**NACIONES UNIDAS** **EP**

**Programa de las Naciones Unidas para el Medio Ambiente**

Distr.
GENERAL

UNEP/OzL.Pro/ExCom/94/18
6 de mayo de 2024

ESPAÑOL
ORIGINAL: INGLÉS

COMITÉ EJECUTIVO DEL FONDO MULTILATERAL
PARA LA APLICACIÓN DEL
PROTOCOLO DE MONTREAL
Nonagésima cuarta reunión
Cuestiones 9 c) y 9 d) del orden del día provisional[1]

# PROGRAMA DE TRABAJO DEL PNUD PARA 2024

[1] UNEP/OzL.Pro/ExCom/94/1

## OBSERVACIONES Y RECOMENDACIÓN DE LA SECRETARÍA DEL FONDO

1. El PNUD solicita al Comité Ejecutivo la aprobación de la cantidad de 2.323.773 $EUA, más 163.865 $EUA en concepto de gastos de apoyo del organismo, para su programa de trabajo de 2024 indicado en el cuadro 1. La comunicación se adjunta al presente documento.

**Cuadro 1: Programa de trabajo del PNUD para 2024**

| País | Actividad/proyecto | Monto solicitado ($EUA) | Monto recomendado ($EUA) |
|---|---|---|---|
| **SECCIÓN A: ACTIVIDADES RECOMENDADAS PARA APROBACIÓN GENERAL** | | | |
| **A1: Renovación de proyectos de fortalecimiento institucional** | | | |
| Cuba | Renovación de proyecto de FI (fase XIII) | 394.965 | 394.965 |
| Indonesia | Renovación de proyecto de FI (fase XIV) | 718.693 | 718.693 |
| Panamá | Renovación de proyecto de FI (fase XI) | 396.115 | 396.115 |
| Trinidad y Tabago | Renovación de proyecto de FI (fase XII) | 180.000 | 180.000 |
| | Subtotal para A1 | 1.689.773 | 1.689.773 |
| | Gastos de apoyo del organismo | 118.285 | 118.285 |
| | Total para A1 | 1.808.058 | 1.808.058 |
| **A2: Preparación de proyecto para un plan de ejecución de Kigali para los HFC (KIP)** | | | |
| Belice [a] | Preparación de un KIP (etapa I) | 39.000 | 39.000 |
| | Subtotal para A2 | 39.000 | 39.000 |
| | Gastos de apoyo del organismo | 2.730 | 2.730 |
| | Total para A2 | 41.730 | 41.730 |
| **A3: Preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y de planes para el acopio, transporte y desecho de dichas sustancias[2]** | | | |
| Chile | Preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y plan | 90.000 | 90.000 |
| Panamá | Preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y plan | 90.000 | 90.000 |
| | Subtotal para A3 | 180.000 | 180.000 |
| | Gastos de apoyo del organismo | 12.600 | 12.600 |
| | Total para A3 | 192.600 | 192.600 |
| **SECCIÓN B: ACTIVIDADES RECOMENDADAS PARA CONSIDERACIÓN INDIVIDUAL** | | | |
| **B1: Preparación de proyecto para un plan de ejecución de Kigali para los HFC (KIP)** | | | |
| China | Preparación de un KIP (etapa I) | 250.000 | * |
| | Subtotal para B1 | 250.000 | * |
| | Gastos de apoyo del organismo | 17.500 | * |
| | Total para B1 | 267.500 | * |
| **B2: Asistencia técnica para redactar un informe de verificación del consumo de HCFC** | | | |
| Angola | Informe de verificación de la etapa II del PGEH | 30.000 | * |
| Sri Lanka | Informe de verificación de la etapa II del PGEH | 30.000 | * |
| | Subtotal para B2 | 60.000 | * |
| | Gastos de apoyo del organismo | 5.400 | * |
| | Total para B2 | 65.400 | * |
| **B3: Preparación de un proyecto piloto para mantener o mejorar la eficiencia energética de las tecnologías y los equipos de sustitución en el contexto de la reducción de los HFC** | | | |
| China | Preparación de un proyecto piloto para mantener o mejorar la eficiencia energética de los equipos de aire acondicionado en centros de datos | 25.000 | * |
| | Subtotal para B3 | 25.000 | * |

[2] En este documento, a esta actividad se la denomina "preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y plan".

| País | Actividad/proyecto | Monto solicitado ($EUA) | Monto recomendado ($EUA) |
|---|---|---|---|
| | Gastos de apoyo del organismo | 1.750 | * |
| | Total para B3 | 26.750 | * |
| **B4: Preparación de un proyecto piloto internacional para mantener o mejorar la eficiencia energética de las tecnologías y los equipos de sustitución en el contexto de la reducción de los HFC** | | | |
| Internacional | Preparación de un proyecto piloto para demostrar el uso de herramientas digitales de supervisión y gestión para mejorar la eficiencia energética y reducir las emisiones de gases de efecto invernadero en los sectores de refrigeración de espacios y cadena de frío de Colombia, el Líbano, Panamá, Sri Lanka y Trinidad y Tabago | 80.000 | * |
| | Subtotal para B4 | 80.000 | * |
| | Gastos de apoyo del organismo | 5.600 | * |
| | Total para B4 | 85.600 | * |
| | Total para A1, A2, A3, B1, B2, B3 y B4 | 2.323.773 | 1.908.773 |
| | Gastos de apoyo de los organismos para A1, A2, A3, B1, B2, B3 y B4 | 163.865 | 133.615 |
| | Total general | 2.487.638 | 2.042.388 |

[a] Con el PNUMA como organismo de ejecución principal
* Recomendada para su consideración individual

## SECCIÓN A: ACTIVIDADES RECOMENDADAS PARA APROBACIÓN GENERAL

### A1: Renovación de proyectos de fortalecimiento institucional

### Descripción del proyecto

2. El PNUD ha presentado solicitudes para la renovación de proyectos de fortalecimiento institucional en los países que se indican en la sección A1 del cuadro 1. Los proyectos se describen en el anexo I del presente documento.

### Observaciones de la Secretaría

3. La Secretaría ha analizado las solicitudes de renovación de cuatro proyectos de fortalecimiento institucional presentadas en nombre de los Gobiernos correspondientes a la luz de las directrices[3] y decisiones relevantes sobre criterios de admisibilidad y niveles de financiación. Las solicitudes se confrontaron con los planes de trabajo de fortalecimiento institucional originales de la etapa anterior, los datos del programa de país y los presentados con arreglo al artículo 7, los últimos informes de ejecución de los planes de gestión para la eliminación de los HCFC (PGEH), el informe sobre la marcha de las actividades presentado por el organismo interviniente y las decisiones pertinentes de las Reuniones de las Partes. Se observó que los cuatro países habían presentado los datos de sus programas de país correspondientes a 2023, que cumplían con los objetivos de eliminación previstos en el Protocolo de Montreal y que su consumo anual de HCFC no excedía el máximo anual permitido establecido en sus Acuerdos con el Comité Ejecutivo en el marco de los PGEH. Además, todas las solicitudes presentadas incluían una evaluación de los indicadores del desempeño, del riesgo y la sostenibilidad de los proyectos y de la consecución de los objetivos de fortalecimiento institucional, de conformidad con la decisión 91/63 b).

[3] Decisión 91/63: b) Aprobar el formato revisado para los informes finales y las solicitudes de prórroga del financiamiento de fortalecimiento institucional y los indicadores de desempeño correspondientes; y c) solicitar a los países del artículo 5, por intermedio de los organismos bilaterales y de ejecución, utilizar el formato revisado a que se refiere el subpárrafo b) anterior para toda solicitud de renovación de proyectos de fortalecimiento institucional a partir de la primera reunión del Comité Ejecutivo en 2023.

**Recomendación de la Secretaría**

4. La Secretaría recomienda la aprobación general de las solicitudes de renovación de proyectos de fortalecimiento institucional de Cuba, Indonesia, Panamá y Trinidad y Tabago con los niveles de financiación indicados en la sección A1 del cuadro 1 de este documento. En caso de estimarlo necesario, el Comité Ejecutivo podría remitir a los respectivos Gobiernos las observaciones formuladas en el anexo II del presente documento.

**A2: Preparación de proyecto para un plan de ejecución de Kigali para los HFC**

**Descripción del proyecto**

5. El PNUD, en calidad de organismo cooperante con el PNUMA como organismo de ejecución principal, ha presentado una solicitud para la preparación de la etapa I del KIP de un país, tal como se muestra en la sección A2 del cuadro 1. El PNUMA, como organismo de ejecución principal para Belice, ha solicitado en su programa de trabajo de 2024[4] 91.000 $EUA, más 11.830 $EUA en concepto de gastos de apoyo del organismo.

**Observaciones de la Secretaría**

6. El PNUMA, como organismo de ejecución principal para Belice ha proporcionado una descripción de las actividades necesarias para la preparación del KIP y los costos correspondientes a cada actividad en su programa de trabajo[5], en el que también se incluyen los comentarios de la Secretaría.

**Recomendación de la Secretaría**

7. La Secretaría recomienda la aprobación general de la preparación del proyecto correspondiente a la etapa I del plan de ejecución de Kigali para los HFC (KIP) de Belice con el nivel de financiación que se muestra en la sección A2 del cuadro 1.

**A3: Preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y de un plan para el acopio, transporte y desecho de dichas sustancias**

**Descripción del proyecto**

8. El PNUD, en calidad de organismo de ejecución designado, ha presentado solicitudes para la preparación un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y plan de dos países, tal como se muestra en la sección A3 del cuadro 1.

**Observaciones de la Secretaría**

9. Al examinar estas solicitudes, la Secretaría ha tenido en cuenta los criterios para la preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y plan establecidos en la decisión 91/66, las actividades propuestas para la preparación de los proyectos y su relación con los planes nacionales de eliminación o reducción (es decir, el PGEH o el KIP) de los países. La Secretaría observó que la financiación solicitada era conforme con la decisión 91/66.

10. El PNUD, en su calidad de organismo de ejecución designado, presentó una descripción de las actividades necesarias para la preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y plan de Chile y Panamá, junto con los costos correspondientes a cada actividad, utilizando los formularios de presentación pertinentes para las propuestas de proyecto.

[4] UNEP/OzL.Pro/ExCom/94/19
[5] Ibid.

11. Entre las actividades incluidas en las solicitudes de financiación de los dos países se incluían la preparación del inventario nacional, un plan de acción y el informe final; la identificación de las partes interesadas; consultas y talleres con las partes interesadas relevantes; un análisis de los equipos en servicio y las tasas de fin de vida útil; una evaluación técnica y económica de las opciones para manipular y eliminar las sustancias controladas de desecho; una evaluación de las opciones para la eliminación final de los desechos de refrigerantes en los países; la elaboración de un plan de comunicación y divulgación; y consideraciones relativas a la incorporación de la perspectiva de género.

**Recomendación de la Secretaría**

12. La Secretaría recomienda la aprobación general a la preparación de un inventario nacional de depósitos de sustancias controladas usadas o no deseadas y un plan para el acopio, transporte y desecho de dichas sustancias en Chile y Panamá con el nivel de financiación indicado en la sección A3 del cuadro 1.

## SECCIÓN B: ACTIVIDADES RECOMENDADAS PARA CONSIDERACIÓN INDIVIDUAL

### B1: Preparación de proyecto para un plan de ejecución de Kigali para los HFC (KIP)

**Descripción del proyecto**

13. El PNUD, en su calidad de organismo de ejecución designado, ha presentado una solicitud para la preparación de la etapa I del KIP de un país del artículo 5, tal como se muestra en la sección B1 del cuadro 1.

**Observaciones de la Secretaría**

14. En el examen de la solicitud, la Secretaría ha tenido en cuenta las directrices para la preparación de los KIP que figuran en la decisión 87/50, las actividades propuestas para la preparación de proyectos y su relación con las actividades de apoyo y con otros proyectos relativos a los HFC existentes en el país.

15. En su calidad de organismo de ejecución designado, el PNUD ha descrito las actividades necesarias para la preparación de la estrategia general del KIP de China utilizando el formato para las solicitudes de preparación de proyectos de los KIP. La comunicación incluía datos sobre el consumo de HFC y mezclas de HFC en el año 2022. Entre las actividades de preparación del proyecto se incluía un análisis histórico de la producción, importaciones, exportaciones y uso de HFC; un estudio sectorial y análisis; una investigación sobre las tecnologías alternativas a los HFC a nivel nacional e internacional; una evaluación de las tecnologías alternativas; una investigación legislativa y de políticas; y el desarrollo de una estrategia general de reducción de los HFC y validación de las partes interesadas. La Secretaría observó que el Gobierno de China había aceptado la Enmienda de Kigali[6] y había enviado una carta de respaldo en la que indicaba su intención de adoptar medidas para reducir los HFC. La Secretaría observó además que, puesto que su nivel básico de HCFC superaba las 2.000 toneladas PAO[7], el nivel de financiación debía asignarse caso a caso, de conformidad con la decisión 87/50 c).

16. En respuesta a una solicitud de aclaración, el PNUD, en nombre del Gobierno de China, señaló que para el país era prioritario iniciar una revisión cuidadosa de los enfoques generales correspondientes a los sectores y subsectores y que, una vez que contara con información más detallada, el Gobierno tenía previsto comunicar a la 95ª reunión la preparación de proyectos correspondiente a los planes del sector de fabricación.

[6] Fecha de aceptación de la Enmienda de Kigali: 17 de junio de 2021

[7] El nivel básico de China para los HCFC es de 57.818,7 toneladas PAO.

**Recomendación de la Secretaría**

17. El Comité Ejecutivo tal vez desee considerar la posibilidad de aprobar la preparación del proyecto de estrategia global para la etapa I del plan de ejecución de Kigali para los HFC (KIP) de China por valor de 250.000 $EUA, más 17.500 $EUA en concepto de gastos de apoyo del organismo para el PNUD.

**B2: Asistencia técnica para redactar un informe de verificación del consumo de HCFC**

**Descripción del proyecto**

18. En línea con la decisión 61/46 c)[8], la Secretaría eligió una muestra de 15 países de bajo consumo que operan al amparo del artículo 5 y dos países que no son de bajo consumo que reciben financiación como si lo fueran[9] con el fin de verificar el cumplimiento de sus Acuerdos relativos a sus planes de gestión de eliminación de los HCFC (PGEH). Los países seleccionados se enumeran en el cuadro 5 del documento UNEP/OzL.Pro/ExCom/94/14 de reseña de las cuestiones identificadas durante el examen de proyectos. El PNUD, en su calidad de organismo de ejecución principal, solicita financiación para la verificación de la etapa II de los PGEH de Angola y Sri Lanka.

**Observaciones de la Secretaría**

19. La Secretaría tomó nota de que las solicitudes de financiación estaban en consonancia con los fondos que se habían aprobado en reuniones anteriores para verificaciones similares, puntualizando que los informes de verificación deben presentarse al menos 10 semanas antes de las reuniones del Comité Ejecutivo en las que corresponda solicitar el siguiente tramo de financiación del PGEH.

**Recomendación de la Secretaría**

20. El Comité Ejecutivo podría desear aprobar la asistencia técnica para la preparación del informe de verificación de la etapa II de los planes de gestión de eliminación de los HCFC (PGEH) de Angola y Sri Lanka, cada uno de ellos por un monto de 30.000 $EUA, más unos gastos de apoyo al organismo de 2.700 $EUA para el PNUD, en el entendimiento de que los informes de verificación deberán presentarse al menos 10 semanas antes de las reuniones del Comité Ejecutivo en las que corresponda solicitar el siguiente tramo de financiación del PGEH.

**B3: Preparación de un proyecto piloto para mantener o mejorar la eficiencia energética de las tecnologías y los equipos de sustitución en el contexto de la reducción de los HFC**

**Descripción del proyecto**

21. El PNUD, en su calidad de organismo de ejecución designado, ha presentado una solicitud para la preparación de un proyecto piloto para mantener o mejorar la eficiencia energética en China, tal como se muestra en la sección B3 del cuadro 1. La comunicación se llevó a cabo en línea con la decisión 91/65.

22. La solicitud es para preparar un proyecto piloto en el que se utilizará una tecnología de refrigeración por inmersión en sustitución de los sistemas de refrigeración por compresión de vapor empleados en los centros de datos, que usan HFC-134a y R-410A (se estima que la capacidad de los equipos de aire acondicionado instalados es de, al menos, 5.500 t). En el proyecto se evaluará la reducción del consumo de HFC para una capacidad de refrigeración comparable y se hará seguimiento de cuánto aumenta la eficiencia energética en un centro de datos en el que se instalará una solución de refrigeración por inmersión. Se

[8] Se pidió a la Secretaría que proporcionara, en la primera reunión de cada año, una lista que represente el 20 por ciento de los países con un nivel básico de consumo de HCFC de hasta 360 toneladas métricas y con un PGEH aprobado a fin de aprobar financiación para la verificación del cumplimiento de sus Acuerdos relativos a sus PGEH en ese año.
[9] Burkina Faso y el Gabón

estima que en 2019 había unos 74.000 centros de datos en China con 2,44 millones de bastidores estándar y que el número de servidores alcanzó los 7,6 millones en 2023. La refrigeración puede llegar a consumir hasta un 30-50 por ciento del consumo total de energía de un centro de datos. En función de los resultados del proyecto, la tecnología podría aplicarse en otros centros de datos y mejorarse combinándola con fuentes de energía renovables y un sistema de recuperación de calor residual para aumentar la eficiencia energética.

23. Entre las actividades de preparación del proyecto se incluyen la recopilación de datos relativos a los HFC y de los perfiles de los equipos empleados en centros de datos, estimaciones del aumento de la demanda de refrigeración y del impacto relativo del consumo total de las sustancias seleccionadas en el consumo total de HFC; una revisión de las normas y legislación relacionados con el rendimiento de los equipos de refrigeración instalados en centros de datos y de las políticas de eficiencia energética pertinentes para este sector; y una evaluación de la información de referencia sobre soluciones de refrigeración por inmersión para centros de datos en combinación con el uso de fuentes de energía renovables y sistemas de recuperación de calor residual en dichos centros de datos. La financiación solicitada cubriría la recogida de datos (7.000 $EUA); la evaluación de la tecnología y los servicios de consultoría relacionados (13.000 $EUA); así como la consulta a las partes interesadas (5.000 $EUA).

**Observaciones de la Secretaría**

24. La Secretaría ha examinado la propuesta de proyecto de acuerdo con los criterios establecidos en la decisión 91/65 y ha observado que la solicitud podría estar comprendida en el apartado b) i)c. relativo a actividades de montaje e instalación de equipos de gran tamaño de refrigeración comercial e industrial, aire acondicionado y bombas de calor[10].

