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COMITÉ EJECUTIVO DEL FONDO MULTILATERAL
PARA LA APLICACIÓN DEL
PROTOCOLO DE MONTREAL
Cuadragésima Primera Reunión
Montreal, 17 al 19 de diciembre de 2003

PROPUESTA DE PROYECTOS: MÉXICO

Este documento consta de los comentarios y recomendaciones de la Secretaría del Fondo sobre las siguientes propuestas de proyectos:

Aerosoles

• Proyecto general para la conversión de CFC-11, CFC-12 y CFC-113 a HFC, HCFC, HFE para aerosoles técnicos en Tecnosol y Dimmex	Banco Mundial

Refrigeración

• Plan de eliminación de CFC en el sector de refrigeración (primera partida)	ONUDI

HOJA DE EVALUACIÓN DEL PROYECTO
MÉXICO

SECTOR: **Aerosol** Uso de SAO en el sector 2002 70,1 toneladas PAO

Umbrales de relación de costo a eficacia en el subsector: n/d

Título del proyecto:

a) Proyecto general para la conversión de CFC-11, CFC-12 y CFC-113 a HFC, HCFC, HFE para aerosoles técnicos en Tecnosol y Dimmex

Datos del proyecto	**Aerosol**
Consumo de la empresa (toneladas PAO)	70,1
Impacto del proyecto (toneladas PAO)	57,3
Duración del proyecto (meses)	36
Suma inicial solicitada ($EUA)	308.620
Costo final del proyecto ($EUA):	252.340
Costo adicional de capital (a)	0
Costo de imprevistos (b)	0
Costo adicionales de explotación (c)	252.340
Costo total del proyecto (a+b+c)	252.340
Propiedad local (%)	100%
Componente de exportación (%)	0%
Monto solicitado ($EUA)	252.340
Costo a eficacia ($EUA/kg.)	4,40
¿Financiación de contraparte confirmada?	
Organismo nacional de coordinación	NAFIN/SEMARNAT
Organismo de ejecución	Banco Mundial

Recomendaciones de la Secretaría	
Monto recomendado ($EUA)	252.340
Impacto del proyecto (toneladas PAO)	57,35
Costo a eficacia ($EUA/kg)	4,40
Gastos de apoyo del organismo de ejecución ($EUA)	18.925
Costo total del Fondo Multilateral ($EUA)	271.265.5

DESCRIPCIÓN DEL PROYECTO

Antecedentes

1. El Gobierno de México presentó una propuesta de proyecto general de eliminación definitiva para la conversión de aerosoles técnicos a base de CFC fabricados para el mantenimiento de equipo electrónico e industrial en tres empresas: Tecnosol (25.000 envases/año), Envatec (32 822 envases/año) y Dimmex (112 140 envases/año).

2. La ejecución de este proyecto llevará a la eliminación de 70,1 toneladas PAO de CFC (30,3 toneladas PAO de CFC-11, 4,0 toneladas PAO de CFC-12, 35,8 toneladas PAO de CFC-113).

3. Las tres empresas solicitan la asistencia del Fondo Multilateral para cubrir solamente los costos de explotación adicionales asociados a la sustitución de CFC (como propulsor) por una mezcla de vertrel, HFE-7100 y HFC-134a.

4. Se ha estimado que los costos totales adicionales de explotación (NPV para 4 años) son de $EUA 3 617 470. Sin embargo, en base al umbral de costo a eficacia ($EUA 4,40/kg), la financiación máxima solicitada es de $EUA 308 620.

5. Se adjunta una comunicación del Gobierno de México relativa a la justificación del uso de tecnologías a base de HCFC.

6. No se solicitarán nuevos fondos del Fondo Multilateral para el sector de aerosoles en México.

COMENTARIOS Y RECOMENDACIÓN DE LA SECRETARÍA

COMENTARIOS

7. La Secretaría pidió una aclaración acerca de las fechas de establecimiento de las líneas de producción de CFC en las tres empresas. En base a las cifras de producción proporcionadas para Envatec y Dimmex (producción nula en 2000, y tres a cuatro veces más de producción en 2002 por comparación con 2001), parecería que la línea de producción de CFC se inició después del 25 de julio de 1995. El intermediario financiero del Banco Mundial indicó que Dimmex y Tecnosol habían sido establecidas el 20 de marzo de 1995. Sin embargo, se comprobó que la financiación de la empresa Envatec no era admisible. Se ajustó consiguientemente el costo del proyecto.

8. Se informa en la propuesta de proyecto que la sustitución de CFC-113 en aplicaciones de aerosol de las dos empresas es un reto importante. “NASA todavía lo utiliza puesto que todavía no han estado en condiciones de encontrar un sustituto de igual eficacia”. El producto más adecuado de alternativa es una mezcla que comprende HFC, HCFC o HFE, “con un precio elevado, y todavía no muy fiable”. Además, la relación de costo a eficacia del proyecto, en la forma presentada, es de $EUA 52,00/kg (las empresas solicitan solamente la financiación para

un valor de $EUA 4,40/kg, de umbral de relación de costo a eficacia en el sector de aerosoles). En base a estas consideraciones, y teniendo en cuenta que el Gobierno de México estaría en condiciones de lograr el blanco de eliminación de CFC al 2007 si se completaban los proyectos de inversión aprobados hasta la fecha y la ejecución del plan de eliminación nacional en el sector de refrigeración (presentado a la 41ª Reunión), la Secretaría propuso que se considerara presentar este proyecto en el futuro, cuando se disponga en el comercio de alternativas más sostenibles y de mejor relación de costo a eficacia.

9. El Banco Mundial informó a la Secretaría que las tres empresas implicadas en el proyecto se habían comprometido plenamente a eliminar en esta fecha el consumo de CFC. El sector privado es plenamente consciente de las obligaciones de México de eliminar el uso de CFC al 2010 y este proyecto estará acompañado de una reglamentación prohibiendo el uso de CFC al 2007 para estas aplicaciones. Considerando que se prevé que los precios de las sustancias químicas de alternativa disminuyan gradualmente a medida que aumenta el consumo en el futuro y los mercados se desplacen hacia productos sin CFC, no se pone en duda la sostenibilidad de la conversión.

RECOMENDACIÓN

10. La Secretaría del Fondo recomienda la aprobación general del proyecto con los correspondientes costos de apoyo, al nivel de financiación indicado en la tabla siguiente:

	Título del proyecto	Financiación del proyecto ($EUA)	Costo de apoyo (EUA$)	Organismo de ejecución
a)	Proyecto general para la conversión de CFC-11, CFC-12 y CFC-113 a HFC, HCFC, HFE para aerosoles técnicos en Tecnosol y Dimmex	252.340	18.925	Banco Mundial

HOJA DE EVALUACIÓN DE PROYECTO
MÉXICO

SECTOR: Refrigeración Uso de SAO en el sector (2002): 1 669 toneladas PAO

Umbrales de relación de costo a eficacia en el subsector: N/D

Título del proyecto:

a) Plan de eliminación de CFC en el sector de refrigeración (primera partida)

Datos del proyecto	**Múltiple**
	Plan nacional
Consumo de la empresa (toneladas PAO)	1 669,0
Impacto del proyecto (toneladas PAO)	1 669,0*
Duración del proyecto (meses)	82
Suma inicial solicitada ($EUA)	3 004 176
Costo final del proyecto ($EUA):	
Costo adicional de capital (a)	
Costo de imprevistos (b)	
Costo adicionales de explotación (c)	
Costo total del proyecto (a+b+c)	10 168 056
Propiedad local (%)	100
Componente de exportación (%)	0
Monto solicitado ($EUA)	1 492 100
Costo a eficacia ($EUA/kg.)	6,09**
¿Financiación de contraparte confirmada?	
Organismo nacional de coordinación	Ministerio de Medio Ambiente (SEMARNAT)
Organismo de ejecución	ONUDI

Recomendaciones de la Secretaría	
Monto recomendado ($EUA)	
Impacto del proyecto (toneladas PAO)	
Costo a eficacia ($EUA/kg)	
Gastos de apoyo del organismo de ejecución ($EUA)	
Costo total del Fondo Multilateral ($EUA)	

* El impacto total es de 1 669,0 toneladas PAO. El impacto de la primera partida es de 0 toneladas PAO.

** Relación de costo a eficacia del plan de eliminación.

DESCRIPCIÓN DEL PROYECTO

Antecedentes del sector

Perfil de consumo y eliminación de CFC (Anexo A Grupo I)

Según la Decisión 35/37 México seleccionó como punto de partida la Opción 1. En la 35ª Reunión se llegó a un acuerdo con el Comité Ejecutivo respecto al punto de partida por una cantidad de: 3 059,5 toneladas PAO

- Consumo remanente de CFC cuya financiación es admisible al mes de noviembre de 2003 (en virtud del Acuerdo) 2 879,6 toneladas PAO
- Impacto de todos los proyectos de CFC sometidos a financiación al mes de noviembre de 2003 1 669,0 toneladas PAO
- Consumo remanente de CFC cuya financiación es admisible después de la aprobación de los proyectos presentados a la 41ª Reunión 1 210,0 toneladas PAO

Total de consumo de CFC en 2002 1 947,2 toneladas PAO

11. Durante la preparación del plan de eliminación de CFC en el sector de la refrigeración de México se realizó un estudio nacional del consumo de CFC en los diversos subsectores de refrigeración, según lo indicado en la tabla siguiente. Se presentan los datos de consumo de CFC en toneladas métricas. La cantidad total de CFC utilizados en el sector de refrigeración es superior en 105,1 toneladas métricas al consumo notificado para 2002.

Subsector	Fabricación	Servicio	Total
Equipo de aire acondicionado de vehículos		1 028	1 028
Equipo comercial de servicio pesado, p.ej., salas refrigeradas, unidades de condensación y otro equipo no unitario		25	25
Comercial: equipo comercial liviano, p.ej., cajas de presentación, engeladores y otro equipo unitario	49,7	656	705,7
Doméstico: refrigeradores y engeladores domésticos		18	18
Total	49,7	1 728	1 777,7

Sector de fabricación de refrigeración

12. El Comité Ejecutivo ha aprobado un total de 39 proyectos para el sector de refrigeración de México. De estos, ya se han completado 35, con una financiación total de $EUA 17 906 243, y una eliminación de 1 414,3 toneladas PAO de CFC.

13. Todos los fabricantes importantes de equipo de refrigeración doméstica y comercial de México han realizado la conversión a tecnología sin CFC. En particular se eliminó por completo al año 1997 el uso de CFC en el subsector de fabricación de refrigeración doméstica mediante

cuatro proyectos de conversión ejecutados por el PNUD. En la actualidad, todos los electrodomésticos nuevos se basan en tecnologías sin CFC.

14. La única actividad remanente de fabricación a base de CFC es en el subsector de la refrigeración comercial. Los 15 restantes fabricantes de refrigeración comercial son pequeñas empresas con acceso limitado a tecnologías de alternativa sin CFC.

Sector de servicio de refrigeración

15. El desglose del consumo en el subsector de servicio se muestra en la tabla precedente en el párrafo 1 que se subdivide de la forma siguiente: 59,5% en el subsector de aire acondicionado de vehículos, 39,5% en el subsector comercial, y 1% en el subsector doméstico. La flota total de vehículos en México se estima que es de 16 millones de unidades, de las cuales aproximadamente el 20%, o 3,5 millones, están equipados con unidades de aire acondicionado. Se estima que todavía funcionan con refrigerantes a base de CFC-12 un total 800 000 unidades de equipo de aire acondicionado de vehículos. Se estima que la cantidad total de refrigerantes necesaria para servicios de aire acondicionado de vehículos es aproximadamente de 1 040 toneladas métricas de CFC-12.

16. Se estima que el número total de refrigeradores domésticos en México es de 20 millones de unidades, el 50% de las cuales funciona todavía a base de CFC-12. Aproximadamente 100 000 unidades de refrigeradores domésticos requieren un servicio anual que lleva aproximadamente a un uso de 20 toneladas de CFC-12 para servicios en este subsector.

17. Se estima que la utilización de CFC para servicio de equipo de refrigeración comercial es aproximadamente de 680 toneladas métricas. El tiempo de vida útil real del equipo de refrigeración comercial es bastante prolongado, todavía quedan muchas unidades antiguas con elevados regímenes de fuga de refrigerantes.

18. Se realizó un estudio amplio en 40 ciudades de México por el que se estimó que el número total de talleres de servicio de refrigeración era de 8 000 y que el número total de técnicos de servicio de refrigeración era de 20 000. Los talleres actuales de servicio de refrigeración en México pueden clasificarse según su magnitud de la forma siguiente:

- De tamaño grande y medio con más de 100 empleados, que representan el 1% del total;
- Pequeños con 16 a 100 empleados que representan el 4% del total; y
- De tamaño muy pequeño con 1 a 15 empleados que representan el 95% del total.

Estrategia

19. La meta estratégica del plan de eliminación de CFC en el sector de refrigeración es asegurarse de que las reducciones de CFC permitirán al país cumplir con sus obligaciones de reducción de CFC en virtud del Protocolo de Montreal al 2007 y al 2010.

20. Todas las actividades comprendidas en el plan de eliminación sectorial se conformarán a las siguientes premisas:

- Debe desarrollarse la industria relacionada con alternativas de CFC de modo conveniente puesto que se prevé que al año 2005 no habrá ninguna demanda de CFC para nuevo equipo en los sectores de refrigeración y de espumas.
- Deben mantenerse en todas las industrias afines los niveles de empleo, particularmente en las empresas de tamaño pequeño y medio (PYMES), que desempeñan una función importante en el subsector de servicio de refrigeración.
- Debe satisfacerse la necesidad de refrigerantes CFC para servicio y mantenimiento del actual equipo de refrigeración y de aire acondicionado a base de CFC y deben tener un suministro en el marco del proyecto nacional de recuperación y reciclaje.
- El sector de servicio en México requerirá esfuerzos coordinados especiales dado el elevado número de PYMES implicadas.
- La disponibilidad de CFC puede ser limitada en el futuro próximo.

