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COMITÉ EJECUTIVO DEL FONDO MULTILATERAL
PARA LA APLICACIÓN DEL
PROTOCOLO DE MONTREAL
Sexagésima séptima Reunión
Bangkok, 16 – 20 de julio de 2012

PROPUESTA DE PROYECTO: NIGERIA

Este documento contiene las observaciones y las recomendaciones de la Secretaría del Fondo sobre la siguiente propuesta de proyecto:

Destrucción

• Proyecto de demostración experimental sobre la gestión de desechos y destrucción de SAO	ONUDI

HOJA DE EVALUACIÓN DE PROYECTO - PROYECTO NO PLURIANUAL

NIGERIA

TÍTULO DEL PROYECTO	**ORGANISMO DE EJECUCIÓN**
Proyecto de demostración experimental sobre la gestión de desechos y destrucción de SAO	ONUDI

AGENCIA DE COORDINACIÓN NACIONAL: Ministerio Federal de Medio Ambiente, Nigeria

DATOS DE CONSUMO MÁS RECIENTES INFORMADOS PARA LAS SAO DEL PROYECTO

A: DATOS EN VIRTUD DEL ARTÍCULO 7 (TONELADAS PAO en 2010)

Anexo I, CFC	0		

B: DATOS SECTORIALES DEL PROGRAMA DE PAÍS (TONELADAS PAO, 2010)

SAO	**Subsector/cantidad**	**Subsector/cantidad**	**Totales**
CFC			0

PLAN ADMINISTRATIVO DEL AÑO EN CURSO: Financiamiento total: 801 299 $EUA Destrucción total: 84 toneladas PAO

TÍTULO DEL PROYECTO

USO DE LAS SAO EN EMPRESAS		n/c
SAO QUE SE ELIMINARÁN		n/c
SAO QUE SE AGREGARÁN		n/c
PROY. EN PLAN ADMINISTRATIVO ACTUAL		Sí
SECTOR		Desechos de SAO
SUBSECTOR		Equipos de refrigeración y aire acondicionado(CFC)
IMPACTO DE PROYECTO		84 toneladas
DURACIÓN DEL PROYECTO		24 meses
PROPIEDAD LOCAL		100%
COMPONENTE DE EXPORTACIÓN		%
DONACIÓN PEDIDA DEL FML	$EUA	911 724
COSTOS DE APOYO DEL ORGANISMO (7,5%)	$EUA	68 379
COSTO TOTAL DEL PROYECTO AL MLF	$EUA	980 103
RELACIÓN DE COSTO A EFICACIA	$EUA/kg	10,85 SAO (métrico)
HITOS DE SUPERVISIÓN DEL PROYECTO		Incluido

RECOMENDAC. DE LA SECRETARÍA:	Consideración individual

DESCRIPCIÓN DEL PROYECTO

Introducción

1. La ONUDI, en nombre del gobierno de Nigeria, presentó a la 67ª Reunión una propuesta para un proyecto de demostración experimental sobre la gestión y destrucción de desechos de las sustancias que agotan la capa de ozono, por un costo de 911 724 $EUA, según lo presentado originalmente, más los costos de apoyo del organismo. Este proyecto se presenta conforme a la decisión 58/19 y aborda a la destrucción de 84 toneladas métricas de desechos de SAO en el país.

2. En la 57ª Reunión, se decidió examinar los proyectos experimentales de destrucción de SAO que respondieran a la decisión XX/7 de la Vigésima Reunión de las Partes, que establecía que los proyectos experimentales podrían cubrir la recolección, el transporte, el almacenamiento y la destrucción de SAO, concentrándose en agrupamientos de existencias con alto potencial neto de calentamiento de la tierra, y en una muestra representativa de países al amparo del Artículo 5 situados en diversas regiones. Asimismo, los miembros subrayaron que los proyectos de demostración de destrucción de SAO deberían ser factibles e incluir métodos de cofinanciación renovables. En la 58ª Reunión del Comité Ejecutivo, se trataron los criterios y las pautas para la selección de proyectos de destrucción de SAO, y esto llevó a la decisión 58/19. Esta decisión estableció la base para el estudio y la aprobación de los proyectos de demostración de destrucción de SAO.

Antecedentes

3. En la 60ª Reunión, el Comité Ejecutivo proporcionó los fondos para que la ONUDI preparase un proyecto de demostración experimental de destrucción de SAO para Nigeria. La Secretaría realizó un estudio de esta propuesta, basada en los principios establecidos mediante la decisión 58/19. La Secretaría también aplicó el subapartado a) ii) a de la decisión, que especificaba que en el proyecto experimental no habría financiación disponible para la recolección de desechos de SAO. La definición para la recolección de SAO se incluyó en un Anexo del informe de la 58ª Reunión, llamado las “Definiciones de las actividades incluidas en las pautas provisionales para la financiación de los proyectos de demostración para destrucción de SAO”.

4. El proyecto experimental de Nigeria trata de demostrar un modelo comercial sostenible para la gestión de desechos de SAO, desde la recolección hasta su destrucción, usando ayuda del Fondo Multilateral como capital inicial para destruir sus existencias actuales de SAO no deseadas y generar créditos de carbono. Estos créditos se utilizarían posteriormente para establecer un programa de sustitución de electrodomésticos en el país para sostener el sistema actual de recuperación y recolección de SAO con vistas a incorporar otros refrigerantes más adelante. Este programa previó la sustitución de los refrigeradores y equipos de aire acondicionado domésticos existentes por otros más eficaces desde el punto de vista energético. Se diseñó de manera tal que las actividades serían total y económicamente autosuficientes y crearían los incentivos para actividades de gestión de desechos y de destrucción de SAO en el futuro. Se prevé que la futura destrucción de desechos de SAO será emprendida a través de instalaciones locales de incineración cuya capacidad se desarrollará mediante los ingresos generados a partir de estos créditos de carbono.

5. Asimismo, el proyecto brinda una oportunidad para examinar sinergias con un proyecto del rendimiento energético financiado por el Fondo para el Medio Ambiente Mundial (FMAM) y ejecutado actualmente por el PNUD y el gobierno de Nigeria, en especial en el fortalecimiento del sistema actual de recolección de desechos de SAO. Como Anexo I de este documento se adjunta una propuesta de proyecto detallada.