25. La Secretaría preguntó si esta tecnología se estaba ya utilizando en China, cuál era el líquido que se seleccionaría para la eliminación del calor, si la demostración sustituiría la tecnología de una instalación que actualmente ya estuviera consumiendo HFC y el tamaño previsto (es decir, la capacidad y la demanda eléctrica) de cada uno de los equipos de refrigeración por inmersión. El PNUD confirmó que el proyecto se demostrará en un centro de datos nuevo. El PNUD también indicó que la mayoría de los centros de datos existentes utilizaban sistemas de refrigeración por aire a base de HFC, por lo que este proyecto evitaría el uso de un gran volumen de HFC en un nuevo centro de datos. Por otra parte, aunque la densidad de potencia es inferior a 10 kW por bastidor en el caso de los sistemas de refrigeración por aire, la tecnología de refrigeración por inmersión de una única fase puede gestionar densidades de potencia de hasta 60 kW por bastidor. La refrigeración por inmersión es una tecnología ya utilizada en China; sin embargo, hay muchas variedades diferentes que emplean diferentes refrigerantes, que es el aspecto central de la tecnología. El refrigerante más empleado en China es un fluido fluorado para componentes electrónicos, que presenta riesgos para la salud y el medio ambiente. Por lo tanto, el aspecto innovador de la demostración propuesta es que será un proyecto piloto de un refrigerante emergente a base de hidrocarburos llamado "Ice Core 797", que aún se encuentra en la etapa de desarrollo, pero que cuenta con potencial para eliminar los riesgos para la salud y el medio ambiente asociados con la refrigeración por inmersión. El tamaño de los equipos de refrigeración por inmersión para centros de datos depende de varios factores, incluido el tamaño del centro, la carga térmica generada por el equipo y la capacidad de refrigeración deseada.

26. La Secretaría también preguntó sobre los requisitos de diseño e instalación de la solución de refrigeración por inmersión, el refrigerante utilizado para enfriar el agua con el que se enfriará el fluido refrigerante monofásico, la tecnología que se utilizará para absorber el calor residual eliminado del equipo de distribución de refrigeración y si el proyecto incluiría la elaboración de normas de eficiencia energética para este sector. El PNUD explicó que el usuario final se elegirá durante la preparación del proyecto y que

[10] Actividades de montaje e instalación de equipos de gran tamaño de refrigeración comercial e industrial, aire acondicionado y bombas de calor (c. Se considerarán prioritariamente los proyectos que implican asistencia técnica para el montaje e instalación de equipos que darían lugar a la adopción de tecnologías para mantener o mejorar la eficiencia energética durante la conversión de los HFC y demuestren la repetibilidad y escalabilidad en el país o región.

será necesario diseñar los equipos a medida e instalarlos por parte de contratistas especializados. El proyecto tiene como objetivo recuperar este calor y utilizarlo en la industria o sectores agrícolas. El proyecto piloto se centrará en soluciones alternativas para utilizar el calor residual, como bombas de calor energéticamente eficientes de $CO_2$ o R-290. La bomba de calor se elegirá de acuerdo con el escenario de aplicación, a fin de garantizar un rendimiento y sostenibilidad óptimos. Las normas de eficiencia energética actuales para los centros de datos de China están basadas en tecnologías tradicionales y los resultados de este proyecto piloto servirán de base para actualizar las normas de forma que se facilite la adopción de la tecnología; además, como parte del proyecto se incluirá una revisión de las normas de eficiencia energética existentes para centros de datos.

27. En respuesta a las observaciones de la Secretaría, el PNUD explicó que parte de la preparación del proyecto consistiría en estimar el costo de instalar un centro de refrigeración de ese tipo. Además, el PNUD observó que, cuando el país presente la propuesta completa de financiación, se asegurará de que se cumplan los requisitos de la decisión 91/65 b) iv).

**Recomendación de la Secretaría**

28. El Comité Ejecutivo tal vez desee considerar la posibilidad de aprobar la preparación de un proyecto piloto para mejorar la eficiencia energética y acelerar la eliminación de los HFC mediante una solución de refrigeración por inmersión de una sola fase en un centro de datos inteligente de China por un monto de 25.000 $EUA, más 1.750 $EUA en concepto de gastos de apoyo del organismo para el PNUD.

**B4: Preparación de un proyecto piloto internacional para mantener o mejorar la eficiencia energética de las tecnologías y los equipos de sustitución en el contexto de la reducción de los HFC**

**Descripción del proyecto**

29. En la 93ª reunión, el PNUD presentó una solicitud para la preparación de un proyecto piloto internacional para dar soporte a pruebas piloto en cinco países de herramientas digitales para la supervisión y gestión de sistemas de aire acondicionado y cadena de frío[11]. El Comité Ejecutivo decidió[12] aplazar hasta la 94ª reunión el examen de la solicitud para la preparación de un proyecto piloto internacional destinado a demostrar el uso de herramientas digitales de supervisión y gestión para aumentar la eficiencia energética y reducir las emisiones de gases de efecto invernadero en los sectores de refrigeración de espacios y cadena de frío en Colombia, el Líbano, Panamá, Sri Lanka y Trinidad y Tabago, que hacía falta perfeccionar teniendo en cuenta las observaciones del Comité Ejecutivo sobre la propuesta que se había comunicado a la 93ª reunión[13].

30. En línea con la decisión 93/37, el PNUD, en calidad de organismo de ejecución designado, presentó una propuesta revisada para la preparación de un proyecto piloto internacional para apoyar la realización en cinco países de pruebas piloto de herramientas digitales destinadas a reducir las emisiones de HFC y aumentar la eficiencia energética de las tecnologías de refrigeración de espacios utilizadas en los sectores de la cadena de frío, tal como se indica en la sección B4 del cuadro 1.

31. En la nueva propuesta se indica que el PNUD podría proporcionar cofinanciación si se aprobara el concepto del proyecto. En los siguientes apartados se describe la relación con la reducción de HFC de cada uno de los países:

a) El Gobierno de Colombia tiene previsto comunicar la etapa I de su KIP en la 95ª reunión. Se espera que en la etapa I del KIP se trabajará con los sectores de cadena de frío de alimentos y agroindustrial, prestando asistencia técnica para fomentar la adopción de

[11] UNEP/OzL.Pro/ExCom/93/35
[12] Decisión 93/37
[13] Observaciones indicadas en los párrafos 153 a 157 del documento UNEP/OzL.Pro/ExCom/93/105

tecnologías que no contengan sustancias que agotan la capa de ozono, tengan un bajo potencial de calentamiento atmosférico y sean eficientemente energéticas, utilizando soluciones digitales.

b) El Gobierno de Sri Lanka ha presentado a la presente reunión[14] la etapa I de su KIP y un proyecto de eficiencia energética. En este proyecto de eficiencia energética se proponía promover el rendimiento energético en los sectores de aire acondicionado y refrigeración comercial mediante la demostración de 90 equipos supereficientes y con un bajo PCA, utilizando módulos de medición de energía en un tercio de los equipos instalados. Por tanto, el proyecto propuesto está diseñado para ayudar a Sri Lanka a ampliar el despliegue de herramientas digitales de energía, utilizando medidores potencialmente más baratos y desarrollando un software de seguimiento energético de código abierto con capacidades móviles adicionales. Estas experiencias también podrían beneficiar a las empresas de fabricación locales al incorporarlas en el diseño de los nuevos equipos de refrigeración comercial, que se espera pasen a usar R-290.

c) El Gobierno del Líbano tiene previsto presentar la etapa I de su KIP en la 95ª reunión, y se espera que incluya el fomento del uso de alternativas de bajo PCA en el sector de la cadena de frío. Este proyecto ayudaría a los diseñadores e instaladores locales a acceder a herramientas digitales por un costo menor y a incorporar nuevas características de diseño que permitan hacer un seguimiento en línea del rendimiento asegurando la seguridad del sistema. Esto podría permitir adoptar tecnologías para mantener o mejorar la eficiencia energética en el proceso de dejar de usar los HFC.

d) El proyecto propuesto para Panamá permitiría ampliar el despliegue de herramientas digitales de energía en varios sectores de refrigeración y aire acondicionado. Las lecciones aprendidas durante la implantación de este proyecto se incorporarían en la ejecución de los proyectos de demostración destinados a promover nuevas tecnologías y a adoptar sistemas de refrigeración y aire acondicionado que no empleen SAO, sean energéticamente eficientes y tengan un bajo PCA previstos en el segundo tramo del KIP aprobado (ejecución en 2026-2028)[15].

e) El proyecto propuesto para Trinidad y Tabago y las actividades aprobadas para la etapa I de su KIP[16] serán complementarias. La actividad del KIP consistente en crear un registro de usuarios finales de HFC de tamaño mediano y grande en el sector de refrigeración y aire acondicionado se utilizará en este proyecto para identificar a usuarios finales en los que poder aplicar soluciones digitales. A su vez, los resultados de este proyecto se utilizarán en las actividades de concienciación que forman parte de la ejecución del KIP destinadas a motivar a los grupos de interés a hacer el cambio de tecnología y a mejorar la eficiencia energética.

32. Entre las actividades de preparación del proyecto se incluye una revisión de los sistemas de automatización y control instalados para los equipos de refrigeración y aire acondicionado en los países piloto; asistencia técnica sobre las tecnologías digitales que se han aplicado en los equipos de aire acondicionado y de cadena de frío, incluidos los utilizados para supervisar y notificar el consumo de energía; encuestas locales, recopilación de datos sobre el terreno y revisión a nivel nacional de los requisitos específicos del proyecto; y elaboración de la estrategia del proyecto y actividades específicas. La financiación solicitada cubriría la contratación de consultores internacionales en tecnologías de aire

[14] UNEP/OzL.Pro/ExCom/94/54
[15] Decisión 93/72
[16] Decisión 93/74

acondicionado y de cadena de frío (20.000 $EUA), expertos en tecnologías digitales (20.000 $EUA), consultores nacionales (12.000 $EUA) y gastos de viaje (28.000 $EUA).

**Observaciones de la Secretaría**

33. La Secretaría preguntó por el costo potencialmente elevado del proyecto y por los motivos de haber seleccionado esos cinco países (y no un número menor). El PNUD explicó que los cinco países se habían elegido en función de su geografía, diversidad climática, diferentes etapas de adopción de tecnologías y aplicaciones diversas, replicabilidad y apoyo del gobierno nacional. Este enfoque tiene por objeto crear una amplia base de conocimientos y un conjunto sólido de mejores prácticas que puedan reproducirse en diversos entornos a nivel mundial.

34. Además, la Secretaría pidió más información sobre la vida útil prevista de las herramientas tecnológicas y la forma en que se gestionarán y actualizarán una vez finalizado el proyecto. El PNUD aclaró que los componentes disponibles para supervisar y gestionar la eficiencia energética y las emisiones de refrigerantes (como sensores, termostatos, controladores, etc.) normalmente se diseñan para cumplir con los estándares industriales en ese momento y seguir siendo relevantes durante un período de tiempo considerable y que, de acuerdo con uno de los fabricantes de dichas piezas, la vida útil podría alargarse durante 15 años[17]. A menudo, los dispositivos se pueden actualizar con un nuevo software para mejorar sus funcionalidades sin necesidad de reemplazar todo el sistema. Una vez finalizado el proyecto, el uso posterior y las actualizaciones de estas herramientas se gestionarían mediante la capacitación de técnicos locales y de las partes interesadas en el mantenimiento y funcionamiento de estas herramientas digitales, algo que se incluiría en las actividades del proyecto, mediante la integración en los KIP de los respectivos países.

35. En cuanto a la contribución de este proyecto a reducir el consumo de HFC y respecto a si los gobiernos de los países participantes estarían dispuestos a comprometerse a formular políticas para únicamente promover las alternativas de bajo PCA en sus países si se aprobara el proyecto, el PNUD explicó que la relación del proyecto con la reducción de los HFC radica en su capacidad para mejorar la gestión de los equipos existentes y mostrar las ventajas de pasar a utilizar alternativas de bajo PCA energéticamente eficientes. Mediante la supervisión de las tasas de fugas de refrigerantes y la eficiencia energética, el proyecto permitirá tomar medidas correctivas de forma inmediata, algo que no solo ayuda a mantener la eficiencia operativa, sino que también previene posibles emisiones de refrigerantes de alto PCA debido a las posibles fugas, lo que permitiría reducir la demanda de refrigerantes; el proyecto también ayudaría a adoptar buenas prácticas para operar los equipos de forma energéticamente eficiente y con bajas fugas de refrigerante. Se espera que los datos recopilados y analizados como resultado del uso de estas herramientas digitales ayuden a concienciar a las partes interesadas sobre los equipos que utilizan refrigerantes de bajo PCA y a que apoyen su introducción. El PNUD confirmó que los gobiernos de los países participantes se habían comprometido a formular políticas para fomentar las alternativas de bajo PCA como parte de sus KIP.

**Recomendación de la Secretaría**

36. El Comité Ejecutivo podría considerar la aprobación de la solicitud para la preparación de un proyecto piloto internacional destinado a demostrar el uso de herramientas digitales de supervisión y gestión para aumentar la eficiencia energética y reducir las emisiones de gases de efecto invernadero en los sectores de refrigeración de espacios y cadena de frío de Colombia, el Líbano, Panamá, Sri Lanka y Trinidad y Tabago, por un monto de 80.000 $EUA, más 5.600 $EUA en concepto de gastos de apoyo del organismo para el PNUD.

[17] www.winsen-sensor.com, ejemplo ZRT510 de módulo de sensor de refrigerante

# Annex I

## INSTITUTIONAL STRENGTHENING PROJECT PROPOSALS[1]

### Cuba: Renewal of institutional strengthening

| **Summary of the project and country profile** | | | |
|---|---|---|---|
| Implementing agency: | | | UNDP |
| Amounts previously approved for institutional strengthening (US $): | | | |
| | Phase I: | Jun-93 | 194,354 |
| | Phase II: | Nov-98 | 129,573 |
| | Phase III: | Jul-01 | 129,573 |
| | Phase IV: | Jul-03 | 160,246 |
| | Phase V: | Nov-05 | 160,246 |
| | Phase VI: | Nov-07 | 160,246 |
| | Phase VII: | Nov-09 | 160,246 |
| | Phase VIII | Nov-11 | 160,120 |
| | Phase IX: | Dec-13 | 159,467 |
| | Phase X: | Nov-15 | 204,159 |
| | Phase XI: | May-19 | 204,160 |
| | Phase XII: | Jun-22 | 204,160 |
| | | Total: | 2,026,549 |
| Amount requested for renewal (phase XIII) (US $): | | | 394,965 |
| Amount recommended for approval for phase XIII (US $): | | | 394,965 |
| Agency support costs (US $): | | | 27,648 |
| Total cost of institutional strengthening phase XIII to the Multilateral Fund (US $): | | | 422,613 |
| Date of approval of country programme: | | | 1993 |
| Date of approval of HCFC phase-out management plan: | | | 2011 |
| Baseline consumption of controlled substances (ODP tonnes/$CO_2$-eq tonnes): | | | |
| (a) Annex B, Group III (methyl chloroform) (average 1998-2000) | | | 0.0 |
| (b) Annex C, Group I (HCFCs) (average 2009-2010) | | | 16.9 |
| (c) Annex E, (methyl bromide) (average 1995-1998) | | | 50.5 |
| (d) Annex F (HFCs) (average 2020-2022 plus 65% of HCFC baseline) | | | 1,030,662 |
| Latest reported ODS consumption (2023) (ODP tonnes) as per Article 7: | | | |
| (a) Annex B, Group III (methyl chloroform) | | | 0.00 |
| (b) Annex C, Group I (HCFCs) | | | 0.55 |
| (c) Annex E, (methyl bromide) | | | 0.00 |
| | | Total: | 0.55 |
| (d) Annex F (HFCs) ($CO_2$-eq tonnes) as per Article 7 | | | 1,368,669 |
| Year of reported country programme implementation data: | | | 2023 |
| Amount approved for projects (as at December 2023) (US $): | | | 19,423,541 |
| Amount disbursed (as at December 2022) (US $): | | | 18,258,493 |
| ODS to be phased out (as at December 2023) (ODP tonnes): | | | 726.80 |
| ODS phased out (as at December 2022) (ODP tonnes): | | | 698.20 |

1. Summary of activities and funds approved by the Executive Committee:

| **Summary of activities** | **Funds approved (US $)** |
|---|---|
| (a) Investment projects: | 13,305,858 |
| (b) Institutional strengthening: | 2,026,549 |
| (c) Project preparation, technical assistance, training and other non-investment projects: | 4,091,133 |
| Total: | 19,423,541 |
| (d) HFC activities funded from additional voluntary contributions | 0 |

[1] Data as at December 2022 are based on document UNEP/OzL.Pro/ExCom/93/16.

Progress report

2. Phase XII of the institutional strengthening (IS) project for Cuba has been successfully implemented. The Ozone Technical Office had direct contact with decision makers, which facilitated the implementation of projects funded by the Multilateral Fund and all issues related to the Montreal Protocol. The country-maintained control over its ODS phase-out and has a robust licensing and quota system for all controlled substances. The country proceeded in implementing stage II of the HCFC phase-out management plans (HPMP) in close collaboration with local authorities and stakeholders, carrying out multiple initiatives such as training of refrigeration and air-conditioning technicians on low-GWP alternatives and implementation of good refrigeration practices. The Kigali HFC implementation plan (KIP) was developed, submitted and approved during the phase and the country is actively preparing for the implementation of the Kigali Amendment. It also participated in regional and global meetings relevant to the implementation of the Montreal Protocol and is currently a member of the Executive Committee of the Multilateral Fund.

Plan of action

3. During phase XIII of the institutional strengthening project, the Government of Cuba will maintain the ban on CFCs and halons, as well as the reductions made in HCFC consumption, and will start the control of HFCs through the new quota system. The activities to be developed will count on the active participation of the actors involved in the consumption of the substances controlled by the Montreal Protocol, including national and local authorities, maintaining a solid training programme on good refrigeration practices and continuous public awareness activities. Likewise, the Government of Cuba will continue the implementation of stage II of the HPMP and the first stage of its KIP to ensure its commitments to reduce HFC consumption. The Government of Cuba will continue to actively participate in the meetings of the Montreal Protocol regional and global network, looking to exchange information and experiences that favour the implementation of national policies and strategies for the protection of the ozone layer.

Sustainability and risk assessment

4. The whole system of implementation of the Montreal Protocol in Cuba is based on achieving sustainability of the system through the completion and improvement of the legislation and national implementation programmes and plans, as well as the new regulation for the management and handling of ODS and HFCs, equipment and technologies containing them, which will be approved as a National Resolution of mandatory compliance. These actions minimise the risks in the development of the process. In addition, OTOZ is integrated in the national institutions in charge of implementing the country's environmental and energy policy, which ensures the sustainability and support of its actions.

