلقة بخطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية، وتضمنت الشواغل انعدام الالتزام القوي من جانب الحكومات/ المستخدمين النهائيين لدعم اعتماد التكنولوجيات البديلة المختارة التي تنخفض فيها القدرة على الاحترار العالمي، ونقص التمويل المشترك اللازم لسداد تكاليف عمليات التحويل، ونقص التدريب المرتبط بالاستدامة. ولذلك وافقت اللجنة على شرائح تمويل على أساس الفهم، *ضمن جملة أمور*، بأن تدريب فنيي الخدمة سوف يعزز من استدامة برامج تحفيز المستخدمين النهائيين، وأن المستخدمين النهائيين سوف يوفرون التمويل المشترك للمشاركة في الخطة.

2. وخلال الاجتماع الثاني والثمانين وبناء على طلب من أحد الأعضاء، أزالت اللجنة التنفيذية من قائمة المشروعات المقدمة للموافقة الشمولية طلبات شرائح خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية التي تعرضت لصعوبات فيما يتعلق بخطط تحفيز المستخدمين النهائيين. وعقب مناقشات بشأن هذه المسألة طلبت اللجنة من الأمانة مايلي:

(أ) أن تجمع معلومات عن خطط حوافز المستخدمين النهائيين (المشار إليها أيضا *ضمن جملة أمور*، بالمشروعات الإيضاحية الرائدة وبرامج التحفيز) الممولة بموجب خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية؛

(ب) أن تقدم تقريرا يتضمن مايلي:

(1) معلومات عن الأنشطة الموافق عليها مثل الكمية من الأطنان التي سيتم إزالتها والتمويل، والتمويل المشترك الذي سيقدم، وعدد المنتفعين والقطاع والمساعدات التقنية ذات الصلة؛

(2) حالة الخطط بما في ذلك المعلومات عن التأخيرات حسب مقتضى الحال؛

(3) المقررات التي اتخذتها اللجنة التنفيذية ذات الصلة بتمويلات المستخدمين النهائيين من حيث علاقتها بخطط تحفيز المستخدمين النهائيين التي ووفق عليها في إطار خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية (المقرر 54/82).

نطاق الوثيقة

3. واستجابة للمقرر 54/82، أعدت الأمانة هذه الوثيقة التي تتألف من ثلاثة أجزاء وتوصية:

(أ) مقررات اللجنة التنفيذية ذات الصلة بعمليات تحويل المستخدمين النهائيين؛

(ب) المعلومات عن الأنشطة ذات الصلة بالمستخدمين النهائيين بما في ذلك الكميات من الأطنان التي سوف تزال والتمويل، والتمويل المشترك الذي سيقدم، وعدد المنتفعين والقطاع، والمساعدات التقنية ذات الصلة وحالة الخطط بما في ذلك معلومات عن التأخيرات؛

(ج) ملاحظات الأمانة؛

(د) التوصية.

4. كما تتضمن الوثيقة المرفقين التاليين:

المرافق الأول: مدخلات مقدمة من الوكالات الثنائية والمنفذة بحسب البلد.

المرق الثاني: موجز لسياسات الصندوق المتعدد الأطراف فيما يتعلق بأنشطة المستخدمين النهائيين.

المنهجية المستخدمة في جمع البيانات

5. أجرت الأمانة، لإعداد هذه الوثيقة، تحليلا مفصلا لجميع المرحلتين الأولى والثانية من خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية في بلدان المادة 5 الموافق عليها حتى الآن، وجميع التقارير المرحلية للشرائح وخطط التنفيذ التي نظرتها اللجنة التنفيذية. وكان من نتائج ذلك تحديد الأمانة 66 نشاطا تتعلق بخطط تحفيز المستخدمين النهائيين.

6. ونظرا لأن المعلومات المتعلقة بحوافز المستخدمين النهائيين لم تبلغ بصورة منتظمة،وضعت الأمانة وثيقة إشارية تتضمن العناصر التي طلبت في المقرر 54/82(ب)(1) (أي أهداف المشروع ووصف المشروع والكميات التي ستجري إزالتها والتمويل من الصندوق، والتمويل المشترك من المستخدمين النهائيين، وعدد المنتفعين والقطاع والمساعدات التقنية ذات الصلة) وتوزيعها على الوكالات الثنائية والمنفذة. وقد نوقشت المسألة خلال الاجتماع التنسيقي،[1] المشترك للوكالات، وقدمت الوكالات الثنائية والمنفذة أفكارا متعمقة إضافية عن تنفيذ مشروعات المستخدمين النهائيين.

7. وبعد ذلك قدمت الوكالات الثنائية والمنفذة معلومات مفصلة على النحو الوارد في المرفق الأول بهذه الوثيقة. وأعربت الأمانة عن تقديرها للمدخلات التي قدمتها الوكالات والتي شكلت الأساس للتحليل الوارد في هذه الوثيقة.

[1] مونتريال 9-11 أكتوبر/ تشرين الأول 2019.

مقررات اللجنة التنفيذية ذات الصلة بعمليات تحويل المستخدمين النهائيين

8. نظرا لأن العديد من المواد الخاضعة للرقابة بموجب بروتوكول مونتريال تستخدمها جميع البلدان لخدمة أجهزة تكييف الهواء، أولت اللجنة التنفيذية الاهتمام المستحق للأنشطة المتعلقة بهذا القطاع منذ إنشاء الصندوق المتعدد الأطراف.

9. وكانت المسائل ذات الصلة بالبرامج للمستخدمين النهائيين بموجب قطاع خدمة التبريد، موضع اهتمام اللجنة منذ فترة طويلة ترجع الى اجتماعها السادس والعشرين عندما طلبت من الأمانة، أن تعد، بالاقتران مع الوكالات المنفذة، ورقة عن الظروف التي يمكن للجنة التنفيذية في ظلها نظر مشروعات إعادة تهيئة أجهزة التبريد التجاري، وكيفية حساب التكاليف الإضافية لهذه المشروعات (المقرر 38/26).

10. وإعمالا للمقرر 38/26، نظرت اللجنة التنفيذية وثيقة عن الظروف التي يمكن في ظلها نظر إزالة المواد المستنفدة للأوزون في قطاع المستخدمين النهائيين للتبريد،[2] التي استندت فيها اللجنة في اعتماد المبادئ التوجيهية لتحويل المستخدمين النهائيين في قطاع التبريد التجاري. ووضع هذه المبادئ التوجيهية الظروف ذات الصلة التي يتعين أن تسود قبل إسناد الأولوية لأنشطة تحويل المستخدمين النهائيين التي تفرض، *ضمن جملة أمور*، رقابة على إنتاج واستيراد الهيدروفلوروكربون والأجهزة العاملة بالهيدروفلوروكربون والإنفاذ الفعال، وكان الاستهلاك المتبقي من المواد الكلوروفلوروكربونية توجد بالدرجة الأولى في قطاع خدمة التبريد، ووضعت صورة شاملة للاستهلاك المتبقي الكلي أمام اللجنة وعدم وجود أي أنشطة أخرى تتيح تحقيق التزاماته بالرقابة على الهيدروفلوروكربون أو أن أسعار المواد الهيدروفلوروكربونية مرتفعة بالمقارنة بغازات التبريد البديلة خلال الأشهر التسعة على الأقل، ويتوقع أن تواصل ارتفاعها (المقرر 44/28).

11. ومن هذه النقطة، قدم عدد محدود من طلبات التمويل لإعادة تهيئة أجهزة التبريد التجاري، وجرى تقييمها على أساس كل حالة على حدة مع منح الأولوية لتحويل المخازن المبردة في قطاعات الزراعة وصيد الأسماك أو غير ذلك من صناعات سلسلة الأغذية والتي كانت هامة لاقتصاديات البلد المعني.

12. انتهت اللجنة التنفيذية خلال اجتماعها الحادي والثلاثين مناقشاتها بشأن مشروع المبادئ التوجيهية عن خطط إدارات غازات التبريد التي تعالجها احتياجات البلدان التي ينخفض فيها حجم الاستهلاك بالنظر الى أ، كل استهلاك من الكلوروفلوروكربون كان يتعلق بخدمة أجهزة التبريد (وإن كانت المبادئ التوجيهية العريضة قد تناولت أيضا للبلدان التي لا ينخفض فيها حجم الاستهلاك) ويمكن لبلدان المادى 5 إدراج برامج تحفيزية للتشجيع على إعادة تهيئة أجهزة التبريد.

13. ونظرت اللجنة التنفيذية خلال اجتماعها الثاني والثلاثين ثلاثة مقترحات تتعلق ببرامج التحفيز للتشجيع على إعادة تهيئة نظم التبريد. سوف تستخدم هذه المقترحات معظم أو جميع التمويل المتوافر للبلدان التي لديها خطط إدارة غازات التبريد موافق عليها إلاّ أنها لا تغطي جميع المنشئات في البلد. ولن توفر إزالة كافية لتمكين البلد من تحقيق الامتثال لالتزاماته دون اتخاذ تدابير أخرى. وعقب المناقشات، قررت اللجنة أن بالإمكان تقديم المقترحات الخاصة ببرامج التحفيز التشجيع على إعادة تهيئة أجهزة التبريد في إطار خطة إدارة غازات التبريد على أساس الفهم بأنه يتعين على الوكالة المنفذة أن تتشاور مع البلد وجميع الوكالات الأخرى التي تنفذ عناصر من خطة إدارة غازات التبريد، وجرى إحاطة البلد المعني بالكامل بجميع الأنشطة الاستثمارية وغير الاستثمارية التي قد تتوافر، وما إذا كان توقيت النشاط المقترح يناسب ظروف البلد المعني (المقرر 28/32).

14. ومنذ ذلك الوقت، تدرج برامج تحفيز المستخدمين النهائيين في خطط إدارة إزالة المواد الكلوروفلوروكربون التي ساعدت في كثير من الحالات في خفض استخدام الكلوروفلوروكربون-12 من خلال إدخال خلائط مباشرة أو غازات R-600a وخاصة لأجهزة التبريد المنزلية التجارية الصغيرة.

[2] الوثيقة UNEP/OzL.Pro/ExCom/28/47.

15. ومع تسارع إزالة المواد الهيدروكلوروفلوروكربونية، إدراج الكثير من بلدان المادة 5 مقترحات لتحويل/ استبدال المستخدمين النهائيين للأجهزة المعتمدة على الهيدروكلوروفلوروكربون (كان معظمها من أجهزة تكييف الهواء المنزلية) لغازات التبريد التي تنخفض فيها القدرة على الاحترار العالمي في إطار خططها لإدارة إزالة المواد الهيدروكلوروفلوروكربونية. وخلال الاجتماع الثاني والسبعين، عرضت الأمانة على اللجنة التنفيذية مقترحا مقدما من أحد بلدان المادة 5 وضع برنامجا لإعادة تهيئة الأجهزة المعتمدة على الهيدروكلوروفلوروكربون-22 الى غازات التبريد المعتمدة الهيدروكربونات حيث تم تقييم وإدارة المخاطر، وطبق معيار لوضع الأجهزة المعتمدة على الهيدروكربونات وإدارتها بصورة آمنة. واستنادا الى هذا المقترح، قررت اللجنة إدراج النص التالي في شرائح مشروعات أنشطة خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية التي اقترحت إعادة تهيئة الأجهزة المعتمدة على الهيدروكلوروفلوروكربون لاستخدام غازات التبريد القابلة للاشتعال والسامة "في حالة أن يضطلع البلد العامل في إعادة تهيئة أجهزة التبريد وتكييف الهواء المعتمدة على الهيدروكلوروفلوروكربون لاستخدام غازات التبريد القابلة للاشتعال أو السامة ومايرتبط بها من خدمة على أساس الفهم بأن البلد يتحمل جميع المسؤوليات والمخاطر المرتبطة بها" (المقرر 17/72). وجرت مواصلة تعزيز هذا النص بإضافة "ينبغي عدم إجراء عمليات إعادة التهيئة إلاّ وفقت للمعايير والبروتوكولات ذات الصلة" (المقرر 34/73).

16. وأنهت اللجنة التنفيذية خلال اجتماعها الثاني والسبعين أيضا مناقشاتها بشأن التقليل الى أدنى حد من التأثيرات المناخية الضارة لإزالة الهيدروكلوروفلوروكربون في قطاع خدمة التبريد بالاعتماد على الوثائق التي أعدتها الأمانة.[3] وشجعت اللجنة، وهي تفعل ذلك بلدان المادة 5، *ضمن جملة أمور*، على أن تنظر خلال تنفيذها خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية لديها في تركيز الأنشطة في قطاع خدمة التبريد على تدريب الفنيين، والممارسات الجيدة والمناولة الآمنة لغازات التبريد، وعلى الاحتواء والاسترجاع وإعادة التدوير وإعادة استخدام غازات التبريد المسترجعة بدلا من إعادة التهيئة (المقرر 41/72(ج)(3)).

17. وطلبت اللجنة، في مقرراتها الأخيرة الرامية الى تعزيز تنفيذ عناصر تحفيز المستخدمين النهائيين استنادا الى ظروفها الوطنية، من الوكالات الثنائية والمنفذة تقديم خطة تنفيذ مفصلة عن برامج تحفيز المستخدمين النهائيين بما في ذلك التمويل المشترك من المنتفعين لتقديمها للمرحلة الثانية من خطة إدارة إزالة المواد الهيدروكلوروفلوروكربونية لترشيد فعالية هذه الخطط (المقرر 58/80(ح)(1) و 59/82(ح)(1)).

المعلومات عن الأنشطة ذات الصلة بالمستخدمين النهائيين الموافق عليها

18. استنادا الى تحليل المعلومات المقدمة من الوكالات الثنائية والمنفذة، أشارت الأمانة الى أن 38 نشاطا من مجموع 66 نشاطا كانت تتعلق في الأصل بإعادة تهيئة الأجهزة العاملة بالهيدروكلوروفلوروكربون لاستخدام غازات التبريد القابلة للاشتعال المنخفضة القدرة على الاحترار العالمي. غير أنه نتيجة للعديد من البدائل على مستوى البلد وفي ضوء المقررات التي اتخذتها اللجنة التنفيذية ولاسيما المقررات 17/72 و40/72 و34/73، أرجئت أنشطة المستخدمين النهائيين التي كانت مقترحة في الأصل أو أعيد تصميمها لإسناد الأولوية لأنشطة أخرى في قطاع خدمة التبريد، وأعيد تخصيص معظم التمويل المرتبط بتلك الأنشطة لتعزيز معاهد التدريب بالدرجة الأولى أو لزيادة برامج التدريب لفنيين التبريد على ممارسات الجيدة. وقد أبلغ عن عمليات إعادة تخصيص الأنشطة المتعلقة بالمستخدمين النهائيين في التقارير المرحلية للشرائح ذات الصلة في المرحلتين الأولى والثانية من خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية.

19. ويتضمن الجدول 1 حالة تنفيذ الأنشطة ذات الصلة بالاستخدامات النهائية حتى الاجتماع الرابع والثمانين.

[3] الوثيقتان UNEP/OzL.Pro/ExCom/70/53/Rev.1 وUNEP/OzL.Pro/ExCom/72/42 .

الجدول 1: موجز أنشطة المستخدمين النهائيين في إطار خطة إدارة إزالة المواد الهيدروكلوروفلوروكربونية الموافق عليها لبلدان المادة 5

الوكالة	المجموع	التنفيذ	إعادة التوجيه
اليونديبي	19	13	6
اليونيب	10	2	8
اليونيدو	25	8	17
البنك الدولي	1	-	1
فرنسا	1	1	-
ألمانيا	10	4	6
المجموع	**66**	**28**	**38**

20. وفيما يتعلق بالأنشطة ذات الصلة بالمستخدمين النهائيين البالغ عددها 28 التي يجري تنفيذها حددت الأمانة ثلاث فئات متميزة:

(أ) خطط حوافز المستخدمين النهائيين لتحويل أو استبدال الأجهزة المعتمدة على الهيدروكلوروفلوروكربون؛

(ب) المشروعات التي توضح التكنولوجيات البديلة في منشأة للمستخدمين النهائيين

(ج) برامج الحد من التسرب للمستخدمين النهائيين.