Descripción de proyecto

6. El proyecto experimental presentado por la ONUDI eliminará 84 toneladas de CFC-12 recogidas de fuentes industriales en Nigeria, en particular de refinerías de petróleo. Estas SAO no deseadas se inventariaron y están almacenadas para su destrucción. Algunas existencias de SAO todavía se encuentran en las respectivas compañías, si bien otras fueron transferidas al centro de recolección del Pueblo del ozono. Este Pueblo del ozono es un centro de desarrollo de tecnología donde se producen máquinas de recuperación y reciclado manufacturadas localmente y máquinas de fabricación de espumas. Asimismo, el Pueblo se está utilizando para los esfuerzos actuales de recolección de SAO no deseadas y parte del CFC-12 que se recoge de la industria ya está almacenado allí.

7. En Nigeria, el sistema actual de recolección de desechos de SAO está apoyado por las reglamentaciones ambientales nacionales sobre la protección de la capa de ozono. Actualmente, se centra sobre todo en fuentes industriales, ya que estas son las más fáciles de recolectar y almacenar. La recolección de CFC-12 había sido emprendida por las compañías petroleras individuales como parte de un esquema de recolección no doméstica requerido por las reglamentaciones nacionales.

8. En Nigeria la recuperación y el reciclado de SAO también se emprende como parte del sector de servicios del plan nacional de país para la destrucción de los CFC y apoyada por la reglamentación nacional. Sin embargo, hasta el momento no hay un sistema institucional organizado de recolección para los electrodomésticos. Por lo tanto, un objetivo del proyecto es establecer medidas institucionales mediante un programa de sustitución de electrodomésticos que organice los sistemas existentes de recuperación y de recolección en el país en un sistema integrado y eficiente de convalidación y evaluación de la recolección. Se prevé que esto apoyará la sostenibilidad del proyecto una vez terminada la fase experimental. Durante el proceso de preparación del proyecto se realizaron consultas sobre este programa. Además, hay algunas cantidades adicionales de CFC que se recolectarán de los refrigeradores que se sustituirán gracias al proyecto del Fondo Africano para la Sustitución de Enfriadores (AFROC). El total de refrigeradores y las cantidades de SAO instaladas se determinaron mediante el Fondo Africano para la Sustitución de Enfriadores y fueron confirmados durante la preparación de este proyecto experimental.

9. El enfoque global que se utilizará para destruir los desechos de SAO en Nigeria será a través de la exportación para destrucción y lo llevará a cabo EOS Climate Inc., una compañía establecida en Estados Unidos que es productor mundial de reducciones de emisiones verificadas y de alta calidad, generadas a partir de la destrucción de SAO. EOS Climate asegurará la destrucción de los CFC recolectados en Nigeria, en condiciones seguridad, y ejecutará el proyecto bajo el Protocolo Climate Action Reserve (CAR). El gobierno de Nigeria y la ONUDI firmarán un contrato con EOS Climate por el que pagarán una porción de los costos del proyecto relacionados con el transporte y la destrucción de los CFC. Los desechos de SAO se destruirán en Clean Harbors Environmental Service en El Dorado, Arkansas, una instalación reconocida por la Agencia de Protección Ambiental de Estados Unidos (EPA) así como por el PNUMA/Grupo expertos de evaluación técnica y económica con un nivel de eficacia de destrucción y remoción de SAO que excede el 99,99 por ciento. EOS Climate tiene una relación de promotor de preferencia exclusiva con Clean Harbors y se espera que esta asociación provea las mayores ventajas para Nigeria.

10. Además, EOS Climate es socio de Jaco Environmental, la más grande empresa de reciclado de electrodomésticos de Estados Unidos de América con 35 instalaciones que utilizan tecnologías avanzadas para asegurar la recuperación del 100 por ciento de los materiales de los componentes de los electrodomésticos, inclusive los refrigerantes con SAO y espumas de aislación. EOS Climate y Jaco Environmental juntos suministrarían la capacitación, los equipos, la tecnología y el apoyo operacional

para ayudar a establecer una infraestructura y sistema de reciclado de electrodomésticos para que el programa futuro de sustitución de electrodomésticos se formalice en Nigeria.

11. Asimismo la propuesta previó el diseño de un sistema que monetice créditos de carbono provenientes de SAO por destruir, que se utilizará para agrandar proporcionalmente el proyecto, dependiendo de los resultados de la actividad experimental. Por lo tanto, la ONUDI y Nigeria también han explorado diversas opciones locales para la futura destrucción de desechos de SAO en Nigeria, para después de terminado el proyecto experimental. Actualmente se está tratando con dos instalaciones de incineración con hornos rotatorios y una había manifestado interés. La instalación seleccionada deberá estar acreditada para cumplir con el 99,99 por ciento requerido de rendimiento de destrucción y eliminación, indicado por el Grupo de expertos de evaluación técnica y económica. Se considera que una vez que se cobren los créditos de carbono y el programa de sustitución de electrodomésticos esté en funcionamiento, la segunda fase del proyecto se podría ejecutar sin la financiación adicional del Fondo Multilateral.

12. Se prevé que el proyecto de demostración de destrucción de SAO se ejecutará en dos años.

Cálculo de las SAO por eliminar

13. Según lo presentado, la cantidad de SAO que el proyecto experimental manejará será 84 toneladas, todas ellas de CFC-12. Como se mencionó anteriormente, algunas de estas cantidades se almacenan en las compañías petroleras y otras están en el Pueblo del ozono y están listas para ser destruidas. La fuente de los desechos estimados de SAO se muestra en el Cuadro 1 siguiente:

Cuadro 1: Cantidades estimadas de desechos de SAO que se eliminarán en el proyecto

Fuente de recolección	**Cantidad (CFC-12) (TM)**
Compañías petroleras y compañías de mantenimiento	66,5
Refrigeradores sustituidos mediante el Fondo Africano para la Sustitución de Enfriadores	17,5
TOTAL	**84**

Gestión financiera del proyecto

14. La propuesta previó que el financiamiento del Fondo Multilateral cubrirá los costos de destrucción de los desechos de SAO actualmente disponibles, exportándolos a una instalación acreditada de destrucción en Estados Unidos de América, como se describe anteriormente. El promotor del proyecto (EOS Climate) mantendrá un porcentaje de los créditos de carbono necesario para pagar los costos de la gestión del proyecto de comercialización del carbono, incluyendo los aranceles profesionales para el mismo. El resto será administrado por el gobierno de Nigeria, y los ingresos se invertirán para mejorar la capacidad de las instalaciones locales de incineración para permitir la destrucción localmente, financiar el programa de sustitución de electrodomésticos y proporcionar el apoyo adicional a la capacitación de los técnicos en prácticas idóneas y recuperación de refrigerantes.