21. El Gobierno ha tratado de lograr el siguiente calendario de fechas de reducciones de CFC por conducto del plan de eliminación en el sector de la refrigeración:

Año	2004	2005	2006	2007	2008	2009	2010
Reducciones en virtud del plan de eliminación en el sector de refrigeración (toneladas métricas)	0	50	655	500	350	200	100

22. En el plan de eliminación de CFC del sector de refrigeración se incluyen los siguientes proyectos:

Programa de capacitación para aduanas

23. El objetivo del proyecto es capacitar aproximadamente a 200 oficiales de aduanas (aproximadamente cinco por cada puerto de aduanas) en relación con cuestiones sobre ozono así como para detectar las sustancias controladas del Protocolo de Montreal, el equipo y los productos en los que están incluidas. Con el proyecto se suministrará también a los principales puertos de aduanas, equipo de detección de CFC y se promoverá además la creación de una base de datos sobre SAO importadas.

Programa nacional de capacitación de técnicos de refrigeración

24. El programa de capacitación de técnicos de refrigeración tiene como finalidad capacitar a 4 000 técnicos de refrigeración, entre un total estimado de 20 000 que trabajan en el país. La capacitación se concentrará en buenas prácticas de servicio de refrigeración, en evitar o reducir la liberación intencional o involuntaria de refrigerantes a la atmósfera y en el uso adecuado de refrigerantes controlados, CFC-12 y CFC-11. Además, con este proyecto debería fomentarse la recuperación, reciclaje y regeneración de refrigerantes a fin de reducir la dependencia de CFC vírgen.

Programa nacional de recuperación y reciclaje

25. Con el programa nacional de recuperación y reciclaje se establecerán en todo el país 36 centros de reciclaje. Cada centro de reciclaje estará equipado con una máquina de recuperación, una máquina de reciclaje con la capacidad de retirar gases no condensables, varias pequeñas bombonas de recuperación, bombas de vacío, un detector de refrigerantes (de tipo infrarrojo), una bombona de almacenamiento, herramientas de servicio (válvula penetrante, medidor de presión, etc.) y un detector manual de fugas. Los centros recibirán también una bombona para guardar los refrigerantes no reciclables hasta que hayan sido ulteriormente tratados. La instalación de regeneración que fue previamente instalada en México será utilizada con eficacia en virtud de este plan.

26. Determinados talleres de servicio recibirán además equipo esencial para servicios en relación con buenas prácticas de servicio y recuperación de refrigerantes. Se proporcionarán a los talleres un total de 3 000 unidades de recuperación así como bombas de vacío, bombonas y cuadernos para recuperación, válvulas de penetración y otras herramientas de servicio. Para facilitar la reducción en el uso de CFC en relación con el enjuague a presión de los sistemas de refrigeración, se proporcionarán a determinados talleres de servicio en los que el uso de CFC-11 es elevado, unidades de enjuague a presión con agentes sin SAO (alcoholes, glicol, éter, etc.).

Programa de incentivos para equipo de refrigeración industrial

27. Con un programa de incentivos para equipo de refrigeración industrial se fomentará el cambio o sustitución del equipo de refrigeración a base de CFC en instalaciones de tamaño relativamente grande tales como cadenas de supermercados.

Componente de apoyo técnico

28. El componente de apoyo técnico en el plan de eliminación sectorial tendrá el objetivo de asegurar la sostenibilidad de todas las medidas emprendidas en función del plan de eliminación sectorial y de que estén en consonancia con otros objetivos del gobierno. Constará de los siguientes elementos:

- Establecimiento de normas de calidad y de actuación para productos y aplicaciones sin CFC dentro del sector;
- Suministro de asistencia tecnológica a la industria para la sostenibilidad de aplicaciones de refrigeración sin CFC mediante talleres y reuniones técnicas;
- Establecimiento de un programa de capacitación, certificación y otorgamiento de licencias para los operadores y técnicos del equipo de producción de sistemas de refrigeración para sostenimiento de las tecnologías sin CFC.

Marco jurídico propuesto

29. El Gobierno de México formulará reglamentación detallada para supervisar y controlar el uso en el país de las sustancias que agotan la capa de ozono (SAO). Los elementos más destacados de la reglamentación serán:

- Abandono gradual del uso de SAO en todos los sectores, en consonancia con las obligaciones del Protocolo de Montreal. Las normas deberían ser obligatorias para todos los productores, importadores, exportadores, distribuidores, vendedores y consumidores del sector comercial e industrial de CFC;
- Se permitirá solamente la comercialización de CFC para satisfacer las necesidades nacionales básicas y los usos esenciales en el país. En la reglamentación se incluirán calendarios respecto a las cantidades anuales máximas admisibles para tales usos hasta 2010;
- Prohibición de producir o importar toda clase de equipo de refrigeración, equipo de aire acondicionado, fórmulas de propulsores, espumas plásticas u operaciones de limpieza con solventes en los que se utilizan CFC o que contienen CFC, excepto para usos esenciales, según lo definido en el Protocolo de Montreal;
- La reglamentación establecerá también normas de control de la comercialización de CFC reciclados o reprocesados.

Asistencia técnica

30. Se han incluido actividades de asistencia técnica que consisten en capacitación, sensibilización y vigilancia como parte de las funciones directas de un equipo de gestión del plan de eliminación sectorial que ha de crearse para la ejecución del plan de eliminación sectorial. Estas actividades de asistencia técnica son:

- Desarrollo y aplicación de actividades de capacitación, sensibilización y creación de capacidad para los departamentos principales del gobierno, legisladores, encargados de la adopción de decisiones y otros interesados institucionales directos con miras a asegurar el compromiso institucional hacia los objetivos del plan de eliminación sectorial;
- Sensibilización de los consumidores y del público en general acerca del plan de eliminación sectorial y de las obligaciones del Protocolo de Montreal mediante talleres, campañas publicitarias y otros métodos de divulgación de información;
- Establecimiento y funcionamiento de un mecanismo descentralizado para supervisión y evaluación de los resultados del plan de eliminación sectorial.

Situación del "Proyecto piloto de préstamos en condiciones favorables para enfriadores"

31. Una vez completada con éxito la fase I del proyecto, se habrá efectuado la sustitución de un total de 12 enfriadores en lugar de los 10 originalmente previstos, y se habrán eliminado 7,8 toneladas PAO de CFC por comparación con las 5 toneladas PAO originalmente previstas. Todavía no se ha aprobado la segunda fase del proyecto en espera de que las Partes en el Protocolo de Montreal consideren cuestiones de política.

Costos adicionales

32. Se ha determinado que los costos adicionales son los siguientes:

Componente de proyecto y actividad	Sub-total	2003 partida	2004 partida	2005 partida	2006 partida	2007 partida
Gestión de proyecto	905 000	117 000	235 750	235 750	180 750	135 750
Componente de apoyo técnico	400 000	0	0	100 000	100 000	200 000
Programa del sector de fabricación de refrigeración	981 876	544 000	0	437 876	0	
Programa de capacitación para aduanas	337 000	337 000	0	0	0	0
Programa nacional para capacitación de técnicos de servicio	1 928 300	113 300	907 500	907 500	0	0
Proyecto nacional de recuperación y reciclaje	5 115 880	380 800	2 135 000	2 135 000	465 080	0
Programas de incentivos para cambio y sustitución de equipo	500 000	0	0	0	0	500 000
Costo total de proyecto	**10 168 056**	**1 492 100**	**3 278 250**	**3 816 126**	**745 830**	**835 750**
Costo de apoyo del organismo de ejecución	**762 604**	**111 908**	**245 869**	**286 209**	**55 937**	**62 681**
Donación total del Fondo Multilateral	**10 930 660**	**1 604 008**	**3 524 119**	**4 102 335**	**801 767**	**898 431**
Plan administrativo 2003 - 2005		3 225 000	0	5 913 000	0	0

33. El Gobierno de México con asistencia de la ONUDI realizará la gestión general del plan.

34. Habrá de estar estrechamente vinculada y coordinada la implantación del plan de eliminación con las diversas medidas de política, normativas, fiscales, de sensibilización y de creación de capacidad que el Gobierno de México está desempeñando a fin de asegurar su compatibilidad con las prioridades del gobierno.

Supervisión y evaluación

35. La supervisión del consumo de SAO será emprendida por el gobierno en las empresas que realizan la conversión a tecnologías sin SAO. Después del establecimiento del plan de recuperación y reciclaje de refrigerantes para todo el país, la actividad de vigilancia se extenderá a todos los centros de reciclaje y a todos los talleres de servicio.

COMENTARIOS Y RECOMENDACIONES DE LA SECRETARÍA

COMENTARIOS

36. La Secretaría pidió que se aclararan algunas incongruencias respecto a los datos de consumo y eliminación de CFC que figuraban en el plan sectorial para refrigeración y en el proyecto de acuerdo. La ONUDI proporcionó nueva información e introdujo los ajustes necesarios al plan.

37. El plan sectorial propuesto no se extendía a la eliminación del consumo de CFC en el subsector de servicio de enfriadores. La Secretaría suscitó la cuestión de los compromisos del Gobierno de México relativos a la eliminación completa en el sector de refrigeración. La ONUDI confirmó que con la aprobación del plan sectorial el Gobierno de México se comprometerá a eliminar el consumo total de CFC en el sector de refrigeración, incluidos los enfriadores. La Secretaría está deliberando con la ONUDI acerca de los arreglos financieros para responder al sector de enfriadores dentro del plan.

38. La Secretaría puso en duda la base para el cálculo de los costos de capital y de explotación que reclamaban las 15 empresas del subsector de fabricación de refrigeración comercial. La ONUDI calculó nuevamente los costos adicionales que demandan estas empresas en la actualidad, en virtud del componente de asistencia técnica del plan.

39. Ya se ha aprobado una suma superior a $EUA 2,8 millones en los subsectores de servicio de refrigeración y de enfriadores. La Secretaría ha pedido a la ONUDI que evalúe el impacto de los proyectos completados de recuperación /reciclaje y capacitación en la disminución del consumo de CFC para el subsector de servicios. La Secretaría trató también de obtener una aclaración sobre la pauta de distribución de las actividades de servicio entre los 8 000 talleres de servicio en los distintos subsectores.

40. Se ha incluido en la propuesta una solicitud de $EUA 500 000 para alentar a la conversión del equipo actual a alternativas sin CFC al año 2007 (como pago en bloque) sin proporcionarse una propuesta detallada. La Secretaría ha pedido que se le proporcione información detallada y que se justifiquen los costos demandados.

41. En el plan de eliminación se incluye una propuesta para un proyecto nacional de recuperación y reciclaje por un costo de $EUA 5 115 880 (50% del costo total de la propuesta), para establecimiento de una red de 36 centros de reciclaje, 3 000 unidades de recuperación, 4 000 bombas de vacío y otro equipo auxiliar. En el plan sectorial, sin embargo, no se indican claramente las prioridades que se establecerán para la capacitación de técnicos y para las operaciones de recuperación y reciclaje. En el plan sectorial tampoco se proporciona suficiente información sobre la demanda futura de refrigerantes CFC para servicios en los subsectores doméstico, comercial y de aire acondicionado de vehículos teniendo en cuenta la reducción en curso de la demanda de CFC para servicios, asociada a la sustitución del equipo a base de CFC por nuevo equipo sin SAO. En el subsector de servicio de aire acondicionado de vehículos, el 41 por ciento del número total de talleres de servicio ya ha sido equipado con unidades de recuperación. Debería realizarse una evaluación de la amplitud con la que este equipo pueda satisfacer las necesidades inmediatas y futuras en recuperación y reciclaje. La necesidad de tal

programa amplio de recuperación y reciclaje ha de fundamentarse más aún. Dada la falta de eficacia de las actividades de recuperación y reciclaje aprobadas hasta el momento se ha recomendado a la ONUDI que considere enfoques de alternativa en los que pudieran incluirse una coordinación de la implantación por etapas y actividades de recuperación y reciclaje en México para someter a prueba su eficacia. La Secretaría y la ONUDI continúan deliberando todavía acerca de estas cuestiones.

42. El costo total para la gestión del proyecto y para apoyo técnico ($EUA 1 305 000) representa más del 12,8% del costo total del proyecto. La Secretaría propuso a la ONUDI que redujera esta categoría de costos a fin de que estuviera en consonancia con otros planes sectoriales similares anteriormente aprobados por el Comité Ejecutivo. Los costos han sido consiguientemente ajustados.

43. Se informará al Subcomité de examen de proyectos acerca de los resultados de las deliberaciones entre la Secretaría y la ONUDI, según proceda.

RECOMENDACIONES

44. Pendientes.

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PROJECT COVER SHEET

COUNTRY	:	**Mexico**	
IMPLEMENTING AGENCY	:	**UNIDO**	
PROJECT TITLE	:	**Refrigeration sector CFC phase-out plan**	
PROJECT IN CURRENT BUSINESS PLAN	:	**Yes**	
SECTOR	:	**Refrigeration**	
ODS USE IN SECTOR (2002) :	:	**1,669**	**ODP tonnes**
PROJECT IMPACT	:	**1,669**	**ODP tonnes**
PROJECT DURATION	:	**2003 - 2010**	
PROJECT COST	:	**USD 10,169,756**	
LOCAL OWNERSHIP	:	**100%**	
EXPORT COMPONENT	:	**Nil**	
REQUESTED GRANT	:	**USD 10,168,056**	
COST-EFFECTIVENESS	:	**USD 6.09**	**per kg ODP**
IMPLEMENTING AGENCY SUPPORT COST	:	**USD 762,604**	
TOTAL COST OF PROJECT TO MULTILATERAL FUND	:	**USD 10,930,660**	
FINANCING ARRANGEMENT	:	**Project cost**	**Grant with support cost**
2003 tranche	:	USD 1,492,100	USD 1,604,008
2004 tranche	:	USD 3,278,250	USD 3,524,119
2005 tranche	:	USD 3,816,126	USD 4,102,335
2006 tranche	:	USD 745,830	USD 801,767
2007 tranche	:	USD 835,750	USD 898,431
STATUS OF COUNTERPART FUNDING	:	**N/A**	
PROJECT MONITORING MILESTONES INCLUDED	:	**Yes**	
NATIONAL COORDINATING AGENCY	:	**SEMARNAT**	

PROJECT SUMMARYT: The present CFC phase-out plan aims at phasing-out all the remaining consumption of Annex A, Group I CFCs in the refrigeration sector in Mexico over the period of 2003 - 2010. A series of investment, non-investment, and technical support activities are proposed to achieve this target in the refrigeration sector. The present CFC Phase-out Plan will enable the Government of Mexico to totally phase-out the CFC consumption by January 01, 2010 except the CFC usage for chiller servicing. Considering this multi-faceted approach it is crucial that flexibility be given to the Government of Mexico to adapt or modify its strategies during implementation of this plan as the need arises.