نظم حوافز المستخدمين النهائيين لتحويل أو استبدال الأجهزة المعتمدة على الهيدروكلوروفلوروكربون

21. يجري تنفيذ 15 مشروعا في إطار خطط حوافز المستخدمين النهائيين لتحويل أو استبدال الأجهزة المعتمدة على الهيدروكلوروفلوروكربون، وفي حين أن هناك تباينا فيما بين المشروعات، فإن النهج الرئيسي يتألف من تحويل أو استبدال الأجهزة المعتمدة على الهيدروكلوروفلوروكربون للعمل بالمادة الهيدروفلوروكربون (وخاصة الهيدروفلوروكربون-32) أو غازات التبريد الطبيعية (مثل R-290 أو الأمونيا). وقد تحققت عمليات التحويل أو الاستبدال هذه في غالبها بتمويل من القطاع الخاص/ المستخدمين النهائيين، وكان معظمها في قطاع تكييف هواء الغرف بتمويل مشترك مقدم من المنتفعين.

22. وفي معظم هذه المشروعات يغطي الصندوق المتعدد الأطراف جزءا من تكاليف التحويل (أو الاستبدال) يتراوح بين 25 الى 50 في المائة بحسب الظروف النوعية السائدة في البلد. والمنتفعين والاستخدام. وفي أحد الحالات، قدم المشروع حافزا التحديد لاستبدال أجهزة عاملة بالهيدروكلوروفلوروكربون (أي من 120 دولارا أمريكيا لوحدة تيار بقدرة 9,000 بتو/ ساعة 250 دولارا أمريكيا لوحدة عاملة بمقدار 24,000 بتو/ ساعة) مع سداد المبلغ المتبقي بواسطة المنتفعين. ويوجز الجدول 2 المعلومات المستخلصة من التقارير المقدمة من الوكالات عن خطط حوافز المستخدمين النهائيين لتحويل أو استبدال الأجهزة المعتمدة على الهيدروكلوروفلوروكربون.

الجدول 2: خطط حوافز المستخدمين النهائيين للتحويل أو استبدال الى الأجهزة المعتمدة على الهيدروكلوروفلوروكربون

البلد*	الوكالة	القطاع الفرعي/ الاستخدام	التكنولوجيا البديلة	التكلفة (بالدولار الأمريكي)		التحويل/ الاستبدال		الهيدروكلورو فلوروكربو ن المزال (بالأطنان المترية)	تاريخ الانتهاء
				الموافق	التمويل المشترك	الخطة	حتى الآن		
بوتان	اليونديبي	تكييف هواء الغرف/ التجاري	القدرة على الاحترار العالمي 675>	79,000	7,982	65	15	0.03	Aug-18
بروناي دار السلام	اليونديبي	Room AC/ Large AC	الهيدروفلوروكربون-32/ R-290	33,500	n/a	35	n/a	n/a	Dec-20
كمبوديا	اليونديبي	Room AC	الهيدروفلوروكربون-32/ R-290	350,000	n/a	900	69	0.14	Dec-24

البلد*	الوكالة	القطاع الفرعي/ الاستخدام	التكنولوجيا البديلة	التكلفة (بالدولار الأمريكي)		التحويل/ الاستبدال		الهيدروكلور وفلوروكربو ن المزال (بالأطنان المترية)	تاريخ الانتهاء
				الموافق	التمويل المشترك	الخطة	حتى الآن		
كرواتيا	اليونيدو	Commercial Industrial RAC	الهيدروفلوروكربون-/ R-290/ R-717	360,000	870,000	10	32	2.22	Dec-15
كوبا	اليونديبي	Commercial RAC	R-404A	350,000	n/a	500	715	n/a	Dec-20
فيجي	اليونديبي	Room AC/ Fishery	Several	48,500	n/a	33	n/a	n/a	Dec-20
غانا **	اليونديبي	Commercial ref.	R-407C	38,000	160,295	13	4	0.46	Sep-17
مدغشقر	اليونيدو	Room AC	R-290	120,000	n/a	6	n/a	n/a	May-20
ماليزيا	اليونديبي	Room AC/ Commercial AC	Several	98,000	110,000	4	83	0.20	Apr-17
جزر المالديف	اليونديبي	Room AC/Fishery	الهيدروفلوروكربون-32/ R-438A	220,000	369,443	765	150	1.50	Nov-20
نيبال	اليونديبي	Room AC/ Commercial Industrial RAC	الهيدروفلوروكربون-32	36,000	111,607	18	24	0.08	Dec-20
سري لانكا	اليونديبي	Room AC	الهيدروفلوروكربون-32	60,866	166,410	204	199	0.52	Dec-20
توغو	اليونيدو	Room AC	R-290	90,000	n/a	3	n/a	n/a	Dec-21
المجموع				**1,883,866**	**1,795,737**	**2,556**	**1,292**	**5.15**	

(*) ووفق مؤخرا على أنشطة المستخدمين النهائيين في كينيا وموزامبيق ولكن لا تتوافر بعد معلومات عن التنفيذ.

(**) لم يدرج برنامج يوفر الأدوات لورش الخدمة لتيسير تحويل وحدات تكييف الهواء من الهيدروكلوروفلوروكربون-22 الى R-290 مع اتباع المبادئ التوجيهية الصارمة الصادرة عن وزارة البيئة حيث أنه لا يتعلق بالمستخدمين النهائيين مباشرة.

23. حصلت هذه المشروعات على دعم من التدريب الذي كان يقدم للفنيين عن استخدام التكنولوجيا البديلة، والورش التي تبين استخدام التكنولوجيا البديلة وأنشطة استثارة الوعي الموجهة الى المستخدمين النهائيين والموردين ومستوردي الأجهزة وغازات التبريد. وحصلت بعض المشروعات على الدعم من وضع القواعد مثل عمليات الحظر في المستقبل عن الواردات من وحدات تكييف الهواء الجديدة المعتمدة على الهيدروكلوروفلوروكربون أو الموافقة على ايرادات المطافئ لاستخدام غازات التبريد القابلة للاشتعال في استخدامات التبريد وتكييف الهواء. وفي إحدى الحالات حيث كان البلد يقع داخل أراضي الاتحاد الأوروبي، أدى اعتماد قواعد الاتحاد الأوروبي لإزالة الهيدروفلوروكربون قبل الموعد المحدد بالاقتران مع زيادة أسعار المواد الهيدروكلوروفلوروكربونية الى ضمان مستخدمين نهائيين آخرون معتمدين على الهيدروكلوروفلوروكربون.يشيرون على نهج مماثل في تحويل أو استبدال نظمه.

24. وفي حين أن معظم مشروعات المستخدمين النهائيين مازالت جارية، فإن المنافع الإضافية التي أبلغت عنها الوكالات الثنائية والمنفذة تتضمن خفض استخدام الطاقة بواسطة النظم الجديدة، وفرصة عرض التكنولوجيات الجديدة أمام أصحاب المصلحة في البلدان واستيراد التكنولوجيات البديلة الى البلد. فعلى سبيل المثال، قام أحد البلدان بتحويل جميع المستخدمين النهائيين أو استبدالهم نظمهم المعتمدة على الهيدروكلوروفلوروكربون متابعة للمشروع نتيجة لمايلي: الالتزامات القانونية بإزالة المواد الهيدروكلوروفلوروكربون قبل الجدول الأصلي، حدثت زيادة كبيرة في أسعار الهيدروكلوروفلوروكربون وتوافر تمويل بيئي لدعم إعادة التهيئة والتحويل. وفي حالات أخرى لا تتوافر سوى معلومات محدودة عن المدى الذي وصل إليه المستخدمون النهائيين في تحويل أو استبدال نظمهم المعتمدة على الهيدروكلوروفلوروكربون بتمويل خاص بهم نتيجة للمشروع.

25. وتتضمن بعض التحديات التي حددت في تنفيذ هذه المشروعات مايلي:

(أ) عدم توافر التكنولوجيات البديلة المختارة المنخفضة القدرة على الاحترار العالمي والصعوبات في

تحديد موردي التكنولوجيا في الأسواق المحلية. وفي بعض الحالات لم يمكن تنفيذ نظم جوائز من خلال "عملية اختيار تنافسية" وذبم نتيجة لمحدودية عدد موردي التكنولوجيا؛

(ب) انعدام اهتمام المستخدمين النهائيين بالنظر الى أن الحوافز لم تكن كافية لسداد التكاليف الإضافية المباشرة للتكنولوجيا البديلة المنخفضة القدرة على الاحترار العالمي أو لتكاليف التشغيل والصيانة المرتفعة المتعلقة بأجهزة التبريد وتكييف الهواء التي تستخدم التكنولوجيا البديلة (مثل في إحدى المجالات فإن تكاليف وحدات تكييف الهواء العاملة بالهيدروفلوروكربون-32 تتجاوز الحوافز المتلقاة)؛

(ج) العمليات المعتمدة والمضيعة للوقت في موافقة السلطات المعنية على إدخال أجهزة التبريد وتكييف الهواء المعتمدة على غازات التبريد القابلة للاشتعال؛

(د) أسفرت الدعايات ضد أجهزة التبريد وتكييف الهواء المعتمدة على غازات قابلة للاشتعال أسفرت على تصور للمخاطر المرتبطة باستخدام هذه الأجهزة؛

(ه) نقص غازات التبريد البديلة المنخفضة القدرة على العالمي لإعادة تهيئة الأجهزة في استخدامات معينة. فعلى سبيل المثال فإنه في حالة مصايد الأسماك، يتراوح عمر السفن مابين 25 و35 عاما مع مسائل متكررة من التسرب والصيانة؛ وفي الوقت الحاضر لا تتوافر بدائل مناسبة وسليمة ومنخفضة القدرة على الاحترار العالمي يمكن استخدامها في هذه السفن.

مشروعات لإيضاح التكنولوجيات البديلة

26. يجري تنفيذ ما مجموعه 12 مشروعا لإيضاح التكنولوجيات البديلة. ويتألف النهج عادة لتحويل أو استبدال وحدة أو عدد محدود من الوحدات الخاصة بالتبريد وتكييف الهواء التي تعمل في مؤسسة عامة أو خاصة لإيضاح الاستخدام الآمن للبدائل المنخفضة القدرة على الاحترار العالمي المقترحة (مثل R-290 وثاني أكسيد الكربون). ويغطي الصندوق المتعدد الأطراف في بعض هذه المشروعات تكاليف عدد وحدود من الوحدات التي يجري تحويلها أو استبدالها، وتقدم المؤسسات المستفيدة مساهمات عينية وذلك بالدرجة الأولى في شكل دعم فني للتركيب والصيانة والرصد لهذه الأجهزة. ويوجز الجدول 3 المعلومات المستخلصة من التقارير المقدمة من الوكالات والمستخلصة من المشروعات الإيضاحية التي يجري تنفيذها.

الجدول 3: المشروعات الإيضاحية للتكنولوجيات البديلة

البلد*	الوكالة	القطاع الفرعي/ الاستخدام	التكنولوجيا البديلة	التكلفة (بالدولار الأمريكي)		التحويل/ الاستبدال		الهيدروكلوروفلوروكربون المزال (بالأطنان المترية)	تاريخ الانتهاء
				الموافق	التمويل المشترك	الخطة	حتى الآن		
شيلي	اليونديبي	Supermarket	Transcritical CO_2	485,863	2,482,790	5	2	3.30	Dec-18
كوستاريكا*	اليونديبي	Cold room	CO_2 /NH_3	524,000	419,000	1	1	1.31	Jan-18
إكوادور	اليونيدو	Cold room	R-290	n/a	n/a	1	1	0.03	Nov-19
غرينادا	اليونيب	Room AC	R-290	9,000	-	2	2	n/a	Dec-18
جمهورية إيران الأسلامية	ألمانيا	Supermarket	R-290	415,000	-	2	3	n/a	Dec-14
موريشيوس	ألمانيا	Supermarket	R-744	200,000	-	1	1	n/a	Dec-28
موريشيوس	ألمانيا	Supermarket/ supply chain	R-290/ R-744	250,000	-	n/a	n/a	n/a	Dec-30
سانت فنسنت وجزر غرينادين	اليونيب	Commercial AC	HC	99,800	-	2	2	n/a	Dec-26
تركيا	اليونيدو	Cold room; supermarket	CO_2/NH_3 R-448A/ R-290	380,000	n/a	3	1	0.09	Dec-21

البلد*	الوكالة	القطاع الفرعي/ Chiller	التكنولوجيا البديلة HFO-1233zd	التكلفة (بالدولار الأمريكي)		التحويل/ الاستبدال		الهيدروكلو	تاريخ الانتهاء
جمهورية فنزويلا (البوليفارية)	اليونيدو	Commercial AC (chiller)	R-290	n/a	n/a	1	1	0.008	Nov-18
المجموع				**2,363,663**	**2,901,790**	**18**	**14**	**4.72**	

* معلومات من التقرير النهائي للمشروع الإيضاحي، وجرى تحديد مروعات إيضاحية إضافية بما في ذلك السوبر ماركت في الأرجنتين (سيقدم التقرير النهائي للاجتماع الخامس والثمانين) وجورجيا (لم تتوافر بعد معلومات عن التنفيذ)

27. وحصلت هذه المشروعات الإيضاحية على الدعم عن التدريب المستخدم للفنيين وذلك بالدرجة الأولى لتعريفهم بالدرجة الأولى بالتكنولوجيا البديلة المطبقة، وأنشطة استثارة الوعي وغير ذلك من الأنشطة الداعمة لضمان توافر التكنولوجيا البديلة في الأسواق المحلية. فعلى سبيل المثال، قدم أحد البلدان الدعم لمشروع إيضاحي من خلال إدراج مبلغ يسدد عن كل طن من قدرة التبريد في الهيدروكلوروفلوروكربون-22 وR-410A اللتان حلا مكان الأجهزة المعتمدة على الهيدروفلوروكربون-32 في حين اعتمد بلدان آخرون قواعد ومعايير جديدة، تتيح المناولة الآمنة لاستخدام وخدمة غازات التبريد البديلة المطبقة وخدمتها.

28. وتتضمن المنافع الإضافية التي أبلغت عنها الوكالات الثنائية والمنفذة مايلي: الخبرات التي اكتسبتها المنشئات المحلية في استخدام طرق تقييم المخاطر وتشغيل النظم بغازات تبريد قابلة للاشتعال، وخفض استخدام الطاقة بواسطة النظم الجديدة (حتى 30 في المائة في بعض الأحيان) وفرص عرض التكنولوجيا الجديدة أمام اصحاب المصلحة في البلدان، وفتح الأسواق الجديدة أمام هذه التكنولوجيات.

29. والمعلومات محدودة عن مدى قيام المستخدمين النهائيين الآخرين بتمويل أو استبدال النظم المعتمدة على الهيدروكلوروفلوروكربون بتمويل خاص منهم نتيجة للمشروعات. كما لا تتوافر سوى معلومات محدودة عن التحديات التي ووجهت في تنفيذ هذه المشروعات.

<u>برامج خفض التسرب لدى المستخدمين النهائيين</u>

30. تم في بلد واحد تركيز مشروع المستخدمين النهائيين على تحسين عملية الاحتواء لنظم الهيدروكلوروفلوروكربون العاملة في اثنين من السوبر ماركت من خلال *عدة أمور* من بينها استبدال الأجزاء غير الكفأة القديمة واستخدام أقفال وصمامات وأنابيب وصل أفضل وغير ذلك من المكونات. وأدت هذه العملية الى تحقيق وفورات في الوقود وخفض الطلب على المواد الهيدروكلوروفلوروكربونية- وغطى الصندوق المتعدد الأطراف التكاليف المرتبطة بالأجهزة والأدوات (مثل أجهزة رصد التسرب، والأدوات الإضافية للتجميع) والأعمال الهندسية والتدريب في حين سدد السوبر ماركت المستفيد تكاليف خدمات الفنيين والمواد الاستهلاكية والخدمة.

31. وأسفر تنفيذ المشروع عن تخفيضات في معدلات تسرب الهيدروكلوروفلوروكربون-22 من 130 في المائة من شحن الغاز الى صفر. وتحسن معادل أداء النظام بنسبة تصل الى 13.4في المائة وانخفض استهلاك الاقة. وحصل المشروع على دعم من التدريب على أفضل الممارسات الذي قدمه الموظفون الفنيون في السوبر ماركت. وعلاوة على ذلك تم تدريب نحو 4,800 فني، في إطار خطة إدارة إزالة المواد الهيدروكلوروفلوروكربونية لهذا البلد، على عدة *مجالات من بينها* بتصميم النظام ورصد التسرب، والتلميع والاسترجاع وإعادة التدوير وتسجيل البيانات والصيانة الوقائية المقررة ولم تسن أي تدابير تنظيمية بالنظر الى أن نطاق المشروع ينحصر في إيضاح أفضل الممارسات في قطاع خدمة التبريد.