Supervisión y verificación de la destrucción

15. Para asegurarse de que todos los desechos de SAO se contabilizan correctamente, el proceso se supervisará de cerca y se registrarán los datos obtenidos. El promotor del proyecto será responsable de desarrollar un plan de supervisión que cubra todas las operaciones e informar sobre todas las actividades

asociadas al proyecto. Además, la Dependencia Nacional del Ozono será responsable de proporcionar la certificación del origen de los desechos de SAO, basado en los datos que se registran en el Pueblo del ozono. Verificará que las SAO se hayan recuperado o reciclado y se tomarán todas las precauciones para asegurar que no se desvía ninguna existencia virgen para la destrucción. No hay riesgo de que se inflen volúmenes ni que haya existencias inadmisibles, dado que no hay instalaciones de producción en Nigeria.

16. La instalación de destrucción seleccionada expedirá asimismo un certificado, para constatar las cantidades de las SAO destruidas. Posteriormente esto se verificaría contra las cantidades de SAO registradas en los centros de recolección y exportadas.

Costo del proyecto

17. La financiación total pedida para el proyecto se calculó en 911 724 $EUA. Los detalles se indican en el cuadro siguiente.

Cuadro 2: Costo propuesto del proyecto

COMPONENTE 1: COSTO DE RECOLECCIÓN Y PRUEBAS PARA 84 TONELADAS DE CFC-12			
COMPONENTE DE COSTO	**COSTO UNITARIO (EUA/UNIDAD)**	**COSTO TOTAL (EUA)**	
Transporte de 84 toneladas métricas de CFC-12 de diversos centros a lugares centralizados para la recolección	1 por kilogramo	84 000	
Costo de alquiler de 2 tanques ISO (20 pies, capacidad 17 toneladas)	20 000 por tanque	40 000	
Alquiler para estacionar los tanques ISO por un año	8 por tanque por día	5 840	
Pruebas de las existencias antes de la exportación (una por tanque por viaje - total 5 veces)	200 por prueba	1 000	
SUBTOTAL		**130 840**	
Contingencias	10% del total	13 084	
		COSTO TOTAL DE RECOLECCIÓN Y PRUEBA	**143 924**
COMPONENTE 2: TRANSPORTE Y DESTRUCCIÓN			
ACTIVIDAD	**COSTO UNITARIO (EUA)**	**COSTO (EUA)**	
Transporte del tanque ISO para exportación a otro país, inclusive el seguro y los sistemas de rastreo por GPS (5 viajes en total por los 2 tanques ISO)	10 000 por viaje	50 000	
Transporte del puerto del país al sitio de destrucción, inclusive el seguro y sistemas de rastreo por GPS	1000 por viaje	5 000	

Purificación y prueba en el sitio de destrucción por el laboratorio certificado de Instituto de Refrigeración, Calefacción y Aire acondicionado (AHRI) antes de la destrucción	1,0 por el kilogramo	84 000	
Destrucción del CFC-12	6 por el kilogramo	504 000	
SUBTOTAL		**643 000**	
Contingencias	10% del total	64 300	
COSTO TOTAL DE TRANSPORTE Y DESTRUCCIÓN			**707 300**
COMPONENTE 3: SUPERVISIÓN, LEGISLACIÓN Y SEGURIDAD			
COMPONENTE DE COSTO	**COSTO UNITARIO (EUA/UNIDAD)**	**COSTO TOTAL (EUA)**	
Gestión, coordinación y supervisión, mejora/modernización de la legislación local	30 000	30 000	
Salud, seguridad, capacitación sobre medio ambiente (cursos técnicos con experto internacional)	25 000	25 000	
SUBTOTAL		**55 000**	
Contingencias	10% del total	5 500	
COSTO TOTAL DE SUPERVISIÓN Y SEGURIDAD			**60 500**
COSTO TOTAL DEL PROYECTO			**911 724**

OBSERVACIONES Y RECOMENDACIÓN DE LA SECRETARÍA

OBSERVACIONES

18. La Secretaría hizo varias observaciones y comentarios respecto al proyecto presentado, basado en el estudio siguiendo los criterios establecidos en la decisión 58/19. Planteó varias cuestiones relacionadas con el sistema de recolección, hasta dónde se había preparado y cómo se sostendría el proyecto en el futuro. Observó además que hasta el momento sólo se cubrieron las fuentes industriales y expresó su inquietud por no tener razón para que todavía no se hubiese organizado la recolección de los electrodomésticos. La ONUDI explicó que la razón principal por la que los desechos de fuentes industriales se recogiese primero era que las refinerías de petróleo tenían ya un sistema que simplemente requería la recolección. Con respecto a los electrodomésticos, si bien se estaban realizando actividades de recuperación y reciclado, el gobierno creyó que organizándolo mediante un programa de sustitución de electrodomésticos que implantará, como resultado del proyecto experimental, era el mejor enfoque para resolver la cuestión. Esto permitiría al gobierno adquirir experiencia en todos los componentes del proceso de destrucción de SAO y en consecuencia permitiría una mejor gestión de los desechos recolectados de los electrodomésticos. La Secretaría también observó que el enfoque tomado para este proyecto experimental es similar a los de México y Turquía aprobados en las reuniones anteriores del Comité Ejecutivo, con ciertas cláusulas restrictivas.

19. Asimismo la Secretaría observó que si bien el proyecto experimental fue diseñado para exportar los desechos de SAO para su destrucción, la propuesta inicial presentada no era muy clara sobre qué se había seleccionado realmente, basado en las opciones presentadas sobre dónde estos desechos podrían

exportarse. Pidió que se aclarara los criterios usados por la ONUDI y el gobierno para decidir que los desechos fuesen transportados a Estados Unidos de América en lugar de Europa o Arabia Saudita, las otras dos opciones presentadas en la propuesta. La ONUDI aclaró que todas las opciones presentadas habían sido exploradas detenidamente; sin embargo, la razón de no enviar desechos de SAO a Europa ni a Arabia Saudita fue por la dificultad de encontrar a un comprador para los créditos en Europa, comparado con Estados Unidos de América, lo que podría causar retrasos en el proyecto. La buena relación actual entre el promotor propuesto y la instalación donde se llevará a cabo la destrucción había contribuido a esta decisión dado que habían asegurado al gobierno y la ONUDI que generarían los mejores resultados sostenibles para el proyecto y el país. La Secretaría trajo a la atención de la ONUDI las inquietudes similares del Comité Ejecutivo en lo que respecta al proyecto experimental para México y Turquía. La ONUDI indicó que éstos se han tenido en cuenta en la decisión final.