**Indonesia: Renewal of institutional strengthening**

| **Summary of the project and country profile** | | | |
|---|---|---|---|
| Implementing agency: | | | UNDP |
| Amounts previously approved for institutional strengthening (US $): | | | |
| | Phase I: | Jun-93 | 355,701 |
| | Phase II: | Nov-97 | 235,475 |
| | Phase III: | Dec-00 | 235,677 |
| | Phase IV: | Dec-03 | 290,833 |
| | Phase V: | Nov-05 | 291,480 |
| | Phase VI: | Nov-07 | 291,588 |
| | Phase VII: | Nov-09 | 290,432 |
| | Phase VIII: | Nov-11 | 289,958 |
| | Phase IX: | Dec-13 | 290,083 |
| | Phase X: | Nov-15 | 371,467 |
| | Phase XI: | Nov-17 | 367,335 |

| **Summary of the project and country profile** | | |
|---|---|---|
| Implementing agency: | | UNDP |
| | Phase XII: Dec-19 | 369,097 |
| | Phase XIII: Jun-22 | 371,498 |
| | Total: | 4,050,625 |
| Amount requested for renewal (phase XIV) (US $): | | 718,693 |
| Amount recommended for approval for phase XIV (US $): | | 718,693 |
| Agency support costs (US $): | | 50,309 |
| Total cost of institutional strengthening phase XIV to the Multilateral Fund (US $): | | 769,002 |
| Date of approval of country programme: | | 1994 |
| Date of approval of HCFC phase-out management plan: | | 2011 |
| Baseline consumption of controlled substances (ODP tonnes/$CO_2$-eq tonnes): | | |
| (a) Annex B, Group III (methyl chloroform) (average 1998-2000) | | 13.3 |
| (b) Annex C, Group I (HCFCs) (average 2009-2010) | | 403.9 |
| (c) Annex E (methyl bromide) (average 1995-1998) | | 40.7 |
| (d) Annex F (HFCs) (average 2020-2022 plus 65% of HCFC baseline) | | 23,370,721 |
| Latest reported ODS consumption (2023) (ODP tonnes) as per Article 7: | | |
| (a) Annex B, Group III (methyl chloroform) | | 0.00 |
| (b) Annex C, Group I (HCFCs) | | 149.42 |
| (c) Annex E (methyl bromide) | | 0.00 |
| | Total: | 149.42 |
| (d) Annex F (HFCs) ($CO_2$-eq tonnes) as per Article 7 | | 1,535,575 |
| Year of reported country programme implementation data: | | 2023 |
| Amount approved for projects (as at December 2023) (US $): | | 85,652,023 |
| Amount disbursed (as at December 2022) (US $): | | 76,857,505 |
| ODS to be phased out (as at December 2023) (ODP tonnes): | | 10,555.9 |
| ODS phased out (as at December 2022) (ODP tonnes): | | 10,721.9 |

5. Summary of activities and funds approved by the Executive Committee:

| **Summary of activities** | **Funds approved (US $)** |
|---|---|
| (a) Investment projects: | 71,411,179 |
| (b) Institutional strengthening: | 4,050,625 |
| (c) Project preparation, technical assistance, training and other non-investment projects: | 10,190,219 |
| Total: | 85,652,023 |
| (d) HFC activities funded from additional voluntary contributions | 250,000 |

Progress report

6. Under phase XIII, Indonesia continued its efforts towards implementation of the Montreal Protocol obligations and ODS phase-out activities. The national ozone unit provided support and actively coordinated the implementation of HCFC phase-out management plans (HPMP) stage II, achieving the HCFC reduction targets under its Agreement, and led the preparation and timely submission of stage III of the HPMP. The Government of Indonesia continued to control the consumption of ODS with an effective control of supply and consumption through the Licensing and Quota Systems and submitted the country programme and Article 7 reports in a timely manner. Indonesia is in compliance with the post-2015 HCFC phase-out targets due to the effective ODS control measures (legislations) put in place in the country. The Kigali Amendment was ratified in December 2022. During this phase, Indonesia designed and put in place the HFC licensing system and its supporting instruments through coordination meetings, focused group discussions and dissemination activities; conducted periodic monitoring of manufacturers/importers and evaluated the ODS import data; coordinated actions on the implementation of HCFC consumption reduction to meet phase-out targets; and raised the awareness of the general public and the specific sectors to support

implementation of Multilateral Fund projects through social media, communication materials, and events for celebrating the World Ozone Day.

Plan of action

7. Phase XIV of the institutional strengthening (IS) project for Indonesia will continue the support for integrating projects in the country and enhancing its achievements by supporting and ensuring the implementation of the Montreal Protocol programme. It will continue to (i) deliver effective management, monitoring and enforcement on ODS phase-out activities including sustainability of ODS phase-out, (ii) continue the implementation and enforcement of the Ozone Depleting Substances legal framework; (iii) provide coordination and oversight to complete the stage II of the HPMP and advance the implementation of stage III; and (iv) continue the awareness outreach activities for active involvement of all stakeholders in sustaining ODS phase-out, HPMP implementation, Kigali HFC implementation plan preparation and implementation.

Sustainability and risk assessment

| Category | Risk | Impact and Likelihood | Mitigation |
|---|---|---|---|
| Operational | Potential risk of staff turnover during project lifecycle that may impact effectiveness of project execution tasks and potential delays | Delays in the initiation of the project and in project activities and implementation<br>Impact: Medium<br>Likelihood: Low | Establish a "project staff transition' plan to secure that new staff is properly trained and responsibilities are handed over to reduce negative impacts to project execution |
| Political | Formation of new Ministry cabinet due to elections can lead to change in MOEF Senior Managers responsible for MLF portfolio management, leading in delays in the project execution | Delays in the initiation of the project and in project activities and implementation<br>Impact: Medium<br>Likelihood: Medium | IA to conduct regular oversight meetings with MOEF, IS and project staff to secure proper institutional memory that can be transmitted to new Government Senior Staff |

**Panama: Renewal of institutional strengthening**

| **Summary of the project and country profile** | | | |
|---|---|---|---|
| Implementing agency: | | | UNDP |
| Amounts previously approved for institutional strengthening (US $): | | | |
| | Phase I: | Jul-93 | 194,925 |
| | Phase II: | Jul-00 | 129,950 |
| | Phase III: | Nov-02 | 149,500 |
| | Phase IV: | Dec-04 | 149,500 |
| | Phase V: | Nov-11 | 128,390 |
| | Phase VI: | Dec-13 | 159,960 |
| | Phase VII: | Nov-15 | 204,558 |
| | Phase VIII: | Nov-17 | 204,754 |
| | Phase IX: | Dec-19 | 204,755 |
| | Phase X: | Jun-22 | 204,755 |
| | | Total: | 1,731,047 |
| Amount requested for renewal (phase XI) (US $): | | | 396,115 |
| Amount recommended for approval for phase XI (US $): | | | 396,115 |
| Agency support costs (US $): | | | 27,728 |

| **Summary of the project and country profile** | |
|---|---|
| Implementing agency: | UNDP |
| Total cost of institutional strengthening phase XI to the Multilateral Fund (US $): | 423,843 |
| Date of approval of country programme: | 1993 |
| Date of approval of HCFC phase-out management plan: | 2011 |
| Baseline consumption of controlled substances (ODP tonnes/$CO_2$-eq tonnes): | |
| (a) Annex B, Group III (methyl chloroform) (average 1998-2000) | 0.0 |
| (b) Annex C, Group I (HCFCs) (average 2009-2010) | 24.8 |
| (c) Annex E (methyl bromide) (average 1995-1998) | 0.0 |
| (d) Annex F (HFCs) (average 2020-2022 plus 65% of HCFC baseline) | 2,543,386 |
| Latest reported ODS consumption (2023) (ODP tonnes) as per Article 7: | |
| (a) Annex B, Group III (methyl chloroform) | 0.0 |
| (b) Annex C, Group I (HCFCs) | 8.85 |
| (c) Annex E (methyl bromide) | 0.0 |
| Total: | 8.85 |
| (d) Annex F (HFCs) ($CO_2$-eq tonnes) as per Article 7 | 2,733,914 |
| Year of reported country programme implementation data: | 2023 |
| Amount approved for projects (as at December 2023) (US $): | 6,800,227 |
| Amount disbursed (as at December 2022) (US $): | 5,377,649 |
| ODS to be phased out (as at December 2023) (ODP tonnes): | 318.8 |
| ODS phased out (as at December 2022) (ODP tonnes): | 251.4 |

8. Summary of activities and funds approved by the Executive Committee:

| **Summary of activities** | **Funds approved (US $)** |
|---|---|
| (a) Investment projects: | 3,201,014 |
| (b) Institutional strengthening: | 1,731,047 |
| (c) Project preparation, technical assistance, training and other non-investment projects: | 1,868,165 |
| Total: | 6,800,227 |
| (d) HFC activities funded from additional voluntary contributions | 0 |

Progress report

9. Phase X of the institutional strengthening (IS) project for Panama focused on monitoring HCFC import control measures and the 50 per cent and 56 per cent reduction scheduled for 2022 and 2023, respectively; consultation and promulgation of the legal instrument establishing the mechanisms for the regulation and control of HFCs; capacity building for officials of key institutions for the monitoring and control of HFCs by applying the specific tariff items for HFCs and their mixtures in accordance with the VII Amendment to the Harmonized System; coordination with stakeholders to establish the levels of consumption of methyl bromide and the timely submission of reports to the Multilateral Fund and the Ozone Secretariats. Communication channels and the exchange of technical information among all stakeholders, both from the public and private sectors, were kept open for effective decision-making in the implementation of all projects. Essential products were prepared, edited, designed, and laid out to raise awareness of the implementation of the Kigali Amendment, the Montreal Protocol, and gender equality. Actions were carried out to strengthen synergies with the climate change and energy efficiency agendas. Awareness-raising actions were developed within the framework of the celebration of Ozone Day with relevant sectors of the population, including innovative actions that take advantage of art and cultural spaces to raise awareness about the environment and gender.

Plan of action

10. Phase XI will concentrate national ozone unit (NOU) efforts on following up on HCFC import control measures and the upcoming scheduled reductions, monitoring HFC import control measures, and freezing baseline consumption. Also, efforts will be focused on the implementation of the legal framework that establishes provisions for HFC substance trade control and monitoring the importation of controlled technologies that contain or are designed to contain HFC; capacity-building sustainability for officials of the National Customs Authority (ANA), the Ministry of Health (MINSA), and other key institutions; and developing the process for the establishment of a mechanism for institutional coordination of Montreal Protocol implementation, particularly the Kigali Amendment. An NOU communication and awareness plan will be developed in consultation with key stakeholders, both public and private, and a roadmap developed to promote gender mainstreaming and the gender approach in the implementation of the Montreal Protocol in Panama. General awareness-raising activities and Ozone Day celebrations will continue for relevant sectors of the population, ensuring the distribution of promotional and educational material and the diffusion of relevant information throughout different communication networks.

Sustainability and risk assessment

11. The project is designed to ensure the sustainability of the NOU to meet the challenge of meeting the Montreal Protocol's ODS and HFC phase-out targets. The existing legal and regulatory basis for HCFC and HFC control is sound and functional and has been designed with the input and consensus of all parties, public and private. This legal framework may incorporate new meanings in accordance with the progress made in its application or evolve according to the challenges of the future. The strict and sustained application of this legal framework has also prevented illegal trade in ODS/HFC and indirectly facilitated the process of transitioning to other alternative substances and new technologies. Importers of refrigerant gases led the process of regulating HCFC and HFC quotas. They have been able to undertake or adopt new lines of business that replaced those substances that had been phased out and continue today to lead the search for alternatives that do not include substances harmful to the ozone layer. Along the way, this sector has provided support to other UNO/MINSA initiatives, providing information and baseline data for studies or field evaluations and supporting awareness-raising and technical training actions. Ozone protection issues had been integrated into the national structure. Internally, the objectives and indicators assumed under the Montreal Protocol are incorporated in the annual operational plans (AOP) of the General Sub-Directorate of Environmental Health, as well as in the Monitoring and Evaluation System of the National Health Plan (SIMEPLANS) 2016–2025 of the Ministry of Health. This element gives the project and, consequently, the Montreal Protocol the relevance and sustainability it requires for the development of the ozone layer protection strategy. The project has promoted synergies between other chemical conventions that the Ministry of Health has within the same sub-directorate, such as the Basel, Rotterdam, Stockholm, and, more recently, Minamata Conventions. The training programs for customs officials and other relevant agents in the application of ODS control measures incorporate this perspective, which benefits the environmental sustainability interventions of these agreements at the national level. Through this project, the NOU also assumes the responsibility of articulating at the inter-institutional level issues related to the Montreal Protocol, such as the actions for climate protection led by the Ministry of Environment and the rational and efficient use of energy led by the National Energy Secretariat.

**Trinidad and Tobago: Renewal of institutional strengthening**

| **Summary of the project and country profile** | | |
|---|---|---|
| Implementing agency: | | UNDP |
| Amounts previously approved for institutional strengthening (US $): | | |
| Phase I: | Oct-96 | 68,678.01 |
| Phase II: | Dec-00 | 45,616.29 |
| Phase III: | Nov-02 | 64,063.50 |
| Phase IV: | Dec-04 | 64,017.52 |

| **Summary of the project and country profile** | | | |
|---|---|---|---|
| Implementing agency: | | | UNDP |
| | Phase V | Nov-06 | 61,196.53 |
| | Phase VI: | Nov-09 | 64,500.00 |
| | Phase VII: | Dec-12 | 64,180.00 |
| | Phase VIII: | Nov-14 | 64,200.00 |
| | Phase IX: | Jul-17 | 90,542.79 |
| | Phase X: | May-19 | 90,424.97 |
| | Phase XI: | Nov-21 | 90,950.00 |
| | | Total: | 768,370 |
| Amount requested for renewal (phase XII) (US $): | | | 180,000 |
| Amount recommended for approval for phase XII (US $): | | | 180,000 |
| Agency support costs (US $): | | | 12,600 |
| Total cost of institutional strengthening phase XII to the Multilateral Fund (US $): | | | 192,600 |
| Date of approval of country programme: | | | 1996 |
| Date of approval of HCFC phase-out management plan: | | | 2011 |
| Baseline consumption of controlled substances (ODP tonnes/$CO_2$-eq tonnes): | | | |
| (a) Annex B, Group III (methyl chloroform) (average 1998-2000) | | | 0.7 |
| (b) Annex C, Group I (HCFCs) (average 2009-2010) | | | 46.0 |
| (c) Annex E, (methyl bromide) (average 1995-1998) | | | 1.7 |
| (d) Annex F (HFCs) (average 2020-2022 plus 65% of HCFC baseline) | | | 5,681,787 |
| Latest reported ODS consumption (2023) (ODP tonnes) as per Article 7: | | | |
| (a) Annex B, Group III (methyl chloroform) | | | 0.00 |
| (b) Annex C, Group I (HCFCs) | | | 10.11 |
| (c) Annex E, (methyl bromide) | | | 0.00 |
| | | Total: | 10.11 |
| (d) Annex F (HFCs) ($CO_2$-eq tonnes) as per Article 7 | | | 4,969,573 |
| Year of reported country programme implementation data: | | | 2023 |
| Amount approved for projects (as at June 2023) (US $): | | | 6,157,071 |
| Amount disbursed (as at December 2022) (US $): | | | 4,123,676 |
| ODS to be phased out (as at June 2023) (ODP tonnes): | | | 251.8 |
| ODS phased out (as at December 2022) (ODP tonnes): | | | 131.4 |

12. Summary of activities and funds approved by the Executive Committee:

| **Summary of activities** | **Funds approved (US $)** |
|---|---|
| (a) Investment projects: | 3,774,356 |
| (b) Institutional strengthening: | 768,370 |
| (c) Project preparation, technical assistance, training and other non-investment projects: | 1,614,345 |
| Total: | 6,157,071 |
| (d) HFC activities funded from additional voluntary contributions | 150,000 |

Progress Report

13. Phase XI of Trinidad and Tobago's institutional strengthening (IS) project was successfully implemented by the national ozone unit (NOU) at the Ministry of Planning and Development. Trinidad and Tobago has a successful Licensing and Quota System of HCFC management and met its reduction targets as per its Agreement with the Executive Committee. The country also successfully developed its licensing and quota system for HFCs. In close coordination with importers and relevant stakeholders, the country managed to introduce low-GWP alternatives in key sectors such as domestic air-conditioning. Trinidad and Tobago also raised awareness with end-users, technicians, and associations, and technical capacities were built through the import of training equipment that allowed the building of capacities in the country.

Plan of action

14. Phase XII of the IS project will allow Trinidad and Tobago to continue the reinforcement of the licensing and quota system for the import of Montreal Protocol controlled substances. Relevant activities and stakeholder consultations are key for an adequate development of the strategy that will allow the country to continue its effective path for ODS management and phase-out. The upcoming phase will allow the NOU to continue its active participation in global and regional network meetings, relevant trainings, and high-level meetings for the promotion of the Montreal Protocol activities in the country. In addition, Trinidad and Tobago will continue efforts to introduce energy efficiency activities for refrigeration and air-conditioning equipment in order to reinforce the reduction of HFC consumption. Awareness-raising and dissemination activities will also be continued and reinforced.

Sustainability and risk assessment

15. Constant coordination with border control agencies and importers reduces the risk for non-sustainability of activities given that the country enforces a strict control of imports for Montreal Protocol controlled substances. The renewal of the IS allows Trinidad and Tobago to continue the implementation of effective training programs on good refrigeration practices and the expansion of its successful Certification Programme for refrigeration and air-conditioning technicians. The Trinidad and Tobago NOU has also been successful in the training of Border Control officials on ODS regulation and HFC phase-down at the Ministry of Trade and Industry and the Trinidad and Tobago Bureau of Standards. Furthermore, the renewal of IS and the funds received will allow the NOU to continue with all activities as planned.

## Anexo II

## PROYECTO DE OPINIONES EXPRESADAS POR EL COMITÉ EJECUTIVO SOBRE LA RENOVACIÓN DE LOS PROYECTOS DE FORTALECIMIENTO INSTITUCIONAL COMUNICADOS A LA 94ª REUNIÓN

### Cuba

1. El Comité Ejecutivo examinó el informe presentado junto con la solicitud de renovación del proyecto de fortalecimiento institucional de Cuba (fase XIII) y observó positivamente el hecho de que el Gobierno de Cuba está cumpliendo con sus objetivos de reducción y que ha comunicado los datos de 2023 con arreglo al artículo 7 y del programa de país a la Secretaría del Ozono y a la Secretaría del Fondo respectivamente. El Comité también constató que el Gobierno de Cuba había adoptado medidas para eliminar el consumo de SAO y reducir el de HFC; en concreto, se han introducido controles a la importación de HCFC y HFC mediante un sistema de concesión de licencias y cuotas y se ha capacitado a funcionarios de aduanas y técnicos en refrigeración. El Comité también tomó nota y valoró las actividades iniciadas para ejecutar la Enmienda de Kigali. El Comité reconoció los esfuerzos del Gobierno de Cuba y espera, por tanto, que en los próximos tres años el Gobierno de Cuba seguirá ejecutando con éxito las actividades del plan de gestión de la eliminación de los HCFC, el plan de ejecución de Kigali para los HFC y el proyecto de fortalecimiento institucional a fin de lograr la reducción del 67,5 por ciento del consumo de HCFC requerida el 1 de enero de 2025 y los controles relacionados con la Enmienda de Kigali a partir de 2024.

### Indonesia

2. El Comité Ejecutivo examinó el informe presentado junto con la solicitud para la renovación del proyecto de fortalecimiento institucional de Indonesia (fase XIV) y tomó nota y valoró el hecho de que Indonesia ha notificado los datos de 2023 de ejecución del programa de país y con arreglo al artículo 7 a la Secretaría del Fondo y a la Secretaría del Ozono, respectivamente, que indican que el país ha logrado su objetivo de reducción de HCFC para ese año. El Comité también reconoció el compromiso de Indonesia para seguir ejecutando de forma eficaz las actividades de fortalecimiento institucional, incluido el diseño y la puesta en marcha del sistema de concesión de licencias de HFC y sus instrumentos de apoyo, el seguimiento y evaluación de los datos de importación de SAO, la coordinación de las medidas sobre la reducción del consumo de HCFC, y la concienciación del público y de los sectores específicos para apoyar la ejecución de los proyectos del Fondo Multilateral. El Comité también elogió a Indonesia por haber ratificado la Enmienda de Kigali el 14 de diciembre de 2022 y por las medidas pertinentes adoptadas para preparar su aplicación.