32. وتتضمن بعض التحديات التي ووجهت خلال تنفيذ المشروع مايلي:

(أ) نقص توافر العناصر والأجهزة مثل رصد التسرب الثابت ونظام الرصد؛

(ب) محدودية عدد الموردين المهتمين بالمشاركة في المناقصات وتقديم الإعدادات وفقا للمواصفات

والمتطلبات التقنية للمشروع (يتم الإعلان عن المناقصة لمدة سنوات مما يؤدي الى تأخير المشروع)؛

(ج) التأخيرات في تسليم الأجهزة مما أدى الى سحب اثنين من السوبر ماركت المختارين.

ملاحظات الأمانة

33. كان قد ووفق على المشروعات المتعلقة بخطط جوائز المستخدمين النهائيين بالدرجة الأولى للبلدان التي ينخفض فيها حجم الاستهلاك فيما بين 2010 و2013 وللبلدان التي لا ينخفض فيها حجم الاستهلاك. وكان عدد المشروعات ذات الصلة بحوافز المستخدمين النهائيين التي ووفق عليها محدودا ومن العسير لدى النظر الى مبلغ التمويل المتوافر بمقتضى خطط قطاع الخدمة (بما في ذلك خطط حوافز المستخدمين النهائيين) في المرحلتين الأولى والثانية من خطة إدارة إزالة المواد الهيدروكلوروفلوروكربونية،[4] تقييم حجم اعتماد التكنولوجيا البديلة المنخفضة القدرة على الاحترار العالمي التي روج لها في خطط حوافز المستخدمين النهائيين باستثناء الأوضاع التي يحدد فيها استخدام الهيدروكلوروفلوروكربون في استخدام معين (مثل استخدام الهيدروكلوروفلوروكربون-22 في مصايد الأسماك)،[5] أو حيثما يقرر مستخدم أو أكثر من المستخدمين النهائيين اعتماد التكنولوجيا البديلة في المرافق التابعة لهم بعد إيضاح أدائها (مثل التكنولوجيا المعتمدة على R-744 في السوبر ماركت).

34. وتتعلق عوامل السوق على وجه الخصوص بتوافر الأجهزة المعتمدة على غازات التبريد المرتفعة القدرة على الاحترار العالمي الخالية من المواد المستنفدة للأوزون (مثل الهيدروفلوروكربون-134a و R-404Aفي استخدامات التبريد أو R-410A وR-407C في نظم تكييف الهواء)،[6] ويفرض نقص القواعد التي تقيد إدخال أجهزة جديدة عاملة بالهيدروكلوروفلوروكربون التي تشملها خطط حوافز المستخدمين النهائيين تحديا في تحقيق التغلغل المقصود في الأسواق لخطط الحوافز.

35. ويمكن أن يسفر الانخفاض في توافر المواد الهيدروكلوروفلوروكربونية مع تسارع خطط إزالة المواد الهيدروكلوروفلوروكربونية ومثل إزالة المواد الهيدروكلوروفلوروكربونية بحلول 2025 بدلا من 2030 على النحو المقترح في المرحلتين الأولى والثانية من خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية في العديد من بلدان المادة 5). بالاقتران مع تنفيذ برامج حوافز المستخدمين النهائيين والترويج لاعتماد التكنولوجيا البديلة المنخفضة القدرة على الاحترار العالمي، تسارع خفض استهلاك الهيدروكلوروفلوروكربون وإدخال التكنولوجيات المنخفضة القدرة على الاحترار العالمي.

36. ولمحدودية توافر خيارات التكنولوجيا المنخفضة القدرة على الاحترار العالمي الخالية من الهيدروكلوروفلوروكربون تأثير على تطور خطط حوافز المستخدمين النهائيين. فمازالت الخيارات التقنية المتعلقة بمختلف استخدامات التبريد وتكييف الهواء التي تشملها خطط حوافز المستخدمين النهائيين قيد الإعداد، ومازال توافر وخيارات مردودية التكاليف في الأسواق المحلية محدودة (مثل أجهزة تكييف الهواء المعتمدة على الهيدروفلوروكربون-32/ R-290 أو معدات التبريد التجاري المعتمدة على R-744) ويتغير الآن هذا الوضع مع تزايد مستويات توافر المعدات العاملة بالغازات المنخفضة القدرة على الاحترار العالمي في بعض الاستخدامات في الأسواق المحلية، واضطلعت كذلك الأنشطة المعتمدة على تعديل كيجالي (مثل الأنشطة التمكينية) بدور في عمليات اعتماد التكنولوجيات في الماضي القريب (مثل اثنتان الأخيرتان أو نحو ذلك).

[4] المقرر 44/60 للمرحلة الأولى من خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية والمقرر 50/74 للمرحلة الثانية من نفس الخطط.

[5] تواجه برامج إعادة تهيئة قطاع مصايد الأسماك وصفا ينطوي على تحديات بشأن توافر التكنولوجيات البديلة المنخفضة القدرة على الاحترار العالمي.

[6] يجري سريان تعديل كيجالي منذ الأول من يناير/ كانون الثاني 2019، وأصبح عدد متزايد من البلدان أعضاء في التعديل. ويواجه عنصر التبريد وتكييف الهواء المنخفضة القدرة على الاحترار العالمي نموا متزايدا. وأبلغ عن هذه الزيادة أيضا في تقرير فريق المهام التابع لفريق التكنولوجيا والتقييم الاقتصادي بشأن كفاءة استخدام الطاقة.

37. واستنادا الى الخبرات المكتسبة في العديد من بلدان المادة 5 بشأن إعادة تهيئة أجهزة التبريد المنزلية المعتمدة على الكلوروفلوروكربون وأجهزة التبريد التجاري المتصلة خلال الفترة الأخيرة من إزالة الكلوروفلوروكربون خلال الفترة المبكرة من الموافقة على المرحلة الأولى من خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية تمثل أحد الأهداف الرئيسية لخطط حوافز المستخدمين النهائيين المتضمنة في إعادة تهيئة أجهزة التبريد المعتمدة على الهيدروكلوروفلوروكربون في استخدامات نوعية للتبريد وتكييف الهواء. غير أنه خلال مراحل التنفيذ المبكرة، أرجئت هذه الحوافز أو أعيد تصميمها لإسناد الأولوية لأنشطة أخرى مثل التدريب الإضافي للفنيين أو شراء المعدات وأدوات الخدمة لدعم ورش الخدمة و/أو المؤسسات الوطنية للأسباب التالية:

(أ) زيادة التعقيدات المرتبطة بضمان ممارسات وعمليات الصناعة لإعادة التهيئة المنخفضة القدرة على الاحترار العالمي للأجهزة التي تصمم لغازات التبريد غير القابلة للاشتعال بما في ذلك التدريب الدقيق وبناء قدرات الفنيين على إعادة تهيئة الأجهزة، وعملية شهادات الاعتماد للفنيين للاضطلاع بعملية إعادة التهيئة هذه؛

(ب) العملية الطويلة والمضيعة للوقت لتعديل الإطار التنظيمي لرصد الاعتماد الآمن لإعادة تهيئة الأجهزة المعتمدة على الهيدروكلوروفلوروكربون بغازات التبريد القابلة للاشتعال؛

(ج) توافر خيارات إعادة التهيئة بغازات تبريد (مثل R-407C لأجهزة تكييف الهواء المعتمدة على الهيدروكلوروفلوروكربون-22) فضلا عن الأجهزة المعتمدة على الغازات المنخفضة القدرة على الاحترار العالمي؛

(د) المقررات السياسية التي تتخذها اللجنة التنفيذية لتجنب الممارسات غير الآمنة في تنفيذ عمليات إعادة التهيئة باستخدام غازات تبريد قابلة للاشتعال في غازات التبريد المصممة في الأصل للغازات غير القابلة للاشتعال (المقررات 17/72 و40/72 و34/73).

38. يمكن على قياس الأمور حسب المعتاد أن تشجع عوامل السوق اعتماد الأجهزة المعتمدة على غازات التبريد الجديدة المرتفعة القدرة على الاحترار العالمي والخالية من الهيدروكلوروفلوروكربون (مثل تكييف الهواء المعتمد على R-410A، والتبريد التجاري المنفصل المعتمد على الهيدروفلوروكربون--134a أوR-404A) كبديل للأجهزة المعتمدة الهيدروكلوروفلوروكربون التي يجري الاستغناء عنها. ويؤثر نقص السياسات والقواعد على المستوى الوطني لتقييد استخدام أجهزة جديدة تعتمد على الهيدروكلوروفلوروكربون والتشجيع على اعتماد التكنولوجيات البديلة المنخفضة القدرة على الاحترار العالمي في التأثير الشامل الذي تحققه خطط حوافز المستخدمين النهائيين. ويمكن أن تزيد القواعد وغيرها من التدابير التي تروج لاعتماد البدائل المنخفضة القدرة على الاحترار العالمي بما في ذلك تلك التي تراعي في نظام الحوافز بالاقتران بالتدابير ذات الصلة بإزالة الهيدروكلوروفلوروكربون من تأثير خطط حوافز المستخدمين النهائيين.

39. ويتراوح التمويل المشترك بواسطة المنتفعين بموجب خطط حوافز المستخدمين النهائيين بين 50 في المائة و85 في المائة. وتبين مستويات التمويل المشترك مدى التزام المنتفعين باعتماد التكنولوجيا البديلة المعنية بموجب هذا النظام. غير أنها لا تتضمن تطور التكنولوجيا المعتمدة نظرا لأن هذه الخطط لا توضح سوى أداء التكنولوجيات البديلة لعدد محدود من المستخدمين النهائيين. ويمكن أن تؤدي صلات هذه الخطط ببرامج أخرى الى أن تسفر عن استبدال الأجهزة (مثل برنامج استبدال أجهزة التبريد المنزلي في البرازيل التي تنفذ بدعم من مرافق الكهرباء وبرنامج استبدال الأجهزة في المكسيك) عن تطوير هذه البرامج (والأكثر من ذلك عن زيادة كميات الهيدروكلوروفلوروكربون-22 المسترجع من وحدات مستبدلة) مع ملاحظة أن من الضروري أن تصمم هذه الخطط لإدراج تطبيق غازات التبريد المنخفضة القدرة على الاحترار العالمي في المعدات.

40. وتنفذ عمليات التدريب وبناء القدرات للفنيين لاعتماد التكنولوجيات البديلة المنخفضة القدرة على الاحترار العالمي في إطار خطط حوافز المستخدمين النهائيين وبرامج التدريب المدرجة كجزء من أنشطة قطاع الخدمة بمقتضى خطط إدارة إزالة المواد الهيدروكلوروفلوروكربون ويسفر بناء القدرات المعزز عن ارتفاع مستويات الثقة بين أصحاب المصلحة فيما يتعلق باعتماد التكنولوجيات البديلة. وفي بعض الحالات فإن الدعم المقدم للمؤسسات التقنية يعزز التطبيق الآمن للتكنولوجيات البديلة المنخفضة القدرة على الاحترار العالمي.

41. وفي أحد البلدان، ركز نظام حوافز المستخدمين النهائيين على خفض التسرب في متاجر السوبر ماركت وأسفر عن خفض كبير في تسرب الهيدروكلوروفلوروكربون، والنهوض بأداء التجديد في المعدات. وينطوي تكرار هذه التجربة في بلدان أخرى من بلدان المادة 5 عن بناء قدرات المستخدمين النهائيين والفنيين المعنيين لإجراء تقييم مفصل لتسرب معدات التبريد التجاري المستخدمة في متاجر السوبر ماركت وتطبيق ممارسات جيدة لخفض التسرب واسترجاع وإعادة استخدام المواد الهيدروكلوروفلوروكربونية.

التوصية:

42. قد ترغب اللجنة التنفيذية فيمايلي:

(أ) أن تحاط علما بالوثيقة UNEP/OzL.Pro/ExCom/84/63 عن تقرير بشأن الحوافز للمستخدمين النهائيين المعدل في إطار خطة إدارة إزالة المواد الهيدروكلوروفلوروكربونية (المقرر 54/82)؛

(ب) أن تنظر نظام حوافز المستخدمين النهئيين في المراحل الحالية أو المقبلة من خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية على أساس كل حالة على حده مع مراعاة الإطار السياساتي لقييد استخدام المواد الخاضعة للرقابة بمقتضى بروتوكول مونتريال وتشجيع اعتماد التكنولوجيا البديلة المقترحة بمجرد نظام الحوافز وتطور التكنولوجيا البديلة المقترحة في ضوء ظروف الأسواق المحلية؛

(ج) أن تطلب من الوكالات الثنائية والمنفذة لدى تقديم خطط حوافز المستخدمين النهائيين على النحو المبين فيالفقرة الفرعية (ب) أعلاه:

(1) أن تصمم نظام حوافز للمستخدمين النهائيين للاستخدامات النوعية للتبريد وتكييف الهواء مما يؤدي الى أقصى حد ممكن الى تسريع إزالة المواد الخاضعة للرقابة وتعزيز الاعتماد المبكر للتكنولوجيا البديلة التي يجري اقتراحها؛

(2) أن تضع قواعد وتدابير أخرى، حسب مقتضى الحال، لتقييد استخدام المواد الخاضعة للرقابة والترويج للاعتماد ا لمبكر للتكنولوجيا البديلة التي يجري اقتراحها في الاستخدامات المحددة؛

(3) أن تقدم معلومات عن المستوى الفعلي للتمويل المشترك من جانب جميع المستخدمين النهائيين المستفيدين والمشاركين في نظام الحوافز، ووصف الإجراءات التي سيتخذونها للترويج لاعتماد التكنولوجيا المقترحة؛

(4) أن تدرج التدريب وبناء القدرات والمساعدات التقنية لاعتماد التكنولوجيا البديلة المقترحة بطريقة تحقق مردودية تكاليفها مع مراعاة التآزر مع برامج التدريب التي تنفذ في إطار خطط إدارة إزالة المواد الهيدروكلوروفلوروكربونية الموافق عليها؛

(5) أن تتنبأ بتأثير نظام الحوافز من حيث إزالة المواد الخاضعة للرقابة وإدخال غازات التبريد البديلة.

(د) أن تطلب من الوكالات الثنائية والمنفذة تقديم تقارير مفصلة عن نظام حوافز المستخدمين النهائيين بمجرد الانتهاء من هذا النظام بما في ذلك الإجراءات التي تتخذ للترويج لاعتماد التكنولوجيا البديلة التي تستند عليها الأمانة في وضع نشرات إعلامية يمكن استخدامها خلال تنفيذ المشروع.

المرفق الأول

المقررات المتعلقة بتنفيذ إعادة التهيئة، والاستبدال ونظم حوافز المستخدمين النهائيين خلال الإزالة

1. نصت المبادئ التوجيهية لتحويل المستخدمين النهائيين في قطاع التبريد التجاري التي اعتمدتها اللجنة التنفيذية خلال اجتماعها الثامن والعشرين (المقرر 44/28) بأن الظروف ذات الصلة التي تسود قبل إسناد الأولوية لأنشطة تحويل المستخدمين النهائيين تشمل:

(أ) تكون الرقابة على إنتاج واستيراد المعدات المعتمدة على الكلوروفلوروكربون ورباعي كلوريد الكربون وإنفاذها بفعالية، وتقييد انتشار عناصر الكلوروفلوروكربون الجديدة؛

(ب) يتمثل الاستهلاك المتبقي الرئيسي للبلد في خدمة أجهزة التبريد وتكييف الهواء؛

(ج) تم تحديد البيانات الشاملة عن حالة جميع الاستهلاك المتبقي وأتيحت للجنة التنفيذية؛

(د) سواء توافرت أنشطة محتملة أخرى مما تتيح للبلد تحقيق التزامات بشأن الرقابة على الكلوروفلوروكربون أو ارتفاع الأسعار الاستهلاكية للمواد الكلوروفلوروكربونية مقارنة بغازات التبريد البديلة لمدة تسعة أشهر على الأقل، ويتوقع أن تواصل ارتفاعها.

2. وقررت اللجنة التنفيذية خلال اجتماعها الحادي والثلاثين أن بالإمكان تقديم برامج تحفيزية للتشجيع على إعادة التهيئة للاجتماع الثاني والثلاثين وفقا للمقرر 48/31. وضع اليوئنديبي فكرة البرامج التحفيزية لإعادة تهيئة/ استبدال أجهزة التبريد في القطاعات التجارية والصناعية والمستخدمين النهائيين، وقدم ثلاثة مشروعات، وقررت اللجنة التنفيذية *ضمن جملة أمور* أنه يمكن تقديم مقترحات المشروعات بشأن البرامج التحفيزية للتشجيع على إعادة تهيئة أجهزة التبريد في إطار خطة إدارة غازات التبريد وفقا لظروف معينة (المقرر 28/32).