20. La Secretaría pidió una explicación para la fase II del proyecto con el fin de comprender su futura sostenibilidad. Asimismo solicitó a la ONUDI que proporcionase más información sobre los criterios usados para decidir que la destrucción local a través de instalaciones de incineración en el país era la mejor opción para la destrucción futura. La ONUDI había indicado que si bien se está explorando esta opción, el proceso concluiría sólo una vez que se hubiesen generado los ingresos del carbono. La ONUDI también reconoció que el costo local de la destrucción podría ser demasiado alto, basado en los ajustes que deben hacerse a las instalaciones locales para permitir que cumpla con las normas del Grupo de expertos de evaluación técnica y económica. Sin embargo, dado que una instalación estaba interesada si se proporcionaba cierta ayuda técnica y económica, el gobierno de Nigeria creyó que ésta sería la mejor opción económica y sostenible para el país. Asimismo consideró la posibilidad de que en el futuro la destrucción de desechos de SAO generada de los países en la región podría proporcionar ingresos adicionales. La ONUDI también puso de relieve que no se está buscando ninguna inversión de capital para la segunda fase del proyecto del Fondo Multilateral.

21. Asimismo la ONUDI había indicado que el costo total del proyecto experimental de destrucción de Nigeria es más alto que lo que se pide del Fondo Multilateral, y que otras fuentes de financiación proporcionarán los fondos restantes, como se indica en el cuadro siguiente:

Cuadro 3: Costo total del proyecto experimental de destrucción de SAO en Nigeria

COMPO-NENTE DE COSTO	**COMPONENTE DEL COSTO DEL PROYECTO**	**EUA**
1	Costos del proyecto no cubiertos por el FML	925 000*
2	Transporte, destrucción y gestión	916 724
3	Supervisión y verificación de destrucción de SAO para CAR	30 000
4	Gestión de proyecto para CAR	50 000
TOTAL		**1 921 724**
FINANCIACIÓN PEDIDA DEL FML		**911 724**

*Costos ya cubiertos mediante la recolección y el almacenamiento de las existencias provenientes de la industria y del gobierno.

22. En otras deliberaciones sobre el presupuesto, la Secretaría y la ONUDI convinieron en el costo final del proyecto en 911 724 $EUA, más los costos de apoyo de 68 379 $EUA, calculados en 10,85 $EUA/kg, que es más bajo que el umbral de 13,2 $EUA/kg previsto en la decisión 58/19. Esta cantidad está tal como se presentó originalmente y se resume en el Cuadro 2, apartado 16 antedicho.

23. La ONUDI también había proporcionado la información adicional requerida por la Secretaría que cumplió con todos los requisitos de las pautas de la decisión 58/19.

RECOMENDACIÓN

24. El Comité Ejecutivo podría:

a) Tomar nota con beneplácito de la presentación del gobierno de Nigeria de un proyecto experimental de gestión de desechos y destrucción de SAO para eliminar un total de 84 toneladas métricas de desechos de SAO;

b) Aprobar la ejecución de un proyecto experimental para la gestión de desechos y destrucción de SAO en Nigeria por 911 724 $EUA, más los costos de apoyo del organismo de 68 379 $EUA para la ONUDI, observando que la aprobación se da a condición de que:

i) No hubiera otros fondos disponibles para Nigeria para ningún proyecto de destrucción de SAO en el futuro;

ii) Toda comercialización de las reducciones de emisiones de gases de efecto invernadero generadas o asociadas al proyecto se haría conforme a una decisión del Comité Ejecutivo; y

c) Solicitar al gobierno de Nigeria, a través de la ONUDI, que estableciese un sistema de vigilancia para la operación y las actividades asociadas al proyecto de demostración de destrucción de SAO y solicitar a la ONUDI que informe al respecto al Comité Ejecutivo cuando terminé el proyecto en 2014, asegurándose de que no había habido ninguna comercialización de las reducciones de emisiones de gases de efecto invernadero.

MULTILATERAL FUND FOR THE IMPLEMENTATION OF THE MONTREAL PROTOCOL
ON SUBSTANCES THAT DEPLETE THE OZONE LAYER

PROJECT COVER SHEET

COUNTRY	Nigeria	**IMPLEMENTING AGENCY**	UNIDO
PROJECT TITLE	Demonstration Project for Disposal of Unwanted ODS in Nigeria		
PROJECT IN CURRENT BUSINESS PROJECT	Yes		
SECTOR	ODS Destruction		
SUB-SECTORS	Refrigeration and Air-conditioners (CFCs) sub-sector		

ODS DESTROYED	2 years of project (MLF funded)	84	mt of CFCs
	Carbon Trading Offset Programme, (expected average year 1)	66.5	mt of CFCs
	Carbon Trading Offset Programme, (expected average year 2)	17.5	mt of CFCs
PROJECT IMPACT	Reflecting annual emissions in CO2 equivalent in refrigerating sector in Year 1	652,365	tCO2 e
	Reflecting annual emissions in CO2 equivalent in refrigerating sector in Year 2	171,675	tCO2 e
	Carbon Trading Offset Programme: Year 1 Year 2	 651,916.13 171,557	 tCO2 e tCO2 e
PROJECT DURATION		2 Years (MLF funded phase)	

PROJECT COSTS			
	Incremental Capital Costs	US$	851,224
	Contingencies	US$	85,122
	Incremental Operating Costs	US$	N/A
	Policy & Management Support	US$	65,500
	Total Project Costs	US$	916,724