### Panamá

3. El Comité Ejecutivo examinó el informe presentado junto con la solicitud para la renovación del proyecto de fortalecimiento institucional de Panamá (fase XI) y observó positivamente que el Gobierno de Panamá había comunicado los datos de 2023 del programa de país y con arreglo al artículo 7 a la Secretaría del Ozono y a la Secretaría del Fondo, que indicaban que el país está cumpliendo con lo establecido en el Protocolo de Montreal. El Comité constató además que el Gobierno de Panamá ha adoptado medidas para eliminar el consumo de las SAO; en concreto, la introducción de controles a las importaciones de HCFC y HFC mediante el sistema de concesión de licencias y cuotas y la capacitación de funcionarios de aduanas y técnicos en refrigeración. El Comité también observó, y valoró, las actividades iniciadas para facilitar la ejecución de la Enmienda de Kigali, como la aprobación de la primera etapa del plan de ejecución de Kigali para los HFC. El Comité reconoció los esfuerzos del Gobierno de Panamá y espera, por tanto, que en los próximos tres años el Gobierno de Panamá seguirá ejecutando las actividades del plan de gestión de la eliminación de los HCFC, el plan de ejecución de Kigali para los HFC y el proyecto de fortalecimiento institucional con éxito para lograr la reducción del 67,5 por ciento del consumo de HCFC requerida para el

1º de enero de 2025, mantener la congelación del consumo de HFC y alcanzar los objetivos de control de 2025.

**Trinidad y Tabago**

4. El Comité Ejecutivo examinó el informe presentado junto con la solicitud de renovación del proyecto de fortalecimiento institucional de Trinidad y Tabago (fase XII) y observó positivamente que el Gobierno de Trinidad y Tabago había comunicado los datos de 2023 con arreglo al artículo 7 y del programa de país a la Secretaría del Ozono y a la Secretaría del Fondo, que indicaban que el país está cumpliendo con lo establecido en el Protocolo de Montreal. El Comité tomó nota de los esfuerzos realizados por Trinidad y Tabago para eliminar el consumo de SAO mediante sistemas de concesión de licencias y cuotas, así como la capacitación de funcionarios de aduanas y técnicos de refrigeración y la introducción de alternativas. El Comité tomó nota con reconocimiento de las actividades iniciadas para facilitar la ejecución de la Enmienda de Kigali y espera que, en los próximos tres años, el Gobierno de Trinidad y Tabago siga ejecutando con éxito las actividades del plan de gestión de la eliminación de los HCFC, el plan de ejecución de Kigali para los HFC y el proyecto de fortalecimiento institucional a fin de alcanzar los próximos objetivos de control del Protocolo de Montreal de 2024 y 2025.

***94th Meeting of the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol***

***(27 – 31 May 2024)***

# UNDP
## 2024 WORK PROGRAMME

## 2024 WORK PROGRAMME

## I. EXECUTIVE SUMMARY

The present document constitutes UNDP's 2024 Work Programme and is being submitted for consideration of the Executive Committee (ExCom) at its 94th Meeting. The list of submissions for all funding requests (including investment projects) that will be submitted by UNDP to the 94th ExCom meeting in Annex 1 to this document is provided for information. Project documentation such as tranche requests under multi-year agreements (MYA), investment and demonstration project proposals and other individual proposals are not included in this document and are submitted separately as per normal practice. Only the following (non-investment) submissions are part of this document.

## II. FUNDING REQUESTS PART OF THE WORK PROGRAMME

### Institutional Strengthening Extensions

UNDP is submitting the requests for funding the extension of institutional strengthening projects to the 94th ExCom Meeting as tabulated below. Relevant terminal reports and requests for extension of funding are being submitted separately.

| Country | Type | Title | Duration (months) | Amount | Agency Fee | Total |
|---|---|---|---|---|---|---|
| Cuba | INS | Several Ozone unit support | 36 | 394,965 | 27,648 | 422,613 |
| Indonesia | INS | Several Ozone unit support | 36 | 718,693 | 50,309 | 769,002 |
| Panama | INS | Several Ozone unit support | 36 | 396,115 | 27,728 | 423,843 |
| Trinidad and Tobago | INS | Several Ozone unit support | 36 | 180,000 | 12,600 | 192,600 |
| **Total (4 requests)** | | | | **1,689,773** | **118,285** | **1,808,058** |

### Preparation funding requests for HFCs phase down

UNDP is submitting the following funding requests for the preparation of the Stage I KIP to the 94th ExCom meeting. The request for Belize is being submitted as a Cooperating Agency. The actual request will be submitted by UNEP as a Lead Agency. Annex 2 contains the submissions.

| Country | Type | Title | Duration (months) | Amount | Agency Fee | Total |
|---|---|---|---|---|---|---|
| Belize | PRP | Preparation of a Kigali HFC implementation plan | 12 | 39,000 | 2,730 | 41,730 |
| China | PRP | Preparation of a Kigali HFC implementation plan | 12 | 250,000 | 17,500 | 267,500 |
| **Total (2 requests)** | | | | **289,000** | **20,230** | **309,230** |

### Project preparation (PRP) requests for national inventories of banks for used and/or unwanted controlled substances and a plan for the collection, transport and disposal of such substances

Pursuant to the ExCom decision 91/66, UNDP is submitting the following requests for the preparation of national inventories of banks of used or unwanted controlled substances and a plan

for the collection, transport and disposal of such substances, including consideration of recycling, reclamation and cost-effective destruction. Annex 3 contains the submissions.

| Country | Type | Title | Duration (months) | Amount | Agency Fee | Total |
|---|---|---|---|---|---|---|
| Chile | PRP | Preparatory funding for inventories of bans of used/unwanted controlled substances | 12 | 90,000 | 6,300 | 96,300 |
| Panama | PRP | Preparatory funding for inventories of bans of used/unwanted controlled substances | 12 | 90,000 | 6,300 | 96,300 |
| **Total (2 requests)** | | | | **180,000** | **12,600** | **192,600** |

**Project preparation (PRP) requests for pilot projects to maintain and/or enhance energy efficiency of replacement technologies and equipment in the context of HFC phase-down**

Pursuant to the ExCom decision 91/65, UNDP is submitting the following requests for the preparation of pilot projects to maintain and/or enhance energy efficiency of replacement technologies and equipment in the context of HFC phase-down. Annex 4 contains the submissions.

| Country | Type | Title | Duration (months) | Amount | Agency Fee | Total |
|---|---|---|---|---|---|---|
| Global | PRP | Project preparation for Demonstrating digital monitoring and management tools to enhance energy efficiency and reduce emission of green-house gases in the space cooling and cold chain sectors in Columbia, Lebanon, Panama, Sri Lanka, and Trinidad and Tobago | 12 | 80,000 | 5,600 | 85,600 |
| China | PRP | Preparatory funding for HFC Energy Efficiency Investment project | 12 | 25,000 | 1,750 | 26,750 |
| **Total (2 requests)** | | | | **105,000** | **7,350** | **112,350** |

**Project preparation (PRP) requests for LVCs HPMP Verification Reports**

UNDP is submitting the following requests for the preparation of LVCs' HPMP verification reports.

| Country | Type | Title | Duration (months) | Amount | Agency Fee | Total |
|---|---|---|---|---|---|---|
| Angola | PRP | Project preparation for HPMP Verification Report | 12 | 30,000 | 2,700 | 32,700 |
| Sri Lanka | PRP | Project preparation for HPMP Verification Report | 12 | 30,000 | 2,700 | 32,700 |
| **Total (2 requests)** | | | | **60,000** | **5,400** | **65,400** |

## III. SUMMARY OF FUNDING REQUESTS (WORK PROGRAMME)

The table below summarizes the funding requests for non-investment activities and proposals being submitted to the 94th ExCom Meeting as part of UNDP's Work Programme for 2024:

| Country | Type | Title | Duration (months) | Amount | Agency Fee | Total |
|---|---|---|---|---|---|---|
| Angola | PRP | Preparatory funding for HPMP Verification Report | 12 | 30,000 | 2,700 | 32,700 |
| Belize | PRP | Preparatory funding for Stage I KIP | 12 | 39,000 | 2,730 | 41,730 |
| Chile | PRP | Preparatory funding for inventories of bans of used/unwanted controlled substances | 12 | 90,000 | 6,300 | 96,300 |
| China | PRP | Preparatory funding for Stage I KIP | 12 | 250,000 | 17,500 | 267,500 |
| China | PRP | Preparatory funding for HFC Energy Efficiency Investment project | 12 | 25,000 | 1,750 | 26,750 |
| Cuba | INS | Several Ozone unit support | 36 | 394,965 | 27,648 | 422,613 |
| Global | PRP | Project preparation for Demonstrating digital monitoring and management tools to enhance energy efficiency and reduce emission of green-house gases in the space cooling and cold chain sectors in Columbia, Lebanon, Panama, Sri Lanka, and Trinidad and Tobago | 12 | 80,000 | 5,600 | 85,600 |
| Indonesia | INS | Several Ozone unit support | 36 | 718,693 | 50,309 | 769,002 |
| Panama | INS | Several Ozone unit support | 36 | 396,115 | 27,728 | 423,843 |
| Panama | PRP | Preparatory funding for inventories of bans of used/unwanted controlled substances | 12 | 90,000 | 6,300 | 96,300 |
| Sri Lanka | PRP | Preparatory funding for HPMP Verification Report | 12 | 30,000 | 2,700 | 32,700 |
| Trinidad and Tobago | INS | Several Ozone unit support | 36 | 180,000 | 12,600 | 192,600 |
| **Total (12 requests)** | | | | **2,323,773** | **163,865** | **2,487,638** |

**ANNEX 1**

## List of all UNDP submissions for funding to the 94th ExCom Meeting

| No. | Country | Type | Description | Funding Request to the 94th ExCom (US$) | | |
|---|---|---|---|---|---|---|
| | | | | Amount | Agency Fee | Total |
| 1 | Angola | PRP | Preparatory funding for HPMP Verification Report | 30,000 | 2,700 | 32,700 |
| 2 | Bangladesh | PHA | Stage II HPMP (air conditioning and servicing) | 1,071,205 | 74,984 | 1,146,189 |
| 3 | Belize | PHA | HPMP Stage II | 59,233 | 4,146 | 63,379 |
| 4 | Belize | PRP | Preparatory funding for Stage I KIP | 39,000 | 2,730 | 41,730 |
| 5 | Brazil | PHA | Stage III HPMP (servicing) | 5,010,039 | 350,703 | 5,360,742 |
| 6 | Chile | PRP | Preparatory funding for inventories of bans of used/unwanted controlled substances | 90,000 | 6,300 | 96,300 |
| 7 | China | PRP | Preparatory funding for Stage I KIP | 250,000 | 17,500 | 267,500 |
| 8 | China | PRP | Preparatory funding for HFC Energy Efficiency Investment project | 25,000 | 1,750 | 26,750 |
| 9 | Cuba | INS | Several Ozone unit support | 394,965 | 27,648 | 422,613 |
| 10 | El Salvador | KIP | KIP | 180,000 | 23,400 | 203,400 |
| 11 | El Salvador | TAS | Support to public sector end-users in the promotion of new technologies with low GWP as alternatives to HFCs under KIP (Decision 91/65) | 125,000 | 16,250 | 141,250 |
| 12 | Eswatini (the Kingdom of) | PHA | Stage II HPMP | 142,617 | 9,983 | 152,600 |
| 13 | Global | PRP | Project preparation for Demonstrating digital monitoring and management tools to enhance energy efficiency and reduce emission of green-house gases in the space cooling and cold chain sectors in Columbia, Lebanon, Panama, Sri Lanka, and Trinidad and Tobago | 80,000 | 5,600 | 85,600 |
| 14 | Indonesia | INS | Several Ozone unit support | 718,693 | 50,309 | 769,002 |
| 15 | Iran (Islamic Republic of) | PHA | Stage II HPMP | 337,860 | 23,650 | 361,510 |
| 16 | Lao People's Democratic Republic (the) | PHA | Stage II HPMP | 65,685 | 4,598 | 70,283 |
| 17 | Lao People's Democratic Republic (the) | KIP | HFC phase-down plan | 18,612 | 2,420 | 21,032 |
| 18 | Malaysia | PHA | Stage III HPMP | 6,587,185 | 461,103 | 7,048,288 |
| 19 | Panama | INS | Several Ozone unit support | 396,115 | 27,728 | 423,843 |
| 20 | Panama | PRP | Preparatory funding for inventories of bans of used/unwanted controlled substances | 90,000 | 6,300 | 96,300 |
| 21 | Paraguay | PHA | Stage II HPMP (servicing) | 281,077 | 19,675 | 300,752 |
| 22 | Paraguay | TAS | Energy efficiency activities under Stage II HPMP (Decision 89/6) | 50,000 | 3,500 | 53,500 |
| 23 | Paraguay | KIP | HFC phase-down plan | 235,675 | 30,638 | 266,313 |
| 24 | Republic of Moldova (the) | PHA | Stage III HPMP | 145,500 | 10,185 | 155,685 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 25 | Republic of Moldova (the) | TAS | Introduction of alternatives to HCFCs with low or zero GWP and for maintaining energy efficiency in the refrigeration servicing sector: | 70,000 | 6,300 | 76,300 |
| 26 | Sri Lanka | PHA | Stage II HPMP (servicing) | 293,200 | 20,524 | 313,724 |
| 27 | Sri Lanka | TAS | Energy efficiency activities under Stage II HPMP | 120,000 | 8,400 | 128,400 |
| 28 | Sri Lanka | KIP | HFC phase-down plan | 229,800 | 16,086 | 245,886 |
| 29 | Sri Lanka | TAS | Energy Efficiency activities under KIP | 245,000 | 17,150 | 262,150 |
| 30 | Sri Lanka | PRP | Preparatory funding for HPMP Verification Report | 30,000 | 2,700 | 32,700 |
| 31 | Timor-Leste | PHA | Stage II HPMP (servicing) | 25,421 | 1,779 | 27,200 |
| 32 | Trinidad and Tobago | INS | Several Ozone unit support | 180,000 | 12,600 | 192,600 |
| **Total (32 requests)** | | | | **17,586,882** | **1,266,640** | **18,923,071** |

**Notes:**

a. All amounts in are in US dollars.

b. Special reports due (delays, balances, status reports, etc.) as well as other projects not part of the WP will be submitted separately.

**ANNEX 2**

**Project preparation (PRP) request for Stage I Kigali Implementation Plan**

1. **China**

**MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL**
**KIGALI-HFC IMPLEMENTATION PLAN (KIP) PROJECT PREPARATION (PRP)**
**KIGALI HFC PHASE DOWN PLAN (OVERARCHING STRATEGY)**

PLEASE ADJUST THE TEXT IN THE ANNEX IN LINE WITH THE TEXT IN THE GUIDE

**Part I: Project information**

| | | |
|---|---|---|
| Project title: | Overarching Strategy for HFCs Phase-down, Stage I Project Preparation | |
| Country: | People's Republic of China | |
| Lead implementing agency: | UNDP | |
| Cooperating agency (1): | (select) | Click or tap here to enter text. |
| Cooperating agency (2): | (select) | Click or tap here to enter text. |
| Cooperating agency (3): | (select) | Click or tap here to enter text. |
| Implementation period for stage I of the KIP: | From approval to 2029 | |
| Duration of PRP implementation (i.e., time (in months) from the approval of PRP to submission of the KIP (please specify): 18 months | | |
| Funding requested: | | |
| Agency | Sector | Funding requested (US $)* |
| UNDP | Overarching | 250,000 |
| (select) | (select) | Click or tap here to enter text. |
| (select) | (select) | Click or tap here to enter text. |
| (select) | (select) | Click or tap here to enter text. |

*Details should be consistent with information provided in the relevant sections below.

**Part II: Prerequisites for submission**

| Item | Yes | No |
|---|---|---|
| Official endorsement letter from Government, indicating the specifying roles of respective agencies (where more than one IA is involved) | ☒ | ☐ |

**A. Information required for PRP funding request for the overarching strategy of the KIP**

<table>
<tr><td colspan="4">1. Montreal Protocol compliance target to be met in ☐ stage I of the KIP</td></tr>
<tr><td>Phase-out commitment (%)</td><td>10</td><td>Year of commitment</td><td>2029</td></tr>
<tr><td colspan="2">☐ Servicing only</td><td>☐ Manufacturing only</td><td>☒Servicing and manufacturing</td></tr>
<tr><td colspan="4">2. Brief background/description/information on approved relevant projects and multi-year agreements as follows:<br>• The current progress in implementation of any funded HFC-related project (enabling activities or stand-alone HFC investment projects)<br>• The current progress in ongoing HCFC phase-out management plan (HPMPs)<br>• Consideration of integrating HFC phase-down activities with HPMP activities taking into account previously approved HFC-related projects, if this information is available.</td></tr>
<tr><td colspan="4">Enabling activities for HFCs Phase-down in China, totaling USD 250,000, were approved at the 80th Excom meeting in November 2017 with UNDP and UNEP as implementing agencies. The activities conducted under the project supported China in its ratification of the Kigali Amendment and fulfilment of the initial obligations. All project activities have been completed by June, 2021. The government of China accepted the Kigali Amendment in June 17, 2021 and preparations for meeting initial obligations have been accordingly conducted .<br>China has been implementing its HPMPs stage II in the following sectors: (i) industrial and commercial refrigeration and air conditioning, (ii) room air conditioning, (iii) polyurethane (PU) foam, (iv) extruded polystyrene (XPS) foam, (v) solvent and (vi) service sectors since 2016, which supported China to achieve targets of reducing HCFCs by 35% from baseline levels by 2020.<br>According to the revised HPMP stage II strategy (2021-2026) approved by the 86th ExCom meeting:<br>• the industrial and commercial refrigeration and air conditioning, sector and service sector will achieve a reduction of 67.5% of the baseline level by the end of 2025.<br>• Room air conditioning will achieve a 70% reduction of the baseline level by the end of 2025.<br>• (c) A complete phase-out of HCFCs consumption in PU foam, XPS foam and solvent sectors by 2026.<br><br>In these six (6) Sector Plans, conversion of production lines and technical assistance activities such as revision of standards, awareness-raising and training have been carried out, and 104,000 tons of HCFCs are expected to be eliminated by the year 2026.<br>Since there are no previous experiences of implementing HFC phase-down projects and EE projects within FECO, and also considering that needs to develop the national strategies to achieve the Stage I of the HFC phase down targets, in line with the Kigali Amendment to the Montreal Protocol, China has not yet considered options for integrating HFC phase-down activities with HPMP activities at this moment.</td></tr>
<tr><td colspan="4">3. Overview of current HFC consumption in metric tonnes by substance (last three years)</td></tr>
</table>

| Substance/blend | Sector | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| (select) | Manufacturing-AC | N/A | N/A | 138,848.40 |
| (select) | Manufacturing-Foam | N/A | N/A | 12,138.59 |
| (select) | Manufacturing-REF | N/A | N/A | 90,536.00 |
| (select) | Solvent | N/A | N/A | 2,478.38 |
| (select) | (select) | | | |
| (select) | (select) | | | |
| (select) | (select) | | | |
| (select) | (select) | | | |
| (select) | (select) | | | |

4. Based on the consumption data given above, please provide a description of the sector/sub-sector that use HFCs in the country, including a short analysis and explanation of the consumption trends (i.e., increasing or decreasing)

Click or tap here to enter text.

As the largest producer and consumer of HFCs, China must fulfill its responsibility to reduce HFC consumption, and at the same time, it also needs international support. China should achieve a consumption freeze in 2024 and a 10% reduction in 2029, the task is daunting, and China must take actions to achieve the compliance targets of the Kigali Amendment and contribute to reducing climate warming.