3. وعقب ثلاث سنوات من المقررات التي اتخذتها اللجنة التنفيذية في اجتماعيها الحادي والثلاثين والثاني والثلاثين، أجرى تقييم لتنفيذ خطة إدارة غازات التبريد في 2003. وأبلغ التقييم عن اختبارات رائدة على إعادة تهيئة الأجهزة المنزلية والتجارية الصغيرة لاستخدام الهيدروكربونات في العديد من البلدان التي تمت زيارتها (غانا والسنغال وأوروغواي) التي رؤى أنها خيار محتمل لمواصلة تشغيل أجهزة التبريد المعتمدة على الكلوروفلوروكربون بتكاليف محدودة بعد إزالة الكلوروفلوروكربون، ويتطلب تدريبا مكثفا على السلامة للفنيين، وإجراء تعديلات في الورش، وأشير الى أن كفاءة استخدام الطاقة سوف تتحسن وإن لم يكن قد تم توثيق ذلك. وقد تبين أن تحويل أجهزة التبريد الى الهيدروفلوروكربون-134a لاينطوي على سلامة اقتصادية في معظم الحالات نتيجة لارتفاع التكاليف، وتكاليف الزيوت اللازمة والصعوبات في مناولة النظام. ورؤى أن غازات التبريد المباشرة جديدة في ذلك الوقت بالاستكشاف باعتبارها من الحلول التقليدية المفيدة.

4. وتشير الدلائل المحدودة التي جمعت بشأن عمليات تحويل المستخدمين النهائيين خلال هذا التقييم، مرة أخرى، الى أن بوسع البرامج التحفيزية أن تصبح، من حيث المبدأ، فعّالة إذا توافرت العناصر التالية: نظام تراخيص للواردات عامل وفعّال مع مخصصات من الحصص، رقابة يعتمد عليها على مستوى استهلاك الكلوروفلوروكربون، وفروق سعرية طفيفة أو حتى معاكسة فيما بين المواد الكلوروفلوروكربونية وغازات التبريد البديلة، وتطبيق الحوافز الاقتصادية وأخيرا وليس آخر النمو الاقتصادي الذي يساعد في تعبئة الأموال العامة والخاصة لتحديث الاستثمارات، وخلص التقييم كذلك الى أن توقعات تطورات السوق وليس استثارة الوعي هي التي يمكن أن تدفع القطاع الخاص الى أن يعكف على تحويل التكنولوجيات، وتحل استثمارات إضافية، وأن الأمر يتطلب إجراء تحليل آخر لعوامل النجاح.

5. بحلول 2007 كان قد ووفق على عشرين برنامجا من برامج حوافز المستخدمين النهائيين لغازات التبريد، وأجريت بعد ذلك دراسة نظرية عن برامج الحوافز للتشجيع على إعادة التهيئة وأكدت الدراسة أن من الممكن بل وكذلك من الضروري لبلد ما لكي يحقق المتطلبات التي حددتها اللجنة التنفيذية للموافقة على برنامج الحوافز أي: الرقابة على الإنتاج والواردات من المواد الكلوروفلوروكربونية والأجهزة العاملة بهذه المواد، وإنفاذها بفعالية بالاقتران مع فرض قيود على وضع مكونات جديدة من الكلوروفلوروكربون. وأكدت الدراسة كذلك أنه بدون هذه الشروط المسبقة، يصبح التعاون الضروري الوثيقة مع المنتفعين المحتملين بالغ الصعوبة بل ومستحيل التحقيق مثلما تعرضت له بعض البلدان. وكانت التأخيرات التي لوحظت في المشروعات تعزى بالدرجة الأولى الى انعدام الشروط المسبقة الضرورية لنجاح البدء في مشروعات التحفيز.[1]

6. وأظهرت الدراسة أنه قد تم نظر سلسلة من البدائل في برامج حوافز المستخدمين النهائيين بما في ذلك إعادة التهيئة لاستخدام الهيدروكلوروفلوروكربون-22 والهيدروفلوروكربون-134a، والهيدروفلوروكربون-404A، والهيدروكربونات أو إدخال غازات التبريد المعتمدة على الهيدروفلوروكربون-406 والهيدروفلوروكربون-409 وC-10M1. وأكدت المنشئات المستفيدة من برامج الحوافز وجود منافع اقتصادية كبيرة مستمدة من التمويل نتيجة لانخفاض أسعار الهيدروكلوروفلوروكربون-22 (في جميع الحالات من 20 و52 في المائة من أسعار الكلوروفلوروكربون-12). وفي حالات التحويل الى الهيدروفلوروكربون-134a أو الهيدروفلوروكربون-404A، أبلغ أصحاب أجهزة التبريد بأنه حتى مع ارتفاع أسعار الكيلوغرام من البدائل الجديدة مرتفعة في الوقت الحاضر عن أسعار الكلوروفلوروكربون-12 فإن المنافع الاقتصادية المستمدة من كفاءة تشغيل النظم الجديدة تتجاوز بكثير الفروق في أسعار غازات التبريد، وينبغي أن تصبح حافزا للتحويل الى البدائل الجديدة. ولعمليات التمويل المباشر باستخدام الخلائط المحتوية على الهيدروكلوروفلوروكربون في ذلك الوقت يحد من الاستخدامات في بلدان المادة 5 نتيجة لانخفاض توافره وارتفاع تكاليفها وخاصة بالنظر الى ارتفاع معدل التسرب من أجهزة التبريد الهرمة. وأبلغت جميع الشركات تقريبا عن أن تسرب الغازات والأعطال المتكررة قد انخفض أو توقفت تماما مما أدى الى تخفيضات كبيرة في تكاليف التشغيل وخسائر دورية في المنتجات المخزنة.

7. وتتضمن بعض العوامل التي دفعت المستخدمين النهائيين على إعادة تهيئة أجهزتهم محدودية ما تبقى من عمر افتراضي للأجهزة العاملة، وزيادة تكاليف الصيانة، وزيادة أسعار غازات الكلوروفلوروكربون-12 والانخفاض النسبي في أسعار الهيدروكلوروفلوروكربون-22، وزيادة وعي الملاك عن إزالة المواد المستنفدة للأوزون ونقص غازات التبريد المعتمدة على الكلوروفلوروكربون والإجراءات البسيطة نسبيا للحصول على الأموال بمقتضى برامج الحوافز، وزيادة الوعي بالمنافع الإضافية الناشئة عن التحويل مثل الوفورات في الطاقة وانخفاض نكاليف الصيانة وخفض التسرب وفرص الأعمال الواعدة المرتبطة بالأداء الأفضل لأجهزة التبريد المستبدلة أو المعاد تهيئتها. وقد أسفرت عملية إعادة تهيئة الأجهزة القائمة عن تمديد العمر الافتراضي وإرجاء الاستثمارات التي كان لابد منها لولا ذلك في صناعة تجهيز الأغذية، وتوافر التكنولوجيا البديلة، وتقديم المقاولين المحليين الخدمة الجيدة لاستبدال وإعادة التهيئة، والصلات الجيدة للخبراء الاستشاريين المحليين مع فنيين الخدمة ومقاولي غازات التبريد المحليين من خلال روابط التبريد الوطنية.

8. وفي عام 2009 خلصت عملية تقييم خطط إدارة الإزالة النهائية الى أن المشروعات التحفيزية لإعادة التهيئة قد سادت بصورة جيدة في الأماكن التي كانت فيها أسعار الكلوروفلوروكربون-12 تتزايد بسرعة في حين كانت اسعار البدائل المتوافرة كذلك ثابتة. وخلص التقييم ايضا الى أن الفروق السعرية ومستوى الحوافز وأنشطة وحدات الأوزون الوطنية قد اضطلعت أيضا بدور كبير.[2]

[1] الوثيقة UNEP/OzL.Pro/ExCom/52/18.
[2] الوثيقة UNEP/OzL.Pro/ExCom/58/8.

Annex II

REPORTS ON END-USERS RECEIVED FROM IMPLEMENTING AND BILATERAL AGENCIES

Group I End-user incentive schemes for conversion or replacement of HCFC-based equipment

Group II Projects to demonstrate alternative technologies

Group III Leakage reduction programmes at end-users

Group I: **End-user incentive schemes for conversion or replacement of HCFC-based equipment**

PROJECT DESCRIPTION	
Country	Bhutan
Stage of the HPMP	HPMP (2011-2025)
Implementing agency	UNDP
Project title	HCFC phase-out management plan
Subsector/application	RAC/ domestic/commercial air-conditioning
Alternative technology	Capped to GWP-675 or lower
Number of beneficiaries planned	65
HCFC-22 to be phased out (mt)	232 Kgs
Funds approved (US $)	US$ 79,000
Co-funding commitment (US $)	30% was funded from project and 70% was co-financed by the beneficiaries
Planned date of completion	Completed (December 2018)
Description: The objective of the replacement incentive programme was to support and promote zero ODP and low GWP appliances. 65 units of appliances were planned for conversion out of which: 60 appliances in domestic refrigeration and air conditioning and 5 in commercial sector.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	2 (15 units)
HCFC-22 phased out (mt)	33 Kgs.
Co-funding provided (US $)	USD 7,892
Actual date of completion	August 2018
Main results obtained and any other environmental/economic impact achieved: The programme has initiated after four workshops with stakeholders were carried out to promote it. There was reluctance from targeted audience to replace their existing R-22 based equipment due to timing and incompatibility with public budget. The NOU targeted private sector in order to maximize project outputs. In both cases, the initial planning from beneficiaries was to install R-22/R410A units (commercially available and less costly). Two institutions (The National Animal hospital in 2017 and the Samtse Higher Secondary School in 2018) were installed with fifteen R-32 based units' heat pump and AC. The potential direct emission reduction was 24,516 $CO_{2\text{-eq}}$ (39,096 CO2-eq from baseline equipment to 14,580 CO2-eq for new units).	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: Although sensitized on this incentive scheme in various workshops, meetings and trainings, the stakeholders felt 25%-30% incentive was insufficient to motivate the change of technology. The cost of newer low GWP technologies are higher than the HFC-410A-based air conditioners (seen as most common replacement for R-22 units) and even higher when compared to R-22 units, with the cost differential superseding the 25-30% incentive level. There was an urgent need to revisit the national strategy. Further, the government wanted to strengthen Refrigeration & Air-conditioning course in Technical Education for sustaining the training outputs to reduce leakage. Keeping in mind the sustainability of future training, the 83rd ExCom has approved the reallocation of unspent funds towards other component of training and procurement.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Workshops, awareness actions, information sharing and sensitization, as well information embedded in RAC training activities
Associated policies or regulatory measures planned/promulgated, if any	Yes, the government put a ban on imports of new air-conditioners with HCFC-22 under the HPMP.
Number of additional end-users that followed the same approach as a result of the project	N/A
Comments on the reasons for success of failure of the project and recommendations: Bhutan faces a challenging scenario in terms of market penetration of low GWP-based RAC equipment, since R-290A ACs are not available and are not offered by international suppliers, and current available HFC-32 units have a cost that supersede the 30% subside offered under the replacement programme, making not viable to implement a large-scale replacement programme in the very short term while no further restrictions over HFC-based equipment are legally possible to be put in place. Another reason is that there is current low penetration of HCFC-22 based air-conditioners used in the government buildings, therefore there is less need to change the air-conditioners at these end-users since they did not reach end-of-life yet, while further newer installation are based on HFCs units. In the face of recognizing these challenges, upon request from the Government of Bhutan, the MLF agreed the reallocation of USD 33,817 for use of remaining funds in training/R&R activities under the HPMP.	

PROJECT DESCRIPTION	
Country	Brunei Darussalam
Stage of the HPMP	HPMP I
Implementing agency	UNDP
Project title	HCFC Phase out Management Plan Stage I
Subsector/application	Residential AC and large RAC for phasing out HCFC based equipment
Alternative technology	Zero ODP Low GWP alternates (R32, R290)
Number of beneficiaries planned	35
HCFC-22 to be phased out (mt)	85 kg
Funds approved (US $)	US$ 33,500 (including incentive and awareness/capacity building workshops)
Co-funding commitment (US $)	Up to 25% from HPMP Up to 75% co-funding
Planned date of completion	Dec 2020
Description: End user replacement programme is one the component under HPMP I of Brunei. The purpose is to demonstrate and share experience on replacing R-22 based equipment in RAC sector with zero-ODP and low-GWP alternatives, with the provision of incentive (up to 25% of the cost). The activities include awareness and capacity building workshops for stakeholders (users, technicians, importers, decision makers etc.) in addition to implementation of replacement programme.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	n/a
HCFC-22 phased out (mt)	n/a
Co-funding provided (US $)	n/a
Actual date of completion	ongoing
Main results obtained and any other environmental/economic impact achieved: The activity has been initiated. Stakeholder meetings were conducted, however, the alternates (non-ODP, Low-GWP) identified as suitable for the sectors are mildly flammable/flammable. As per country's law, NOU requires approval of the relevant authorities to introduce these A2l/A3 refrigerants in the country. NOU is following up and still awaiting approval of relevant government agencies for allowing use of flammable refrigerants as required. The meetings are held by NOU with these relevant government agencies.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: As above	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Awareness workshops and technical workshops is being conducted for alternate technology about benefits of energy efficiency
Associated policies or regulatory measures planned/promulgated, if any	Additional Policy allowing approval of fire department for allowing use of flammable refrigerant in RAC applications
Number of additional end-users that followed the same approach as a result of the project	On going
Comments on the reasons for success of failure of the project and recommendations: This component of HPMP I is yet under implementation stage. However, learning is to ensure that policy mechanism is in place while considering alternate technology.	

PROJECT DESCRIPTION	
Country	Cambodia
Stage of the HPMP	HPMP (single stage up to 2030)
Implementing agency	UNDP
Project title	HCFC phase-out management plan
Subsector/application	Residential air conditioning
Alternative technology	R-32, R-290
Number of beneficiaries planned	900
HCFC-22 to be phased out (mt)	1,800 kg
Funds approved (US $)	USD 350,000 (includes awareness workshops and technical workshops for stakeholders in addition to incentive for replacement programme)
Co-funding commitment (US $)	25% would be incentive for low GWP equipment. Balance 75% will be borne by the beneficiaries
Planned date of completion	Dec 2024 (as proposed in fourth tranche request) – HPMP Project ends in 2030
Description: to demonstrate and share experience on replacing R-22 based refrigeration equipment in RAC sector with zero-ODP and low-GWP alternatives. The activity will include creating awareness in users for alternate technology. Technical workshops for technicians about the replacement programme and implementation of replacement programme.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	69 as of July 2019 – ongoing
HCFC-22 phased out (mt)	138 kg
Co-funding provided (US $)	n/a.
Actual date of completion	Ongoing
Main results obtained and any other environmental/economic impact achieved: HFC-32 units were introduced into the domestic market giving opportunity for Cambodia to implement the replacement programme vis-à-vis with the market penetration of the climate-friendly technology. Training/awareness to technicians/suppliers/users about non-ODS low GWP technology were implemented in order to ensure that replacement incentive programme is received well by the country. Many awareness workshops for different stakeholder groups (users, technicians, importers) had to be conducted to create awareness/capacity building for penetrating low GWP alternatives. The programme has received good response from the users. The quantity of replacements is increasing. NOU has been visiting beneficiaries that have replaced their air conditioners for monitoring purposes. Initial feedback from the users found high rates of satisfaction with the program. The programme is ongoing.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: n/a	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	In addition to awareness workshops, several training workshops were organized during the project period to train technicians on alternate technology. In 2015, HFC-32 and HC-290 were not yet commercially available in Cambodia's domestic market. MOE worked closely with technical experts, service agencies and implementing agencies on identification of feasible options for adoption. Also, in the meantime, MOE continued organizing awareness activities and capacity building for technicians for new technologies.
Associated policies or regulatory measures planned/promulgated, if any	Ban of imports of HCFCs-based equipment from 2020.
Number of additional end-users that followed the same approach as a result of the project	No specific study done. The replacement incentive programme is still ongoing.
Comments on the reasons for success of failure of the project and recommendations: Project ongoing.	