The Government of Mexico requests about US$ 10.2 million as the total funding from the Multilateral Fund for the total elimination of all Annex A Group 1 substances (CFCs) in the refrigeration sector. The funding will be paid out in installments as specified in the Agreement attached. Being a performance based Agreement, future payments will be conditioned to meeting the performance targets and conditions specified in the Agreement. The approval of this project will result in the elimination of CFCs consumption in the refrigeration sector of Mexico and will substantially contribute to the ability of the country to meet its Montreal Protocol obligations.

Prepared by UNIDO/SEMARNAT Date: 9 September 2003
Reviewed by J Ellis/P Appleyard Date: September 2003

CONTENTS

Chapter 1. General information

The present project proposal consists of a refrigeration sector CFC phase-out plan in Mexico. The proposal aims at reduction of the consumption of Annex A, Group I substances, CFCs in Mexico in compliance with the Montreal Protocol obligation. The plan has duration of 7 years (funding is requested for 5 years).

Ratification status of Mexico is as below,

Vienna Convention, ---------- ratification on 14 September 1987
Montreal Protocol, ---------- acceptance on 31 March 1988
London Amendments, ---------- acceptance on 11 October 1991
Copenhagen Amendment, ----- acceptance on 16 September 1994
Montreal Amendment, --------- under study
Beijing Amendment, ---------- under study

Chapter 2. Impact of the proposal

2.1 Basic data on the country consumption of CFCs

Mexico used to have two CFC production factories, Quimobasico and DuPont. The DuPont plant was closed in 1995 and the Quimobasico plant is only a remaining CFC production facility. Table 1 shows production and consumption of CFCs from 1995 to 2002.

Table 1. Consumption and Production of Annex A Group I substances in Mexico, in ODP tonnes

Max allowed consumption	-	-	-	-	4,624.9	4,624.9	4,624.9	4,624.9
Consumption	4,859	4,859	4,157	3,483	2,838	3,060	2,224	1,947
Production	15,737	8,959	8,431	5,252	5,530	7,546	6,640	5, 652

Mexico's baseline average consumption of Annex A, Group I substances for the period from 1995 to 1997 amounted to 4,624.9 ODS tonnes. The country has always been in compliance with the Montreal Protocol control measures for the CFC consumption from 1999.

Relevant data for Multilateral Fund assistant scheme are given below.

Table 2. CFC Consumption data related to MFMP assistance for Mexico, ODP tones.

Baseline consumption	4,624.9
Starting point established by Decision 35/57	3,059.5
Consumption funded since the starting point	179.9
Remaining eligible consumption un-funded as of submission of the proposal	2,879.6

2.2 Assessment of the consumption reduction schedule

The remaining CFC consumption is 1,947.2 ODP tonnes in 2002 for all sectors. In the refrigeration sector, there was total of 1,669.2 ODP tonnes of CFC consumption, which correspond to 86% of the total country consumption.

The projection of the CFC consumption trend as the result of the implementation of the present phase-out plan and that of on-going MFMP projects is given in Table 3 and illustrated in Fig. 1. A part of CFC consumption in the refrigeration manufacturing sector (20 ODP tonnes) will be reduced through the completion of a on-going project. It is also assumed that the consumption of 192 ODP tonnes in the foam sector will be phased out with a new activities, and that 14.5 ODP tonnes of usage in the sterilants sector will be phased out with implementation of the newly approved project at the 40th ExCom.

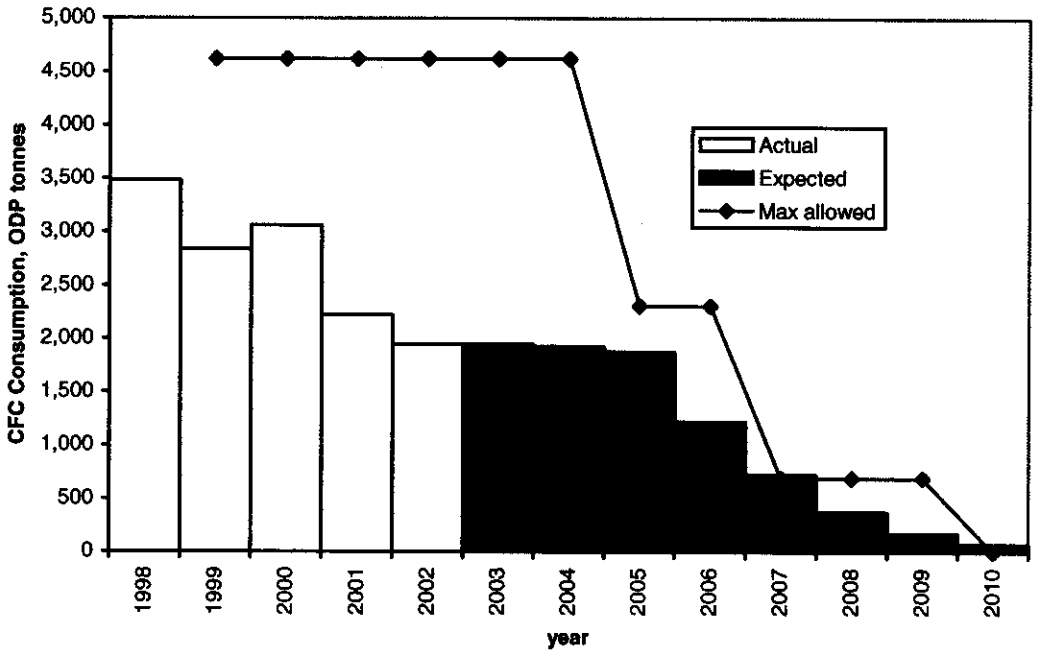
In the present sector phase out strategy, about 50 ODP tonnes of CFC consumption in the commercial refrigeration manufacturing sector is planned to be phased out in 2006, and the total CFC usage for the refrigeration service sub-sector is planned to be reduced gradually. By 2010, there is expected zero "consumption" for the refrigeration sector. Only limited amount of CFC usage will remain in solvent, aerosol (particularly medical application) sectors and for chiller servicing.

It is expected that Mexico will achieve the 50% reduction target in 2005, 85% reduction in 2007 and zero consumption after 2010 except the CFC usage for specific application through implementation of activities included in this project proposal.

Table 3. CFC Consumption reduction schedule, in ODP tonnes

Year	2003	2004	2005	2006	2007	2008	2009	2010
1. Max allowable total consumption of CFC	4,625	4,625	2,312	2,312	694	694	694	0
2. Reduction from ongoing projects as per business plan	0	20	0	0	0	0	0	0
3. New reduction under the present plan	0	0	50	655	500	350	200	100
4. Total annual reduction of CFC	0	20	50	655	500	350	200	100
5. Expected total consumption of CFC	1,947	1,927	1,877	1,222	722	372	172	72
NB: New reduction as per business plan 2003 - 2005	0	0	582	500	600			

Fig. 1. CFC Consumption reduction schedule in Mexico



Chapter 2. Data collection and validation

2.1Methodology for data collection

Data of CFC consumption

CFC Consumption data are reported to the Montreal Protocol Secretariat according to the definition of the Montreal Protocol; i.e., Consumption = Production + Import – Export. The distribution of the CFC use in the country was determined by SEMARNAT through extensive survey of relevant industries including CFC suppliers and distributors.

Data of refrigeration sector

The Ozone office in SEMARNAT conducted the survey of remaining commercial manufacturers, that still use CFCs, to identify eligible enterprises.

UNIDO contracted with a local consulting firm, Objectivos Adhoc, that has experiences with survey of the refrigeration industry and market in Mexico, for the collection of information required for preparation of the refrigeration service sub-sector phase out plan, including:

- District wide distribution of service workshops (see ANNEX I for regions in Mexico),
- Estimation of total number of workshops,
- Current service practices,
- Potential service providers,
- Market situation of CFCs,
- CFCs commercial supply routes,

- CFCs and alternatives trends,
- Pricing and taxation of CFCs,
- Trade agreement with neighboring countries,
- Industrial statistics of production and import of refrigeration and air-conditioning equipment,
- Technical institutions and vocational training centers,
- Industrial associations,
- Governmental Agencies relevant to ODS issues,
- Amount of CFCs in installed units.

The contractor has already a list of about 4,000 workshops as published in their publication related to the refrigeration and air-conditioning industry in Mexico. In the study, about 1,800 service workshops in 40 largest cities were directly interviewed to gather information of the situation of the relevant sector in the year 2003 (see Table 4)[1]. The result of the extensive survey was summarized in the survey report with the database of all service shops investigated.

Table 4. Surveyed cities for data collection in the service sub-sector[2]

#	Region	Cities
1	South	Acapulco, Cuernavaca, Toluca, Puebla, Queretaro, San Juan del Rio, Tlazcala
	Federal district	Mexico city
2	Southeast	Cancun, Campehce, Coatzacoalcos, Merida, Veracruz, Villahermosa
3	North	Saltillo, Cd. Juarez, Cd. Victoria, Chihuahua, Matamoros, Nuevo Laredo, Reynosa, Torreon, Tampico, Cd. Delicias, Gomez Palacios, Durango
	Monterey	Monterey
4	Pacific central	Celaya, Leon, Cd. Obregon, Culiacan, Hermosillo, Mazatlan, Puerto Vallarta, San Luis Potosi
	Guadalajara	Guadalajara
5	Free frontier	Ensenada, Tijuana, Mexicali, Nogales

During the above survey exercise, official bodies, industrial associations[3], refrigerants distributors, importers of refrigeration equipment and other stakeholders were consulted. The support was given from the CFCs producer, Quimobasicos, and refrigerant distributors to obtain precise data about sales, stocks, and trends of refrigeration/air conditioning equipment, and other equipment as well as refrigerants price information.

[1] Direct interviews were conducted with director generals (40%), directors of business (22%), technical directors (36%) and managers of the technical department (2%).

[2] South region stands for Zona Sur in ANNEX I, Southeast region for Zona Sureste, North region for Zona Notre, Pacific central region for Zona Pacifico Centro, and Free fontier for Zona Libre Frontera.

[3] ANTAD (Asociacion nacional de Tiendas de Autoservicio y Departamentales), ASHRAE (ASHRAE Mexico chapter), CEAC (Cultura Ecologica), ANFIR (Asociacion Nacional de Fabricantes para la Industia de la Refrigeracion), AMDA (Asociacion Mexicana de Distribucion de Automotores), AMIA (Asociacion Nacional dela Industria Automotriz), ANIQ (Asociacion Nacional de la Industira Quimica).

The usage of CFC at service workshops determined through direct survey was doubly checked based on the obtained industrial statistics of appliances and automobiles.

3.2 Sector distribution of the remaining eligible CFC consumption

The distribution of the consumption of CFCs in Mexico is given below.

Table 5. Distribution of CFC consumption, 2002

Sector	Aerosol	Foam	Refrigeration manufacturing	Refrigeration service	Solvent	Total
CFC-11	30.3	192.0	29.7	175.0	0	427.0
CFC-12	10.0	0	20.0	1,431.0	0	1,461.0
CFC-113	0	0	0	0	57.0*	57.0
CFC-114	0	0	0	0	0	0
CFC-115	0	0	0	16.9	0	16.9
TOTLAL, MT	40.4	192.0	49.7	1,622.9	57.0	1,961.9
TOTAL, ODP tonnes	40.4	192.0	49.7	1,619.5	45.6	1,947.2

* Solvent for aerosol formulation.

Chapter 4. Strategy and plan of implementation

4.1 General strategy of reduction of CFC consumption

4.1.1 Annual reduction of CFC consumption

In 2004. 20 MT of CFC consumption will be reduced through completion of on-going projects as projected in the 2003 – 2005 rolling business plan of implementing agencies.

New activities were planned in the 2003 – 2005 rolling business plan by UNIDO. Based on the scenario in this business plan, totally 984 ODP MT will be reduced in Mexico by 2007. However, according to the analysis made after the intensive investigation of the remaining CFC consumption along with the extensive survey of the remaining user sectors, it is expected that the CFC consumption in 2007 would exceed the maximum amount allowed for the country, if only the activities in the business plan would be executed. Therefore, the activities necessary to achieve the compliance target particularly in 2007 are proposed in the present phase out strategy.

In the present proposal, the total CFC consumption in the refrigeration-manufacturing sector is going to be phased out by 2006. In the refrigeration service-sector, a certain amount of CFC usage is expected to be reduced by implementation of technicians training program, which is proposed in this strategy, since intentional or non-intentional leakage of CFC refrigerants from equipment will be reduced during service or maintenance work as well as during operation of the equipment due to better service practices.

It is aimed to gradually reduce the CFC consumption in the service sector from 2005 till 2010 by introducing the national recovery and recycling scheme. Thereby, service workshops will be able to rely on recovered, recycled or reclaimed refrigerants for their service job to greater extent[4].

There is relatively small amount of CFC usage in aerosol and solvent sectors and for chiller maintenance. The CFC usage for chiller servicing will continue as no measure is considered at the moment.

It is worth mentioning that the quite big amount of consumption reduction is planned in 2006 and 2007 in order to achieve the 85% reduction target in 2007. This is the critical objective for the success of the present strategy.

4.1.2 Management of the supply and demand of CFC

The local manufacturer, Quimobasicos is a major supplier of CFCs to the local market. A part of the local demand was satisfied by imports through major importers[5].

At the 40th Executive Committee meeting, the Government of Mexico agreed to gradually reduce the CFC production. According to the agreement, the total CFC production for 2003 – 2005 is limited to 22,000 metric tonnes and the production is to be ceased in 2005. Table 6 shows the comparison between the local CFC demand expected in the present strategy

[4] A certain amount of spontaneous reduction would also be expected in the refrigeration service sector due to the replacement of CFC appliances and MAC with non-CFC units. However, the amount of spontaneous reduction is uncertain.