Besides as the world's largest producer, consumer, China is also the largest exporter of HFCs. According to the national data reported to the Ozone Secretariat, the global production of HFCs in 2022 is about 1.7 billion tons of CO2-eq, of which China's production accounts for more than 90%. At the same time, nearly 60% of the HFCs produced in China are exported to other countries as chemicals. China faces arduous task in phasing down HFCs.

According to preliminary information on HFC consumption in China, the refrigeration and air-conditioning sectors are the most important application fields of HFCs in China. There are also HFC consumption in foam, fire-fighting, aerosol, electronics and other sectors. In refrigeration and air-conditioning sectors, room air-conditioning sector is the estimated largest consumer, and automobile and industrial and commercial refrigeration account for a large proportion.

In order to achieve the compliance objectives stipulated in the Kigali Amendment, China, like all A5 countries, needs urgently to conduct research on HFCs management and reduction strategies as soon as possible with the support of the Multilateral Fund of the Protocol and the assistance of the international implementing agencies, so as to send a clear signal of compliance to the sectors and the public, which will also contributes to the global fulfillment of the Kigali Amendment compliance goals.

China has an important cooling and heating industry, not only with large internal demand for use in thermal comfort for cooling and heating, with growing demands for reversible heat pumps based on vapor-compression refrigeration cycle, but also for processes required in several industries.

Independent consultancies project that the cooling and heating sector in China may grow with a CAGR of 9% until the year 2029 to cope with the demand, also considering the important exporting capacities of China.

These factors are corroborated by the consumption data reported by China through the A7 and CP Reports, therefore sector priority shall also be carefully reviewed when phasing down HFCs, taking into account multiple factors. As indicated by preliminary information, some of the sectors and sub-sectors is experiencing rapid growth, which may pose great challenges for fulfilling the first stage HFCs phase-down obligations at the national level.

5. Description of information that needs to be gathered during project preparation. Explain how this data will be gathered

| Information needed | Description | Agency |
|---|---|---|
| Data on HFC consumption in manufacturing/servicing sector | To collect the historical data of production, import, export and use of HFCs, compare with relevant data and surveys of sectors, put forward the sectorial HFC distribution in China, and analyze the reasons for the historical growth and development potential, and analyze China's import and export distribution. | UNDP |
| HFC sectoral consumption information | To organize sector survey, collect sector information, analyze and summarize the use of HFCs and alternatives in the sectors, sectors scale, sector characteristics, enterprise distribution, etc. | UNDP |
| New information on ODS regulations | To do research on existing policies, regulations and management systems on controlled substance, and analyze how existing policies and management systems can be improve to ensure the fulfillment of compliance objectives. | UNDP |
| Others, specify. | To collect information about HFCs alternative technologies at | UNDP |

| | | |
|---|---|---|
| | home and abroad, analyze and evaluate existing alternatives and alternative technologies, identify their advantages and disadvantages and scope of application, and determine the alternative technology roadmap based on the latest research results of alternative technology selection in sectors | |
| 6. Activities to be undertaken for project preparation and funding (decision 87/xx(b)) | | |
| Activity | Indicative funding (US $) | Agency |
| Workshops/meetings Including inception and validation workshops, stakeholders consultations and technical visits. | 40,000 | UNDP |
| Project development including data collection and analysis: carry on field surveys for data refinement, analysis of technology scenarios and options, technical support for strategy and project interventions development, development of action plans, project concept writing and translation. | 195,000 | UNDP |
| Management, communications and miscellaneous: including oversight travel costs for FECO staff, translators to assist international experts, outreach and communication costs, printing and other miscellaneous costs | 15,000 | UNDP |
| Click or tap here to enter text. | | (select) |
| Click or tap here to enter text. | | (select) |
| TOTAL | | |

| |
|---|
| 7. How will activities related to preparing the KIP be linked to the current stages of the HPMP being implemented in the country? (OPTIONAL) |
| N/A |
| 8. How will the Multilateral Fund gender policy be considered during project preparation? |
| In line with the decision 84/92, the operational policy on gender mainstreaming would be applied wherever feasible in the preparation of the project including in the following activities (a) collected gender aggregated data and encouraging participation in the consultative meetings. (b) promoting awareness to develop staff competency and awareness on gender mainstreaming as part of the consultation exercise. (c) share experiences and lessons learned on gender mainstreaming. |

**B. Information required for PRP funding request for investment projects/sector plans as part of or in advance of the KIP**

| | |
|---|---|
| **1. Agency:** | (select) |
| **2. Sector:** | (select) |
| **3. HFC consumption in item #2 reported under country programme data?** | ☐ **Yes**, please specify reported amount and year: _____<br>☐ **No** |
| **4. Does the enterprise commit to phase out the HFC consumption associated with the proposed investment project, if approved by the Executive Committee?** | ☐ **Yes**, please provide support letter _____<br>☐ **No** |
| **5. If the project preparation is requested in advance of the KIP, did the Government provide a written commitment that the consumption associated with these investment projects, once approved, will be deducted from the country's starting point, once established?** | ☐ **Yes**<br>☐ **No** |
| **6. Please explain briefly how the investment project would relate to the overarching strategy for the country, and when the final KIP will be submitted (decision 87/50(e))** | |

**7. Information on sector consumption (specify previous year HFC consumption)**

| **Substance** | **Consumption (metric tonnes)** |
|---|---|
| (select) | |
| (select) | |
| (select) | |
| | |

**8. Information on enterprise(s) for which funding is being sought**

| **Enterprise** | **Year established** | **HFC consumption (metric tonnes) (last three years)** | | | **HFC phase-out to be achieved (metric tonnes and $CO_2$-eq. tonnes)** |
|---|---|---|---|---|---|
| | | **2019** | **2020** | **2021** | |
| | | | | | |
| | | | | | |
| | | | | | |

**9. Activities to be undertaken for preparation of the investment project and funding requested**

| Activity | Indicative funding (US $) | Bilateral/implementing agency |
|---|---|---|
| Click or tap here to enter text. | | |
| Click or tap here to enter text. | | |
| Click or tap here to enter text. | | |
| Click or tap here to enter text. | | |
| Click or tap here to enter text. | | |
| Click or tap here to enter text. | | |
| **TOTAL** | | |

**ANNEX 3**

**Project preparation (PRP) requests for national inventories of banks for used and/or unwanted controlled substances and a plan for the collection, transport and disposal of such substances**

1. **Chile**
2. **Panama**

**GOVERNMENT OF CHILE**

# FUNDING REQUEST FOR THE PREPARATION OF NATIONAL INVENTORIES OF BANKS OF USED OR UNWANTED CONTROLLED SUBSTANCES

**Lead Implementing Agency:** **UNDP**

**National Executing Agency:** **Ozone Unit**
**Climate Change Division**
**Ministry of Environment**

***March 2024***

## Part I: Project information

| | |
|---|---|
| **Project title:** | Preparation of national inventories of banks of used or unwanted controlled substances |
| **Country:** | Chile |
| **Lead implementing agency:** | UNDP |
| **Meeting where request is being submitted** | 94th |
| **Implementation period** | July 2024 – June 2026 |
| **Duration of implementation (i.e., time (in months)) from the approval of PRP to submission of the national inventory and action plan (please specify):** 24 | |
| **Funding requested:** | |
| **Agency** | **Funding requested (US $)** |
| **UNDP** | **90,000** |

## Part II: Prerequisites for submission

| Item | Yes | No |
|---|---|---|
| Official endorsement letter from Government, indicating roles of respective agencies (where more than one IA is involved), and that the national inventory/action plan will be completed within 24 months from the date of project approval | ☒ | ☐ |
| Project included in the bilateral/IA business plan? | ☒ | ☐ |

## A. Information required for PRP funding request for the national inventories of banks of used or unwanted controlled substances and a plan for the collection, transport and disposal of such substances, including consideration of recycling, reclamation and cost-effective destruction.

**1. Brief overview of the the concept, methodology and approach to be taken for the preparation of the national inventory and / or action plan and how it is linked to other activities in the country (i.e., national plans like the KIP), in particular those activities in the refrigeration servicing sector such as recovery, recycling, and reclamation programmes.**

The Government of the Republic of Chile is requesting funding for the preparation of the national inventories of banks of used or unwanted controlled substances. The project complies with the criteria established by Decision 91/66.

ODS banks are defined as the 'total amount of substances contained in existing equipment, chemical stockpiles, foams and other products not yet released to the atmosphere' (IPCC/TEAP, 2005). Thus, ODS can either be quantified in an aggregated manner such as bulk/cylinder (stockpiles) or estimated via ODS-containing equipment.

A sound understanding of ODS banks at the country level is the basis for any action and policy decisions in the field of ODS bank management. In particular, the inventory is important to:

- Assess the general need for action in the field of ODS bank management.
- Assess the potential environmental benefits to the ozone layer and the climate.
- Decide whether to export ODS or to find a local destruction solution.
- Design optimal capacities for destruction technology in case of local destruction options.
- Assess long-term availability of ODS to guarantee economic viability of a destruction plant.
- Design appropriate policy measures.
- Design appropriate collection systems.

**Key elements of responsible ODS/HFC management:**

- Promote on-site recycling.
- Use of reusable cylinders.
- Adopt a take-back obligation with a deposit-and-refund scheme.
- Ensure accessible collection points for refrigerants or waste appliances.
- Ensure reclamation and destruction facilities.
- Building a quality infrastructure based on informed decision-making.

The case of Chile has the following unique features:

- Chile is a developing country with mid ODS/HFC consumption.
- The opportunity to leverage market-based finance mechanisms will be explored for the conversion of environmental services of avoided ODS emissions into carbon assets. Methodology and standards and the critical issues (technical, regulatory and financial risks) will be discussed.
- This proposal will review and evaluate the development and implementation of the ODS and HFC destruction strategy in place.
- The main challenge in Chile is related to setting up the logistic framework and cost-effective infrastructure for transport, storage and destruction of ODS/HFC.

**2. Description of activities that will be implemented during the preparation of the national inventories/action plans of banks for used and/or unwanted controlled substances and an indication of the estimated costs for the activities described broken down per agency**

| Activity | Description | Agency |
|---|---|---|
| Others, specify.<br>Data collection and analysis | Elaboration of an inventory to cover the equipment in-service and predictive analysis to estimate the rate it reaches EOL(End-of-life) inclusive of national capability to maintain it and update the initial EOL management plan. | UNDP |
| Stakeholder consultations | Conducting interviews, organizing workshops and stakeholders' consultations for the integration of national regulations and procedures and the harmonization with national waste management regulation to accommodate EOL ODS/HFCs. | UNDP |
| Others, specify.<br>Analysis and evaluation of the disposal system of refrigerant waste in place. | Assessment of options for the final disposal of refrigerant waste in the country. | UNDP |
| Preparation of inventory report/national plan | Delivery of inventory report and national plan for the collection, transport and disposal of such substances, including consideration of recycling, reclamation and cost-effective destruction. | UNDP |
| Communication and outreach plan preparation and development of awareness-raising activities | Awareness raising of relevant stakeholders on ODS/HFC banks and EOL management and disposal. | UNDP |

**3. Funding for the activities described in 2 above**

| Activity | Indicative funding (US $) | Agency |
|---|---|---|
| Data collection and analysis | 20,000 | UNDP |
| Stakeholder consultations | 20,000 | UNDP |
| Analysis and evaluation of the disposal system of refrigerant waste in place. | 15,000 | UNDP |
| Preparation of inventory report/national plan | 25,000 | UNDP |

| | | |
|---|---|---|
| Communication and outreach plan preparation and development of awareness-raising activities | 10,000 | UNDP |
| **TOTAL** | **90,000** | |

**4. How will the Multilateral Fund gender policy be considered during project preparation?**

The objective of the gender policy of the Multilateral Fund is to promote gender mainstreaming (gender equality and women's empowerment - GEWE) in the preparation and implementation of projects funded by the Multilateral Fund, consistent with the gender policies of the implementing agencies.

The Chilean Government promotes a program for the inclusion of women in line with the MLF gender policy contained in ExCom document 84/73 and special effort will be made to involve females in data collection and analysis of inventory of ODS/HFC bank as well as on EOL management of RAC equipment.

The project preparation will aim to advocate the importance of the leadership of women technicians in awareness-raising activities.

Also, this project preparation will ensure that both women and men can provide input, access and participate in all activities (e.g., through outreach / invitations of female technicians to participate in stakeholder consultations, expert recruitment etc.).

**GOVERNMENT OF PANAMA**

# FUNDING REQUEST FOR THE PREPARATION OF NATIONAL INVENTORIES OF BANKS OF USED OR UNWANTED CONTROLLED SUBSTANCES

**Lead Implementing Agency:** **UNDP**

**National Executing Agency:** **National Ozone Unit**
**Ministry of Health**

***March 2024***

**Part I: Project information**

| | |
|---|---|
| **Project title:** | Preparation of national inventories of banks of used or unwanted controlled substances |
| **Country:** | Panama |
| **Lead implementing agency:** | UNDP |
| **Meeting where request is being submitted** | 94th |
| **Implementation period** | July 2024 – June 2026 |
| **Duration of implementation (i.e., time (in months)) from the approval of PRP to submission of the national inventory and action plan (please specify):** 24 | |
| **Funding requested:** | |
| **Agency** | **Funding requested (US $)** |
| **UNDP** | **90,000** |

**Part II: Prerequisites for submission**

| Item | Yes | No |
|---|---|---|
| Official endorsement letter from Government, indicating roles of respective agencies (where more than one IA is involved), and that the national inventory/action plan will be completed within 24 months from the date of project approval | ☒ | ☐ |
| Project included in the bilateral/IA business plan? | ☒ | ☐ |

## B. Information required for PRP funding request for the national inventories of banks of used or unwanted controlled substances and a plan for the collection, transport and disposal of such substances, including consideration of recycling, reclamation and cost-effective destruction.

**5. Brief overview of the the concept, methodology and approach to be taken for the preparation of the national inventory and / or action plan and how it is linked to other activities in the country (i.e., national plans like the KIP), in particular those activities in the refrigeration servicing sector such as recovery, recycling, and reclamation programmes.**

The Government of the Republic of Panama is requesting funding for the preparation of the national inventories of banks of used or unwanted controlled substances. The project complies with the criteria established by Decision 91/66.

ODS banks are defined as the 'total amount of substances contained in existing equipment, chemical stockpiles, foams and other products not yet released to the atmosphere' (IPCC/TEAP, 2005). Thus, ODS can either be quantified in an aggregated manner such as bulk/cylinder (stockpiles) or estimated via ODS-containing equipment.

A sound understanding of ODS banks at the country level is the basis for any action and policy decisions in the field of ODS bank management. In particular, the inventory is important to:

- Assess the general need for action in the field of ODS bank management.
- Assess the potential environmental benefits to the ozone layer and the climate.
- Decide whether to export ODS or to find a local destruction solution.
- Design optimal capacities for destruction technology in case of local destruction options.
- Assess long-term availability of ODS to guarantee economic viability of a destruction plant.
- Design appropriate policy measures.
- Design appropriate collection systems.

**Key elements of responsible ODS/HFC management:**

- Promote on-site recycling.
- Use of reusable cylinders.
- Adopt a take-back obligation with a deposit-and-refund scheme.
- Ensure accessible collection points for refrigerants or waste appliances.
- Ensure reclamation and destruction facilities.
- Building a quality infrastructure based on informed decision-making.

The case of Panama has the following unique features:

- Panama is a developing country with an ODS/HFC consumption centred around the RAC sector.
- The opportunity to leverage market-based finance mechanisms will be explored for the conversion of environmental services of avoided ODS emissions into carbon assets. Methodology and standards and the critical issues (technical, regulatory and financial risks) will be discussed.
- This proposal will review and evaluate the development and implementation of the ODS and HFC destruction strategy in place.
- The main challenge in Panama is related to setting up the logistic framework and cost-effective infrastructure for transport, storage and destruction of ODS/HFC.

**6. Description of activities that will be implemented during the preparation of the national inventories/action plans of banks for used and/or unwanted controlled substances and an indication of the estimated costs for the activities described broken down per agency**

| Activity | Description | Agency |
|---|---|---|
| Others, specify.<br>Data collection and analysis | Elaboration of an inventory to cover the equipment in-service and predictive analysis to estimate the rate it reaches EOL(End-of-life) inclusive of national capability to maintain it and update the initial EOL management plan. | UNDP |
| Stakeholder consultations | Conducting interviews, organizing workshops and stakeholders' consultations for the integration of national regulations and procedures and the harmonization with national waste management regulation to accommodate EOL ODS/HFCs. | UNDP |
| Others, specify.<br>Analysis and evaluation of the disposal system of refrigerant waste in place. | Assessment of options for the final disposal of refrigerant waste in the country. | UNDP |
| Preparation of inventory report/national plan | Delivery of inventory report and national plan for the collection, transport and disposal of such substances, including consideration of recycling, reclamation and cost-effective destruction. | UNDP |
| Communication and outreach plan preparation and development of awareness-raising activities | Awareness raising of relevant stakeholders on ODS/HFC banks and EOL management and disposal. | UNDP |

**7. Funding for the activities described in 2 above**

| Activity | Indicative funding (US $) | Agency |
|---|---|---|
| Data collection and analysis | 20,000 | UNDP |
| Stakeholder consultations | 20,000 | UNDP |
| Analysis and evaluation of the disposal system of refrigerant waste in place. | 15,000 | UNDP |
| Preparation of inventory report/national plan | 25,000 | UNDP |

| | | |
|---|---|---|
| Communication and outreach plan preparation and development of awareness-raising activities | 10,000 | UNDP |
| **TOTAL** | **90,000** | |

**8. How will the Multilateral Fund gender policy be considered during project preparation?**

The objective of the gender policy of the Multilateral Fund is to promote gender mainstreaming (gender equality and women's empowerment - GEWE) in the preparation and implementation of projects funded by the Multilateral Fund, consistent with the gender policies of the implementing agencies.

The Panama Government promotes a program for the inclusion of women in line with the MLF gender policy contained in ExCom document 84/73 and special effort will be made to involve females in data collection and analysis of inventory of ODS/HFC bank as well as on EOL management of RAC equipment.

The project preparation will aim to advocate the importance of the leadership of women technicians in awareness-raising activities.

Also, this project preparation will ensure that both women and men can provide input, access and participate in all activities (e.g., through outreach / invitations of female technicians to participate in stakeholder consultations, expert recruitment etc.).

**ANNEX 4**

**Project preparation (PRP) requests for pilot projects to maintain and/or enhance energy efficiency of replacement technologies and equipment in the context of HFC phase-down**

1. **Global**
2. **China**

**Title of project**: Demonstrating digital monitoring and management tools to reduce emission of HFCs and enhance energy efficiency in the space cooling and cold chain sectors in Colombia, Lebanon, Panama, Sri Lanka, and Trinidad and Tobago

**Objective**: Supporting program countries to pilot digital tools for monitoring, optimizing, and managing air conditioning and cold chain systems to reduce emission of the HFCs, reduce energy consumption and associated indirect emission of greenhouse gas, and improve overall maintenance of cooling system proactively.

**Funding Window**: Energy Efficiency window

**Estimated Funding for this project:** US$ 1,000,000

**Requested PRP funding:** US$ 80,000

---

**Sector relevance and technology development trends**

1. Space cooling and cold chain are essential for sustainable development, providing people comfortable environment and relief from heat waves, preserving food, reducing food waste, ensuring the safe storage of medicines. However, cooling also generated a serious carbon footprint, directly and indirectly, due to the emissions of high global warming potential refrigerants and the consumption of electricity.