PROJECT DESCRIPTION	
Country	Croatia
Stage of the HPMP	Stage I
Implementing agency	UNIDO
Project title	HCFC Phase-out Management Plan
Subsector/application	Retrofit/replacement of HCFC-22 chillers/industrial/commercial refrigeration installations
Alternative technology	Retrofit to HFCs, replacement to natural alternatives
Number of beneficiaries planned	At least three (3) sites retrofitted to the use of alternative refrigerants with zero ODP; At least seven (7) sites converted to the use of refrigerants with low GWP, like CO_2, ammonia or hydrocarbons.
HCFC-22 to be phased out (mt)	0.89
Funds approved (US $)	360,000
Co-funding commitment (US $)	About US$ 690,000
Planned date of completion	Completed December 2015
Description: This component shall be used as a promotion of low GWP alternatives and new technologies. In this case, it is of particular interest to support some demonstration retrofit projects of non-HFC, low-GWP technologies, such as hydrocarbon (R290, R1270), carbon dioxide (R744) and ammonia (R717) with applications in supermarket refrigeration, chiller installations and heat pump systems. In the Republic of Croatia there are a number of water chillers that contain and consume high quantities of HCFC-22 refrigerant. Insufficient funding for maintenance and service activities is the major cause of their poor condition. In order to decrease the HCFC-22 consumption and at the same time to increase energy efficiency and lower the GWP impact of existing systems, it is recommended to replace the largest, state-owned HCFC-22 systems, e.g. public hospitals, ministerial premises, etc, in the Republic of Croatia.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	32
HCFC-22 phased out (mt)	2,224 (installed capacity)
Co-funding provided (US $)	Approximately US$ 870,000
Actual date of completion	December 2015
Main results obtained and any other environmental/economic impact achieved: 22 retrofits to HFCs – (1,502 kg) 7 conversions to propane and 3 conversions to ammonia (722 kg) Annual saving of 4,472,110 kg CO_2 eq	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: Not applicable	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Not as part of the incentive programme, but as separate HPMP component.
Associated policies or regulatory measures planned/promulgated, if any	Adoption of EU regulations
Number of additional end-users that followed the same approach as a result of the project	All HCFC-users, since after entry to the EU, Croatia had to comply with EU regulations.
Comments on the reasons for success of failure of the project and recommendations: The project was successful due to the legal obligations of phasing-out HCFCs ahead of the original schedule and the significantly increased HCFC prices, as well the availability of the environmental fund to support retrofits and conversions.	

PROJECT DESCRIPTION	
Country	Cuba
Stage of the HPMP	HPMP (2011-2020)
Implementing agency	UNDP
Project title	HCFC phase-out management plan Stage 1
Subsector/application	RAC/ Commercial /Commercial refrigeration
Alternative technology	Non established.
Number of beneficiaries planned	500
HCFC-22 to be phased out (mt)	2.85 mt (for all activities in the refrigeration sector).
Funds approved (US $)	350,000
Co-funding commitment (US $)	
Planned date of completion	On-going (December 2020)
Description: The project aimed to provide technical assistance and co-financing to a determined number of commercial refrigeration users to convert and update their HCFC-based refrigeration system to ODS-free technologies. Conversion is structured in different levels, from replacing the condensing units, the compressors and controls to changing the refrigerant and oils. The type of equipment converted is commercial refrigeration units, medium size, located in stores (such as cold rooms); The converted equipment used HCFC-22 as refrigerant, with high leakage rate and high energy consumption. These two problems were solved with the conversion to R-404A. When the NOU designed this activity within the HPMP, it analyzed different alternatives for the selection of the refrigerant, at the end R-404A was selected due to availability, cost, and technical knowledge; other alternatives were either more expensive, with higher GWP or not available in the country.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	715
HCFC-22 phased out (mt)	Not available.
Co-funding provided (US $)	Not available.
Actual date of completion	On going (December 2020).
Main results obtained and any other environmental/economic impact achieved: The project supported the introduction of an ODS-free technology in 715 RAC systems while helping to improve the energy efficiency, to reduce the refrigerant leaks and to improve the reliability of the RAC systems. All these effects translate in savings for the owner of the equipment and increased "on-time" of the equipment which translated in fewer lost of goods. Also, OTOZ promoted among RAC technicians criteria for evaluating the RAC systems to determine if conversion was a cost-effective option.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: There were not delays in the implementation of the project. Other alternatives with lower GWP were not available in the country or were not cost-effective, this lack of alternatives could be considered a constrain for the implementation of the project.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Workshops, awareness actions, information sharing and sensitization on alternatives technologies for the supermarket sector, mainly transcritical CO2.
Associated policies or regulatory measures planned/promulgated, if any	N/A.
Number of additional end-users that followed the same approach as a result of the project	N/A
Comments on the reasons for success or failure of the project and recommendations: Considering that the Kigali Amendment was approved and that the country is in process of its ratification, OTOZ is analyzing possible alternatives with lower GWP to replace the introduction of R-404A. Finding a suitable alternative will be key for the continuation of the project. Nevertheless, the technical assistance given and the criteria thought to the RAC technicians are key elements to support the replicability and sustainability of the conversion to ODS-free technologies. The improvements in the performance of the equipment and the generated operational savings are used to promote the conversion to new refrigerants.	

PROJECT DESCRIPTION	
Country	Fiji
Stage of the HPMP	HPMP I
Implementing agency	UNDP
Project title	HCFC Phase out Management Plan Stage I
Subsector/application	Residential AC and large RAC (including fishery)
Alternative technology	Non ODS Low GWP alternates
Number of beneficiaries planned	33
HCFC-22 to be phased out (mt)	120 kg
Funds approved (US $)	US$ 48,500 (including incentive and awareness/capacity building workshops)
Co-funding commitment (US $)	Up to 25% incentive would be provided for replacement incentive programme Up to 25% as co-funding
Planned date of completion	December 2020
Description: The activities in the HPMP were designed to address three strategic elements crucial to the successful phase-out of HCFCs in the country, namely: reducing the dependence on HCFCs and HCFC-based equipment through limiting supply, promoting HCFC-free-based alternatives to HCFC-based equipment and reducing demand for HCFCs in existing equipment. End-user incentive programme is one of the important part of HPMP I which supports promoting HCFC Free alternatives to reduce demand of HCFCs. The purpose is to demonstrate and share experience on replacing R-22 in RAC sector with zero-ODP and low-GWP alternatives, with the provision of incentive (up to 25% of the cost). The activity also includes awareness workshops for stakeholders, technical workshops for capacity building of technicians in addition to implementation of replacement programme.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	Ongoing
HCFC-22 phased out (mt)	-
Co-funding provided (US $)	-
Actual date of completion	NA
Main results obtained and any other environmental/economic impact achieved: Several consultation meetings on replacement options and incentive schemes with the residential air-conditioning and fishing vessel sectors were organized. A scheme for implementing end-user incentive programme for residential ACs was designed. Meetings were held with relevant stakeholders. It is noted that R32 is introduced in the market and this end user incentive programme will support penetration of this low-GWP alternative.	
Reasons for delay. The incentive programme is delayed mainly for the fishery sector, most vessels are second hand and already reached age of 25-35 years. Due to this, there are frequent issues of leakage and maintenance. Till now, there is no suitable viable alternative that can be applicable to the aged vessels (matching factors of investment required, payback period, and A1 alternatives with acceptable lower GWP than current HCFCs). A study is being done by the government to assess the situation, since fishery sector is critical in growing economy of Fiji, it is very important for department of Environment to work out a solution for this sector. The awareness is already there in the sector about HCFC phase out. NOU along with UNDP is working to find out various options. The residential AC incentive programme will be implemented soon.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Several training programme for technicians were conducted on alternate technology including HC, R32 and R290 to assist the industry in transiting to non-ODS and low GWP refrigerant.
Associated policies or regulatory measures planned/promulgated, if any	Fiji currently regulates the ODS through Act 1998 and the ODS Regulations 2010 which regulates the use of ODS and Equipment charged with ODS
Number of additional end-users that followed the same approach as a result of the project	n/a.
Comments on the reasons for success of failure of the project and recommendations: Overall, though replacement programme is still ongoing, the awareness and technical assistance activities allowed to spread awareness about alternatives and also gave exposure to main stakeholders to understand options and its pros and cons. The important lesson is that alternatives for the domestic RAC sector exists and can become viable at the country, however for fishery sector, more efforts will be required, due to the unavailability of a suitable alternate A1 refrigerant (uncertainty of performance of alternate refrigerant, safety, costs etc.). Second hand old vessels of Fiji are most vulnerable to the HPMP activities. Meetings were organized with the fisheries sector stakeholders to assess the need and way forward for implementing replacement programme in Fiji. The meeting also initiated a technical working group / stakeholder working group which will focus on replacement programme related issues to find ways to move forward.	

PROJECT DESCRIPTION	
Country	Ghana
Stage of the HPMP	Stage I
Implementing agency	UNDP
Project title	END-USER INCENTIVE PROGRAMME (EUIP)
Subsector/application	COMMERCIAL REFRIGERATION SERVICING (Cold Stores)
Alternative technology	RETROFITTING/CONVERSION FROM HCFC-22 TO A NON-ODS (in first 4 cases, R407C was selected as transitional refrigerant).
Number of beneficiaries planned	Ca. 13 to 15 beneficiaries in total expected at HPMP approval, but only four of them have been covered by the project as of today.
HCFC-22 to be phased out (mt)	1.246
Funds approved (US $)	38,000 USD have been provided to the 4 first companies.
Co-funding commitment (US $)	160,296 USD from the four companies that have completed the project.
Planned date of completion	June 2020

Description: These were facilities that were running on R22 until the HPMP assisted the beneficiaries to retrofit their facilities to run on (HFC) R-407C. In addition to the refrigeration systems, the retrofits included improvements of the existing electrical installations for maximum safety and efficiency. Safety precautions including personal protective clothing and storage techniques, such as First-in-First-Out (FIFO) & Last-In First-Out (LIFO) were also provided.

The modality for the incentive was based on the initial HCFC-22 refrigerant charged into the system, inspection of facilities and vetting and approval of application by the National Committee on ODSs (NACODS). Advertisements were made in the print and electronic media for the general public to buy into the programme. Beneficiary companies were required to sign contracts with Ghana EPA and provide bank guarantees of financial solvency and operational sustainability. Payments were made in two installments. First 60% installment was paid upon signing of contract and 40% after the completion with a verification report among others.

COMPANY	PROJECT FUND (USD)	CO-FINANCED (USD)
Home Support Cold Store	8,000	30,823.23
BroadWater Co. Ltd	11,000	39,139.30
Charlie Boy Ent.	11,000	51,709.22
Bajejo	8,000	38,624.18
TOTAL	**38,000**	**160,295.93**

ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	Four (initial group)
HCFC-22 phased out (mt)	0.46
Co-funding provided (US $)	160,296
Actual date of completion	20th Sep. 2017 (Completion by initial group of 4 beneficiaries)

Main results obtained and any other environmental/economic impact achieved:

The retrofitted facilities are currently running on R-407C which has zero ODP and better energy efficiency (with a GWP of 1774). The retrofits were performed using safety and technical guidance to ensure safe and efficient operations of the facilities and have been well accepted by the beneficiaries. This HFC blend is being used as transitional refrigerant pending final replacement with zero- or low-GWP refrigerant. It also provides better cold storage temperatures thus providing better quality frozen foods in the cold rooms. The operatives have been trained in the code of good refrigeration practices and have acquired better maintenance culture. Unwanted emissions and leakages of the refrigerant have been prevented leading to refrigerant savings and mitigation of adverse environmental impact on the ozone layer and climate.

Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated:

The initial four beneficiaries completed retrofitting their facilities in 2017. However, due to the decision against the use of high-GWP HFCs as alternatives to HCFC-22 the implementation of the programme for the next group of nine companies was suspended. With resources currently available from the EUIP programme it is intended to take some initiatives imminently to address the issues of low-GWP technologies and their market availability in order to restart the programme. This is intended to be achieved through cooperation and assistance of the IAs (UNDP and Italy) and external institutions, such as the Centro Studi Galileo of Italy (which has expressed interest) in organizing relevant seminar/workshop for stakeholders and technical fact-finding visits by a selected national refrigeration expert to facilities and suppliers abroad to facilitate quicker transition to appropriate alternatives.

REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	The technicians manning the facilities were retrained on routine and running maintenance of the facilities based on good refrigeration servicing practices. It is expected that the trained technicians, especially workshop foremen will in turn train other operatives on the job. The NOU keeps monitoring the facilities. Additionally,

PROJECT DESCRIPTION	
Country	Ghana
	the three Ghanaian special refrigeration training centres established with MLF support are made accessible to practicing technicians for regular refresher training.
Associated policies or regulatory measures planned/promulgated, if any	The underpinning strategy of the Ghana HPMP is transition from ODS-based refrigerants to alternative natural refrigerants to the extent possible and low-GWP refrigerants as they become available and economically viable for end-users. Policies and regulatory measures taken as part of the implementation of the HPMP have driven the widespread use of R-600a as alternative to CFC-12 and HFC-134a in the domestic refrigeration sector, while R-290-based air conditioners and R-290 as alternative refrigerant for HCFC-22 are gaining market acceptability. The Ghana EPA intends to organize focused workshops to address the issues of low-GWP alternatives for the RAC servicing sector in general and in the commercial refrigeration sub-sector in particular in line with ExCom Decision 84/48 (b) and (c).
Number of additional end-users that followed the same approach as a result of the project	Given the appropriate conditions of availability of alternative technology the remaining identified nine companies could follow the same approach as result of the success story from the first four beneficiaries. However, unless the alternatives proposed are ozone- and climate-friendly, the funding from the Multilateral Fund would not be provided.
Comments on the reasons for success of failure of the project and recommendations: The Ghana EPA advocacy was well received by the beneficiaries which provided leverage for companies to contribute on average a co-financing of 4 to 1 to the MLF funding. The tangible operational and economic advantages derived from the project generated interest among other stakeholders to participate in the programme. UNDP and Italy are supporting Ghana to explore the opportunity for the low-GWP alternatives. Please note that due to the potentially higher costs, the beneficiaries might be limited. For LVC Article 5 countries, the low consumption volumes of refrigerants usually militate against early market penetration of more environmentally acceptable refrigerants on markets available elsewhere; this is due to high costs. In order to facilitate the market uptake of the low-GWP alternative, LVCs need more funding from the MLF to provide the incentives. Current budget may be insufficient to carry out the incentive programme using the alternatives such as CO2, Ammonia, R290, HFOs.	

PROJECT DESCRIPTION	
Country	Madagascar
Stage of the HPMP	Stage I
Implementing agency	UNEP/UNIDO
Project title	- Project title: HCFC phase-out management plan - Activity title: Replacement scheme aiming to facilitate the replacement of HCFC-based air-conditioners to low-GWP alternative
Subsector/application	- Project subsector/application: servicing sector - Activity subsector/application: replacement of 38 HCFC-22-based air-conditioners (12,0000 BTU cooling capacity) by R-290-based air-conditioners (18,000 BTU cooling capacity)
Alternative technology	Natural refrigerant (propane, R-290)
Number of beneficiaries planned	6 Facilities
HCFC-22 to be phased out (mt)	0.154 (ODS 2.8)
Funds approved (US $)	USD 120,000 (incl. training, purchase and distribution of equipment for installation and maintenance of the R-290-based air-conditioners)
Co-funding commitment (US $)	The beneficiaries will have to provide inland transportation for the equipment and install the R-290-based air-conditioners.
Planned date of completion	May 2020
Description: Facilities were identified to benefit from the financial incentive scheme aiming to facilitate the replacement of HCFC-based air-conditioners with low-GWP alternatives. The beneficiaries will have to provide inland transportation for the equipment and install them. UNIDO will provide technical support during the installation process. A supplier in a position to deliver the required air-conditioners was identified and commercial contract was established. The procurement process is ongoing and is expected to be completed during the course of 2019. The planned payment of incentives to commercial facilities to convert refrigeration systems from HCFC-22 to low-GWP alternatives was replaced by a replacement scheme expanded to more buildings due to inadequate funding for the refrigeration conversion after closer survey of proposed beneficiaries.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	Project is ongoing
HCFC-22 phased out (mt)	Project is ongoing
Co-funding provided (US $)	Project is ongoing
Actual date of completion	Project is ongoing
Main results obtained and any other environmental/economic impact achieved: Project is ongoing	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: Project is ongoing	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Project is ongoing
Associated policies or regulatory measures planned/promulgated, if any	N/A
Number of additional end-users that followed the same approach as a result of the project	Project is ongoing
Comments on the reasons for success of failure of the project and recommendations: Project is ongoing	