LOCAL OWNERSHIP		100%	
EXPORT COMPONENT		0%	
REQUESTED GRANT	US$	**911,724**	
COST EFFECTIVENESS	US$/kg	10.91	
IMPLEMENTING AGENCY SUPPORT COSTS	US$	68,379	
TOTAL COST OF PROJECT TO MULTILATERAL FUND	US$	**980,103**	
STATUS OF COUNTERPART FUNDING		Committed - Ozone Village Project- $1,500,000 towards future collection phase	
PROJECT MONITORING MILESTONES		Included	
NATIONAL COORDINATING BODY		Federal Ministry of Environment, Nigeria	

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List of Abbreviations

CAR	Climate Action Reserve
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CFC	Chlorofluorocarbone
CFI	Carbon Financial Instrument
CO2e	CO2-equivalent
CRT	Climate Reserve Ton
ExCom	Executive Committee of the Multilateral Fund for Implementation of the Montreal Protocol
FGN	Federal Government of Nigeria
GEF	Global Environment Facility
GHG	Greenhouse Gas
GWP	Global Warming Potential
HAP	Hazardous Air Pollutant
IET	International Emissions Trading
KP	Kyoto Protocol
MACT	Maximum Attainable Control Technology
MLF	Multilateral Fund for Implementation of the Montreal Protocol
MLS	Secretariat of the Multilateral Fund for Implementation of the Montreal Protocol
MP	Montreal Protocol
ODS	Ozone Depleting Substance
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbons Standard
VCU	Voluntary Carbon Unit

SECTION 1 – PROJECT OVERVIEW

1.1 PROJECT OBJECTIVES

UNIDO is re-submitting a Pilot Project for the Disposal of unwanted ODS collected in Nigeria to the 67th Meeting of the Executive Committee of the Multi-Lateral Fund (MLF) for the implementation of the Montreal Protocol.

The project will establish a model which will not only show the best way to manage of the unwanted ODS banks in the developing countries, but also will show how ODS Disposal can promote other environmental and climate change issues like Energy Efficiency, Carbon Market Co-financing among others.

In a nutshell, this project at first aims at disposing the already existing stocks of ODS collected by the oil companies from their installations and also the stocks to be collected from the chillers (under AFROC project) in Nigeria with the funding from the MLF and also would seek from carbon market co-financing from CAR (Climate Action Reserve). The second phase would use the funds generated from the carbon markets to assist in the establishment of an Appliance Replacement Project. This Appliance Replacement Project would involve replacing the existing domestic refrigerators and air-conditioners with more energy efficient ones and would be designed in such a way that it becomes self-sustainable within a short time.
No extra funding is requested from the MLF or from any other source particularly for this but would definitely create areas wherein synergies can be developed like best practices to collect the refrigerants from the appliances during servicing and also management of end-of-life appliances.

The salient features of this project are as follows:-

- Geographical and technical: This is the 1st disposal project in Africa that aims to use carbon credits to upgrade an existing facility to handle the ODS as well as POPs for disposal in future, including stocks from countries in the region. There has been much interest from other African countries to dispose of stocks of seized mixed ODS that are currently being stored and for which there is no market for voluntary credits. Currently, other countries are storing these stocks and are unsure what to do with them since the costs of shipping them for disposal to the US are too high. Considering the huge problem of mixed refrigerants entering West Africa, a disposal facility that can handle these stocks is highly needed.

- Sectoral: This would be the first ODS Disposal project aimed at disposing the stocks collected from industrial sources. The oil companies were encouraged to finance the collection of these ODS by replacing their equipments, thereby setting a classic example in which the industries consuming these gases form part of a disposal project in a developing country. This example can be followed in other parts of the world as well. These stocks may not have very high purity for which they do not find much demand in the servicing of the old equipments and thus, need to be disposed in time; otherwise long term storage may lead to loss of nearly 84 metric tonnes of CFC 12 into the atmosphere through slow leakage. It is the 1st project that will show how an article 5 country can manage industrial ODS wastes by enforcing the recovery of such wastes from end-of-life appliances.

- Geographical/co-financing: This is the first ODS Disposal Project aimed at establishment of an Appliance Replacement Project within Nigeria to promote energy efficiency and related climate benefits like reduction of GHG emissions and claiming CDM[1] credits as co-financing for

[1] CDM (Clean Development Mechanism) can be availed for the energy efficiency achieved by means of the new energy efficient appliances brought in place of the old inefficient ones. All similar programs around the world have availed the benefits of CDM.

expansion of the scheme. This would complement the *"Project for promoting Energy Efficiency in Residential and Public Sector in Nigeria"* which is being carried out by *United Nations Development Programme (UNDP) Nigeria Country Office in collaboration with the Federal Government of Nigeria (FGN) and the Global Environment Facility (GEF)*.

- This project does not seek any funding for the collection of the gases, but rather uses the money generated from the carbon markets to collect more gases by means of the Appliance Replacement project and then disposing them, again without any further funding.

- The project has created significant interest from the project developers and also from companies engaging in the end-of-life appliance management that are interested in setting up state-of-the art appliance recycling and refrigerant collection centers in Nigeria.

- Management of insulation foam and their blowing agents will also be considered in the Appliance Replacement project.

1.2 PROJECT STRATEGY

The oil companies in Nigeria have collected 66.5 metric tonnes of CFC 12 from their installations and the chiller replacement project is expected to collect another 17.5 metric tonnes. The stocks from the oil companies are available for disposal and thus would form the first phase of the project. The chiller stocks would be taken up in the second phase. The stocks in both phases would be disposed with funding from the MLF.

The disposal would also aim at availing carbon market co-financing under the Climate Action Reserve (CAR) and this money would be invested in various ways like Appliance Replacement, Creating a facility for disposal of future quantities of ODS Disposal and various others as mentioned in the previous section.

The Appliance Replacement program aims at replacing 100,000 domestic refrigerators per annum for three years and together can generate about 30 metric tonnes of ODSs for disposal through this. This project will incorporate the domestic air-conditioners after the mid-term evaluation done after 1.5 years of operation and thus has the potential of bringing in further quantities of ODSs for disposal. The project will be made self-sustainable with financing from various sources like CDM, CAR, sale of the steel and plastics from the old appliances, discounts from the manufacturers etc., all leading to providing discounts on the price of the new equipments.

Currently Nigeria does not have any ODS Disposal facilities or any regulations/policies mandating such activities. This project would aim at promotion of such activities apart from the promotion of Energy Efficiency and Climate issues, thereby creating numerous jobs in the country.