2. Air conditioners currently consume 20% of the electricity used in buildings around the world and their use is expanding more rapidly than any other building appliance[1]. According to projections by the International Energy Agency, global energy demand for space cooling is expected to triple by 2050[2]. If cooling efficiency is not improved significantly, an increase in greenhouse gas emissions from energy consumption and refrigerants will occur and warm the planet.

3. Designing more sustainable food cold chains is also an important component of the sustainability and resilience of the food system. According to the Food and Agriculture Organization of United Nations (FAO), food waste accounts for approximately 8% of global greenhouse emissions. Almost one third of food produced for human consumption goes to waste and the lack of effective and efficient refrigeration systems is a leading contributor to this waste, directly resulting in the loss of 526 million tons of food production (12% of total) in 2017[3].

4. In its 2023 Supplementary Progress Report on Energy Efficiency, the Technical and Economic Assessment Panel (TEAP) highlighted the importance of a system approach for sustainable cooling that looks at the whole cooling system design, operation and maintenance, not just the individual components.

5. TEAP noted that, through design optimization, operation, and maintenance of the RACHP systems within the context of the overall facility which they service, the emission could be reduced and overall efficiency could be improved significantly. This requires a holistic

[1] https://www.cleancoolingcollaborative.org/the-challenge/

[2] IEA report, The Future of Cooling, 2018

[3] Cool Coalition (2022). *Sustainable Food Cold Chains: Opportunities, Challenges and the Way Forward*. Peters, T. and Sayin, L. Nairobi: United Nations Environment Programme and Food and Agriculture Organization of the United Nations

analysis of the cooling and heating loads, the equipment and system performance, leakage detection and prevention, optimizing of operation in response to the change of temperature, energy supply and demand, as well as the solutions for energy recycling and storage.

6. In the past decade, digital technology is the primary enabler and driver for high quality and efficient cooling equipment in RACHP sector either at component/unit level (invertor compressor and smart air-conditioner), or system/facility level (such as smart hospital and district cooling). Digital tools provide valuable insights, automation, and control capabilities that can significantly enhance the energy efficiency of cooling systems, reducing emission of refrigerants, identifying energy saving opportunities.

7. Furthermore, smart cooling contributes to sustainable urban planning. City can develop a smart energy management system to balance energy supply and demand, reduce the urban heat island effect by deploying solutions for energy recycling and storage from cooling, minimize the amount of electricity consumed, which in turn reduces the use of fossil fuels and pressure on the power grid in the peak time.

**Addressing HFCs phase-down and yielding energy efficiency benefits by combining use of low-GWP refrigerants and digitalization trends in AC-R Sectors**

8. Digitalization of refrigeration and air conditioning systems, using Internet of Things (IoT) and Artificial Intelligence (AI), is an innovative approach for the effective implementation of the Kigali Amendment. Digital solutions in RACHP sector offers the following advantages:

    a) Early warning of (high-GWP) refrigerant leakages: Digital sensors and monitoring systems can collect real-time data on system operation such as temperature and pressures. This data can be analyzed to identify refrigerant leakages below 5-10% and detect potential issues. As such, maintenance can be scheduled timely to prevent further emission. Such monitoring and detection systems are particularly important for large systems that use high GWP HFC blends. It will help for informed decision from high GWP HFCs to more sustainable and advanced cooling system.

    b) Optimizing system settings for energy saving: Digital tools could monitor the performance of equipment and energy consumption in a real time, so the data could be used for analysis to optimization of the operations using long terms reports and parameters designed. Smart monitoring and control system could save energy up to 30%. In assembly sub-sector, digital tools are critical for achieving higher performance of cooling system while using low-GWP alternative technologist to HFCs.

    c) Improve management practices of servicing sector: Digital software can help develop a centralized cooling service management platform. The platform could be used for inventory of refrigerants and cooling assets and connecting ender users and service providers. The platform also has the potential to advance “cooling as a service - CaaS” model for affordable cooling in low-income and rural communities. This potential could be explored in the servicing sector to improve the effectiveness of refrigerant management and energy saving.

9. Figure 1 illustrates a flowchart detailing the process of digital data collection. In this setup, the operational machinery (or complex plant) is equipped with a selection of appropriate sensors and data acquisition systems to conduct real-time measurements. Subsequently, the

collected data can be stored and analyzed for various purposes, whether on local platforms or remotely through a network.


**Figure 1 Flow chart of digital data collection**
***(source: IIR, 55th Informatory Note on Refrigeration Technologies, 2023)***

10. IoT and digitalization offer substantial advantages in managing energy for building air conditioning, especially for energy-intensive systems. The trend is moving towards "smart entities." This entails installing and utilizing building technology systems comprising sensors, controllers, actuators, controllable valves, pumps, cameras, and microphones interconnected through a building management system (BMS). This integration facilitates efficient energy management and enhanced comfort solutions.

11. IoT has been used in retail, and most equipment has been IoT-ready for some time. It performs vital functions to ensure safety compliance by monitoring temperature, maintaining equipment reliability to prevent food waste and enabling traceability for insurance purposes. IoT operates at both the product and equipment level.

12. In practical terms, when applied in the Kigali Amendment framework, monitoring and managing refrigerant consumption and energy efficiency could be achieved in an integrated manner enabled by digital tools. The digitalized low GWP solutions to be demonstrated in the KIP could help the government and stakeholders accessing real time data for motivation, data analysis, policy development, awareness raising to support the transition to sustainable cooling.

## PROJECT JUSTIFICATION

13. This project idea aligns with the TEAP assessment on the needs to approach energy efficiency interventions within the Montreal Protocol framework on a system approach. It is also inspired by innovative approaches and technologies that can help end-users to predict equipment faults and avoid refrigerant leakages before it happens by establishing online, Realtime, energy monitoring tools.

14. This project idea also aligns with the ExCOM Decision 91/65 for pilot projects to maintain and/or enhance the energy efficiency of replacement technologies and equipment in the context of HFC phase-down in different levels as:

    (a) Manufacturing Level: enable manufacturers to design cooling systems able to adopt parts that are “ready-to-use” with digital tools and IoT, aiming enhance energy efficiency while converting out of HFCs.

    (b) Assembling and Installations Levels: Support designers and installers to access lower costs digital tools and support the widening of the supply chain of parts and accessories required for these installations, while overlapping the HFCs use. This technical assistance can result in the adoption of technologies to maintain and/or enhance energy efficiency while converting from HFCs and demonstrate replicability and scalability of more energy efficient, low GWP refrigerant systems.

(c) Servicing Sector: track the energy efficiency of the installed base of high GWP HFC-based cooling equipment and act on corrective maintenance before catastrophic faults that could lead to emissions of refrigerants. Hence, also avoiding the leakage at first place. Faults and data analysis can also help the stakeholders to make informed decision about the retrofit option or the early replacement of equipment to fulfill the obligation of HFC phasing down.

15. Micro, Small and Medium Enterprises (MSMEs) could be one of the most critical beneficiaries of the project in all levels above considering the lack of technical capacities and challenges in access lower cost or open-source digital tools, hence, fully in line with the provisions of Decision 91/65.

16. Despite refrigeration and air conditioning accounting for a significant share of global energy consumption, the application of digitalization to these areas has so far received less attention than for other household appliances and mobility devices[4]. Therefore, it is important to conduct demonstration projects to showcase and accumulate experiences for replication in more countries. The project will explore the demonstration projects in manufacturing, assembly and servicing sector target at design and installation of the new system using low GWP alternative, and effective refrigerant management and energy saving practices in serving and maintenance of existing HFC-based equipment that was installed more than five years without digital tools.

**Linkages to the HFCs phase-down activities in targeted Pilot Countries**

17. The selection of demonstration countries is based on several criteria including the willingness of respective governments, relevant experience and capacity of local partner, relevant initiatives in the cooling sector in respective countries, availability of data, and alignment with priority of government policies related to digitalization and/or cooling/cold chain strategy. Based on above criteria, recommendations were made by UNDP for the demonstration countries of digital tools include Sri Lanka, Trinidad and Tobago, Panama, Lebanon, and Columbia.

*Sri Lanka*

18. UNDP, on behalf of the Government of Sri Lanka, is submitting the Stage I of its KIP for the consideration of the 94th Ex.COM. The cold chain in Sri Lanka is expected to grow at high rates of 10 to 15%. For example, the Government and the Diary Association have ambitions plans to refrigerate all 12,000 milk farmers in country to improve shelf life, reduce waste and increase food security in dairy sector. Current technologies are based on HFC-134a or R-404A.

19. There is also a need to facilitate the introduction of low-GWP refrigerants based AC and Condensing Units and replication strategies are highlighted in stage-I KIP of Sri Lanka. For this purpose, not only green procurement guidelines will be needed, but real energy efficiency testing and continuous monitoring is required so to convince stakeholders about technology choice. This project idea can directly benefit Sri Lanka's KIP by deploying digital monitoring methods to support the transition.

[4] IIR, 55th Informatory Note on Refrigeration Technologies, USE OF INTERNET OF THINGS AND ARTIFICIAL INTELLIGENCE IN REFRIGERATION AND AIR CONDITIONING, 2023

*Lebanon*

20. UNDP is supporting the Government of Lebanon to prepare its KIP Stage I, which is expected to be submitted to the 95th Ex.COM. It is already anticipated the need for Lebanon to promote the use of lower GWP alternatives, particularly in the cold chain (large to medium sized) given the economic profile when it comes to the local production and exports of foods and goods that depend on cooling. Hence, the country is also considering the development of EE interventions in the Assembly and Installation sector of larger cooling equipment, such as condensing units (for cold rooms), process chillers and centralized racks.

21. This project idea can support local designers and installers to access to lower costs digital tools, incorporate new design features that align online performance monitoring to system safety, and assist in the identification of an effective supply chain of parts and accessories required for these installations while overlapping the HFCs use. This technical assistance can result in the adoption of technologies to maintain and/or enhance energy efficiency while converting from HFCs and demonstrate replicability and scalability of more energy efficient, HFC-free, systems.

*Trinidad and Tobago*

22. Trinidad and Tobago, a twin-island State, located in the Caribbean, is a RAC technology taker. Surveys performed during the Stage KIP preparation noted that a wide availability of HFC based equipment and systems are currently installed and operating in the country. This is backed through aggressive commercial policies from suppliers, along with skepticism and/or resistance from the installers / end-users to adopt HFC-free / low-GWP technologies.

23. The country strongly promotes the adoption of policies to support the implementation of the Kigali Amendment including potential bans on import of certain types of HFC based RAC equipment and the development of energy efficiency standards and other relevant standards. Measures to replace domestic air conditioning equipment are already being promoted through a GEF-funded project.

24. With support from UNDP, the Government of Trinidad and Tobago submitted its Stage 1 KIP at the 93rd meeting of the ExCom. Digital Solutions will be incorporated into project implementation, to motivate stakeholders on technology transition and energy efficiency improvement.

*Panama*

25. UNDP, on behalf of the Government of Panama, submitted and got approval of the Stage I of its KIP at the 93rd meeting of the ExCOM. During the preparation of the KIP and the implementation of its different HPMP stages, it has been cleared that Panama is an early adopter of technologies, which replicate in the region due to its intense commerce sector, supported by the Panama Canal and the Colon Free Trade Zone.

*26.* The implementation of this project will complement the initiatives to be conducted under the first stage of the KIP on the promotion of new technologies and the introduction of non-ODS, low-GWP, energy efficient RAC systems. Understanding of digital tools, IoT and connectivity are fundamental for the adoption of the latest technologies and a powerful tool

for the implementation of the Kigali Amendment, as an informed stakeholder, either end-user, designer, installer or technician, will accept more easily the introduction of new technologies.

*Colombia*

27. UNDP is supporting the Government of Colombia to prepare its KIP Stage I, which is expected to be submitted to the 95th Ex.COM. During the preparation of the KIP, it has been noted the important consumption of HFC in the RAC sector and the interest of stakeholder in the adoption of non-ODS, low-GWP, energy efficient RAC systems.

28. It is expected that the stage I of the KIP will work with the food cold chain and agro-industrial sectors, giving technical assistance to foster the introduction of non-ODS, low-GWP, energy efficient technologies. Digital solutions will be a key tool to complement and facilitate the transitions needed to comply with the Kigali Amendment.

29. Also, the stage I of the KIP in Colombia will work on the promotion of good practices for HFCs management and promotion of the safe and sustainable use of low-zero GWP alternatives, digital solutions are an important tool to fully promote the practices and alternatives that will be fostered.

**Activities that can potentially be performed in the full-sized project**

30. Engage with Stakeholders and disseminate data and improve awareness on the Project:

(a) Organize workshops, create knowledge materials, create awareness and improve their capacities on the benefits of AC-R digitalization.
(b) Create engagement/coordination mechanisms to engage with relevant stakeholders and also lead to coordination and exchange of experiences and enable to Policy setting among government agencies and private sector stakeholders.
(c) Establish partnerships with international organizations to leverage resources and identify project replication opportunities.
(d) Raise awareness about the project's benefits and share success stories.

31. Asses highly energy efficiency, low-GWP refrigerant based, Technologies and conduct implementation of pilot initiatives to:

(a) Identify and evaluate existing digital monitoring and management tools and technologies relevant to energy efficiency and refrigerant emission reduction.
(b) Explore potential adaptations or innovations specific to the local context.
(c) Select space cooling and cold chain representative installations for pilot testing of the chosen digital tools and technologies.
(d) Implement energy-efficient equipment, IoT sensors, and monitoring systems.
(e) Collect data on energy consumption and emissions before and after implementation.
(f) Continuously monitor and collect data from the pilot site to assess the impact on energy efficiency and emissions reduction.
(g) Analyze the data to make necessary adjustments and improvements.

32. Installation and Servicing Sector Capacity Building:

(a) Provide training to local technicians and operators on using the digital tools and managing energy-efficient systems.
(b) Foster knowledge transfer and skills development among local technical community.

**Potential Outcomes and Deliverables of the full-sized project**

33. Low-GWP, highly efficient, truly monitored technologies demonstrated

(a) Taking into consideration national efforts to deploy low-GWP alternatives in selected countries, expand national projects scope and deploy Digital and IoT technologies to be tested in space cooling and cold chain sectors, focusing on enhancing energy efficiency and reducing greenhouse gas emissions from energy consumption.
(b) Monitoring and data analytics are carried out to improve system performance and minimize refrigerant loss.
(c) Technology assessed is duly reported, experiences about monitoring and management tools, IoT sensor networks and data collection systems are made available and possible to be replicated in KIPs of other countries.
(d) Pilot implementation reports templated, methodologies and standards are developed with real data on energy savings and emission reductions based on national conditions.

32. New approaches to capacity building and training materials for manufacturing, assembling and installation companies, as well as to servicing sector companies, are developed:

(a) Capacity-building documentation is prepared allowing national trainings to be revamped to incorporate energy efficiency features linked to the adoption of digital tools under the KIPs.
(b) Training manuals and materials for local technicians and operators are developed.

33. Policy Recommendations:

(a) Policy briefs advocating for energy-efficient practices and incentives for the digitalization in the space cooling and cold chain sectors.

34. Replication initiatives/possibilities are assessed and reported on, to ensure the sustainability and replication of the project, considering the following points:

(a) Creation of a comprehensive documentation of the project, including lessons learned and best practices. This will serve as a valuable resource for replication in other regions.
(b) Comprehensive analysis and experience sharing on building local capacity, so that trained professionals can replicate the project in different locations.
(c) Assessment of the use of open-source tools making the digital tools and technologies open-source or freely available to encourage wider adoption and replication.

**Why UNDP**?

34. UNDP has extensive experience in working with governments across all geographies and levels, providing neutral expertise and independent support on diverse aspects of their digital transformation, from strategy to technology procurement, as well as convening across public and private sectors and capacity building. UNDP developed its Digital Strategy with a vision to support the digitalization in 100 countries by 2030.

35. UNDP has been successfully using digital tools to address the challenges in the distribution of vaccines during the covid-19 pandemic. UNDP Indonesia has helped develop and scale up the cloud-based SMILE digital system which manages tracking of vaccine inventory for the national immunization programme. Similarly, the CoWIN system in India does all that SMILE does, as well as the ability to identify, register, monitor and certify vaccine recipients. Several UNDP COs have supported the used of DHIS-2 for logistics and stock management for health. All these solutions are open-source and open-license, can be freely adopted in countries. UNDP has the experience and technical know-how to support countries in customizing and scaling up similar digital tools.
36. UNDP chemical and waste hub/Montreal Protocol Unit has extensive experience in the cooling sector as one of the implementing agencies of the Multilateral Fund since 1991 and has active programs and pipelines in more than 50 countries to support the transition of cooling sector to low global warming, energy-efficient technologies. The hub developed sustainable cooling offer which aims to promote integrated programs for the refrigerant transition and energy efficiency, enabled by innovative finance, green technologies, and digital tools to accelerate the transition and amplify the impact. UNDP could build upon the on-going programs such as HCFC Phase-out Management Plan (HPMP), Kigali Implementation Plan (KIP) and other relevant initiatives such as Cool-Up, demonstrate the power of digital solutions in the cooling sector, and roll out to all program countries.

**Estimated Budget**

37. The cost of digital monitoring software and tools for cooling systems can range from relatively affordable options for small-scale applications to more expensive solutions for larger and more complex cooling systems. It is important to demonstrate the potential cost savings and benefits that digital monitoring tools can provide. It is worth noting that the cost of these tools has been decreasing over time as technology advances and becomes more accessible at scale. It is expected that 20-30% of energy saving could be achieved by the digital tools, and even more depending on the context of pilot site. The detailed budget of the project will be analyzed at the preparation stage with a tentative estimation of project fund at 1 million US dollars. UNDP may be able to provide co-financing if this project concept could be approved by the MLF.

**Estimated budget at preparation stage:**

| Items | Budget Unit | REMARK | Subtotal |
|---|---|---|---|
| International Consultant on air conditioning and cold chain technology | US$ 800/day | 25 working days | US$ 20,000 |
| International consultant of digital experts | US$ 800/day | 25 working days | US$ 20,000 |
| National consultants | US$ 200/day | 60 working days | US$ 12,000 |
| Travel cost | US$ 28,000 | | US$ 28,000 |
| Total | | | US$ 80,000 |

**MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL**
**KIGALI-HFC IMPLEMENTATION PLAN (KIP) PROJECT PREPARATION (PRP)**
**ENERGY EFFICIENCY PROJECT UNDER DECISION 91/65**

## Part I: Project information

| | | |
|---|---|---|
| **Project title:** | Improve energy efficiency and accelerate removal of HFCs through single-phase immersion cooling solution for intelligent data center | |
| **Country:** | People's Republic of China | |
| **Lead implementing agency:** | UNDP | |
| **Cooperating agency (1):** | (select) | Click or tap here to enter text. |
| **Cooperating agency (2):** | (select) | Click or tap here to enter text. |
| **Cooperating agency (3):** | (select) | Click or tap here to enter text. |
| **Implementation period for stage I of the KIP:** | TBD | |
| **Duration of PRP implementation (i.e., time (in months) from the approval of PRP to submission of the KIP (please specify):** | | |
| **Funding requested:** | | |

| Agency | Sector | Funding requested (US $)* |
|---|---|---|
| UNDP | (select) | 25,000 |

*Details should be consistent with information provided in the relevant sections below.