PROJECT DESCRIPTION	
Country	Malaysia
Stage of the HPMP	HPMP I
Implementing agency	UNDP
Project title	Pilot retrofitting/replacement programme for end-users
Subsector/application	Residential and commercial RAC sector
Alternative technology	Zero ODP Low GWP alternates
Number of beneficiaries planned	Two large users in the air-conditioning and two large users in the refrigeration sector
HCFC-22 to be phased out (mt)	Not established
Funds approved (US $)	US$ 98,000 (including awareness and technical assistance)
Co-funding commitment (US $)	1:1 ratio
Planned date of completion	Dec 2017
Description: Pilot retrofitting/replacement programme for end-users was aimed to replace HCFC-based equipment in the domestic and commercial RAC sector to demonstrate, build confidence in other end-users, precipitate early replacement in other end-users, and reduce HCFC demand for servicing equipment at end-users.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	82 domestic air conditioning and one commercial refrigeration
HCFC-22 phased out (mt)	203 kg
Co-funding provided (US $)	US$ 110,000 by beneficiary
Actual date of completion	April 2017
Main results obtained and any other environmental/economic impact achieved: As approved for third tranche request (75th ExCom): (1) it was decided that rather than promoting retrofit, country would replace around 100 small-size HCFC-22-based air-conditioning units for HFC-32-based units (retrofit that time to low-GWP efficient retrofit technologies were not recommended). (2) Reallocation of the fund balance leading to US $162,952 for supporting pilot incentive programme for replacement of HCFC-22 equipment with alternatives to industrial and commercial refrigeration (e.g., ammonia-based systems and CO2-based systems). Pilot retrofitting/replacement programme for end-users was one of the activities under HPMP I. Replacement project at Jaya Grocer with CO_2 was completed in April 2016 with support from Panasonic, Japan. Replacement project of HCFC-22 air conditioners with HFC-32 air conditioners was completed in July 2016 at two demonstration sites (University Kuala Lumpur - 16 units; Environmental Institute of Malaysia - 66 units). Both the replacement programme were well received by the stakeholders. It allowed the market transformation for residential air conditioning with the field demonstration of safety and efficiency of the units deployed.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: The commercial refrigeration replacement project was delayed by 3-4 months due to difficulty in identifying technology providers in Malaysia and the beneficiary willing to provide co-funding required. Several meetings were organized by NOU with supplier and beneficiary and finally the management of Jaya Grocer agreed to co-fund the replacement of old R-22 system.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Throughout the project period, many awareness programme for users/technician were carried out to create awareness/capacity building for alternate technology.
Associated policies or regulatory measures planned/promulgated, if any	A ban on the establishment and expansion of new HCFC-based manufacturing capacities as of 1 January 2013 was issued. Malaysia will also issue ban on the import of RAC equipment operated with HCFCs and on the manufacturing and new installation of RAC equipment operating with HCFCs by 1 Jan 2020.
Number of additional end-users that followed the same approach as a result of the project	No dedicated monitoring funds were allocated further than collect the project immediate results.
Comments on the reasons for success of failure of the project and recommendations: The activities related to replacement programme under the HPMP were implemented successfully with active support, participation and cooperation of the NOU and critical stakeholders. The collaboration between NOU, Supplier, beneficiaries and UNDP helped effective implementation. The awareness and technical training also has a big role to play for any such replacement programme.	

PROJECT DESCRIPTION	
Country	Maldives
Stage of the HPMP	HPMP (2011-2020)
Implementing agency	UNDP (co-op IA)
Project title	HCFC phase-out management plan
Subsector/application	RAC domestic air-conditioning and Fisheries
Alternative technology	R-32 for domestic air-conditioners and R-438A for large commercial and industrial refrigeration end-users
Number of beneficiaries planned	750 residential units 15 commercials units
HCFC-22 to be phased out (mt)	1,650 Kgs residential (includes maintenance) 300 Kgs. Commercial (includes maintenance)
Funds approved (US $)	US$ 220,000 (includes TA for workshops, experts and documentation)
Co-funding commitment (US $)	In large systems, US$ 70,443 and In small appliances, it is being 35% was funded from project and 65% was co-financed by the beneficiaries (final figures at the completions of the project)
Planned date of completion	November 2020
Description: The objective of the replacement incentive programme was to support and promote zero ODP and low GWP appliances. 765 units of appliances were planned: 750 appliances in domestic refrigeration and air conditioning and 15 in large commercial and industrial refrigeration sector.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	Four end-users supported: 15 units of commercial RAC system. One end-user supported: 135 units of air-conditioners
HCFC-22 phased out (mt)	1,497 Kgs in total: 297 Kgs. from air conditioners and 1,200 Kgs. from commercial retrofitting
Co-funding provided (US $)	Co-financing for the R 438A conversion by beneficiaries – 70,422.80 USD Co-financing for the R-32 conversion by beneficiary – 299,000 USD (on-going)
Actual date of completion	The project is on-going

Main results obtained and any other environmental/economic impact achieved:

This activity was carried out through organizing four consultative workshops with government and private partners. The activity was divided into two groups: (a) large commercial and industrial refrigeration end-users (inc. Fisheries Sector); and (b) Domestic air-conditioning:

- In fisheries sector, total 1,200 kgs of R-22 was eliminated by four beneficiaries, where 15 large units were replaced (project´s target accomplished).
- In domestic air-conditioning, a series of workshops were held from 2014-2017 to aware the beneficiaries and on alternative technologies, but penetration of low-GWP units were still very incipient and no further replacement action could take place. In 2017, a technology roadshow was organized to promote R-32, R-290, Ammonia and CO2 alternatives. It was noticed during technology road show that the price of R-410A units offered by importers was lower than R-32 and R-290 based air-conditioners, but with additional benefits of having similar COPs but easier handling (no flammable, wide range of parts for maintenance), which constituted another barrier. The tourism sector (resorts) showed interest in engage into a large programme, however because of the competitive scenario for HFC-32, the project could not go on with these stakeholders. In this regard, after thorough market analysis, the Ministry (MIFCO) took the lead on the incentive programme and replaced approximately 135 air-conditioners of different capacity with R-32 to "open the market" for the technology and holding the higher cost opportunity for the transition. Current, almost same quantity of ACs are being be procured under the replacement incentive scheme. MIFCO is keen on deliver further support especially for the fisheries sector (critical for Maldives), where another six vessels are interested in retrofit/replacement, however only viable alternative would be R-448A, which currently is not incentivized as per discussions held at MLF level for the Demonstration Project.

Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated:

The project was delayed due to non-availability of best alternatives in the Asian market. The alternate came into the market was R-438A, which was used by the beneficiaries, however MLF conveyed that the usage of R438A should not be encouraged due to high GWP.

REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	All the technicians of the companies involved were given training. In the case of fishery vessels, specific trainings were provided. Some of the areas covered during the trainings include;

PROJECT DESCRIPTION	
Country	Maldives
	- Good practices in retrofitting - Fundamental of refrigeration and air-conditioning - Alternatives to R 22 - Good servicing practices in handling flammable refrigerants
Associated policies or regulatory measures planned/promulgated, if any	HCFC import/export controls imposed as per the new Ozone Layer Protection Act, 2015, and the Government of Maldives has introduced tax incentives for HCFC alternatives and disincentives for HCFCs through its Import and Export Act. For ammonia, the import tax reduced from 10% to 5% to provide incentive for adoption of low GWP alternatives. For HCFCs and blends, the import tax was increased from 10% to 100%.
Number of additional end-users that followed the same approach as a result of the project	Horizon Fisheries, a private fisheries complex has converted all their equipment to non-HCFCs with their own funding after the retrofit programme. The company has reduced from 2,202 kg of HCFCs.

Comments on the reasons for success of failure of the project and recommendations:

- Fishery sector is critical in terms of technology selection. Social and environmental factors must be balanced when deciding the technology change (in many cases, it if not feasible to push the change of the vessel for a new one that is fully adapted for toxic/flammable alternatives due to extreme higher costs when issues related to return rate, profitable, investment capacity of the owner are not feasible). In this regard, the lifetime of current vessels must be considered and some flexibility in the technology change should be allowed to assure compliance with the HCFCs phase-out schedule.
- Market penetration of low-GWP alternatives is critical! Ample time should be given in search of and for test run of new refrigerants. Countries that are "technology takers" suffer the double as the low GWP alternatives will take much longer to be available at competitive costs. Training is also critical to assure that proper installation and maintenance is given. Aftermarket parts are also critical to assure sustainability.
- In all workshops and consultations, the message given by stakeholders is that "All the end users should be comfortable with the new refrigerant"

PROJECT DESCRIPTION	
Country	Nepal
Stage of the HPMP	HPMP Stage I (2012-2020)
Implementing agency	UNDP (co-op. IA)
Project title	HCFC phase-out management plan
Subsector/application	RAC/ domestic air-conditioning / commercial/industrial refrigeration and air-conditioning
Alternative technology	R-32 (No ODP, GWP-675) and/or low GWP
Number of beneficiaries planned	18 beneficiaries planned. (15 domestic air-conditioning, and 3 for large commercial/ industrial refrigeration)
HCFC-22 to be phased out (mt)	153 Kgs planned. (including charge amount and servicing sector needs)
Funds approved (US $)	US$ 36,000
Co-funding commitment (US $)	35% funded from project; 65% was co-financed by the beneficiaries
Planned date of completion	December 2020.
Description: The objective of the replacement incentive programme is to support and promote zero ODP and low GWP appliances in domestic refrigeration and air conditioning and in commercial sector.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	24 (as of 31 July 2019)
HCFC-22 phased out (mt)	75 Kgs.
Co-funding provided (US $)	USD 111,607
Actual date of completion	On-going
Main results obtained and any other environmental/economic impact achieved: Three meetings with government stakeholders and two workshops with multi-stakeholders were organized to promote this activity. A public call notice was published twice in newspaper to seek for interested end-users. The government could get very low response from the public calls and it was believe that due to public's lack of interest for (i) relative higher cost of alternative equipment and; (ii) need to go over screening and legal process to engage into programme. The government obtained support from equipment distributors, this was critical to establish a route to channel the incentives and facilitate access of end-user, since the customer can access the distributor of his/her trust to obtain technical and commercial support on the replacement. The distributor is responsible to complete all legal and bureaucratic steps on behalf of the end-user, the application is submitted to the Government whom will (or not) approve the incentive to be release. The NOU staff will verify the documents and approve the funds. This approach has worked very successful. Up to now, 34 installations were completed. On the monitoring side, the NOU undertake verification of installations based on sampling approach, also interacting with the end-user to assess the implementation performance of the project, and so far, no issues were raised by the end-users.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: The project has faced some initial delays due to a confluence of issues: change of the National Ozone Officer and Assistant, the earthquake that hit Nepal requesting change of priorities from GOV and private sector and the lack of R-32 based units in the market at competitive costs with other high-GWP alternatives. Initial issues were resolved and since 2018 project is in full implementation, has already surpassed initial target, it is considered that there is a high demand of end-users seeking for support.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	stakeholders workshop looked to sensitize target audience on the benefits of the alternate technologies. The distributors were training and are replicating energy savings approach to increase impact. Lower emissions, and no ODP features are also being informed.
Associated policies or regulatory measures planned/promulgated, if any	Yes, the government put a ban on new air-conditioners with HCFC-22.
Number of additional end-users that followed the same approach as a result of the project	Not available
Comments on the reasons for success or failure of the project and recommendations: Despite the challenges faced in the beginning, the project has gained its momentum is demonstrating to be successful. Project is still ongoing.	

PROJECT DESCRIPTION	
Country	Sri Lanka
Stage of the HPMP	Stage I
Implementing agency	UNDP
Project title	HCFC Phase-out Management Plan
Subsector/application	Air-conditioners (Domestic air-conditioning up to 2 TR capacity)
Alternative technology	R-32 or other low GWP technology
Number of beneficiaries planned	204 (domestic and commercial)
HCFC-22 to be phased out (mt)	520 kg (including charge amount and servicing sector needs)
Funds approved (US $)	60,866 (requested funds were US$137,000; however, the approval was of US$ 60,866) It includes replacement and TA activities.
Co-funding commitment (US $)	Incentive payment depend on the cooling capacity was paid to end user and balance cost of the Air Conditioner was borne by the end user. Approximately 15-25% from the project and 75-85% by the beneficiary.
Planned date of completion	December 2020
Description: Objective of this project was to encourage purchasing of new technology domestic Air Conditioners working on zero ODP, Low GWP refrigerant such as R 32 or R 290. It was related to new purchase and majority as replacement of old ACs worked on R-22. Modality of incentive paid for a unit of AC was as follows: 9,000 Btu/h – US$ 120; 12,000 Btu/h -US$ 150, 18,000 Btu/h – US$ 200, 24,000 Btu/h – US$ 250	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	199 (as of 31 July 2019)
HCFC-22 phased out (mt)	520 Kg of HCFC-22 eliminated
Co-funding provided (US $)	166,410
Actual date of completion	Project ongoing.
Main results obtained and any other environmental/economic impact achieved: The project has not yet been completed. Preliminary results are showing that the Sri Lankan Government is being able to promote R-32 as a suitable replacement for installations that current work or aim to on R-22. A strong awareness programme was put in place so general public could be aware of low GWP alternative technologies available in the country. Based on the incentives, customers have opted for R-32 ACs upon AC replacement actions. At present, leading importers are fully aware of existence and technical features of R-32 ACs up to 5 RT, as well as have access to main global suppliers.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: NA	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	NOU provided training on handling of flammable refrigerant to RAC technicians under the Good Practices of Refrigeration Training Programme. Database of Technicians are being prepared to enhance of training on priority basis.
Associated policies or regulatory measures planned/promulgated, if any	Recommended to include a clause to the Government Procurement Guidelines to prioritize purchase of equipment with low GWP alternatives for acquisition of new and replacement of existing equipment. Low-GWP technologies considerations were incorporated with Green Building Guidelines, and higher grading/standard allows allocation of 2 extra marks for buildings that use 0 ODP, Low GWP AC systems
Number of additional end-users that followed the same approach as a result of the project	No external monitoring is at place, however, per interviews collected from importers, it is perceived that customers are open for new technologies (R 32, R 290), being that the argument over energy efficiency is remarkably positive. NOU is continuing follow up the market trends.
Comments on the reasons for success of failure of the project and recommendations: At the beginning of the project, there were no importer of R-32 ACs. Cost of early shipments of R-32 ACs were higher compare to R-410A ACs, and even incentive proposed was not enough to compensate the price difference. However, with the increase of number of importers who imported R-32 ACs the scenario has changed, but still it took several years from the approval of the Stage I to bring AC price competitive nowadays, being that gross of replacements occurred between 2018 and 2019. Propaganda against R-32 as mild flammable refrigerant was a barrier for market penetration, and is still a great barrier for introduction of R-290a units (allied to lack of suppliers willing to export these A3 units). However, the project was critical to support the market penetration of the R-32 technology. Incentive payment was the "game changer" for the beneficiaries and helped to bridge the gap of the difference of cost of new technology equipment. The Government consider that would be highly recommended to continue similar incentives under the HPMP stage II to minimize the burden when acquiring new alternative technologies. Monitoring funding (for both EE gains and replicability results) should also be allocated.	