Regarding volatility in carbon prices, according to information obtained from project developers and buyers of voluntary carbon credits internationally (USA and Europe), although the market is volatile, price levels of 2 USD/CRT and 0.5 USD/VER have been identified as prices that could be obtained under prevailing market conditions.

1.3 JUSTIFICATION FOR THE ODS DISPOSAL PILOT PROJECT

This section details out how the project complies with the guidelines for funding of the demonstration projects for ODS disposal, laid out in the Decision 58/19 of the 58th Meeting of the Executive Committee of the Multi-Lateral Fund (MLF), in accordance with the paragraph 2 of the Decision XX/7 of the Meeting of the Parties to the Montreal Protocol.

- **An indication of the category or categories of activities for the disposal of ODS (collection, transport, storage, destruction), which will be included in the project proposal:**

  This project is requesting funds only for the aggregation/ transportation and destruction of ODS wastes. The collection activity related to this project is restricted to collection from industrial facilities to ensure a large, less dispersed waste stream.

  The four categories mentioned in the project as follows:-

  - **Collection** – Co-financing from the end-users to the tune of up to 475,000 USD was employed for the collection of all ODS stocks. The chiller stocks would be collected under the AFROC project using the same collection model established through the initial industrial collection scheme. Thus, no funding is needed from the MLF for collection.

  - **Aggregation/Transportation –** The gases need to be transported from Nigeria to the United States for disposal. Various means of transportation were evaluated including shipping cylinders in containers and shipping by means of ISO tanks. Shipping by means of ISO tanks was found to be easier, more economical and also safer (from the point of view of leakages during transit). Thus it is proposed to use two ISO tanks for two years for transporting the stocks, for which funding is being requested from the MLF. Aggregation in a central facility before shipping will also be done and funding is requested from the MLF for this purpose.

  - **Storage** – There is no separate need for any storage space for stocks or any funds for the same as they are already kept within the Ozone village or by the oil companies as established in the model for management of ODS Banks.

  - **Destruction** – The destruction costs for these stocks have been found to be around 6 to 7 USD per kilogram, which is a bit on the higher side. This is on account of the fact that these gases are from industrial sources and thus may contain impurities like oil, ions, etc., which require a higher retention time and thus higher energy costs for destruction. This cost is being sought from the MLF.

- **An indication of whether disposal programs for chemicals related to other multilateral environmental agreements are presently ongoing in the country or planned for the near future, and whether synergies would be possible:**

  This project has synergies to other programs as follows:-

  - **World Bank PCB Management Project:** This project aims to strengthen national capacity for management of Persistent Organic Pollutants (POPs) and in particular Polychlorinated Biphenyls (PCBs) as required under the Stockholm Convention on Persistent Organic Pollutants. Project will include a pilot disposal project demonstrated by 2015, where synergies related to health and safety training will be explored. Hazardous Chemicals/Waste Management Regulations will also be reviewed and harmonized. This activity will complement the ODS disposal programme, therefore the Ozone Unit will contribute to this activity so that the needs of the disposal programme are met in the harmonized regulations. In addition, the project aims to upgrade 4 PCB testing facilities.

This may also be complementary to the ODS disposal programme if these facilities can also be used for testing the collected CFCs. Since the project will also develop guidelines for transporting and handling of PCB containing oils from one location to the other, this synergy should be addressed in the harmonization of chemicals waste regulations to address the movement of ODS wastes and other chemical wastes.

- **African Fund for Replacement Of Chillers (AFROC):** Strategic Demonstration Project for accelerated conversion of CFC Chillers in 6 African Countries, both the Montreal Protocol and Global Environment Facility (GEF) have come together to replace existing chillers with more energy efficient ones in Nigeria. The project which was presented by UNIDO in the 47th Meeting of the Parties to the Montreal Protocol and subsequently funded by the Executive Committee through its Decision 47/26. This ODS Disposal project aims at disposal of the stocks collected from chiller replacement under the AFROC Project as well as other chillers that do not benefit from the project.

- **Project for promoting Energy Efficiency in Residential and Public Sector in Nigeria:** This project is being carried out by *United Nations Development Programme (UNDP)* Nigeria Country Office in collaboration with the Federal Government of Nigeria (FGN) and the Global Environment Facility (GEF). This project will set up comprehensive energy efficiency legislation in Nigeria as well as an appliance labeling scheme. The energy efficiency standards implemented through this project will complement the refrigerator replacement programme. The project will also develop an independent internationally accredited testing centre, certification standard codes and labeling and enforcement mechanism to promote the energy efficiency of end-use appliances at the national level. UNIDO and UNDP have examined the synergies between this project and the ODS disposal project. The energy efficiency standards put in place will lay a good foundation for replacement of refrigerators with low energy efficiency and the labelling scheme will provide a basis for the classification of refrigeration equipment exchanged through the appliance replacement project. The Nigerian Association of Refrigeration and Air Conditioning Practitioners is a strategic partner of this project and its members were consulted during the preparation phase and will also be trained on the adoption of energy efficient refrigerators.

At present, chemical wastes in Nigeria are disposed of using incinerators and there are a few plastics recycling plants in the country. Other kinds of chemical wastes that the country does not have the technology to dispose of are shipped abroad for proper disposal in accordance with best environmental practices. There is no capacity at present to treat gaseous chemical wastes.

There is an on-going hazardous (chemical) wastes management project being financed through Government budgetary provision. This is the establishment of a gas phase chemical reduction plant (GPCR) for the environmentally sound management of POP wastes, expected to be operational by 2015. GPCR involves the reduction of organic compounds by hydrogen and some steam (which acts as a heat transfer agent and a 2nd source of hydrogen) at temperatures of 850°C or greater. While the GPCR process can be used to treat both POPs and chlorinated refrigerants, there is not yet enough information on the demonstration of this technology for CFCs and Halons and it is not applicable for foams. Once this facility is operational in 2015, the possibility of carrying out a test burn on ODS will be explored.