[5] In 2001, about 75% of local demand was satisfied by the local production.

and the local production. The demand after 2006 may be satisfied by a stock.

Table 6. Production and consumption of CFCs, Mexico, in ODP tonnes

year	1995	1996	1997	1998	1999	2000	2001	2002
Max allowed consumption	-	-	-	-	4,624.9	4,624.9	4,624.9	4,624.9
Consumption	4,859	4,859	4,157	3,483	2,838	3,060	2,224	1,947
Production	15,737	8,959	8,431	5,252	5,530	7,546	6,640	5,652
year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Max allowed consumption	4,625	4,625	2,312	2,312	694	694	694	0
Expected consumption,	1,947	1,927	1,877	1,222	722	372	172	72
Max allowed production as per Agreement*	12,353	12,353	6,750	0	0	0	0	0

* The total production for 2003 - 2005 must not exceed 22,000 metric tonnes.

4.1.3 Policy instruments

A. Introduction

This chapter describes the policies that will be introduced to support the phase-out plan and its implementation, in light of the experiences to date with the policies and actions already taken to reduce production and consumption of CFCs in Mexico. Since the late eighties the Government of Mexico has been applying a policy approach using a mix of instruments in the form of voluntary agreements with private sector, adoption of legislation and regulation. The Government of Mexico will reinforce this approach to ensure an appropriate implementation of the phase-out program in the refrigeration sector.

B. Past policy and actions for phase-out

Mexico holds one of the most advanced CFC phase-out programs among Article 5 Countries. Actions started as early as in 1988 and have become a permanent effort of the Government of Mexico. These actions have been coordinated through the Ministry of Environment (currently SEMARNAT). The Mexican CFC policy framework has been focusing on the use and supply of CFCs rather than on actions to control production. Some of the most important measures implemented, include:

a) Conversion of the propellant industry: Negotiations headed by Government of Mexico led to the complete conversion of the non-medicinal aerosol and propellant producing industry from CFCs to hydrocarbons in 1989. The decision was formalized through a voluntary agreement signed between the Government of Mexico and the domestic propellant producers. The program was implemented without financial assistance from the Fund to compensate the incremental investment cost of industry.

b) Monitoring on trade of CFCs: Starting from 1993, the Ministry of Environment has required the national CFC producing enterprises to voluntarily report domestic and international commercial activities such as production, imports and exports volumes. The industry is fully compliant with this requirement.

c) Import control on CFCs and CTC: SEMARNAT has set up an import licensing system on CFCs and CTC, using an inter-ministerial mechanism called CICOPLAFEST. The Ministry of Finance through the Customs Office enforces this regulation. Under the system, only the holders of import rights (namely Quimobásicos and DuPont de México) are allowed to import CFCs and CTC. Allocation of rights is based on historical (1990) domestic sales data. Quotas are established according to the average sales of the years 1995-1997 and subjected to the internal goals of SEMARNAT.

d) Constraints for growth on industrial demand of CFCs: Since 1993, SEMARNAT has played an active role to circumvent the installation of any new CFC consuming facility in the Country, with emphasis on the original equipment manufacturer (OEM) sector. For the installation of any new production facility in the Country Mexican law requires an operation's license, which is granted by SEMARNAT, in order to manage related environmental impact and risks, and to establish emission prevention and control requirements, as well as to define operational conditions and growth. To enable compliance with the Mexican obligations under Montreal Protocol, SEMARNAT has been able to discourage the use of CFCs, and negotiate in favor of CFC substitutes, thus avoiding new progress on CFC consumption in the OEM sector.

Notwithstanding the current degree of success of controlling and diminishing CFC consumption in the Country, the major concerns of the Government regarding further progress of the phase-out process enabling definite compliance with Montreal Protocol obligations are:

a) Conversion of medium and small size commercial, institutional and industrial end users: Despite the successful conversion of large industrial CFC consumers, there are still lagging segments, which continue demanding CFCs. To this end, the Government through SEMARNAT and the National Ozone Unit are working on preparing and presenting projects to MLF in order to eliminate demand of CFCs in particular for servicing equipment still in use in such consuming sectors.

b) Prohibition of import of CFC containing equipment: Since 1998 the Government has been setting up temporary prohibitions on import of refrigeration, air conditioning and water cooling equipment using CFCs in order to halt new additional CFC demand, and complement efforts in controlling manufacturing industry's demand. Permanent control measures will be established by SEMARNAT to prohibit import of equipment using CFC, including also used cars in addition to refrigeration equipment.

c) Elimination of CFC demand for household refrigerator and air-conditioning equipment, and mobile air conditioning units: The Government of Mexico's approach to manage residual end-consumer demand is based on technology substitution (meaning discontinued use of CFC-based equipment by end-users through acquiring newer generation, CFC-free equipment). The rate of replacement depends on a complex array of factors, including the purchasing power of end-users. To that extent, potential measures to be implemented include: making new CFC-containing equipment unavailable (as discussed above), implementing a training program for refrigeration technicians, and developing educational and promotional campaigns for the general public.

d) Controlling availability of CFCs on the Mexican market: Collaboration with CFC producers/importers has provided major advancements on control of CFC availability. An agreement on a definite CFC production and import phase-out schedule is already formalized. Nevertheless, the Government of Mexico is concerned about the uncontrolled introduction of CFCs to the Country, and to that end, is preparing actions to strengthen regulations and enforcement to control illegal trade. Support from the international community is requested as part of this project to enhance and speed-up the implementation of such regulations and enforcement.

C. Policy objectives and instruments

The Government of Mexico will establish a set of additional supporting policies and measures to promote CFC phase-out in the Country. The main objective of the formulation of new regulatory instruments is the strengthening of a policy framework to achieve complete ODS phase-out, complying with the obligations under the Montreal Protocol in a gradual and orderly manner to minimize adverse economic affects to all sectors involved.

CFC production quota system

In order to ensure that Mexico's CFC production sector complies with the phase-out schedule targets, the Government will legally formalize a mandatory production quota (or cap) system. The production quota system will be the key policy element for implementing the CFC production sector phase-out plan in Mexico.

Ozone Depleting Substances (ODS) Regulations

The Mexican Government has initiated formulation of a detailed regulation to monitor and control the production and uses of Ozone Depleting Substances in the Country. Salient features of the proposed regulation regarding CFCs are:

(i) Gradual abandonment of the use of substances that deplete the Ozone layer in all sectors consistent with the Montreal Protocol obligations. The rule would be compulsory for all producers, importers, exporters, distributors, vendors and commercial and industrial consumers of CFCs.

(ii) From the date of implementation of the norm, authorized commercialization of CFCs will be only permitted to satisfy basic internal needs and essential uses in the Country. The regulation will include schedules with maximum allowable quantities permitted for such uses on a yearly basis until 2010.

(iii) From the date of implementation of the regulation, it will be prohibited to produce or import all kinds of refrigeration equipment, air conditioning equipment, propellant formulations, plastic foam or solvent cleaning operations that use or contain CFCs, except those related to essential uses as defined by the Montreal Protocol .

(iv) The regulation will establish rules to control the commercialization of recycled or reprocessed CFCs.

4.1.4 Steps to be taken to gradually curtail CFC demand

Along with the control of CFC production under the Agreements made with CFC producing Article 5 countries (China, India, DPR Korea, and Argentina), the Mexican program of

production phase-out would result in adequate reduction of supply of CFCs in the country. Possible reduction of CFC production in Venezuela and non-Article 5 countries in Europe would further create a favorable circumstance for the present CFC consumption phase-out program, since production phase out programs result in short of virgin CFC availability, encouraging user industries to convert to alternative technologies and to consider the responsible use of refrigerants including recovery and recycling exercise.

Completion of on-going projects supported by the Multilateral Fund will reduce the consumption of CFCs in the refrigeration manufacturing sectors according to the 2003 – 2005 rolling business plans approved at the 39th ExCom. This will be followed by the new activities proposed in the aerosol, foam and refrigeration manufacturing sectors.

In the present sector phase out plan, activities relevant to the CFC phase out in the refrigeration manufacturing sub-sector are proposed. Similarly, activities required for CFC consumption phase-out in the service sub-sector are proposed, including -

Customs training program,
Service technicians training program, and
National recovery and recycling scheme.

At the late stage of the present plan, an incentive program will be introduced to encourage retrofitting and replacement of existing relatively large equipment working with CFCs. It will facilitate the phase-out of final CFC consumption for servicing these units. Chillers are not subject to the incentive program, however.

Except the usage of CFCs for servicing chillers, the CFC demand in the refrigeration sector will be gradually reduced to zero consumption by 2010.

4.2 Refrigeration manufacturing sector implementation program

4.2.1 Current situation of the sub-sector

A. Domestic refrigeration

MFMP Projects in the domestic refrigeration sector are given in Table 7. Through these projects, major OEMs (Mabe and Vitro groups) have already converted CFC production technology to non-CFC including compressor production. Currently all new domestic appliances are based on non-CFC technologies.

Table 7. MFMP Projects in the domestic refrigeration sub-sector; IA, UNDP, all projects completed.

Project title	Description	Impact ODP tonnes	Grant
Conversion of CFC-12 domestic refrigerator compressors to HFC-134a at (Comasa, Mabe Group)	Installation of a 5 stage degreasing cleaning system, 2 dehydration ovens, a compressor leak detector equipment, testing, trials and training. Conversion is a joint venture with Sanyo, a foreign partner and will increase the production capacity threefold.	0	$1,188,724
Conversion of CFC-12 domestic refrigerator compressors to HFC-134a at Fabricacion de Compresores S.A. (Facosa, Vitro Group)	Replacement of upper and lower shell dies, retrofitting of 2 welding machines, ultrasonic immersion cleaner, compressor leak detector equipment, testing, technology transfer and training.	0	$584,000
Elimination of CFC in the manufacture of domestic refrigerators at Ensambladora de Refrigeradores (Enresa, Mabe Group)	Replacement of low-pressure machines by high-pressure units (foam component), charging boards, leak detectors, retrofitting of 80 vacuum pumps and 5 new vacuum pumps, and a lube storage and dehydration system (refrigerant component), testing, technology transfer.	47	$867,033
Elimination of CFC in the manufacture of domestic refrigerators at Industrias Astral (Mabe Group)	Replacement of low-pressure machines by high-pressure units and machine for pilot series (foam component), charging boards, leak detectors, retrofitting of 80 vacuum pumps and 10 new vacuum pumps, and a lube storage and dehydration system	344	$2,439,932
Elimination of CFC in the manufacture of domestic refrigerators at Supermatic, S.A. (Vitro Group)	Enhanced ventilation system (foam component), retrofit of the existing charging boards, 2 leak detectors, retrofitting of 53 vacuum pumps and 10 new vacuum pumps, and a lube storage and dehydration system (refrigerant component), testing, technology transfer.	366	$2,017,517
Elimination of CFC in the manufacture of domestic refrigerators at Estufas y Refrigeradores Nacionales S.A. (Erna, Vitro Group)	Replacement of low-pressure machines by high-pressure units and enhanced ventilation (foam component), charging boards, leak detectors, retrofitting of 35 vacuum pumps and 5 new vacuum pumps, and a lube storage and dehydration system (refrigerant component)	49	$1,038,309
TOTAL		806	

B. Commercial refrigeration

This sector includes manufacturers of refrigerated showcases, bottle coolers, ice cream machines, ice machines, condensing units and cold storage rooms. The national manufacturers supply almost 100% of the market, though some of parts or components used in their products are imported.

Commercial equipment manufacturers under the MFMP assistance for technology conversion are listed in Tables 8 and 9. In Table 8 assistance for retrofitting of CFC equipment at super market chains, Gigante, Aurrera and Chedroui) are also included.

Table 8. Commercial refrigeration projects (refrigeration parts) under the

Multilateral Fund assistance, all projects completed, IA, IBRD.

Project title	Description	Impact ODP tonnes	Grant
Replacement of CFC-12 with HFC-134a refrigerant in the manufacturing of commercial refrigeration in Refrigeración Ojeda	Modification of a refrigeration manufacturing line to use HFC-134a refrigerant. It includes procurement of refrigerant recharges, vacuum pumps and testing equipment. NOTE: Approved within the $4 million line of grant.	13	$225,000
ODS phase out at Gigante 1	Elimination of CFC-12 and R502 at 53 stores of Gigante supermarket through a combination of near drop-in retrofitting of intermediate age compressors. NOTE: Approved within the $4 million line of grant.	38	$496,380
ODS phase out at Aurrera 1	Project consists of combination of retrofitting of intermediate age compressors (3-7.5 HP) per manufacturer's guidelines for near drop-in retrofit procedures; and replacement of older units not feasible to be retrofitted. NOTE: Approved within the $4 mil	44	$500,000
ODS phase out at Gigante 2	Elimination of ODS at several stores of Gigante supermarket through a combination of near drop-in retrofitting of intermediate age compressors. NOTE: Approved within the $4 million line of grant.	18	$278,070
ODS phase out at Chedraui stores	Elimination of CFC-12 in 16 stores of Chedraui through retrofitting of intermediate age compressors (3.5-7.5 HP) per manufacturer's guidelines for near drop-in retrofit procedures for use with MP-39. NOTE: Approved within the $4 million line of grant.	15	$228,120
ODS phase out at Aurrera 2	Project consists of combination of retrofitting of intermediate age compressors (3-7.5 HP) per manufacturer's guidelines for near drop-in retrofit procedures; and replacement of older units not feasible to be retrofitted. NOTE: Approved within the $4 mil	22	$275,000
TOTAL		150	

Table 9. Commercial refrigeration projects (whole operation); IA, UNIDO.