## Part II: Prerequisites for submission

| Item | Yes | No |
|---|---|---|
| Official endorsement letter from Government, indicating the specifying roles of respective agencies (where more than one IA is involved) | ☒ | ☐ |

## C. Information required for PRP funding request for the overarching strategy of the KIP

| | | | |
|---|---|---|---|
| **9. Montreal Protocol compliance target to be met in ☐ stage I of the KIP** | | | |
| **Phase-out commitment (%)** | **tbd** | **Year of commitment** | **tbd** |
| **☐ Servicing only** | | **☐ Manufacturing only** | **☐ Servicing and manufacturing** |

**10. Brief background/description/information on approved relevant projects and multi-year agreements as follows:**

- The current progress in ongoing HCFC phase-out management plan (HPMPs)
- Consideration of integrating HFC phase-down activities with HPMP activities taking into account previously approved HFC-related projects, if this information is available.

China has ratified the Kigali Amendment to the Montreal Protocol on 15 September 2021. As per the provisions of the Montreal Protocol, licensing system has been put in place since 25 October, 2021. Data reporting on HFCs and blends containing HFCs were delivered for the years 2020, 2021 and 2022. China is yet to prepare its Kigali Implementation Plan (KIP-I) with the assistance of the Multilateral Fund (MLF) for the implementation of the Montreal Protocol

China has met the 2013, 2015 and 2020 compliance targets as per the accelerated phase out schedule of the Montreal Protocol and is currently implementing the Stage II of its HPMP. Through the implementation of HPMP Stage-1, and HPMP Stage-2, as well, China has complied with the policy, regulatory framework and investment and technical assistance activities to assist and sustain the phase out HCFCs.

Since there is no previous experience of implementing HFC phase-down linked to EE projects within FECO, and also considering that needs to develop the national experiences to allow strategy and policy setting framework for HFC phase down, in line with the Kigali Amendment to the Montreal Protocol, China has not yet considered integrating HFC phase-down activities with HPMP activities.

| 11. Overview of current HFC consumption in metric tonnes by substance (last three years) | | | | |
|---|---|---|---|---|
| **Substance/blend** | **Sector** | **2020** | **2021** | **2022** |
| (select) | Manufacturing-AC | 75800.2 (R32) | 84400 (R32) | 74100(R32) |
| (select) | Manufacturing-REF | 3700(R32) | 5000(R32) | 8000(R32) |
| (select) | RAC servicing | 949.13(R32) | 8546.71(R32) | 3370.13(R32) |
| (select) | Other, specify. | 100(R32) Aerosol | 0 | 0 |
| (select) | Other, specify. | 17000(R134a) MAC | 16542.4(R134a) MAC | 17573.8(R134a) MAC |
| (select) | Manufacturing-REF | 21500(R134a) | 25500(R134a) | 24000(R134a) |
| (select) | RAC servicing | 15978.13(R134a) | 13942.54(R134a) | 7979.33(R134a) |
| (select) | Other, specify. | 2980(R134a)domestic refrigeration and heat pump | 3130(R134a)domestic refrigeration and heat pump | 3930(R134a)domestic refrigeration and heat pump |
| (select) | Manufacturing-AC | 300(R134a) | 460(R134a) | 0 |
| | MAC servicing | 17361(R134a) | 21000(R134a) | 15940.8(R134a) |
| | Aerosol | 3000(R134a) | 4000(R134a) | 60(R134a) |
| | Blowing agent | 2000(R134a) | 1000(R134a) | 23.84(R134a) |
| | Manufacturing-AC | 43000(R410A) | 37300(R410A) | 37400(R410A) |
| | Manufacturing-REF | 28000(R410A) | 37000(R410A) | 39500(R410A) |
| | RAC servicing | 19040.96(R410A) | 24771.4(R410A) | 35673.76(R410A) |

**12. Based on the consumption data given above, please provide a description of the sector/sub-sector that use HFCs in the country, including a short analysis and explanation of the consumption trends (i.e., increasing or decreasing)**

In recent years, the rise of Intelligent Data Centers has paralleled the advancements in information technologies like cloud computing, big data, and artificial intelligence. According to the Ministry of Industry and Information Technology, China had 74,000 data centers with 2.44 million standard data racks in 2019. By 2022 the number of racks has surged to 6.5 million, reaching 7.6 million in 2023. The Chinese data-center market has been expanding at an annual growth rate of about 30% since 2012. The huge market demand is driving the expansion of computing power in data centers and cooling technology. The evolution of data center cooling technology in China has occurred in three stages: before 2012, air-cooled direct-expansion precision air conditioners predominated; from 2012 to 2018, centralized water-cooled chilled water air-conditioning systems were prevalent; since 2019, refrigeration technologies such as evaporative cooling and liquid cooling have emerged.

It is estimated that more than 80% of data centers in China rely on air-conditioning systems, primarily using high GWP refrigerants like R134a and R410a, with a conservative estimate of 5,500MT in installed capacity. Additionally, the energy efficiency of air conditioning systems are low due to the thermo-physical limitations of air. Cooling can consume as much as 30-50% of the overall energy consumption of the data center.

The rapid advancement of chip technology and the proliferation of GPUs driven by AI training have put significant strain on air-based cooling systems in data centers. This has prompted some facilities to bolster their air conditioning capacity or adopt supplementary cold-plate liquid cooling methods. Consequently, data center cooling systems consume substantial electricity annually, exacerbating the exponential rise in HFCs consumption.

Also, in light of the highly demanding use of cooling systems, it is estimated that their useful lifecycle is shorter than usual air conditioning systems, which demand more constant servicing interventions and replacement of units more often than other commercial uses, hence, demand of new installed based of HFCs-based equipment will continue to be on the rise in this sub-sector.

In light of the implementation of the Kigali Amendment aimed at phasing down HFCs in China and the national advocacy for carbon neutrality and reduction targets, it is crucial to explore alternative solutions that not only replace HFCs but also enhance the energy efficiency of data centers. This proposed Energy Efficiency project preparation request will support the Government of China to develop a full stand-alone EE project aiming to

asses and validate the potential EE benefits aligned with potential HFCs reduction in the sub-sector by applying immersion liquid cooling solution for data center, which could later be upscaled in conjunction with renewable energy sources and a waste heat collection system for improved EE gains.

By integrating these elements, the project aims demonstrate the feasibility of promoting a potential early retirement of vapour-compression cooling systems, which are based on high GWP HFCs (reducing future needs of these HFC for installation and servicing), and achieve carbon neutrality in the data center. The results of the project will be carefully analyzed to advocate for the renovation/replacement with the phase-down of use HFC-based equipment in data centers in China. Furthermore, the findings will contribute to updating the energy efficiency standards for data centers in China, ensuring alignment with modern technologies and sustainability objectives, and ultimately, shared information can benefit the Montreal Protocol community on replication actions or projects under KIPs being developed or under implementation.

**13. Description of information that needs to be gathered during project preparation. Explain how this data will be gathered**

| Information needed | Description | Agency |
|---|---|---|
| HFC sectoral consumption information | Collection of HFC-related data and equipment profile in the data centers sector, estimates of growth and relative impact in the overall consumption of targeted substances | UNDP |
| New information on ODS regulations | Surveys on adjacent standards and regulations related to cooling performance for data centers, interlinkages with relevant energy efficiency Policies for this sector | UNDP |
| Others, specify. | Assess baseline information on immersion liquid cooling solution for data center, in conjunction with renewable energy sources and a waste heat collection system | UNDP |

**14. Activities to be undertaken for project preparation and funding (decision 87/xx(b))**

| Activity | Indicative funding (US $) | Agency |
|---|---|---|
| Data collection | 7,000 | UNDP |
| Project preparation and technology assessment | 10,000 | UNDP |
| Consultant (Advisor Services) | 3,000 | UNDP |
| Stakeholders consultation | 5,000 | UNDP |
| Click or tap here to enter text. | | (select) |
| **TOTAL** | **25,000** | |

**15. How will activities related to preparing the KIP be linked to the current stages of the HPMP being implemented in the country? (OPTIONAL)**

**n/a**

**16. How will the Multilateral Fund gender policy be considered during project preparation?**

In line with the decision 84/92, the operational policy on gender mainstreaming would be applied wherever feasible in the preparation of the EE project including in the following activities (a) collected gender aggregated data and Encouraging participation in the consultative meetings. (b) Promoting awareness to develop staff competency and awareness on gender mainstreaming as part of the consultation exercise. (c) Share experiences and lessons learned on gender mainstreaming.

## D. Information required for PRP funding request for investment projects/sector plans as part of or in advance of the KIP

| | |
|---|---|
| **10. Agency:** | UNDP |
| **11. Sector:** | Air-conditioning |
| **12. HFC consumption in item #2 reported under country programme data?** | ☒ **Yes**, please specify reported amount and year: ☐ **No** |
| **13. Does the enterprise commit to phase out the HFC consumption associated with the proposed** | Not applicable |

| | |
|---|---|
| **investment project, if approved by the Executive Committee?** | |
| **14. If the project preparation is requested in advance of the KIP, did the Government provide a written commitment that the consumption associated with these investment projects, once approved, will be deducted from the country's starting point, once established?** | ☐ **Yes,**<br>☒ **Not applicable since the PRP is not for INV project** |
| **15. Please explain briefly how the investment project would relate to the overarching strategy for the country, and when the final KIP will be submitted (decision 87/50(e))** | Not applicable |

## ANNEX I

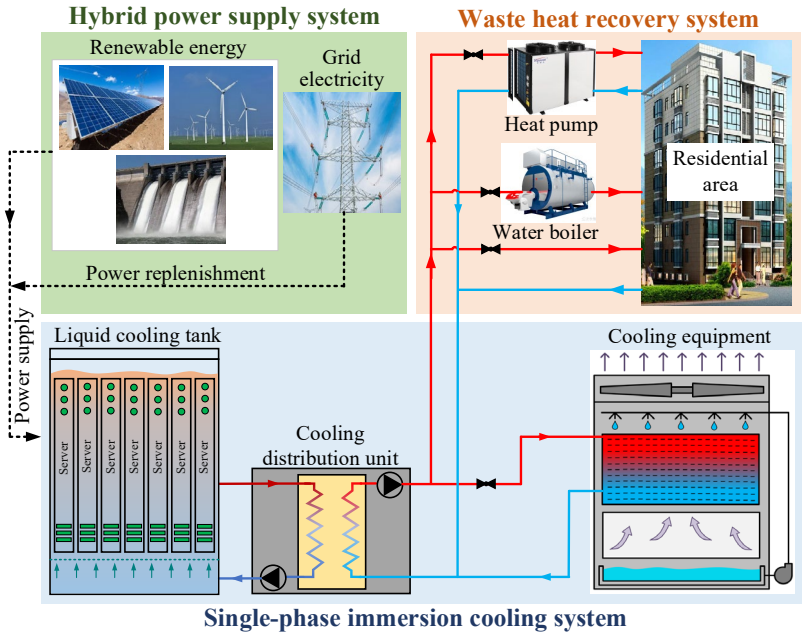
## Technical Characteristics for Immersion liquid cooling technologies for data centers

Immersion liquid cooling has emerged as a cutting-edge heat dissipation technology garnering significant attention in recent years. This innovative cooling solution offers a host of advantages, making it efficient, eco-friendly, and energy-saving. By directly contacting the heat-generating equipment, the coolant minimizes convection heat resistance and maximizes heat transfer efficiency.

With high thermal conductivity and specific heat capacity, coupled with minimal operating temperature variability, the coolant ensures optimal cooling performance. Additionally, immersion liquid cooling eliminates the need for fans, reducing both energy consumption and noise levels while maintaining superior cooling efficiency. Furthermore, the coolant's outstanding insulation properties, high flash point, and non-flammable, non-toxic nature make it a safe and reliable choice that resists corrosion. As a result, this liquid-cooling technology is ideally suited for large data centers, supercomputing facilities, and industrial and scientific research institutions with stringent requirements for heat-flow density and energy efficiency.

Its compact design significantly reduces space requirements, making it particularly well-suited for urban areas with limited space and environments sensitive to noise pollution, such as offices and residential areas. Moreover, the heat generated by liquid cooling can be efficiently collected and transferred to other heat-demanding industries, optimizing overall energy utilization. Leveraging renewable energy sources further enhances its environmental credentials, allowing data centers to achieve carbon neutrality or even carbon negativity.

Fig. 1 illustrates the schematic of a single-phase immersion cooling system featuring a hybrid power supply system and waste heat recovery system. The single-phase immersion cooling system comprises a liquid cooling tank, cooling distribution unit, and cooling equipment. Multiple servers are submerged in the liquid cooling tank to directly exchange heat with the flowing coolant. During operation, the coolant, now at a higher temperature, is conveyed to the cooling distribution unit, where it transfers heat to cooling water from the cooling equipment. Regarding power supply, the utilization of a hybrid power supply system is crucial for reducing energy consumption and carbon emissions. This system integrates grid electricity with renewable energy sources such as wind, water, and solar energy. Additionally, recycling waste heat from single-phase immersion cooling data centers to provide heating and domestic water can maximize energy efficiency.




Single-phase immersion cooling system

Fig. 1 Schematic of single-phase immersion cooling system

*Source: Environment-friendly coolant: the coolant is an innovated product by Chinese company, it is branded as Ice Core797.*

Table 1 Thermo-physical parameter of coolant- Ice Core 797

| Temperature (°C) | Density (kg/m$^3$) | Heat capacity (J/(kg·°C)) | Dynamic viscosity (Pa·s) | Thermal conductivity (W/(m·°C)) |
|---|---|---|---|---|
| 20 | 794 | 1965 | 0.0117 | 0.34 |
| 40 | 786 | 2051 | 0.0061 | 0.36 |
| 60 | 775 | 2154 | 0.0036 | 0.38 |
| 80 | 762 | 2253 | 0.0024 | 0.42 |