PROJECT DESCRIPTION	
Country	Togo
Stage of the HPMP	Stage I
Implementing agency	UNEP/UNIDO
Project title	- Project title: HCFC phase-out management plan - Activity title: Replacement scheme aiming to facilitate the replacement of HCFC-based air-conditioners to low-GWP alternative
Subsector/application	- Project subsector/application: servicing sector - Activity subsector/application: replacement of 70 HCFC-22-based air-conditioners (12,0000 BTU and 18,000 BTU cooling capacity) by R-290-based air-conditioners (18,000 BTU cooling capacity)
Alternative technology	Natural refrigerant (propane, R-290)
Number of beneficiaries planned	3 facilities
HCFC-22 to be phased out (mt)	0.2145 (ODS 3.9)
Funds approved (US $)	USD 90,000
Co-funding commitment (US $)	The beneficiaries will have to provide inland transportation for the equipment and install the R-290-based air-conditioners.
Planned date of completion	December 2021
Description: Facilities were identified to benefit from the financial incentive scheme aiming to facilitate the replacement of HCFC-based air-conditioners with low-GWP alternatives. The beneficiaries will have to provide inland transportation for the equipment and install them. UNIDO will provide technical support during the installation process. A supplier in a position to deliver the required air-conditioners was identified and commercial contract was established. The procurement process is ongoing and is expected to be completed during the course of 2019. The planned payment of incentives to commercial facilities to convert refrigeration systems from HCFC-22 to low-GWP alternatives was replaced by a replacement scheme expanded to more buildings due to inadequate funding for the refrigeration conversion after closer survey of proposed beneficiaries.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	Project is ongoing
HCFC-22 phased out (mt)	Project is ongoing
Co-funding provided (US $)	N/A
Actual date of completion	Project is ongoing
Main results obtained and any other environmental/economic impact achieved: Project is ongoing	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: Project is ongoing	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Project is ongoing
Associated policies or regulatory measures planned/promulgated, if any	Development of guidelines, taking into account international experience, for installation and servicing of R-290-based equipment- still ongoing.
Number of additional end-users that followed the same approach as a result of the project	Project is ongoing
Comments on the reasons for success of failure of the project and recommendations: Project is ongoing	

Group II Projects to demonstrate alternative technologies

PROJECT DESCRIPTION	
Country	Chile
Stage of the HPMP	HPMP (2011-2025)
Implementing agency	UNDP
Project title	HCFC phase-out management plan Stage 1
Subsector/application	RAC/ Commercial /Supermarkets
Alternative technology	Non established.
Number of beneficiaries planned	5
HCFC-22 to be phased out (mt)	2.15 mt
Funds approved (US $)	485,863
Co-funding commitment (US $)	
Planned date of completion	Completed (December 2018)
Description: The project aimed to provide technical assistance and co-financing to a determined number of supermarkets (including large, medium and small examples) in the selection of the most viable technology, the project design, the installation and servicing. The converted installations would become demonstrative cases to be documented and disseminated in the sector. The demonstrative conversions would help understand the in-situ complexities and barriers of adopting these technologies in order to help remove them to encourage others to replicate.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	2 (3 facilities)
HCFC-22 phased out (mt)	Aprox. 3.30 mt
Co-funding provided (US $)	USD 482,790 (from CCAC). Beneficiary companies invested more than USD$ 1 million for the construction of the RAC system for each supermarket.
Actual date of completion	July 2018
Main results obtained and any other environmental/economic impact achieved: Transcritical CO_2 technology was introduced into the country, becoming the default technology in new supermarkets for two (2) of the major supermarket chains in the country. Transcritical CO_2 installations were between 15% and 40% more energy-efficient than comparable installation with HCFC-22 and R-507.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: The project was delayed as supermarkets did not have experience on the management of the new technology, companies were afraid of be the first to try the technology. Also, it was difficult to match the project's schedule with the supermarket's business plan schedule. Another issue that caused delays in the implementation of the project was the difficulties to design an evaluation method that ensure a fair assessment between different approaches.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Workshops, awareness actions, information sharing and sensitization on alternatives technologies for the supermarket sector, mainly transcritical CO2.
Associated policies or regulatory measures planned/promulgated, if any	N/A.
Number of additional end-users that followed the same approach as a result of the project	After the project was completed, 6 additional stores using transcritical CO_2 as refrigerant were built.
Comments on the reasons for success or failure of the project and recommendations: The project was successfully implemented, although with some delays, with an approach that covered the technical and financial aspects for the introduction of a new technology. First, the project rose the awareness on the technologies available for phase out the use of HCFC in the supermarket sector, then trained the technical decision-makers of the beneficiary companies on the technology and reduced the risk associated with the adoption of the new technology when covered part of the incremental costs for the adoption of the new technology. Another reason for the success of the project was that the company selected for the design and installation of the new systems had ample experiences in the selected technology in other regions and that the company was closely supported by its technological suppliers. Transcritical CO_2- based systems installed in Chile are more energy-efficient than comparable HCFC-22 of HFC-based systems, which helped to the technical teams at the supermarket chains to take the decision to select transcritical CO_2 as the default technology for new installations.	

PROJECT DESCRIPTION	
Country	Ecuador
Stage of the HPMP	HCFC phase-out management plan (stage I, third tranche)
Implementing agency	UNIDO
Project title	Demonstration Project of R-290 (propane) as an alternative refrigerant in a cold store used for flower storage.
Subsector/application	Cold store used for flower storage to 1°C (±2°C) whose cooling system has six evaporator blocks, which are fed by two externally located condensing unit, with a capacity of 160,000 BTU / hr approximately.
Alternative technology	As part of a demonstration project, it is proposed to convert the refrigeration systems that provide the flow coldstore with cooling to R-290.
Number of beneficiaries planned	For demonstration one beneficiary is selected. The same beneficiary can replicate the results in at least 10 cold rooms used for flower storage or store perishable goods in similar conditions.
HCFC-22 to be phased-out (mt)	0,03 Ton
Funds approved (US $)	As component of HPMP, no specific funds for the project
Co-funding commitment (US $)	In-kind and approximately 10,000 USD
Planned date of completion	No completion specified. It is planned for November 2019.

Description:

On behalf of the Government of Ecuador, UNIDO as the designated implementing agency has submitted as component of the HPMP the demonstration project of R-290 as an alternative refrigerant in a cold store used for flower storage.

The project objectives are:

- to demonstrate the safe use of R-290 as a low-GWP refrigerant in a cold store used for flower storage;
- validate the requirements for the operation of cold rooms with R-290 refrigerant;
- demonstrate the safe handling and proper risk management for the introduction of flammable refrigerants in the conservation of perishable products, to encourage possible adoption in similar applications.

ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	Hilsea Company
HCFC-22 phased out (mt)	Installed capacity 0,03 service ca. 0.01 mt per year
Co-funding provided (US $)	Not specified
Actual date of completion	Ongoing

Main results obtained and any other environmental/economic impact achieved:

- Successful implementation of this project would be an advance in technology and would enable the introduction of a low-GWP alternative to a sector that otherwise can migrate to HFC-404A or HFC-507A.
- Application of methods to risk assessment and eliminate sources of ignition in refrigeration systems with flammable refrigerants.
- Technical training and qualification of the personnel responsible for providing the refrigeration maintenance and installation with HC as refrigerant.
- This project will generate inputs for updating/formulating the regulations and standards for flammable refrigerants that Ecuador intends to adopt during the implementation of the HPMP Stage II.
- Dissemination workshops are planned at the end of the project, focused on end users related to this sector or with similar cooling needs.
- Application of methodology based on social, economic and environmental life cycle analysis to determine the best replacement option for refrigeration technologies that deplete the ozone layer and cause global warming.

Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: N/A

REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	A workshop will be carried out to provide support for the beneficiary company and the company responsible for the installation of the HC refrigeration equipment. The training included both theory and practice workshops with an international expert that focused on the safe handling of R-290 refrigerant during the installation and maintenance services of refrigeration systems. The main topics presented were: - HCFC -22 system charged with R-290; - Risk assessment and eliminate sources of ignition in refrigeration systems with flammable refrigerants; - Modifications to electrical components and enclosures/panels; - Methods of leak detection system.

PROJECT DESCRIPTION	
Country	Ecuador
Associated policies or regulatory measures planned/promulgated, if any	As component of the HPMP, the Government of Ecuador is promoting the use of hydrocarbon. For the training activities, the demonstration and use of hydrocarbon as alternative is compulsory. Furthermore, Stage II of Ecuador's HPMP and Kigali Amendment include activities for development and establishment of regulations and standards for flammable refrigerants that will allow the safe handling in the use and servicing of HC in refrigeration equipment. The project's outputs will be taken as input for the regulations or standards that will be formulated.
Number of additional end-users that followed the same approach as a result of the project	The flower export association has provided support on this project and the results will be disseminated through them. It is expected that other producers will also follow the approach. In addition, the information generated on the use and measures to ensure the safe handling of HC in refrigeration systems would be made available, which could benefit other projects in the region.
Comments on the reasons for success of failure of the project and recommendations: The project is being implemented with local service and engineering companies and training is provided to the service companies. All the components and equipment has been purchased through local suppliers. It is possible to replicate results like this.	

PROJECT DESCRIPTION	
Country	Georgia
Stage of the HPMP	I
Implementing agency	UNDP
Project title	Demonstration projects to use natural refrigerants
Subsector/application	Servicing
Alternative technology	CO2 as a target for demonstration
Number of beneficiaries planned	1
HCFC-22 to be phased out (mt)	TBD – after a market search for potential partners is completed
Funds approved (US $)	91,300
Co-funding commitment (US $)	TBD – after a market search for potential partners is completed
Planned date of completion	December 2020
Description: HPMP-I had long planned for demonstration of a new technology running on CO2 or ammonia with procurement of a complete package for smaller scale application depending on market prices.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	0
HCFC-22 phased out (mt)	TBD – after a market search for potential partners is completed
Co-funding provided (US $)	TBD – after a market search for potential partners is completed
Actual date of completion	TBD – planned December 2020
Main results obtained and any other environmental/economic impact achieved: Georgia has not started any implementation except identification of potential project sites since the funding in the previous tranche was not enough to have a type of demonstration they wanted to have. Currently the data collection process is ongoing which will help see which type of demos could be financed by the project, and on what conditions (like co-finance, type of technology).	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: N/A. NOU-Georgia planned to combine remaining funds from Tranche 2 and new funding from Tranche 3 to attempt to capitalize on this opportunity and make the project more successful due to generally high prices of new technologies related to CO2 or ammonia as compared to HFC systems available on the market.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Training will be provided by supplier of equipment, if the demonstration project is successful.
Associated policies or regulatory measures planned/promulgated, if any	To be reported later
Number of additional end-users that followed the same approach as a result of the project	Only one project could be possible with available funding. Replication results will mostly depend on capital and operating costs related to the new equipment.
Comments on the reasons for success of failure of the project and recommendations: To be reported later in 2020.	

PROJECT DESCRIPTION	
Country	Grenada
Stage of the HPMP	Stage I
Implementing agency	UNEP
Project title	Demonstration project for the replacement of existing HCFC-based equipment
Subsector/application	Split AC systems
Alternative technology	Hydrocarbons
Number of beneficiaries planned	Not specified
HCFC-22 to be phased out (mt)	Not specified
Funds approved (US $)	9,000
Co-funding commitment (US $)	No additional funding was provided
Planned date of completion	December 2020
Description: A small-scale demonstration project for the replacement of existing HCFC-based equipment was approved at ExCom-77, as part of UNIDO's component of Grenada's HPMP Stage I.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	2 AC units replaced at a community college

PROJECT DESCRIPTION	
Country	Grenada
HCFC-22 phased out (mt)	Not available
Co-funding provided (US $)	No co-funding provided
Actual date of completion	December 2018
Main results obtained and any other environmental/economic impact achieved: The National Ozone Unit (NOU) in the Energy Division of the Ministry of Infrastructure Development, Public Utilities, Energy, Transport & Implementation, in conjunction with the United Nations Industrial Development Organisation (UNIDO) procured two (2) split AC units using natural refrigerants, R-290 (Propane), that were installed in selected buildings to monitor and compare their performance and energy efficiency. The electrical consumption data of the AC units were collected using an efergy e2 classic energy monitor. The consumption was logged on an hourly basis in kilowatt hours (KWh). From this data other parameters such as energy cost and carbon emissions can be calculated. The electricity consumption of the AC units was logged for a minimum of one month (excluding weekends and holidays). Electricity consumption comparisons were made between the units that were previously installed (R-410A) and the replacement R-290 units. In one case, the previously installed 18,000 BTU (5.2KW) split AC unit using R-410A was replaced with the R-290 unit. The exercise showed that the R-290 unit performed approximately 30.03% more energy efficient than the previously installed unit, which resulted in savings in running costs and reduction in GHG emissions.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated:	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Over 60% RAC technicians in Grenada have received some level of training in hydrocarbon refrigerant technology. This training is geared for RAC technicians with at least three years' experience in the field. The focus of the training is on the safe handling of flammable refrigerants. Day one of the training covers the theoretical aspects and day two is used for practical sessions. Some of the major topics covered in the training included: • Properties of hydrocarbons • Risk assessment • Legislation, policy and standards • Fire and electrical safety • Charge limitation and room size calculations • Personal protective equipment and specialize tools and equipment required for installation and servicing • Leak detection • Installation, servicing and maintenance practices • Brazing and pipe connections
Associated policies or regulatory measures planned/promulgated, if any	Through a series of consultations and workshops, with the last one being a National Refrigerant Symposium for stakeholders in the RAC industry in Grenada (organized on June 28th, 2019 in observance of the World Refrigeration Day), the NOU Grenada managed to raise awareness of stakeholders' on the importance of the natural refrigerants. Among the stakeholders present at the symposium were: RAC equipment and refrigerant importers, procurement officers, government officials, RAC technicians, the Grenada Bureau of Standards, academia and training institutions and end users. Until recently hydrocarbon-based AC systems were not available in Grenada. At the symposium, participants were informed that there are two Grenadian based companies that have Hydrocarbon (R290) mini-split AC units commercially available and that there are three companies already supplying the hydrocarbon refrigerants. An announcement was made on the testing of R-32 equipment by another company and to make them commercially available on the local market by the third quarter of 2019. A rebate of XCD 100.00 will be offered for every ton of cooling capacity of R-22 and R-410A replaced with the new R-32 equipment. The representative from the Grenada Bureau of Standards also informed of the two new standards that were established for the RAC sector and gave an insight on others that are currently being developed.

PROJECT DESCRIPTION	
Country	Grenada
Number of additional end-users that followed the same approach as a result of the project	Not available at this time.
Comments on the reasons for success of failure of the project and recommendations: This study was carried out using business-as-usual (BAU) scenarios therefore the information presented is specific to the environment where units were installed and monitored. Therefore, individual results and efficiencies may vary at other locations. R-290 split ACs are a sustainable option for Grenada with their ozone and climate friendly refrigerant properties. In addition, they show tremendous potential for energy and cost savings when compared to the previously installed units using fluorinated hydrocarbons.	

PROJECT DESCRIPTION	
Country	Iran (Islamic Republic of)
Stage of the HPMP	I
Implementing agency	Germany
Project title	Financial incentives for technology demonstration
Subsector/application	Refrigeration sector – Introducing Sealed system to beneficiaries, replace the flare connection to brazed one and introduce the brazed component to the market and technicians for using leak tight system, Do demonstration on 3 supermarket systems and hold workshop to promote this technology
Alternative technology	Introduce sealed system for R290
Number of beneficiaries planned	2
HCFC-22 to be phased out (mt)	111 mt (6,1 ODP Tons)
Funds approved (US $)	415,000 USD
Co-funding commitment (US $)	-
Planned date of completion	31.12.2015
Description: Nowadays more and more brands are entering the chain supermarket market but during the time when the project took place Refah and Shahrvand were the biggest supermarket chains in Iran (Islamic Republic of). Around 150 branches of Refah and 50 branches of Shahrvand exist. As a consequence of this (market) situation it was decided to start the demonstration project with them and introduce the sealed system as the fundamental point for promoting R290 and HC systems in general. Brazed components were introduced to the market. In cooperation with local technicians and under supervision of an international technical advisor 3 systems were converted to leak tight systems and at the end a workshop was hold for all technicians of these two supermarkets in order to present this new technology and demonstration project itself to them. The technical handbook "Guidelines for Leakage Reduction and HCFC Emission Reduction in Supermarket Refrigeration Systems" was developed, translated to Farsi, printed and distributed to the beneficiaries.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	2 beneficiaries (Refah and Shahrvand) but in total 3 supermarket systems have been converted (2 of Refah and 1 for Shahrvand).
HCFC-22 phased out (mt)	111 mt (6,1 ODP Tons)
Co-funding provided (US $)	-
Actual date of completion	2014
Main results obtained and any other environmental/economic impact achieved: Introducing leak tight system to the beneficiaries in order to decrease the release of R22 into the atmosphere and also practice with brazed joint and components as the fundamental aspects in using R290 systems.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated:	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Two days workshop was hold for all technicians of these two supermarket and the new technology and demonstration project introduce to them. The technical handbook "Guidelines for Leakage Reduction and HCFC Emission Reduction in Supermarket Refrigeration Systems" was developed, translated to Farsi, printed and distributed to the beneficiaries.
Associated policies or regulatory measures planned/promulgated, if any	Banned on import of RAC equipment that consist of R22
Number of additional end-users that followed the same approach as a result of the project	Nowadays more and more brands are entering the chain supermarket market but during the time when the project took place Refah and Shahrvand were the biggest supermarket chains in Iran (Islamic Republic of). Around 150 branches for Refah and 50 branches for Shahrvand exist.
Comments on the reasons for success of failure of the project and recommendations: Availability of the brazed equipment on market was a challenge and is crucial so that the technicians are able to use this equipment.	