Project title	Description	Impact ODP tonnes	Status	Grant US$
Phasing out of CFCs at Criotec S.A.	The company is requesting retroactive funding of a portion of the capital cost (2 high pressure foaming machines, 2 refrigerant charging boards, retrofitting of 6 vacuum pumps and 2 leak detectors), and the incremental operating costs for 2 years.	16	Completed	240,794

Project title	Description	Impact ODP tonnes	Status	Grant US$
Phasing out of CFCs at Torrey S.A.	The company is requesting partial funding of a portion of the capital cost (a high pressure foaming machine, 3 refrigerant charging boards, and 2 leak detectors), and the incremental operating costs for 2 years.	15.1	Completed	228,165
Phasing out of CFCs at Nieto S.A.	The company is requesting retroactive funding of a portion of the capital cost (3 high pressure foaming machines, 3 refrigerant charging boards, retrofitting of 14 vacuum pumps and 3 leak detectors), and the incremental operating costs for 2 years.	24.6	Completed	353,976
Phasing out of CFC at Vendo S.A.	The company is requesting retroactive funding of a portion of the capital cost (2 high pressure foaming machines, 2 refrigerant charging boards, retrofitting of 7 vacuum pumps and 2 leak detectors), and the incremental operating costs for 2 years.	16.5	Completed	248,524
Phasing out of CFC-11 and CFC-12 with HCFC-141b and HFC 134a at Plásticos Técnicos Mexicanos (PTM) in the manufacture of commercial refrigeration equipment	The enterprise is equipped with 2 high-pressure foaming machines; funds are only requested for retrofitting one of these machines.	50.6	Completed	398,439
Phasing out CFC-11 with cyclopentane and CFC-12 with HFC-134a in the manufacturing plant of commercial refrigerators of Metaplus S.A. de C.V.	The enterprise possesses four low pressure foaming machines, 10 cabinet and 2 door foaming fixtures, refrigerant charging equipment, leak detectors and vacuum pumps. Replacement of existing 4 low pressure foam dispensers with one high pressure dispenser	20.1	On-going	303,094
Phasing out CFC-11 with HCFC-141b and CFC-12 with HFC-134a in the manufacturing plant of commercial refrigerators at Refrigeración Durán S.A. de C.V.	Retrofitting of 2 Gusmer low pressure foaming machines (foam component), retrofit of vacuum pumps, replacement of refrigerant charging units and leak detectors (refrigeration component), redesign, testing, trials, technical assistance and training. Increm	15.1	On-going	112,985
TOATAL		158		

In addition to manufacturers listed above, this sub-sector comprises of a number of small enterprises, which are geographically scattered and are of little access to sophisticated alternative technology and non-CFC production processes. Table 10 lists these enterprises, which are to be assisted for the CFC phase-put.

Table 10. Remaining enterprises in the commercial refrigeration sector

Enterprises	Location	Annual CFC Consumption, MT
Aislamientos Const.	Apodaca	8.5
Banda, Ap.y Eq.R.	Morgue	2.1
Equip.y Refac,Refrig.	Mexico	6.23
Frio y Control de V	Verocruz	1.13
Friooima, SA.	Celaya	4.09
G.I.Gareli	Cadereyta	4.65
Ingeni.en Prod.Con	Mexico	0
Kidron,S. de R.L.	Monterrey	0.35
Manitogo Refrigera.	Mexico	4.5
Pure, S.A.	Mexico	1.3
Refrieom	Veracruz	1.35
Refrigera. Campos	Morelia	1.6
Refrigera. Moderna	Veracruz	0.45
Refrigeraoion y Re.	Escabedo	11.35
Zelma Kooler de Me.	Merida	2.1

C. Mobile air conditioner (MAC).

The conversion of CFC-12 MAC was started in 1993 at the factory of VolksWagen, Mexico. As a result of two MFMP projects (Table 11) and the conversion of production technology at all automobile assembly factories[6] to non-CFC, all new MACs produced in Mexico are with non-CFC refrigerant from 1996. Annual output of the total cars were in a range of 600,000 units for 1992 -1999 and 900,000 - 1,000,000 for recent three years[7]; about 70% are passenger cars. In the past, only 15% of passenger cars were equipped with air-conditioners. However, recently percentage of cars with air-conditioners have been increased in this decade and 80% of passenger cars produced in 2002 were equipped with ACs.

Table 11. MAC Project under the Multilateral Fund Assistance, all projects completed, IA, IBRD.

Project title	Description	Grant
Manufacture of complete heat exchanger systems for air conditioning equipment that use HFC-134a at Climas de Mexico	The project proposes to change the tube and fin condenser to parallel flow design which requires a new multi-flow-tube cutting system and a fin machine for manufacturing the corrugated fins, a Nocolok furnace brazing process	$2,359,812
Conversion of CFC-12 to HFC-134a technology in the production of MAC systems at Airtemp	The project is to convert the tube and fin condenser and evaporator designs to parallel flow designs. It includes a Nocolok furnace brazing process, a fin machine, a tube straighten machine, a core builder, and a condenser header, technology transfer	$1,651,430

D. Industrial refrigeration and air conditioning

[6] Major automobile assembly factories in Mexico include General Motors, Nissan, Ford, VolksWagen, Chrysler, Honda, Mercedez Benz, Renault, and Seat.

[7] The sales of vehicles in Mexico was 1,969,779 in 2002. 60% of cars produced in Mexico were exported, and the same amount was imported.

Majority of industrial refrigeration equipment is based on ammonia and non-CFC refrigerants. Transportation refrigeration units were already converted to non-CFC refrigerants several years ago, and their servicing and maintenance is done by foreign OEMs (like Thermoking).

4.2.2 Phase out plan

As seen in Table 10, there are identified remaining eligible small and medium size enterprises that are manufacturing commercial refrigeration equipment using CFCs. Some of them have facilities of foaming and refrigerant charging, and some have only refrigerant charging facility. They are still manufacturing products with CFC-11 and CFC-12. Alternative technology selected was HCFC-141b as foam blowing agent and HFC-134a as refrigerant. These substitutes are accepted and recommended by TEAP as alternatives to CFC-11 and CFC-12. Depending on the current baseline equipment, assistance for necessary production line modification will be provided.

The investment component of the plan will focus on enabling the participant enterprises to eliminate CFCs from their production activities and would comprise of the following elements:

- Assessment of the technical requirements of conversion
- Determining the scope of international and local procurement
- Development of technical specifications and terms of reference for procurement
- Pre-qualification and short-listing of vendors
- International/local competitive bidding
- Techno-commercial evaluation of bids and vendor selection
- Procurement contracts
- Site preparation
- Customs clearance and delivery
- Installation and start-up
- Product and process trials
- Operator training
- Commissioning of CFC-free production
- Destruction of baseline equipment

The approach for implementing the investment component in the remaining eligible and not funded enterprises in the sector is executed as below:

Foam Operations

a) The use of new formulations will lead to a marginal change in mixing ratios and increased viscosity leading to reduced flow ability of the PU material. In case of rigid foam conversions, the HCFC-141b based foam will have an increased thermal conductivity in relation to that produced with CFC-11, which is being replaced. The existing manual mixing process or low-pressure foam dispensers will not be able to handle the new formulations without adversely affecting the cell structure and thereby the thermal conductivity of the foam. Hand mixing is also not recommended from occupational health and safety standpoints. Therefore, new high or medium-pressure foam dispensers of equivalent effective capacity will be needed to replace the existing dispenser/hand-mixing process. They will provide a finer cell structure and help minimize the deterioration of thermal conductivity of the foam, and also minimize the occupational health and safety risks,

b) The HCFC-141b based foam will have an increased molded density with respect to the

CFC-11 based foam, resulting in increased requirement of chemicals.

Refrigerant Operation

a) Compressors suitable and optimized for HFC-134a will be required.

b) The chemical stability of polyolester lubricants compatible with HFC-134a is highly sensitive to moisture and impurities in the system, as compared to that with CFC-12. The evacuation/charging process for HFC-134a and polyolester lubricant will need to ensure the required level of cleanliness and dryness in the system. To ensure this the following is proposed:

- The vacuum pumps will need to be suitable for use with HFC-134a. Retrofitting of vacuum pumps has not proven feasible or cost-effective in the past due to several factors (unsatisfactory condition, inaccessible suppliers, unavailability of parts, production downtime, etc) therefore appropriate quantities of new vacuum pumps suitable for the conversion, consistent with the baseline capacities, will be provided.

- The existing refrigerant charging units/kits are not suitable for use with HFC-134a and cannot be retrofitted, and will therefore be replaced with automatic charging units or portable semi-automatic charging units suitable for HFC-134a duty.

c) The design/sizing of the refrigeration cycles need to be optimized to ensure the viability of the process and to maintain the product standards for performance and reliability, such as:

- Reengineering evaporators and condensers, so as to ensure the levels of cleanliness and contamination that can be tolerated with HFC-134a.
- Lengthening of the capillaries or changing the thermostatic expansion valve models.
- Use of filter-dryers with finer pores, suitable for use with HFC-134a.

The existing leak detection is unsuitable for detecting HFC-134a leakages; therefore suitable hand-held leak detectors will need to be provided.

Equipment will be procured and delivered to the country by UNIDO based on their financial rule and regulation and in accordance with SEMARNAT. The planned project duration is 30 months, and the CFC consumption in the sub-sector will be phased out by 2006.

4.3 Refrigeration service sector implementation program

4.3.1 Current situation of the sub-sector

A. MFMP Projects

Approved MFMP projects related to the refrigeration service sub-sector are listed in Tables 12. Table 13 is a list of MFMP projects related to chillers.

Table 12. MFMP Projects related to recovery and recycling, all projects completed.

Project title	Description	Impact ODP tonnes	Grant US$	IA
MAC recovery/recycling, Demonstration project in MAC	Collection and analysis of information on MAC sector, MAC recycling workshop for approximately 20 repair shops in a single city, furnishing recycling machines and related equipment to participating repair shops (to be funded by the UNDP Global MAC project	25	120,000	USA
Demonstration programme in CFC recovery and recycling of the Instituto Mexicano del Seguro Social (IMSS) refrigeration equipment	Demonstration programme for the recovery and recycling of CFC in the IMSS refrigeration and air conditioning equipment. The project will lead to the development of a detail recovery programme. NOTE: Approved within the $4 million line of grant.	15	499,918	IBRD
CFC recovery and recycling of refrigeration equipment in Monterrey City (Climas Jiménez)	Recovery and recycling of CFC from refrigeration and air conditioning equipment in operation in the city of Monterrey through 4 recovery machines. NOTE: Approved within the $4 million line of grant.	4	29,328	IBRD
CFC recovery and recycling programme through Quimobasicos, S.A.	Establishment of a CFC recovery, recycling and reclaimed network with recovery units, to be managed by Quimobásicos, S.A. The CFC recovered will be reclaimed by the company and return to the market. NOTE: Approved within the $4 million line of grant.	140	222,540	IBRD
Recovery of CFC-12 servicing of domestic refrigeration at Vitromatic Comercial y Servicios Integrados	Implementation of national programme for recovery and recycling of refrigerant in the refrigeration sector. It will be implemented through the service companies of 2 domestic refrigerator manufacturers (Vitro and Mabe).	76	352,610	UNDP
Pilot sectoral study and action plan in commercial refrigeration	Study and pilot action plan for the commercial refrigeration/chiller sub-sector to be presented to industry associations and selected supermarkets, prepare 2 project proposals covering more than 220 stores.	0	410,000	USA
Training of Quimobasicos personnel in the use of CFC recovery and recycling equipment	Establishment of technical and operational conditions at the local producer of CFCs to recover and recycle CFCs and training programme for service technicians. NOTE: Approved within the $4 million line of grant.	0	252,246	IBRD
TOTAL		260	2,076,642	

Table 13. MFMP Projects related to chillers

Project title	Description	Impact ODP tonnes	Status	Grant US$	IA
Chiller hands-on training	Development of instruction material in Spanish, demonstration and hands-on training on recovery and recycle equipment; develop information on the chiller market in Mexico; 2 training workshop to 167 chiller servicing technicians; identification and contact	-	Completed	81,000	USA
Cancun chiller workshop	Training refrigeration technicians from IMSS and other enters to reduce emissions of ODS during operation and maintenance of chillers.	-	Completed	90,000	USA
Chiller concessional lending pilot project	The project intends to use a grant to leverage matching funds from local sources to set up a revolving fund to finance replacement of 20 CFC chillers with high-energy efficient chillers using HFC-134a (and HCFC-123 when no other alternative is viable) as	5	On-going	565,000	UK

B. Number of service workshops

For preparation of the sound strategy for phasing-out CFC consumption in the service sector, it is essential to have a deep understanding of the sub-sector. Therefore, the extensive survey was conducted as described in Chapter 3.1. The information collected through direct interview with 1,800 service workshops in 40 cities of Mexico during mid of 2003 is summarized below.

The total number of service workshops in Mexico is estimated to be 8,000 and the number of service technicians is 20,000. The regional distribution is shown in Table 14.

Table 14. Distribution of service workshops in Mexico.

Zone	Region	Direct sample	Estimated Number of shops	Estimated number of technicians
1	South	120	824	2,060
	Mexico city	335	1,681	4,202
2	Southeast	172	831	2,078
3	North	345	1,322	3,305
	Monterey	243	864	2,160
4	Pacific central	302	1,245	3,112
	Guadalajara	139	720	1,800
5	Free frontier	145	513	1,283
	TOTAL	1,801	8,000	20,000

Size and life of workshops are summarized in Table 14. Characteristics of service technicians in service workshops are summarized in Table 15. Majority of service shops are small and medium size enterprises.

Table 15. Characteristics of service workshops in Mexico.

Size	**Total number of employees**	**%**
Micro	1 to 15	95
Small	16 to 100	4
Medium	101 to 250	0.5
Large	over 250	0.5
Years in business		**%**
1 to 9		33
10 to 19		31
20 to 29		17
30 to 39		5
over 40		14

Table 16. Characteristics of service technicians

Age of technicians	**%**	**Qualification**	**%**
20 to 29	20	None	1
30 to 39	38	Primary school	11
40 to 49	24	Secondary school	24
50 to 59	13	High school	23
over 60	5	Technical school	21
		College	20
Technician's experiences	**%**	**After school training**	**%**
over 3 year	71	Courses	88
1 to 3 years	20	Personal	1
6 - 12 month	7	Practical	11

As summarized in Table 17, the awareness of Ozone issue is quite high, though the existence of the Ozone unit is not well known.