- **An estimate of the amount of each ODS that is meant to be handled within the project:**

  The table below shows the quantities of ODS to be handled through this project proposal presentl as well as in the future:-

Table 1- *QUANTITIES OF ODSS PRESENTLY AS WELL AS IN THE FUTURE*

ODS SOURCES	QUANTITIES (MT)
Stocks from Oil Industry in Nigeria	66.5
Stocks from Chillers replaced in Nigeria under AFROC	17.5
Stocks from other Industrial sub-sectors	**TBD**
Stocks from the Appliance Replacement project (at least 100,000 refrigerators per annum for 3 years)	30
TOTAL Stocks Determined	**114**
Total Stocks for MLF Funded Proposal	**84**

Funding is sought from the MLF for the disposal of the stocks from the Oil Industry and from the Chillers replaced under AFROC project, which add up to the tune of 84 metric tonnes. The rest of the 30 tonnes from the Appliance Replacement would be self-financed from the Nigerian government and the carbon markets. The stocks from other industrial sources are yet to be quantified and will be done through a survey of about 40 identified possible sources.

- **The basis for the estimate of the amount of ODS; this estimate should be based on known existing stocks already collected, or collection efforts already at a very advanced and well-documented stage of being set up:**

  The basis for the mentioned stocks in the previous section has been mentioned in detail in Section 3: Project Description. The stocks with the oil companies in Nigeria have already been quantified and are stocked for disposal. The numbers of chillers and quantities of installed ODS were determined through the AFROC project and surveyed again under the disposal project.

  The stocks from the Appliance Replacement have been estimated on the fact that the funding from the Ozone village project, carbon markets resulting from the disposal of the previous stocks and from the CDM activities, would be enough to start the project with a capacity of 100,000 equipments per annum for 3 years. Additional quantities can be added if funding can be availed from other sources for the project.

- **For collection activities, information regarding existing or near-future, credible collection efforts and programs that are at an advanced stage of being set up and to which activities under this project would relate:**

  The collection mechanisms are described in detail in Section 3.
  Three collection activities are described below of which two will be related to activities under this project:-

- Collection of CFC-12 was undertaken by various companies as part of an ongoing non-domestic collection scheme backed up by the requirements of sub-section 2(3) of the National Environmental (Ozone Layer Protection) Regulations. Some of these stocks are still with the respective companies, while others have been transferred to the collection centre in the Ozone Village, Ikenne.
- Disposal of stocks from the chillers replaced under the AFROC project – These stocks have not yet been collected and are expected to be done in the next one year, during the execution of the first phase of the project and using the same model established through the industrial collection scheme.
- Disposal of stocks from the Appliance Replacement project – The second phase of the project would dispose the stocks from the chillers and would also contribute to the funds from the carbon markets needed to kick start the Appliance Replacement project. The Appliance Replacement Project will include a dismantling and collection centre situated within the Ozone Village in Ikenne, Ogun State. The Ozone Village is a technology development centre where locally manufactured recovery and recycling machines as well as foaming machines are being produced. The centre is already being used for the ongoing collection efforts as some of the CFC-12 being collected from Industry is already stored there. It is expected that when the dismantling centre is set-up, training will also be given to Nigerian engineers on the production of some of the dismantling equipment. Some of the funds earmarked for the 2nd phase of the Ozone Village Project will be set aside for the Equipment Replacement Programme. Collection activities through this scheme are not related to activities under this proposal.

- **Monitoring and Verification of Collected CFCs**

Nigeria does not produce ODS, so the question of virgin ODS produced specially to declare as ODS for destruction is very unlikely. Nevertheless, a concept for monitoring the ODS recovered will have the following elements:

- Records and reports of quantities of equipment received or converted
- Records and reports of quantities of refrigerants recovered from equipment
- Recording of energy efficiency information
- Destination of recovered refrigerants
- Access for external verification only to download information
- One-way entry for key stakeholders to input information except the PMU, UNIDO and project developer those have 2-way entry i.e. they can both input and download information.

All these will also be verified by the PMU which will conduct audits along with the Project Developer and UNIDO from time to time. Also, the carbon market protocols are very strict in terms of the origin of the stocks, which necessitates a proper record keeping as well as site verifications to track the origins. A database will be developed for the inventory of all data with remote database access for involved parties. A diagram of the monitoring and verification system is given on the next page.

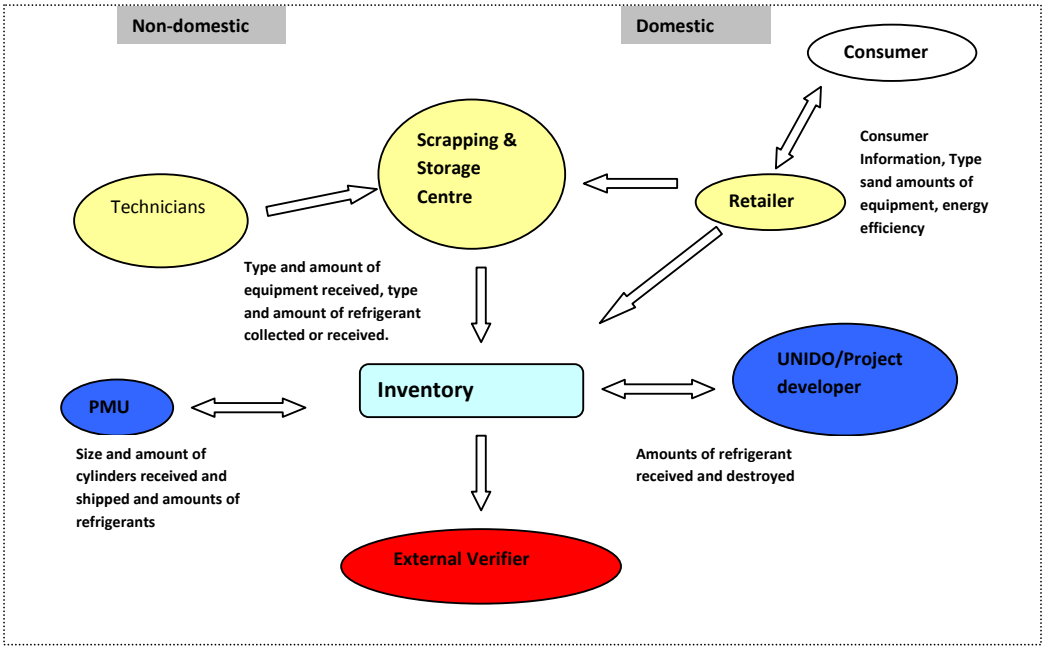


Fig 1: Model for Monitoring and verification of the sources of ODS

- **Sources of Co-financing**

The collection activities related to the present project were co-financed by the end-users and the government. There is already a guaranteed level of co-financing established within the country and earmarked for the future. 475,000 USD was employed in the collection of ODS wastes from various sources from the oil industry.