PROJECT DESCRIPTION	
Country	Mauritius
Stage of the HPMP	HCFC Complete phase out
Implementing agency	GIZ
Project title	HCFC Phase-out Management Plan
Subsector/application	AC
Alternative technology	R-290
Number of beneficiaries planned	Still planned
HCFC-22 to be phased out (mt)	(as per the approved proposal)
Funds approved (US $)	250,000
Co-funding commitment (US $)	(funds committed by beneficiaries, government or other sources, including the level and source of the fund)
Planned date of completion	(as per the approved proposal) 2030
Description: (description of the main objective of the project, whether it is related to conversions, replacements of systems or any other assistance to the end-user; and the modality of the incentive, i.e., what is paid by the Fund and what is paid by the beneficiary) The HPMP for Mauritius was approved already at the 63rd Excom. The project had originally wanted to implement an end user incentive scheme for converting HCFC equipment to low GWP technology but following the Decision 72/17, this activity was revised in the 3rd tranche submission in 2017. Currently the plan is to use these funds to fund the supermarket conversion as well as support the creation of a supply chain for R290 ACs through an incentive scheme. The project implementation is still being planned as the NOU is in consultations with the various stakeholders on it.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	still ongoing
HCFC-22 phased out (mt)	(annual amount of HCFC-22 used to serve the converted/replaced systems)
Co-funding provided (US $)	(indicate the value and the source of the co-funding)
Actual date of completion	(if completed)
Main results obtained and any other environmental/economic impact achieved: (description of the main results achieved by the implementation of the project against the original plan; if none, explanation of the reasons) NA	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: NA	
REPLICABILITY AND SUSTAINABILITY-	
Associated technical assistance/training provided	Under the HPMP all efforts are already ongoing to ensure that the trainers and technicians are trained in both CO2 for the supermarkets and HC for ACs
Associated policies or regulatory measures planned/promulgated, if any	Mauritius is committed to achieve early phase out of HCFC while discouraging use of high GWP refrigerants and therefore CO2 is clearly the option that is best suitable for the supermarket sector.
Number of additional end-users that followed the same approach as a result of the project	
Comments on the reasons for success of failure of the project and recommendations: (lessons learned on the parameters that should be in place for the project to be successful and any other lesson learned that could be applicable to future similar projects) Ongoing.	

PROJECT DESCRIPTION	
Country	Mauritius
Stage of the HPMP	HCFC Complete phase out
Implementing agency	GIZ
Project title	HCFC Phase -out Management Plan
Subsector/application	Demonstration project - Supermarket
Alternative technology	CO_2
Number of beneficiaries planned	1
HCFC-22 to be phased out (mt)	(as per the approved proposal)
Funds approved (US $)	200,000
Co-funding commitment (US $)	(funds committed by beneficiaries, government or other sources, including the level and source of the fund)
Planned date of completion	(as per the approved proposal) 2028
Description: The HPMP for Mauritius was approved already at the 63rd ExCom. The project had originally wanted to do a demo for a working supermarket. However, at the time of implementation the NOU through discussions with the supermarkets reached a conclusion that there was a general know-how deficient on CO2 technologies. So instead, a demonstration unit for CO2 use in the supermarket sector was designed specifically for the UDM (the local university). 2 trainings systems have been provided one working solely on CO_2, another a cascade system using Ammonia and CO2. This has been done for training purposes for students and working technicians. There is ongoing consultations with supermarket owners to determine if a local supermarket can be converted to use CO_2.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	still ongoing
HCFC-22 phased out (mt)	(annual amount of HCFC-22 used to serve the converted/replaced systems)
Co-funding provided (US $)	(indicate the value and the source of the co-funding)
Actual date of completion	(if completed)
Main results obtained and any other environmental/economic impact achieved: (description of the main results achieved by the implementation of the project against the original plan; if none, explanation of the reasons) Mauritius has become one of the few countries in the world that has a state of the art CO_2 system at a local training institute. This unit has allowed graduating technicians to gain hands-on training on how to work with CO_2. This we believe will help the local supermarket sector move towards this technology which is now globally becoming the Business as Usual technology option for this sector.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: NA	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Training was provided during the time of commissioning of the system to the trainers at UDM and other local institutions as well as to industry technicians interested in working with CO2. This has also become part of the regular RAC courses conducted at the UDM.
Associated policies or regulatory measures planned/promulgated, if any	Mauritius is committed to achieve early phase out of HCFC while discouraging use of high GWP refrigerants and therefore CO2 is clearly the option that is best suitable for the supermarket sector.
Number of additional end-users that followed the same approach as a result of the project	This is ongoing and before the end of the HPMP it is hoped that supermarkets will be adopting this technology. NOU has been in consultations with the supermarkets on this.
Comments on the reasons for success of failure of the project and recommendations: (lessons learned on the parameters that should be in place for the project to be successful and any other lesson learned that could be applicable to future similar projects) Ongoing.	

PROJECT DESCRIPTION	
Country	Saint Vincent and the Grenadines
Stage of the HPMP	Stage 1
Implementing agency	UNEP/UNIDO
Project title	Demonstration project for retrofitting to HC refrigerants
Subsector/application	Commercial AC
Alternative technology	Hydrocarbon refrigerant
Number of beneficiaries planned	2
HCFC-22 to be phased out (mt)	Not specified
Funds approved (US $)	US $ 99,800
Co-funding commitment (US $)	No co-funding was provided
Planned date of completion	December 2026
Description: Demonstration project for retrofitting to HC refrigerants in a government and a private building, and provision of conversion kits, was approved for Saint Vincent and the Grenadines, as part of UNEP component of their HPMP. The aim of the pilot project was to provide a physical demonstration for what could be achieved, in terms of energy savings, through retrofitting to low-GWP refrigerants. With the expected positive results from the demonstration, the equipment owners and other stakeholders would recognize the advantages and benefits of retrofitting and reduce the use of HCFCs.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	Two – a clinic and the National Archives
HCFC-22 phased out (mt)	Not available
Co-funding provided (US $)	No co-funding was provided
Actual date of completion	Ongoing project
Main results obtained and any other environmental/economic impact achieved: The NOU, in cooperation with UNEP, has selected two buildings to be included in the pilot program. One is a clinic where most of the AC units are not working and in dire need. The other is the National Archives that also houses the Government's servers. The technology of choice is HC based AC units, following intense training of RAC certified technicians. So far, preliminary needs assessment was done, and the equipment was purchased. Training and retaining was done as recently as July 2019. The installations are expected to commence soon.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: N/A	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	So far, 104 technicians successfully completed their training in "Good Refrigeration Practices, Recovery, Recycling and Retrofitting of HCFCs, Alternative Technology and Natural Refrigerant with Particular Emphasis on HC Technology, with 16 specially trained under the retrofitting exercise" Description of the specific subjects of the training provided to support the project and the coverage in terms of technicians/end-users trained is as follows: Ozone layer depletion and the Montreal protocol; Refrigerant Issue; Introduction to Hydrocarbon; Refrigerant Safety; Guidelines for working with HCs; practical applications of refrigerants; Component service procedure; Conducting Conversions; Installation and servicing procedure; Case studies using Hydrocarbon for conversion; Practical work
Associated policies or regulatory measures planned/promulgated, if any	Not applicable at this point, the project is still ongoing.
Number of additional end-users that followed the same approach as a result of the project	Not applicable at this point, the project is still ongoing.
Comments on the reasons for success of failure of the project and recommendations: Project is ongoing.	

PROJECT DESCRIPTION	
Country	Venezuela (Bolivarian Republic of)
Stage of the HPMP	Stage II, Manufacturing Sector
Implementing agency	UNIDO
Project title	Phase out HCFC in the manufacturing sector
Subsector/application	Service sector. Chiller used in hospital
Alternative technology	R-290 Cold water chiller
Number of beneficiaries planned	N/A
HCFC-22 to be phased out (mt)	0.005 mt
Funds approved (US $)	Integrated in HPMP
Co-funding commitment (US $)	In kind
Planned date of completion	Planned for end 2019
Description: The project aims to introduce non-ODS low GWP alternatives to the manufacturing sector in the country. The selected alternative for the project was R-290 locally bottled which is widely available, fulfils the standards, reduces energy consumption and is a reliable technology. The objective of the conversion was to phase out of 5 (five) kilos of HCFC-R22 and ca. 3 (three) kilos consumed for service per year. The HCFC-22 based unit was dismantled and replaced with a R-290 unit with equivalent capacity (5 TR – 60000 Btu) compact air conditioning.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	One beneficiary, a second one has been selected.
HCFC-22 phased out (mt)	0.005 mt and ca. 0.003 mt used for service per year
Co-funding provided (US $)	N/A
Actual date of completion	November 2018
Main results obtained and any other environmental/economic impact achieved: The objectives of the project were achieved. The R-290 based unit is installed and working with energy consumption reduction of ca. 20% compared to the previous unit. The old HCFC-R22 was dismantled and destroyed, average refrigerant service consumption was more than 50% of total in the unit. The new unit, designed and assembled locally by national companies and experts, was installed by a local refrigeration service company. The project was promoted and presented to other producers through the refrigeration chamber in the country. The possibility of using A3 classified refrigerants, safely and without altering the performance of the equipment was demonstrated. The results will contribute to promoting the use of substances and technologies with low-GWP in unusual applications.	
Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated: N/A	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	The project, in addition to the replacement of the equipment, included training in refrigeration good practices for the personnel in charge of servicing the system. It was a good opportunity to train other service providers and technicians in safely handling of low GWP alternatives and promotion of R-290 as alternative.
Associated policies or regulatory measures planned/promulgated, if any	The National Ozone Unit has a plan to promote HC as refrigerant under the HPMP activities. The training in service and promotion of hydrocarbon is priority in the country.
Number of additional end-users that followed the same approach as a result of the project	It is expected to have a second conversion and promote the results through the refrigeration chamber. Other end users which may be interested will receive support from the project.
Comments on the reasons for success of failure of the project and recommendations: Training of personnel related to system maintenance is very important to ensure the proper functioning of the system. Periodic monitoring will allow the early detection of equipment malfunctions, avoiding damages. The strengthening of human resources and technology will allow replicating this experience in a simple and fast way.	

Group III: Leakage reduction programmes at end-users

PROJECT DESCRIPTION	
Country	Brazil
Stage of the HPMP	Stage 1
Implementing agency	Germany
Project title	HCFC-22 Better Containment Demonstration Projects in Brazilian Supermarkets
Subsector/application	Commercial Refrigeration / Compound Systems in Supermarkets
Alternative technology	Introduction of sealed system design and best maintenance practices for HCFC-22 containment
Number of beneficiaries planned	5
HCFC-22 to be phased out (mt)	909 (reduction target for the whole servicing sector to be achieved by training and capacity building activities, technical assistance and outreach campaigns)
Funds approved (US $)	860.736,00
Co-funding commitment (US $)	-
Planned date of completion	31.12.2015
Description: The project focuses on improved containment practices for existing HCFC systems by demonstrating how to improve system tightness by replacing old inefficient parts and using better seals, valves, pipe connections etc. The case studies differ from one another in terms of refrigerant charge, type of system and critical components. This practice, which leads to energy savings and lower demand for HCFCs is efficient, innovative and costs are comparatively low, enhancing the replication of the methodology by other supermarkets. Costs for equipment and tools, engineering and training were covered by the Fund. The selected partner supermarkets paid for technicians' service, consumables and servicing tools.	
ACHIEVEMENTS AND IMPACT	
Number of beneficiaries assisted	3
HCFC-22 phased out (mt)	0,774 mt
Co-funding provided (US $)	-
Actual date of completion	to be completed until 31.12.2019

Main results obtained and any other environmental/economic impact achieved:

Summary of the main findings from the first two interventions:

- Annual leakage rate before the project:
  - Supermarket 1: 62% of the system charge size (no leak alarms were reported since the intervention in 04/2018): The containment of 118 kg of HCFC-22 corresponds to a reduction of direct emissions of 213.580 kg of CO_2 equivalent.
  - Supermarket 2: 130% of the system charge size (no leak alarms were reported since the intervention in 09/2018): The containment of 156 kg of HCFC-22 corresponds to a reduction of direct emissions of 282.360 kg of CO_2 equivalent.
- Improvements in system performance, e.g. superheat reduction, reduction of discharge temperature to recommended values; reduction of condensation temperature; increase of evaporation temperature and thus increasing the performance of the system.
- Average COP increase:
  - Supermarket 1: Average COP increase of 13% was achieved in the case of the plus cooling system and 4% in the case of the minus cooling system.
  - Supermarket 2: Average COP increase of 7,4% was achieved in the case of the plus cooling system.
- Increase in energy efficiency and therefore the reduction of energy consumption contributes to the reduction of indirect emissions as well.
- Improvement of HCFC-22 containment practices adopted by the maintenance team of the supermarkets was clearly noted.

Reasons for delay. If the project was discontinued, please explain the reasons and indicate to what activities the funding was reallocated:

The technical condition of the supermarket systems was more critical than expected and interventions in order to correct the identified problems were much more complex. Some examples:

- Refrigerant leakages are the focus of the project. Annual refrigerant consumptions of the selected supermarket RAC systems were up to 200% of the initial refrigerant charge. Most of the selected systems comprise of hundreds of mechanical circuit components connections and provide constant sources of refrigerant leakage. Wrong dimensioning, selection and installation practices of refrigerant circuit components lead to abrupt losses of high amounts of refrigerants. Executed insulation of circuit tubing and components (filter elements, suction header, liquid accumulators, etc.) is generally inadequate and lead to corrosion. In many cases pressure vessels are undersized in terms of the maximum allowable working pressure PS (for HCFC-22 refrigerant), safety valves are not dimensioned as required. Operating conditions of primary controllers are not balanced. Most compound plant systems do not operate energy efficient and minimum storage temperatures for frozen and chilled goods are not maintained. Strategic structure for scheduled and preventive maintenance is generally not integrated.

PROJECT DESCRIPTION	
Country	Brazil
- Therefore, larger investments for equipment and for national and international technical consultancy were required even though it was not initially expected. - In addition, there had been delays in the delivery of purchased equipment and components, which had required special attention from the project team. In the meantime, changes to the original layout of the refrigeration system also occurred, which required a reassessment of the project as well as additional technical site visits and data collection. - Two supermarkets announced, close to the beginning of the implementation of the intervention plan, that they would like to decline from the project due to changing of corporate governance strategy, which intends to change the whole refrigeration system within the next two years to an indirect/direct CO_2/ R134-a subcritical cascade system. One supermarket could immediately be replaced by another with the same technical needs and the already purchased equipment could be used as intended. - In order to identify a suitable replacement for the second store, additional technical visits were made. However, given that all equipment purchased was designed and specified in accordance with the originally selected store and its refrigeration system, the project could not be implemented without additional investments in the vast majority of stores. Negotiations with some suitable supermarkets were not successful. - In order to make the best possible use of the equipment and materials, which were already purchased for the implementation of the last demonstration project, vocational training institutions were identified, among the ones that are already partners in the implementation of the HPMP best practice training program to receive the equipment as donation. The functional and sustainable use of the equipment was ensured through a careful selection process, which considers qualification criteria, such as: sustainability, proposed design and work plan, regional importance, synergies with activities already underway within the HPMP. - As HPMP Stage 2 has given priority to HCFC-22 containment in the AC sector, some of the partner schools are not offering training courses in the commercial refrigeration. Therefore, the donation of the equipment will improve the technical infrastructure for demonstration of sealed system design for commercial refrigeration. Besides that, it will increase the capacity of the training institutions for commercial refrigeration in the framework of the HPMP.	
REPLICABILITY AND SUSTAINABILITY	
Associated technical assistance/training provided	Training of supermarket technical staff in best practices in commercial refrigeration, additional 4.800 refrigeration technicians trained in best practices (e.g. sealed system design, leak detection, brazing, recovery and recycling, data recording, planned preventive maintenance)
Associated policies or regulatory measures planned/promulgated, if any	The intention of the project was not to regulate the sector but to demonstrate best practices.
Number of additional end-users that followed the same approach as a result of the project	The project demonstrates to the supermarket sector in Brazil the possible best practices to improve the operation of their refrigeration systems with HCFC-22 or HFCs (e.g. 404A) with economic and environmental gains. The results are being widely disseminated and with the cooperation of the Brazilian Supermarket Association – Abras a great number of end -users will get to know the demonstrated methodology. Besides that, the refrigeration technicians involved in the implementation of the intervention plans also work for other supermarket chains and since they were enthusiastic with the results obtained for the supermarket they intend to apply the methodology to others supermarket chains with high leakage rates in the refrigeration system.
Comments on the reasons for success or failure of the project and recommendations: Lessons learnt are described below: - Components and equipment for the implementation of the intervention plans in the framework of better HCFC containment demonstration projects such as the fixed leak detection and monitoring system are not always available in the national market. Selecting alternative components and contacting potential national suppliers was harder than expected. Moreover, finding suppliers interested in participating in tenders and offering supplies in accordance with the project's technical specifications and requirements has proven to be a difficult task. The tender had to be published several times and the contract for the supply of all items listed in the tender notice took almost one year to be completed. In addition, most of the contracted suppliers had not been able to meet the agreed delivery schedules. - It took more than three years since the first visit to the selected supermarkets and the real start of the implementation due to the delay in the equipment procurement and the delivery. Therefore, several changes had occurred in the management structure and technical team of the supermarkets which led to the withdrawal of two initially selected supermarkets.	