Many of workshops had experiences with refrigerant leakage of equipment at servicing. A half of workshops know the concept of recovery, and many of them intend to recycle the recovered refrigerant. About a half of workshops had experience with retrofitting, mainly by changing lubricant and refrigerant with no change of compressor and other system components. There is limited difficulty in obtaining alternative refrigerant in Mexico.

Table 17. Awareness and practice at service workshops in Mexico.

Items	Known %
Ozone issue	94
Ozone depletion substances	90
CFC phase-out in 2010	73
National ozone office	26
Retrofitting	85
Recovery	52

Items	Yes, %	Items	Yes, %
Aware of concern for leak by customer	69	Difficulty to get alternative	15
Experience with leakage due to	83	Experience of retrofitting	48
corrosion	27	Number of cases, 1 -9	39
friction	34	10 -19	22
vibration	33	20 - 29	11
bad servicing	37	30 - 39	7
temperature change	11	40 - 49	6
no maintenance	4	over 50	15
Idea on how to handle recovered refrigerants		Destruction 4%, recycle 77%, store 5%, reuse, 8%, send to distributor, 2%, emission 1%, others 2%	

As summarized in Table 18, many of workshops do not have vacuum pumps and use compressors for evacuation of the system.

Table 18. Service equipment availability

Equipment	%	Equipment	%
vacuum pump	17	pipe expansion tool	79
compressor	71	charging cylinder	46
recovery unit	41	welding machine	85
manifold	99	hand tools	86
nitrogen cylinder	47	Measuring tools like ampere meter, thermometer, weigh	11
oil pump	32	Pressure regulator	68
pipe cutter	90	leak detector	60
pipe bender	68	freer tool	82

D. CFC service usage by region and application

Regional CFC usage for refrigeration service is summarized in Table 19. North and pacific central regions are major CFC consumption areas in the country due to high temperature climate.

Table 19. Regional distribution of CFC usage in service sector according to the direct survey of service workshops.

Zone	Region	CFC Total* MT	CFC-11 MT	CFC-12 MT
1	South	114	9	99
	Mexico city	151	13	132
2	Southeast	142	6	136
3	North	371	20	337
	Monterey	253	24	190
4	Pacific central	396	43	351
	Guadalajara	139	3	134
5	Free frontier	161	13	132
	TOTAL	1,728	131	1,509

*The total amount estimated based on the direct contacts with service workshops in 2003 is higher than the amount of service usage verified by the NOU in 2002. CFCs other than CFC-11 and CFC-12 are CFC-13 (1 MT), R-500 (6.2 MT), R-502 (69.8 MT), R-503 (2.9 MT), CFC-114 (4.57 MT) and CFC-113 (3.2 MT).

Table 20 lists the amount of CFC used for the service jobs for respective refrigeration and air-conditioning units, which has been determined through the analysis of the information given through the direct survey of service shops.

Table 20. CFC Service usage by application.

Type of units	Estimated on direct survey
Mobile air-conditioners	1,028
Heavy duty commercial equipment, e.g., cold rooms, condensing units	25
Light duty commercial equipment, e.g., show cases, freezers	656
Domestic refrigerators	18
Total	**1,728**

Amount of automobiles in fleet is 13 millions, and 7.5 million are produced before 1996. Out 7.5 million cars, 15% are equipped with MAC. Therefore the amount of cars with CFC-12 MAC is 1.1 million. Assuming the average service use of CFC-12 for MAC is 1.3 kg and 70% MAC need annual service charge, the annual usage was calculated as 1,001.

On the other hand, it is estimated that the total unit of domestic refrigerators in Mexico is 20 million, and a half was already converted to HFC-134a. Therefore, the unit operating with CFC-12 is 10 million. In Mexico only limited amount of these CFC appliances are subject to annual service charge, resulting in 20 metric tonnes of CFC-12 usage.

The CFC usage for servicing commercial equipment is big in Mexico. The life time of commercial refrigeration equipment is quite long and many old equipment is still in operation. They need annual maintenance and recharge.

As a summary, it is revealed that in Mexico the major use of CFC-12 is for servicing of MAC followed by commercial equipment.

D. CFC supply and prices of refrigerants

There is one producer and two importers of CFCs in Mexico permitted by CICOPLAFEST (see Chapter 4.1.3). Totally 78 distributors distribute CFCs in the country with more than 1,000 retail shops. Distribution of distributors is as follows, -

National distributors, 8
Regional distributors, 20
Local distributors, 50

Delivered prices of refrigerants in small cylinders) in the market are given below, -

CFC-11, $ 8.8/kg
CFC-12, $ 17/kg
HFC-134a, $ 11.5/kg
HCFC-22, $ 6/kg

4.3.2 Phase out plan

It is inevitable to take necessary measures for the reduction of the service use of CFC, in order for Mexico to be in compliance with the 50% reduction obligation for the year 2005, followed by the 85% reduction obligation in 2007. Measures for service use reduction are further important. The sector phase-out plan framework is, therefore, of essential importance for Mexico's compliance with the Montreal Protocol. As Mexico is a big country with about 8,000 workshops, the implementation would need several years. It should be started as soon as possible, to enable the country to meet its obligation for the years 2005, 2007 and 2010.

The conditions and constraints for the sector phase-out plan in Mexico are described below.

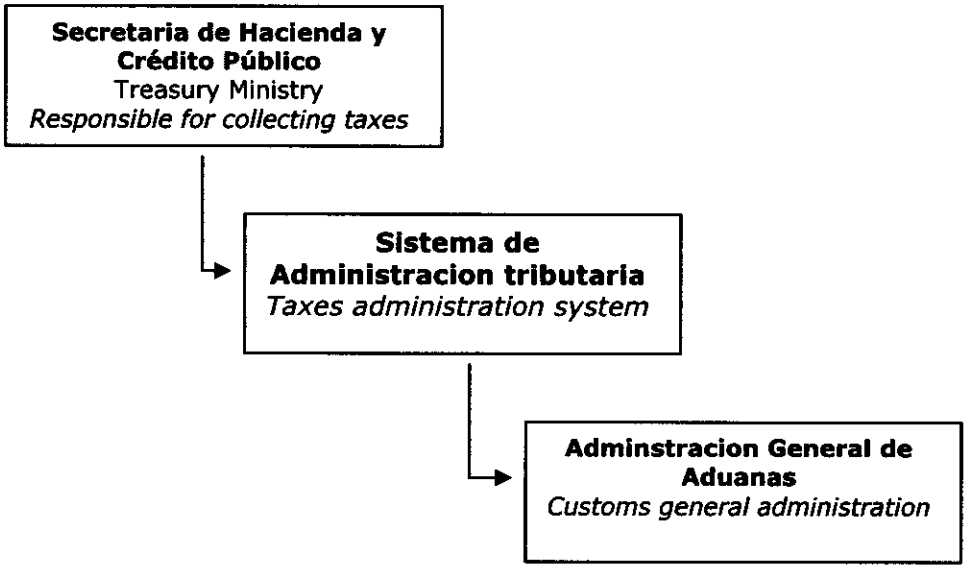
- The industry related to CFCs must be developed in a sustainable manner.
- Employment must be kept in all related industries, particularly in small and medium sized enterprises (SMEs), which play a major role in the refrigeration service sector. Even more employment may be created as a result of successful implementation.
- The requirements of CFC refrigerants for servicing and maintenance of existing CFC refrigeration and air-conditioning equipment must be satisfied and must be supplied through the national recovery and recycling project.
- The service sector in Mexico is not well coordinated due to the huge number of SMEs involved.
- Availability of CFC is limited in the near future.
- Legislation framework in Mexico may need is to be fine tuned.

Under the above circumstances, the present sector phase-out plan must serve as a seed to initiate a sustainable national system for refrigerant recovery and recycling and the responsible use of refrigerant in the refrigeration industry and the consumer sector.

Project components with specific activities or actions, objectives and modalities of implementation in each project component are elaborated below.

A. Customs training program

Current system: The current organization of customs offices in Mexico is illustrated below.



Customs general administration is a Governmental organization belonging to Federal Government under SAT office (Taxes Administration Service) of SHCP (Secretaria de Hacienda y Crédito Público – Treasury Ministry for collecting taxes).

Their main function is acting as public prosecutor, to watch over and to inspect and take control about incoming and leaving commodities to assure carrying out customs laws referring to exterior trade, collecting taxes. It also provides guidelines on import/export procedures, Customs law, currency exchange rate, and related matters.

There are 48 customs and 177 service points in Mexico, as follows:

19	North Border (3,152 km)
2	South Border (1,149 km)
17	maritime (11,122 km of coasts)
10	inside
48	Total

Out of 48 offices, sixteen (16) offices located in the north boarder are important for

investigation of CFC and CFC equipment.

Every custom has following officers, -

Chief administrator,
Administrators for general matter, specific sectors, accounting and banks, textile sector,
Sub-administrators for accounting, banking operations, importers and general census,
Chiefs for baking institutions, accounting, public attention,
fiscal policemen, customs officers, customs operators and tax collector.

The average number of staff in each customs office is 130. These customs officers are not trained on the issues of ODSs and Montreal Protocol. None of customs point is equipped with tools to identify CFCs.

Program: In the present project proposal, two different kinds of training workshops are planned, that is, (1) the general training for all customs offices on ODS issues, and (2) the intensive training for 16 important customs offices.

The training of 150 customs officers (about 3 officers from one customs office) will be carried out to get them acquainted with the Montreal Protocol and related environment issues, and to enable 16 key offices to identify controlled substances under the Montreal Protocol, and imported refrigerators, freezers and other refrigeration and air-conditioning equipment using CFCs.[8] The experience obtained at customs authorities in non-A5 countries will be shared at training courses. For this purpose, ten one-day training workshops will be organized.

The intensive training course for three days will be organized for staff of five key customs offices. In addition to general training on ODS issues, practical training will be given to key customs officers on use of refrigerant identifiers, details of CFC and CFC containing equipment, and illegal trade of CFC and CFC equipment.

CFC detection equipment will be provided to major customs points in the country. In addition, the project allows the customs department to create a database on imported ODS.

B. National technicians training program

Overview: One of the components of a CFC phase-out strategy in the refrigeration service sub-sector is a program for training service technicians in the good service practices in refrigeration and air conditioning, to avoid or reduce the intentional or unintentional release of refrigerant to the atmosphere and particularly about the proper use of controlled refrigerants, CFC-12 and CFC-11. In addition, this project promotes the recovery, recycling and reclamation of refrigerants in order to reduce the reliance on virgin CFCs for their service business, leading to the CFC consumption reduction.
The training provided should be specified in such a way that at the end of the courses each technician should be able to:

[8] "Training manual for customs officers" published by UNEP is a basis of training manual.

- Understand how the CFC refrigerants affect the ozone layer and what kind of effects for the damage of the ozone layer have concerning life on earth.
- Apply appropriate methods of repairs, maintenance and installation of refrigeration or air conditioning equipment.
- Use refrigerant detection equipment to identify early leaks of gases to the atmosphere.
- Apply proper methods of cleaning, charging and discharging refrigeration units to avoid or to reduce the release of ODS into the atmosphere.
- Use proper methods to assess the correct amount of refrigerant to be put into the refrigeration unit during service or repair.
- Use properly the equipment for the recovery or the recycling of refrigerant in the workshops.
- Recognize the ethical implications of using ODS for the future of the world.

The national training plan will be developed in several phases;

- Training of trainers who will be teacher for consecutive training courses.
- Training courses to train and certificate 4,000 service technicians out of 20,000 technicians in 8,000 workshops.

Due to the constraint of the funding, only a part of technicians from selected service workshops will be trained under the present project. Certified technicians or workshops will receive service tools or recovery unit. Training of the rest of the technicians as a part of a certification continuous program will be developed in an early future.

The conditions and specifications of this technician certification program is to be developed by the administration of the program.

Training institute and training material: In Mexico there are several training institutions,

CONALEP (Colegio Nacional de Educación Pública),
D.G.T.I. (Direccion General de Educacion Tecnologica Industrial),
CECATI (Centros de Capacitacion para Trabajo Industrial),
ITESM (Instituto Tecnologico de Estudios Superiosres de Monterrey),
UNAM (Universidad Nacional Autonoma de Mexico),
UECYTM (Dereccion General de Educacion en Ciencias y Technologia del Mar) and
ITACE (Instituto Tamaulipeco de Capacitacion Para el Empleo).

CONALEP is a country wide institution for training of refrigeration technicians. They have 429 shcools all ove the country. CECATI in Mexico city has 41 schools and provides 6 months training, 20 people in 6 months. OEMs (York, Carrier etc.) also have their own training function to train their service technicians. Above institutions are expected to take part in the present program.

Although training institutes in Mexico are relatively well equipped with teaching aids and training equipment, selected schools will be upgraded in terms of training facility by providing with tools for recovery and recycling.

The instructor or the administration of the courses develop or select the appropriate training materials for the courses in Spanish, which includes standard textbooks with the support of audiovisual materials such as computer assisted animations, technical films, transparency films.

The suitability of using the UNEP publication as a textbook of any of the courses should be evaluated, as well as any other training materials from other Spanish speaking countries for similar training.

Instructors for the training Program should demonstrate their technical skills and experience in training and that they should speak Spanish Language by registering at the Office with the responsibility for the Administration of the Program using their curriculum vitae or resume.

In accordance with the required profile they should have:

a) Academic background appropriate for each level of training
b) Experience as instructor in refrigeration.
c) Practical experience in the area.
d) Knowledge about the national and international regulations for protecting the ozone layer.

C. National recovery and recycling project

Establishment of recycling centers: Totally 36 recycling centers will be established at major cities in each region, so that every service workshop can access to centres.

Table 21. Proposed recycling centres, number in parenthesis.

Region	Cities
South (7)	Acapulco (1), Toluca (1), Puebla (1), Queretaro (1)
	Mexico city (3)
Southeast (5)	Cancun (1), Campeche (1), Merida (1), Veracruz (1), Villahermosa (1)
North (10)	Cd. Juarez (1), Cd. Victoria (1), Chihuahua (1), Nuevo Laredo (1), Reynosa (1), Torreon (1), Tampico (1), Durango (1)
	Monterey (2)
Pacific central (9)	Leon (1), Cd. Obregon (1), Culiacan (1), Hermosillo (1), Mazatlan (1), Puerto Vallarta (1), San Luis Potosi (1)
	Guadalajara (2)
Free frontier (5)	Ensenada (1), Tijuana (1), Mexicali (1), Nogales (1), La Paz (1)

Equipment to be provided to recycling centers includes a recovery machine, a recycling machine, a recycling machine with function to remove non-condensable gas, several small recovery cylinders, vacuum pumps, a refrigerant identifier (infrared type), a storage cylinder, service tools (piercing valve, gauge manifold etc.), and a hand-held leak detector. They also

need a cylinder to keep un-recyclable refrigerants until further treatment will be done. Reclamation facility already installed in Mexico will be effectively used in the scheme.