## REVISED COUNTRY PROGRAMME REPORT FORMAT (2019 DATA AND BEYOND)

**COUNTRY: China** **YEAR: January to December of the year** 2021

**SECTION B. ANNEX F - DATA ON CONTROLLED SUBSTANCES (METRIC TONNES)**

**NOTE: Data entry is required in UNSHADED cells only**

| Substance | Use by Sector | | | | | | | | | Import | Export | Production | Import quotas | If imports are banned, indicate date ban commenced (DD/MM/YYYY) | Remarks[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aerosol | Foam | Fire Fighting | Refrigeration | | | | Solvent | Other[3] | TOTAL | | | | | | | |
| | | | | Manufacturing | | | Servicing*** | | | | | | | | | | |
| | | | | Other* | AC** | Total[5] | | | | | | | | | | | |
| **R-462A** | | | | | | | | | | | | | | | | | |
| **Controlled Substances** | | | | | | | | | | | | | | | | | |
| **HFC-32** | 0.00 | 0.00 | 0.00 | 5400.00 | 84400.00 | 0.00 | 8546.71 | 0.00 | 60.00 | 98406.71 | 202.15 | 48675.36 | 239030.99 | 0.00 | | | |
| **HFC-41** | 0.00 | 0.00 | 0.00 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 24.36 | 34.36 | 25.72 | 37.10 | 45.74 | 0.00 | | | |
| **HFC-125** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 47216.11 | 172433.81 | 0.00 | | | |
| **HFC-134** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| **HFC-134a** | 4000.00 | 1000.00 | 0.00 | 28630.00 | 17002.40 | 0.00 | 34942.54 | 50.00 | 0.00 | 85624.94 | 390.24 | 100368.22 | 200706.60 | 0.00 | | | |
| **HFC-143** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| **HFC-143a** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.50 | 0.00 | 0.00 | 7.50 | 0.00 | 27115.96 | 53208.68 | 0.00 | | | |
| **HFC-152** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| **HFC-152a** | 0.00 | 1996.66 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2400.00 | 0.00 | 4396.66 | 0.00 | 24944.80 | 30078.07 | 0.00 | | | |
| **HFC-227ea** | 356.23 | 16.54 | 25534.35 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25907.12 | 18.94 | 4421.09 | 30371.73 | 0.00 | | | |
| **HFC-236cb** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| **HFC-236ea** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 73.26 | 73.26 | 73.07 | 99.71 | 99.90 | 0.00 | | | |
| **HFC-236fa** | 0.00 | 0.00 | -25.81 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -25.81 | 0.00 | 575.42 | 552.36 | 0.00 | | | |
| **HFC-245ca** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | | |
| **HFC-245fa** | 0.00 | 8706.85 | 0.00 | 300.00 | 0.00 | 0.00 | 20.00 | 0.00 | 0.00 | 9026.85 | 416.86 | 4441.27 | 13051.56 | 0.00 | | | |
| **HFC-365mfc** | 0.00 | 418.54 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 418.54 | 199.68 | 0.24 | 0.00 | 0.00 | | | |
| **HFC-43-10mee** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 28.38 | 0.00 | 28.38 | 28.39 | 0.01 | 0.00 | 0.00 | | | |
| **HFC-23 (use)** | 0.00 | 0.00 | 0.00 | 10.00 | 0.00 | 0.00 | 1.00 | 0.00 | 637.98 | 648.98 | 145.88 | 647.57 | 1151.66 | 0.00 | | | |
| **Sub-Total** | **4356.23** | **12138.59** | **25508.54** | **34350.00** | **101402.40** | **0.00** | **43517.75** | **2478.38** | **795.60** | **224547.49** | **1500.93** | **258542.86** | **740731.10** | **0.00** | | | |
| **Blends (Mixtured of Controlled Substances)[1]** | | | | | | | | | | | | | | | | | |
| **R-404A (HFC-125=44%, HFC-134a=4%, HFC-143a=52%)** | 0.00 | 0.00 | 0.00 | 4200.00 | 0.00 | 0.00 | 1201.10 | 0.00 | 0.00 | 5401.10 | 20.75 | 24755.37 | | 0.00 | | | |
| **R-407A (HFC-32=20%,HFC-125=40%,HFC-134a=40%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 161.77 | | 0.00 | | | |
| **R-407C (HFC-32=23%,HFC-125=25%, HFC-134a=52%)** | 0.00 | 0.00 | 0.00 | 380.00 | 35.40 | 0.00 | 564.40 | 0.00 | 0.00 | 979.80 | 1.74 | 8995.04 | | 0.00 | | | |
| **R-407F** | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 378.46 | | 0.00 | | | |
| **R-407G** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 336.00 | | 0.00 | | | |
| **R-407H** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 5.00 | 0.00 | 128.66 | | 0.00 | | | |
| **R-410A (HFC-32=50%, HFC-125=50%)** | 0.00 | 0.00 | 0.00 | 40300.00 | 37410.60 | 0.00 | 24827.50 | 0.00 | 0.00 | 102538.10 | 489.01 | 75011.40 | | 0.00 | | | |
| **R-410B** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 951.46 | | 0.00 | | | |
| **R-417A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 393.49 | | 0.00 | | | |
| **R-417B** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 31.57 | | 0.00 | | | |
| **R-421A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 457.65 | | 0.00 | | | |
| **R-422A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 26.28 | | 0.00 | | | |
| **R-422B** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11777.08 | | 0.00 | | | |
| **R-422D** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 951.47 | | 0.00 | | | |
| **R-426A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 45.62 | | 0.00 | | | |
| **R-427A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 50.54 | | 0.00 | | | |
| **R-437A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.03 | | 0.00 | | | |
| **R-438A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3365.13 | | 0.00 | | | |
| **R-448A** | 0.00 | 0.00 | 0.00 | 50.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 54.00 | 0.00 | 514.87 | | 0.00 | | | |
| **R-449A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 52.32 | | 0.00 | | | |
| **R-452A (HFC-32 = 11%, HFC-125 = 59%, HFO-1234yf = 30%)** | 0.00 | 0.00 | 0.00 | 50.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 54.00 | 0.90 | 3.06 | | 0.00 | | | |
| **R-462A** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.70 | | 0.00 | | | |
| **R-466A (HFC-32 = 49%, HFC-125 = 11.5%, R1311 = 39.5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.06 | | 0.00 | | | |
| **R-507A (HFC-125=50%, HFC-143a=50%)** | 0.00 | 0.00 | 0.00 | 11200.00 | 0.00 | 0.00 | 1716.84 | 0.00 | 0.00 | 12916.84 | 0.00 | 7903.05 | | 0.00 | | | |
| **R-508A (HFC-23 = 39%, PFC-116 = 61%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | | 0.00 | | | |
| **R-508B (HFC-23=46%, PFC-116=54%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.37 | | 0.00 | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R-513A** | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.91 | | 0.00 | | |
| **R23/R125/CO2/HFO-1132 (10%/10%/60%/20%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.44 | 0.00 | | 0.00 | | |
| **R23/R125/R236fa/CF4/Argon (19%/24%/26%/21%/10%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | | 0.00 | | |
| **R23/R125/R236fa/CF4/Argon (20%/15%/25%/25%/15%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | | 0.00 | | |
| **R23/R125/R236fa/CF4/Argon (20%/15%/30%/25%/10%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.72 | 0.00 | | 0.00 | | |
| **R23/R125/R245fa/CF4/Argon (15%/10%/10%/10%/55%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 | | 0.00 | | |
| **R23/R125/R245fa/CF4/Argon (15%/15%/45%/20%/5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | | 0.00 | | |
| **R23/R125/R245fa/CF4/Argon (20%/14%/40%/20%/6%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.45 | 0.00 | | 0.00 | | |
| **R23/R125/R245fa/CF4/Argon (1%/2%/4%/90%/3%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 13.92 | | 0.00 | | |
| **R23/R125/R245fa/R236fa/CF4/Argon (5%/15%/20%/20%/10%/30%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.21 | 0.00 | | 0.00 | | |
| **R23/R236fa/CF4 (30%/48%/22%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | | 0.00 | | |
| **R23/Other uncontrolled substances (98%/2%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | | 0.00 | | |
| **R32/R125/R134a/HFO (24%/25%/26%/25%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.68 | 0.00 | | 0.00 | | |
| **R32/R125/R134a/HFO/Trans-HFO (26%/26%/21%/20%/7%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | | 0.00 | | |
| **R32/R125/HFO (11%/59%/30%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 22.81 | 0.00 | | 0.00 | | |
| **R32/HFO (21.5%/78.5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.86 | 0.00 | | 0.00 | | |
| **R125/R134a/R143a/CF4/Argon (19.4%/1.8%/23%/44.1%/11.7%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | | 0.00 | | |
| **R125/R134a/R143a/C5H12 (42.2%/3.8%/50%/4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.80 | 0.00 | | 0.00 | | |
| **R134a/Other uncontrolled substances (90%/10%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.49 | 0.00 | | 0.00 | | |
| **R134a/Other uncontrolled substances (93%/7%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.12 | 0.00 | | 0.00 | | |
| **R134a/HFO (44%/56%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.94 | 0.00 | | 0.00 | | |
| **R134a/HFO (69%/31%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.90 | 0.00 | | 0.00 | | |
| **R365mfc/R227ea (83%/17%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | | 0.00 | | |
| **R365mfc/R227ea (93%/7%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 236.16 | 0.00 | | 0.00 | | |
| **R32/R125/R134a (26%/26%/48%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.56 | | 0.00 | | |
| **R32/R125/R134a (35%/5%/60%）** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 38.16 | | 0.00 | | |
| **R32/R125/R134a (8.7%/46%/45.3%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 177.00 | | 0.00 | | |
| **R32/R125/R134a/R227ea/R236fa/R600** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 607.65 | | 0.00 | | |
| **R32/R125/R134a/R600a (2%/45.1%/50%/2.9%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.26 | | 0.00 | | |
| **R32/R125/R134a/R600a (29%/29%/38%/4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 142.95 | | 0.00 | | |
| **R32/R125/R134a/R600a (6%/38%/54%/2%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 40.56 | | 0.00 | | |
| **R125/R134a (45%/55%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.04 | | 0.00 | | |
| **R125/R134a/R600 (48%/48%/4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.09 | | 0.00 | | |
| **R125/R134a/R600a (63%/33%/4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25.99 | | 0.00 | | |
| **R125/R152a/R600a (73%/25%/2%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 25.99 | | 0.00 | | |
| **R125/R152a/R134a/R290 (60.1%/9%/27.5%/3.4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 85.09 | | 0.00 | | |
| **R125/R218/R290 (86%/9%/5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | | 0.00 | | |
| **R125/R290/C2H6 (75%/20%/5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.90 | | 0.00 | | |
| **R125/R32/R600 (47%/50%/3%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 94.70 | | 0.00 | | |
| **R125a/R134a (50%/50%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 363.50 | | 0.00 | | |
| **R134a/1-Bromopropane (70%/30%）** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 | | 0.00 | | |
| **R152a/DME (60%/40%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 152.00 | | 0.00 | | |
| **R152a/DME (70%/30%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 34.00 | | 0.00 | | |
| **R152a/DME (75%/25%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 780.50 | | 0.00 | | |
| **R152a/DME (90%/10%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.00 | | 0.00 | | |
| **R152a/R600a/Fluorescers (72.6%/26.4%/1%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.09 | | 0.00 | | |
| **R365mfc/R245fa (60%/40%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.96 | | 0.00 | | |
| **Others:[2]** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | | |
| **Others:[2]** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | | |
| **Sub-Total** | **0.00** | **0.00** | **0.00** | **56186.00** | **37446.00** | **0.00** | **28322.84** | **0.00** | **0.00** | **121954.84** | **790.96** | **138943.36** | | **0.00** | | |
| **Others** | | | | | | | | | | | | | | | | |
| **HFC-245fa in imported pre-blended polyol** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| **HFC-365mfc in imported pre-blended polyol** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| **Sub-Total** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | | |
| **TOTAL** | **4356.23** | **12138.59** | **25508.54** | **90536.00** | **138848.40** | **0.00** | **71840.59** | **2478.38** | **795.60** | **346502.33** | **2291.89** | **397486.22** | **740731.10** | **0.00** | | |

1 When reporting blends/mixtures, reporting of controlled substances should not be duplicated. For the CP report, countries should report use of individual controlled substances and quantities of blends/mixtures used, separately, while ensuring that the amounts of controlled substances are not reported more than once.

2 If a non-standard blend not listed in the above table is used, please indicate the percentage of each constituent controlled substance of the blend being reported in the remarks column.

3 Uses in other sectors that do not fall specifically within the listed sectors in the table.

4 Provide explanation if total sector use and consumption (import-export+production) is different (e.g, stockpiling).

5 If break-down of consumption in manufacturing is not available, information in total can be provided.

## REVISED COUNTRY PROGRAMME REPORT FORMAT (2019 DATA AND BEYOND)

**COUNTRY: China** **YEAR: January to December of the year** 2022

**SECTION B. ANNEX F - DATA ON CONTROLLED SUBSTANCES (METRIC TONNES)**

**NOTE: Data entry is required in UNSHADED cells only**

| Substance | Use by Sector | | | | | | | | | | Import | Export | Production | Manufacturing of Blends* | Import quotas | If imports are banned, indicate date ban commenced (DD/MM/YYYY) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aerosol | Foam | Fire Fighting | Refrigeration | | | | Solvent | Other[3] | TOTAL | | | | | | |
| | | | | Manufacturing | | | Servicing | | | | | | | | | |
| | | | | Other | AC | Total[5] | | | | | | | | | | |
| **Annex F** | | | | | | | | | | | | | | | | |
| **Controlled Substances** | | | | | | | | | | | | | | | | |
| **HFC-32** | 0.00 | 0.00 | 0.00 | 9500.00 | 74100.00 | 0.00 | 3370.13 | 0.00 | 60.00 | 87030.13 | 47.03 | 57637.34 | 259094.31 | | 0.00 | |
| **HFC-41** | 0.00 | 0.00 | 0.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 59.73 | 60.73 | 27.60 | 33.37 | 66.50 | | 0.00 | |
| **HFC-125** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 27602.91 | 188859.73 | | 0.00 | |
| **HFC-134** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| **HFC-134a** | 3051.88 | 23.84 | 0.00 | 27930.00 | 17573.80 | 0.00 | 23920.13 | 0.00 | 0.00 | 72499.65 | 263.45 | 145456.40 | 227222.81 | | 0.00 | |
| **HFC-143** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| **HFC-143a** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.60 | 5912.78 | 55390.06 | | 0.00 | |
| **HFC-152** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| **HFC-152a** | 0.00 | 2000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4130.59 | 2500.00 | 0.00 | 8630.59 | 0.00 | 23265.95 | 32586.13 | | 0.00 | |
| **HFC-227ea** | 367.79 | 20.16 | 28584.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 28972.60 | 0.36 | 5079.70 | 34054.48 | | 0.00 | |
| **HFC-236cb** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| **HFC-236ea** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 111.97 | 111.97 | 111.15 | 189.18 | 190.00 | | 0.00 | |
| **HFC-236fa** | 0.00 | 0.00 | 409.79 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 409.79 | 1.16 | 781.64 | 1191.21 | | 0.00 | |
| **HFC-245ca** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| **HFC-245fa** | 0.00 | 8412.42 | 0.00 | 420.00 | 0.00 | 0.00 | 35.00 | 0.00 | 0.00 | 8867.42 | 0.00 | 8245.81 | 17113.21 | | 0.00 | |
| **HFC-365mfc** | 0.00 | 420.24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 60.00 | 0.00 | 480.24 | 211.20 | 0.00 | 0.00 | | 0.00 | |
| **HFC-43-10mee** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.18 | 0.00 | 18.18 | 18.18 | 0.00 | 0.00 | | 0.00 | |
| **HFC-23 (use)** | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 1.00 | 0.00 | 1464.09 | 1470.09 | 164.31 | 699.51 | 2006.67 | | 0.00 | |
| **Sub-Total** | **3419.67** | **10876.66** | **28994.44** | **37856.00** | **91673.80** | **0.00** | **31456.85** | **2578.18** | **1695.79** | **208551.39** | **863.04** | **274904.59** | **817775.11** | | **0.00** | |
| **Blends (Mixtured of Controlled Substances)[1]** | | | | | | | | | | | | | | | | |
| **R-404A (HFC-125=44%, HFC-134a=4%, HFC-143a=52%)** | 0.00 | 0.00 | 0.00 | 7320.00 | 0.00 | 0.00 | 2142.00 | 0.00 | 0.00 | 9462.00 | 7.44 | 51921.89 | | 0.00 | 0.00 | |
| **R-407A (HFC-32=20%,HFC-125=40%,HFC-134a=40%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 227.18 | | 0.00 | 0.00 | |
| **R-407C (HFC-32=23%,HFC-125=25%, HFC-134a=52%)** | 0.00 | 0.00 | 0.00 | 340.00 | 26.00 | 0.00 | 404.11 | 0.00 | 0.00 | 770.11 | 0.00 | 8874.65 | | 0.00 | 0.00 | |
| **R-407F (HFC-32 = 30%, HFC-125 = 30%, HFC-134a =40%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 322.22 | | 0.00 | 0.00 | |
| **R-407H (HFC-32 = 32.5%, HFC-125 = 15%, HFC-134a = 52.5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 13.00 | 0.00 | 0.00 | 13.00 | 0.00 | 17.18 | | 0.00 | 0.00 | |
| **R-410A (HFC-32=50%, HFC-125=50%)** | 0.00 | 0.00 | 0.00 | 43400.00 | 37530.50 | 0.00 | 35780.26 | 0.00 | 0.00 | 116710.76 | 31.46 | 106286.77 | | 0.00 | 0.00 | |
| **R-410B(HFC-32 = 45%, HFC-125 = 55%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 655.91 | | 0.00 | 0.00 | |
| **R-413A（HFC-134a=88%,R218=9%,R600a=3%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 31.28 | | 0.00 | 0.00 | |
| **R-417A(HFC-125 = 46.6%, HFC-134a = 50%,R600=3.4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 598.90 | | 0.00 | 0.00 | |
| **R-417B(HFC-125 = 79%, HFC-134a = 18.3%,R600=2.7%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 233.79 | | 0.00 | 0.00 | |
| **R-421A(HFC-125 =58%, HFC-134a = 42%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 601.78 | | 0.00 | 0.00 | |
| **R-422A(HFC-125 = 85.1%, HFC-134a =11.5%,R600a=3.4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 28.36 | | 0.00 | 0.00 | |
| **R-422B(HFC-125 = 55%, HFC-134a =42%,R600a=3%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 474.16 | | 0.00 | 0.00 | |
| **R-422D(HFC-125 = 65.1%, HFC-134a =31.5%,R600a=3.4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 588.08 | | 0.00 | 0.00 | |
| **R-426A(HFC-125 = 5.1%, HFC-134a =93%,R600=1.3%,R601a=0.6%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.17 | 50.91 | | 0.00 | 0.00 | |
| **R-427A(HFC-32=15%,HFC-125 = 25%, HFC-134a =50%,HFC-143a=10%** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 37.89 | | 0.00 | 0.00 | |
| **R-437A(HFC-125 = 19.5%, HFC-134a =78.5%,R600=1.4%,R601=0.6%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.52 | | 0.00 | 0.00 | |
| **R-438A(HFC-32=8.5%,HFC-125 = 45%, HFC-134a** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 658.54 | | 0.00 | 0.00 | |
| **R-448A(HFC-32=26%,HFC- 125=26%,HFC-134a=21%,HFO-** | 0.00 | 0.00 | 0.00 | 10.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 15.00 | 0.04 | 560.70 | | 0.00 | 0.00 | |
| **R-449A(HFC-32=24.3%,HFC- 125=24.7%,HFC-134a=25.7%,HFO-** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 101.38 | | 0.00 | 0.00 | |
| **R-452A(HFC-32=11%,HFC- 125=59%,HFO- 1234yf=30%)** | 0.00 | 0.00 | 0.00 | 40.00 | 0.00 | 0.00 | 8.00 | 0.00 | 0.00 | 48.00 | 1.36 | 27.31 | | 0.00 | 0.00 | |
| **R-454B(HFC-32=68.9%,HFO- 1234yf=31.1%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.94 | 1.72 | | 0.00 | 0.00 | |
| **R-454C(HFC-32=21.5%,HFO- 1234yf=78.5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.87 | 1.26 | | 0.00 | 0.00 | |
| **R-455A (HFC-32=21.5%,HFO- 1234yf=75.5%,R-744=3%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | | 0.00 | 0.00 | |
| **R-458A(HFC-32=20.5%,HFC- 125=4%,HFC-134a=61.4%,HFC-** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 97.92 | | 0.00 | 0.00 | |
| **R-468C (HFC-32=42%,HFO- 1234yf=52%,R-1132a=6%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | | 0.00 | 0.00 | |
| **R-469A (HFC-32=32.5%,HFC- 125=32.5%,R-744=35%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | | 0.00 | 0.00 | |
| **R-473A (HFC-23=10%,HFC- 125=10%,R-744=60%,R-1132a=20%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.84 | 0.00 | | 0.00 | 0.00 | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **R-507A (HFC-125 = 50%, HFC-143a = 50%)** | 0.00 | 0.00 | 0.00 | 19500.00 | 0.00 | 0.00 | 3581.24 | 0.00 | 0.00 | 23081.24 | 0.00 | 12071.43 | | 0.00 | 0.00 | |
| **R-508B(HFC-23 = 46%, PFC-116 = 54%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.53 | | 0.00 | 0.00 | |
| **R-513A(HFC-134a=44%,HFO-1234yf= 56%)** | 0.00 | 0.00 | 0.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 | 0.00 | 26.57 | | 0.00 | 0.00 | |
| **R125//R134a/other uncontrolled substances(50.5%/47%/2.5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.86 | | 0.00 | 0.00 | |
| **R125/R134a/R600a(63%/33%/4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 13.00 | | 0.00 | 0.00 | |
| **R125/R152a/R134a/R290(60.1%/9%/27.5%/3.4%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 91.42 | | 0.00 | 0.00 | |
| **R134a/R152a(50%/50%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 36.00 | | 0.00 | 0.00 | |
| **R152A/DME(1%/99%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 14.00 | | 0.00 | 0.00 | |
| **R152a/DME(60%/40%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 117.20 | | 0.00 | 0.00 | |
| **R152a/DME(70%/30%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 86.50 | | 0.00 | 0.00 | |
| **R152a/DME(75%/25%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 710.30 | | 0.00 | 0.00 | |
| **R32/ R125/ R134a/ R601a/R600) (8.5%/45%/44.2%/0.6%/1.7%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.30 | | 0.00 | 0.00 | |
| **R32/R125/R134a(31.5%/30%/38.5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 36.00 | | 0.00 | 0.00 | |
| **R32/R125/R134a/other uncontrolled** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | | 0.00 | 0.00 | |
| **R32/R125/R134a/other uncontrolled substances(26%/21%/20%/33%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 79.98 | | 0.00 | 0.00 | |
| **R32/R125/R134a/other uncontrolled substances(26%/26%/21%/27%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | | 0.00 | 0.00 | |
| **R32/R125/R134a/R227ea/R236fa/other uncontrolled** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 72.90 | | 0.00 | 0.00 | |
| **R32/R125/R134a/R600a(6%/48%/45%/1%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 240.00 | | 0.00 | 0.00 | |
| **R23/R125/R245fa/R236fa/other uncontrolled** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.61 | 0.00 | | 0.00 | 0.00 | |
| **R23/R245fa/other(26%/43%/31%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | |
| **R32/Other uncontrolled substances(21.5%/78.5%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | | 0.00 | 0.00 | |
| **R365mfc/Other uncontrolled substances(85%/15%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.41 | 0.00 | | 0.00 | 0.00 | |
| **R365mfc/R227ea(93%/7%)** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 288.00 | 0.00 | | 0.00 | 0.00 | |
| **Others:**[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | |
| **Others:**[2] | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | |
| **Sub-Total** | **0.00** | **0.00** | **0.00** | **70613.00** | **37556.50** | **0.00** | **41933.61** | **0.00** | **0.00** | **150103.11** | **339.98** | **186019.53** | | **0.00** | **0.00** | |
| **Others** | | | | | | | | | | | | | | | | |
| **HFC-245fa in imported pre-blended polyol** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| **HFC-365mfc in imported pre-blended polyol** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | 0.00 | |
| **Sub-Total** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | | **0.00** | |
| **TOTAL** | **3419.67** | **10876.66** | **28994.44** | **108469.00** | **129230.30** | **0.00** | **73390.46** | **2578.18** | **1695.79** | **358654.50** | **1203.02** | **460924.12** | **817775.11** | **0.00** | **0.00** | |

1 When reporting blends/mixtures, reporting of controlled substances should not be duplicated. For the CP report, countries should report use of individual controlled substances and quantities of blends/mixtures used, separately, while ensuring that the amounts of controlled substances are not than once.

2 If a non-standard blend not listed in the above table is used, please indicate the percentage of each constituent controlled substance of the blend being reported in the remarks column.

3 Uses in other sectors that do not fall specifically within the listed sectors in the table.

4 Provide explanation if total sector use and consumption (import-export+production) is different (e.g, stockpiling).

5 If break-down of consumption in manufacturing is not available, information in total can be provided.