Service equipment and recovery machines: Essential service equipment for good servicing practice and refrigerant recovery will be provided to selected service workshops under defined criteria by SEMARNAT with the assistance of UNIDO. It includes vacuum pumps, recovery machines, piercing valves and other service tools. In order to facilitate the reduction of use of CFC-11 for flushing refrigeration systems, flushing units with non-ODS flushing agents (e.g., alcohols, glycol, ethers) are going to be provided to selected service workshops, where amount of CFC-11 usage is high. All recipients must be certified after the training planned in the present plan.

4.4 Incentive program for retrofitting or replacement of industrial equipment

Incentive program for encouraging retrofitting or replacement of existing CFC based relatively big installation is planned in addition to already completed projects at supermarket chains. Target end-users of this scheme includes corporate users including remaining super market chains, and public users of refrigeration equipment.

4.5 Technical Support Component

Since the sector phase-out plan will addresses the entire refrigeration sector, the industry as a whole will need to be supported through provision of a technical support component to ensure that phase-out actions and initiatives are not only technically sound but also sustainable, and consistent with the important priorities of the Government, which are to prevent industrial dislocation and obsolescence. The technical support component will assist the refrigeration sector as a whole, on, -

a) Establishment quality and performance standards for the CFC-free products and applications within the sector;

b) Interaction with the user industry for providing technology assistance for sustainability of CFC-free refrigeration applications through technical workshops and meetings;

c) Establishment of a training, certification and licensing program for refrigeration system production equipment operators and technicians for sustaining the CFC-free technologies.

This would also provide the Government of Mexico with flexibility for project implementation, thereby the strategy is able to cope with specific situation occurring during the execution of the program.

4.6. Timetable for implementation of the sector phase out plan

Table 22 shows the timeframe for the implementation of each activity in each project component.

Table 22. Timetable for implementation of the THE SECTOR PHASE-OUT PLAN,

Mexico

Year	2003	2004		2005		2006		2007		2008		2009		2010	
Reduction in ref. manufacturing sector							50								
Reduction in service sector	0		0		50		400		500		350		200		100
Approval	*														
Project management															
Coordination group set up															
Training of national experts															
Awareness promotion															
Monitoring															
Reports		*		*		*		*		*		*		*	
Technical support component															
Refrigeration manaufacturing sector															
Customs training															
Technician training															
Recovery and recycling scheme															
Equipment delivery to centres															
training of centre staff															
Delivery of equipment to shops															
Incentive program															

Chapter 5. Incremental costs

5.1 Refrigeration manufacturing sector

Incremental costs for the manufacturing sector plan is composed of equipment costs for modification of existing foaming machines and refrigerant charging units depending on the baseline equipment of enterprises. Incremental operating cost for 24 months operation will be provided to assist enterprises included in the present sector phase-out plan for conversion. The cost detail is elaborated in ANNEX I.

5.3 Refrigeration service sector

Financial assistance required for each activity is summarized in Table 23 for the consideration by the Multilateral Fund. The grant is requested in five tranches from 2003 to 2007, so that an effective use of the allocated fund is ensured. The administration costs of the implementing agency are 7.5 % of the project cost.

Table 23. Costs of the CFC NPP, Mexico

Project component and activity	Sub total	2003 tranche	2004 tranche	2005 tranche	2006 tranche	2007 tranche
PROJECT MANAGEMENT	905,000	117,000	235,750	235,750	180,750	135,750
TECHNICAL SUPPORT COMPONENT	400,000	0	0	100,000	100,000	200,000
REFRIGERATION MANUFACTURING SECTOR PROGRAM	981,876	544,000	0	437,876	0	
CUSTOMS TRAINING PROGRAM	337,000	337,000	0	0	0	0
NATIONAL PROJECT FOR TRAINING SERVICE TECHNICIANS	1,928,300	113,300	907,500	907,500	0	0
NATIONAL RECOVERY AND RECYCLING PROJECT	5,115,880	380,800	2,135,000	2,135,000	465,080	0
INCENTIVE PROGRAM FOR RETROFITTING AND REPLACEMENT	500,000	0	0	0	0	500,000
TOTAL PROJECT COST	**10,168,056**	**1,492,100**	**3,278,250**	**3,816,126**	**745,830**	**835,750**
IA Support Cost	**762,604**	**111,908**	**245,869**	**286,209**	**55,937**	**62,681**
Total Grant by MFMP	**10,930,660**	**1,604,008**	**3,524,119**	**4,102,335**	**801,767**	**898,431**
Business plan 2003 - 2005		3,225,000	0	5,913,000	0	0

The cost breakdown of activities in the project components is given in Annex III.

Chapter 6. Management

The overall management of the plan will be carried out by the Government of Mexico with the assistance of UNIDO.

The Ozone Office will be responsible for monitoring the implementation of the phase-out plan. The Ozone office in SEMARNAT will be responsible for tracking the promulgation and enforcement of policy and legislation and will assist UNIDO with the preparation of annual implementation plans and progress report to the Executive Committee.

The implementation of the phase-out plan will need to be closely aligned and coordinated with the various policy, regulatory, fiscal, awareness and capacity-building actions, which the Government of Mexico is executing, in order to ensure the consistency with the Government priorities.

The phase-out plan for the whole refrigeration sector will be managed by a dedicated team, consisting of a coordinator to be designated by the Government and supported by representatives and experts from the implementing agency and the necessary support infrastructure. The policy and management support component of the phase-out plan will include the following activities for the duration of the plan:

a) Management and co-ordination of the Plan implementation with the various Government policy actions pertaining to the refrigeration sector,
b) Establishment of a policy development and enforcement program, covering various legislative, regulatory, incentive, disincentive and punitive actions to enable the Government to acquire exercise the required mandates in order to ensure compliance by the industry with the phase-out obligations
c) Development and implementation of training, awareness and capacity-building activities for key government departments, legislators, decision-makers and other institutional stakeholders, to ensure a high-level commitment to the Plan objectives and obligations
d) Awareness creation of the Phase-out Plan and the Government initiatives in the Sector among consumers and public, through workshops, media publicity and other information dissemination measures
e) Preparation of annual implementation plans including determining the sequence of enterprise participation in planned sub-projects
1) Verification and certification of ODS phase-out in completed sub-projects within the Plan through plant visits and performance auditing
g) Establishment and operation of a reporting system of usage of ODS/substitutes by users
h) Reporting of implementation progress of the Plan for the annual performance-based disbursement
i) Establishment and operation of a decentralized mechanism for monitoring and evaluation of Plan outputs, in association with provincial regulatory environmental bodies to ensure sustainability.

For implementation of service sector activities, the coordination office in the four regions of Mexico will coordinate the project implementation in each region for following activities, -

- Reassessment and analysis of the sector after the approval of the sector phase-out plan.
- Determination of the specification of equipment to be provided by the sector phase-out plan.
- Selection of trainers for training of technicians (SEMARNAT with the help of UNIDO).
- Selection of service workshops to be trained.
- Awareness promotion.
- Assist SMRNAT for developing licensing system.
- Monitoring and report to SEMARNAT.

Coordination offices are to be established in the south, southeast, north and pacific central regions. One in the pacific central region looks after north border region. Location of the regional coordination offices are as below, -

1. South region, Mexico city
2. Southeast region, Merida
3. North region, Monterey
4. Pacific central region and Free frontier region, Hermosillo

SEMARNAT will be responsible for the national coordination of the whole program. Table 24 is a management organization of the service sector program.

Table 24. Management organization of service sector program

Region	Coordination office	Recycling centre	Number of workshops	Number of technicians	CFC Usage	
					MT	%
SEMARNAT	Central office	-	-	-	-	-
South	1	7	2,505	6,262	265	15
Southeast	1	5	831	2,078	142	8
North	1	10	2,186	5,465	624	37
Pacific central	1	9	1,965	4,912	535	31
Free frontier		5	513	1,283	161	9

In each region, an advisory committee consists of representatives of the local governments (environmental departments and industry departments), customs offices, education and training institutions and industries.

The activities envisaged in the following are required for the coordination:

- A list of service workshops should be updated in terms of their CFC consumption, necessary equipment for recovery, their readiness to recover CFC, commitment to CFC phase out activity, capability and other factors relevant to the recovery and recycling scheme project.
- Possible institutes and/or enterprises for centers for training and recycling should be surveyed.
  The business criteria of refrigerant recycling center should be developed.
- Recipient service workshops of recovery machine should be determined.
- Un-recyclable refrigerants should be kept for further treatment at the proper site.

Further, local distribution of service equipment and refrigerant recovery and recycle machines, which will be procured through UNIDO bidding procedure and delivered to the country, should be executed.

Chapter 7. Monitoring and evaluation

SEMARNAT monitors the consumption data of all ODS. Inspections at reconverted companies are foreseen to ensure the non uses of CFCs after project completion. The licensing system will be a tool to monitor and ensure compliance of control measures.

The Government has offered and intends continuing to offer continuity of activities and endorsement for the projects through the institutional support (National Ozone Unit) over the next years. This will guarantee the success of any activity approved for Mexico.

After the establishment of the countrywide scheme of refrigerant recovery and recycling, the monitoring activity will be initiated to know whether the project is successfully implemented and the target CFC phase out is achieved.

Monitoring activity will be done by:

(1) Establishing the system to ensure with the counterpart institute, that every recycling center and service workshop is encouraged or obliged to report data and give information to the recovery and recycling scheme. This may be enabled through forms to be filled by recycling centers and service workshops.
(2) Setting up adequate office facilities including a computer system to collect and analyze the data.
(3) Regular communication with the counterpart institute.
(4) Occasional visits to workshops and recycling centers.
(5) Regular communication with customs offices.

Following information will be collected from recycling centers and workshops.

CFC quantity

- number of appliances subjected to refrigerant recovery and type of these appliances at every service workshop,
- amount of recovered CFC refrigerants at every workshop,
- amount of recovered CFC refrigerants sent to the recycling centers at every workshop,
- amount of recovered CFC refrigerants stored at every workshop,
- amount of recovered CFC refrigerants received from service workshops at every recycling center,
- amount of recycled CFC refrigerants at recycling centers,
- amount of recycled CFC refrigerants returned (sold) to workshops,
- amount of recycled CFC refrigerants used in workshops and its application,
- amount of CFC refrigerants, which can not be recycled and are subject to further treatment (e.g., sent to reclaiming plants, or decomposition plants abroad)
- other data relevant for monitoring the scheme (amount of imported CFC refrigerants etc.).

Cost information

- cost of recovery at every service workshop and parties who bear the cost,
- cost of recycling at every recycling center and parties who bear the cost,
- price of recycled CFC refrigerants,
- other financial information relevant to monitoring the recovery and recycling scheme.

Data and information collected will be analyzed to check the adequate operations of the scheme.

Chapter 8. Performance targets and disbursement schedule

Table 25 gives an overview of the annual performance targets.

Table 25. Performance targets of the national CFC phase out plan, Mexico

Tranche	Management	Refrigeration manufacturing sector	Refrigeration service sector	CFC Reduction, MT
2003	Project approval			0
2004	Establishment of operational mechanism for management and monitoring of the phase-out plan	Working agreement with enterprise in the manufacturing sector	Training of national core team	0
	Coordination groups set up	Bidding of foaming equipment	Coordination office set up	
	Start of awareness promotion		Selection of recycling centres	
	Monitor and evaluation		Bidding of recycling centre equipment	
			Training of centre staff	
			Selection of training institutes	
2005	Monitor and evaluation	Provision of foaming and charging units to manufacturing enterprises	Bidding for service equipment for workshops (phase 1)	50
			Training of technicians (phase 1)	
2006	Monitor and evaluation	Commissioning of foaming equipment and charging units	Delivery of service equipment (phase 1)	655
	Workshops e.g., supplementary training		Bidding of service equipment (phase 2)	
			Training of technicians (phase 2)	
2007	Monitor and evaluation		Delivery of service equipment (phase 2)	500
	Workshops e.g., supplementary training		Selection of end-users or retrofitting and replacement	
2008	Monitor and evaluation		Execution of retrofitting and replacement	350
2009	Monitor and evaluation			200
2010	Monitor and evaluation			100

Upon approval of the phase-out plan by the MLF, the Government of Mexico, through UNIDO, requests the Executive Committee to authorize disbursement of funding for 2004 in advance, the implementation plan for which, is as following:

a) Establishment of operational mechanism for management and monitoring of the phase-out plan;
b) Formulation of detailed terms of reference and work plans for various activities under the technical support and policy & management support components;
c) Establishment of an operational mechanism for participation in the phase-out plan and for obtaining phase-out commitments from enterprises;
d) Initiating CFC phase-out activities for the ... medium-sized enterprises through individual sub-projects;
e) Selection of the small-sized enterprises for group projects;
f) Two workshops under the technical support component for technology assistance to prospective participant enterprises in the sector;
g) One workshop for public awareness and information dissemination under the policy and management support component.

Since the average duration required for completion of project components is expected to be 10 – 30 months, the phase-out activities initiated in 2003 will not produce results until mid or end-2004, contributing to the reduction of consumption starting 2005. Therefore, the Government of Mexico through UNIDO, will request the disbursement of the 2004 funding at the last Meeting of the Executive Committee in 2003. The funds for 2005 and 2006 will be transferred to UNIDO at the first meeting of the Executive Committee in these years, for the amounts listed in the table above, upon approval of the annual implementation plan and upon confirmation by the Government and UNIDO, that the agreed reduction targets and relevant performance milestones of the respective preceding years have been achieved.

The further detail must be agreed with the Executive Committee and stated in the Agreement.

ANNEX I. Regions and customs offices in Mexico

ANNEX II Project cost break down of phase-out plan in the manufacturing sector

A. Indicative list of remaining enterprises in the refrigeration manufacturing sector

#	Name	CFC-11 MT/year	CFC-12 MT/year	CFC TOTAL	Location
1	Aislamientos Const.	0.9	7.6	8.5	Apodaca
2	Banda, Ap.y Eq.R.	1.5	0.6	2.1	Morelia
3	Equip.y Refac.Refrig.	4.13	2.1	6.23	México
4	Frío y Control de V	1.13	0	1.13	Veracruz
5	Friocima, S.A.	2.49	1.6	4.09	Celaya
6	G.I.Gareli	2.95	1.7	4.65	Cadereyta
7	Ingeni.en Prod.Con	0	0	0	México
8	Kidron,S. de R.L.	0.35	0	0.35	Monterrey
9	Manitogo Refrigera.	3.2	1.3	4.5	México
10	Pure, S.A.	0	1.3	1.3	México
11	Refricom	1.35	0	1.35	Veracruz
12	Refrigera. Campos	0.9	0.7	1.6	Morelia
13	Refrigera. Moderna	0.45	0	0.45	Veracruz
14	Refrigeracion y Re.	9.15	2.2	11.35	Escobedo
15	Zelma Kooler de Mé.	1.2	0.9	2.1	Mérida
	Total(15 enterprises)	29.7	20	49.7	
	ODS phased-out	26.43	20.00	46.433	

#	Name	Baseline equipment Foaming	Baseline equipment Refrigeration	Eligibility
1	Aislamientos Const.	Hand mixing equip.	9 VP& 1 CB & 2 LD	yes
2	Banda, Ap.y Eq.R.	LP Gusmer F1600	2 VP& 1 CB & 1 LD	yes
3	Equip.y Refac.Refrig.	LP Gusmer	3 VP& 1 CB & 1 LD	yes
4	Frío y Control de V	LP Gusmer FF	1 VP& 1 CB & 1 LD	yes
5	Friocima, S.A.	LP Gusmer H3	1 VP& 1 CB & 2 LD	yes
6	G.I.Gareli	LP Gusmer HL2000	2 VP& 1 CB & 1 LD	yes
7	Ingeni.en Prod.Con	no foam operation	1 VP& 1 CB & 1 LD	no
8	Kidron,S. de R.L.	LP Gusmer H-II	N.A.	yes
9	Manitogo Refrigera.	Hand mixing equip.	1 VP& 1 CB & 1 LD	yes
10	Pure, S.A.	no foam operation	3 VP& 2 CB & 2 LD	yes
11	Refricom	LP Gusmer 1600	1 VP & 1 CB & 1 LD	yes
12	Refrigera. Campos	Hand mixing equip.	1 VP& 1 CB & 1 LD	no
13	Refrigera. Moderna	LP Gusmer FF	1 VP & 1 CB & 1 LD	yes
14	Refrigeracion y Re.	LP Cannon C60	4 VP & 1 CB & 3 LD	yes
15	Zelma Kooler de Mé.	LP Cannon L-100	1 VP & 1 CB & 1 LD	yes

VP= Vacuum pump 31 units
CB= Charging board 15 units
LD= Leak detector 19 units

B. INCREMENTAL CAPITAL COSTS

Foaming operation			
base line	Hand mixing	Dispenser	Subtotal
Number of enterprises	2	10	13
Foam dispenser	20,000	45,000	
Trials	2,000	2,000	
Technical asistance	1,500	1,500	
Training	1,000	1,000	
Subtotal	24,500	49,500	
Sub-total foaming (all enterprises)	49,000	495,000	544,000
Refrigerant operation			
Equipment	unit cost	Number	
Vacuum pumps	2,500	31	77,500
Charging units	2,000	15	30,000
Leak detectors	1,000	19	19,000
Subtotal refrigeration equipment			126,500
Technical services			
Trials			1,000
Technical asistance			1,000
Training			500
Subtotal			2,500
Number of enterprises			13
Subtotal for techncial service			32,500
Subtotal refrigeration equipment & services			159,000
Sub-total foaming & refrigeration			703,000
Contingencies (10%)			70,300
Grand Total			**773,300**

C. INCREMENTAL OPERATING COSTS

Foam operation		Before conversion	After conversion
Foam chemicals	kg	228,462	239,885
Rate	US$/kg	2.5	2.67
Amount	US$	571,154	640,492
Net incremental Costs	US$	69,338	
(5%) Savings due to more efficient operation	US$	3,467	
Incremental Operating costs	US$	65,871	
One year (10% discount factor)	US$	59,943	
Second year (10% discount factor)	US$	54,673	
I.O.C. Two years	US$	114,616	
Incremental Operating costs for foaming operation	US$	114,616	
Refrigerant operation			
Item	Refrigerant		
unit	kg		
Quantity	20,000		
Price differential (pre and post conversion)	US$	3	
Modifying factor	US$	0.9	
Net incremental cost (US$/year)	US$	54,000	
One year (10%) discount factor (.91)	US$	49,140	
Second year (10%) discount factor (.83)	US$	44,820	
Incremental operating cost for refrigerant operation	US$	93,960	
Total Incremental Operating costs (foam & refrigeration)	US$	208,576	

D. TOTAL COSTS

Incremental Capital Costs including contingencies	US$	773,300	
Incremental Operating Costs	US$	208,576	
GRAND TOTAL INCREMENTAL COSTS	US$	981,876	

ANNEX II. Cost breakdown of project components of National CFC phase-out plan, Mexico, in US$

Items	Description	unit cost	Q'ty	Sub total	2003 tranche	2004 tranche	2005 tranche	2006 tranche	2007 tranche
PROJECT MANAGEMENT									
International consultant		5,000	6	30,000	5,000	10,000	10,000	5,000	0
Training of national experts		2,000	30	60,000	60,000				
Awareness promotion		5,000	12	60,000	15,000	15,000	15,000	15,000	
Coordination	National consultant in SMARNAT			100,000	25,000	25,000	25,000	25,000	
	Coordination office set up	115,000	4	460,000	0	115,000	115,000	115,000	115,000
	Office equipment	3,000	4	12,000	12,000				
	local services, e.g., selection of service providers and recipients, distribution of equipment			100,000		50,000	50,000		
	travel	500	150	75,000		18,750	18,750	18,750	18,750
	report and sundries	2000	4	8,000		2,000	2,000	2,000	2,000
Element Total				905,000	117,000	235,750	235,750	180,750	135,750

Items	Description	unit cost	Q'ty	Sub total	2003 tranche	2004 tranche	2005 tranche	2006 tranche	2007 tranche
TECHNICAL SUPPORT COMPONENT				400,000		0	100,000	100,000	200,000

Items	Description	unit cost	Q'ty	Sub total	2003 tranche	2004 tranche	2005 tranche	2006 tranche	2007 tranche
REFRIGERATION MANUFACTURING SECTOR PROGRAM									
Equipment, foam operation				544,000	544,000				
Equipment, refrigeration operation				159,000			159,000		
Contingency				70,300			70,300		
Incremental operating cost				208,576			208,576		
Element total				981,876	544,000	0	437,876	0	0

Items	Description	unit cost	Q'ty	Sub total	2003 tranche	2004 tranche	2005 tranche	2006 tranche	2007 tranche
CUSTOMS TRAINING PROGRAM									
Training matrial draft and printing 1,000 pieces				50,000	50,000				
General workshops x 10 with 20 participants, totally 200 customs officers to be trained		9,580	10	95,800	95,800				

3 days- Intensiv	workshop for	teachers ($ 5,000),	91,200	1	91,200	91,200				
important 16 cus	oms points, 8	conference room ($ 2,000),								
participants fron	each point	travel & DSA ($ 83,200, 128 x $650)								
		International customs experts	5,000	5	25,000	25,000				
Identifiers			1,000	50	50,000	50,000				
Contingency					25,000	25,000				
Element Total					**337,000**	337,000	0	0	0	0
Items		**Description**	**unit cost**	**Q'ty**	**Sub total**	**2003 tranche**	**2004 tranche**	**2005 tranche**	**2006 tranche**	**2007 tranche**
NATIONAL PR(JECT FOR TRAIING SERVICE TECHNICIANS										
Establishemnt o	training centres									
Training of train	s		500	30	15,000	15,000				
Training equipm	nt	teaching aids	400	10	4,000	4,000				
		training rigs	1,000	10	10,000	10,000				
		recovery machine	500	10	5,000	5,000				
		recycling machine to be used for both training and recycling in R&R project	6,000	10	60,000	60,000				
		cylinders, 13 kg	30	10	300	300				
		vacuum pumps	300	10	3,000	3,000				
		refrigerant identifier	1,000	10	10,000	10,000				
		service tools, piercing valve, gauge manifold etc.	300	10	3,000	3,000				
		leak detector	300	10	3,000	3,000				
Training worksh	ps	400 x 3-days training course with 10 trainees								
		support for outstation trainees	150	4,000	600,000		300,000	300,000		
		material - preparation drafting, translation, printing 10,000 copies	10	10,000	100,000		50,000	50,000		
		fee for teachers	250	400	100,000		50,000	50,000		
		trainijng course arrangement	2,000	400	800,000		400,000	400,000		
		certification	10	4,000	40,000		20,000	20,000		
Contingency					175,000		87,500	87,500		
Element Total					**1,928,300**	113,300	907,500	907,500		
Items		**Description**	**unit cost**	**Q'ty**	**Sub total**	**2003 tranche**	**2004 tranche**	**2005 tranche**	**2006 tranche**	**20u/ tranche**
NATIONAL REC OVERY AND RECYCLING PROJECT										
Establishment of	ecycling centre	Total 36 recylcing centres								
Training of recov	ry centre staff		500	36	18,000	18,000				

Centre equipment	recycling machine with air purge function	8,000	36	288,000	288,000				
	recovery cylinders	50	200	10,000	10,000				
	storage cylinders	200	36	7,200	7,200				
	service tools (piercing valve, gauge manifold etc.)	300	72	21,600	21,600				
	refrigerant analyzer	1000	36	36,000	36,000				
	Sub total			380,800					
Equipment for service shops									
	Recovery unit with filters	700	2000	1,400,000	0	700,000	700,000	0	0
	Recovery unit	500	1,000	500,000	0	250,000	250,000	0	0
	Vacuum pump	200	4,000	800,000	0	400,000	400,000	0	0
	Recovery cylinder	30	4,000	120,000	0	60,000	60,000	0	0
	flushing unit with non-CFC	500	500	250,000	0	125,000	125,000	0	0
	service tools (piercing valve, gauge manifold etc.)	300	4,000	1,200,000	0	600,000	600,000	0	0
	Sub total			4,270,000					
Contingency				465,080				465,080	
Element Total				5,115,880	380,800	2,135,000	2,135,000	465,080	0

Items	**Description**	**unit cost**	**Q'ty**	**Sub total**	**2003 tranche**	**2004 tranche**	**2005 tranche**	**2006 tranche**	**2007 tranche**
INCENTIVE PROGRAM FOR RETROFITTING, REPLACEMENT				500,000	0	0	0	0	500,000
				Sub total	***2003 tranche***	***2004 tranche***	***2005 tranche***	***2006 tranche***	***2007 tranche***
Total funding				10,168,056	1,492,100	3,278,250	3,816,126	745,830	835,750
IA Cost				762,604	111,908	245,869	286,209	55,937	62,681
Total Grant by MFMP				10,930,660	1,604,008	3,524,119	4,102,335	801,767	898,431

GOVERNMENT NOTE
OF TRANSMITTAL OF INVESTMENT PROJECTS

PROJECT OF THE GOVERNMENT OF MEXICO

The Government of Mexico requests the WORLD BANK to submit the project listed in Table 1 below to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol for consideration at its 41st Meeting.

Section I: ODS Consumption Data

1. The ODS consumption figures of the project have been validated by the National Ozone Unit (NOU) to the level required under this performance agreement.

2. The consumption data have been retained in the records of the NOU for reference and/or future verification.

3. The Government has been advised by the NOU that the agreement to the projects indicates a commitment to ensure that the validated phaseout figures will be realized and will yield a sustained reduction from the 2002 consumption.

Table 1: Project Submitted to the 41ST Meeting of the Executive Committee

PROJECT TITLE	Type of ODS	Consumption (ODP t)	Amount to be Deducted (ODP t)	Implementing Agency
Conversion from CFC-11, CFC-12 and CFC-113 into HFC, HCFC, HFE for technical aerosols at Tecnosol, Envatec and Dimmex.	CFC-11 CFC-12 CFC-113	30.31 4.00 35.8	30.31 4.00 35.8	WORLD BANK
TOTAL		**70.11**	**70.11**	

Section II: Other Relevant Actions Arising from Decision 33/2

4. It is understood that, in accordance with the relevant guidelines, the funding received for a project would be partly or fully returned to the Multilateral Fund in cases where technology was changed during implementation of the project without informing the Fund Secretariat and without approval by the Executive Committee;

5. The National Ozone Unit undertakes to monitor closely, in cooperation with customs authorities and the environmental protection authorities, the importation of CFCs and to combine this monitoring with occasional unscheduled visits to importers and foam companies to check invoices and storage areas for unauthorized use of CFCs.

6. It is understood that the National Ozone Unit might conduct a determined number of unscheduled visits to the recipient enterprises.

7. The National Ozone Unit will cooperate with the relevant implementing agencies to conduct safety inspections where applicable and keep reports on incidences of fires resulting from conversion projects.

Section III: Projects Requiring the Use of HCFCs for Conversion

In line with Decision 27/13 of the Executive Committee and in recognition of Article 2F of the Montreal Protocol, the Government

(a) has reviewed the specific situations involved with the projects as well as its HCFC commitments under Article 2F; and

(b) has nonetheless determined that, at the present time, the projects needed to use HCFCs for an interim period with the understanding that no funding would be available for the future conversion from HCFCs for the company/companies involved.

Name and signature of responsible Officer:

Sergio Sánchez Martínez

Designation: Date:

Director General 13-Oct-03

Telephone: (52) 55 56 24 35 00

Fax: (52) 55 56 24 35 83

E-mail: sergio.sanchez@semarnat.gob.mx