TABLE 2: SOURCES OF CO-FINANCING

Funding	**Duration**	**Amount (USD)**
Current Ozone Village budget including storage component for CFCs	Until end of this year	450,000
Government Budget for Management of ODS Banks-collection activities	Over 3 years from 2013	1,500,000
Oil Industry	Already committed	475,000
Total Co-financing		2,425,000

The provisions for management of ODS banks from 2013 will be used primarily for collection activities related to the appliance replacement project.

- **For activities that focus at least partially on CTC or Halon, an explanation of how this project might have an important demonstration value:**

  This project looks at disposal of the CFC 12 stocks that are currently available as well as would be available in the future. CTC, Halons and all other ODSs are not currently being considered. The disposal of Halons was considered for submission to the 66th Ex-Com but UNIDO was requested by the MLF to revise this component. The current Halon stocks will continue being banked until there is capacity within the country for their environmentally sound disposal.

1.4 Overview of ODS and Waste Management Legislation Related to this Project

Since becoming a party to the Montreal Protocol, Nigeria has come up with several policies and legislations, the implementation of which has led to the successful phase out of CFCs as on 1st January, 2010. The National Environmental Standards and Regulations Enforcement Agency (NESREA) has published 24 separate sectoral regulations governing the environment since 2009 alone. The regulations most directly related to ozone depleting substances and their disposal, are set out below:

- National Environmental (Ozone Layer Protection) Regulations 2009: These regulations place a total ban on CFCs and some control measures on others including HCFCs entering the country. They have the following salient features:-
  - Section 2 prohibits the release of ODS into the atmosphere. Sub-section 2(3) specifies that

  "*No person shall dispose of equipment or fire extinguishing equipment that contains an ozone-depleting substance without first ensuring that the ozone-depleting substance is recovered".*

  This regulation served as the driver for collection of ODS in industry after most of the CFC-based equipment were converted.
  - Sections 13 and 14 deal with import and export permits including granting export permits for disposal of ODS.
  - Section 20 sets out requirements for application and approval of the set-up of an ODS destruction facility within the country.
- National Environmental (Sanitation and Waste Control) Regulations 2009: These regulations govern both municipal and industrial sanitation and waste management.
  - Section 1.28 specifies that importers of different listed products including refrigerators should undertake product stewardship including buy-back of End-of-Life products for recycling. This means that equipment importers have a vested interest in investing in a refrigerator replacement, recycling and disposal scheme in Nigeria.
- The Harmful Wastes Act: This is the main legislation governing the handling, transportation, export and import of hazardous wastes in Nigeria. It prohibits the carrying out of all these activities without lawful authority.

<u>Legislative Features of the Project</u>

- Strengthening of the regulations on the collection of ODS by reviewing the requirements related

to insulation foams attached to equipment and assessing the best legislative methods of addressing the management of CFC-11 contained in foams.

- Introduction of mandatory requirements to destroy ODS with a timeline to start after the end of the replacement programme. This requirement will encourage participation in the domestic replacement programme and also encourage the replacement of equipment in other sectors.
- Introduction of standards for the safe operation of ODS destruction facilities in the country taking into account TEAP requirements and best practices in emissions control.

SECTION 2 – GENERAL INFORMATION

2.1 COUNTRY BACKGROUND

2.1.1 COUNTRY LOCATION

Located in the western part of the African continent, Nigeria is an oil-rich country sharing its borders with the following countries:-

- In the west, Republic of Benin
- In the east, Chad and Cameroon
- In the north, Niger

In the south Nigeria borders Gulf of Guinea, and in the north-east borders Lake Chad. The country commands a total area of 13,000 sq. km. The capital city is Abuja, while the main business city is Lagos.

Nigeria is a federal constitutional republic comprised of thirty-six states and its Federal Capital Territory, Abuja. These states are further sub-divided into 774 Local Government Areas (LGA).

Fig. 2 - *LOCATION OF NIGERIA*[1]

2.1.2 LAND AND GEOGRAPHY

The country's geographic coordinates are 10°00'N 8°00'E. The landscape of Nigeria is marked by the following:-

[1]Image Source: Wikipedia: http://en.wikipedia.org/wiki/Geography_of_nigeria

- Adamawa highlands
- Mambilla Plateau
- Jos Plateau
- Obudu Plateau
- River Niger
- River Benue
- Niger Delta

2.1.3 POPULATION, LABOUR AND EMPLOYMENT[2]

The total population of Nigeria was 158,423,182 in 2010 and is expected to grow by 2.5 % in 2011. The female population has been above 49 % for over many years now. The population density is 174 in 2010, with 10 million people residing in Lagos, the largest city, in 2010. The following was the distribution of the population among the various age groups in 2010:-

Table3 - *POPULATION DISTRIBUTION IN 2010*

AGE GROUP	PERCENTAGE OF THE TOTAL POPULATION
0 to 14	42.81
15 to 64	53.79
65 and above	3.40

The country had a total labor force of 49,646,410 in 2009, of which female constituted 34.70 %. 73.4 % of the total population above 15 years age in 2009 participated in the labour force.

2.1.4 ECONOMY[2]

The GDP of the country was 193,668,738,106 USD in 2010. The GDP growth in 2009 was 7 % and 7.85 % in 2010. The GDP per capita is 1222 USD in 2010.

The economy of Nigeria encompasses a huge oil exploration and production industry, in which there are multinational companies like Shell and Total as well as local companies like Nigerian National Petroleum Corporation (NNPC).

Nigeria is listed among the "Next Eleven" economies, and is a member of the Commonwealth of Nations. The economy of Nigeria is one of the fastest growing in the world, with expectations of growth of 7.4 % in 2011. It is the second largest economy in Africa and is classified as an emerging market with its abundant supply of resources, well-developed financial, legal, communications, transport sectors and stock exchange, which is the second largest in Africa.

In the ODS sphere, Nigeria has RAC (Refrigeration and Air-Conditioners) Manufacturing and Servicing in addition to the Foam manufacturing. Also, there is a Halon Bank which has both Halons 1211 and Halon 1301. Nigeria is not an ODS manufacturer, thus it only imports them for consumption.

[2] Source: World Bank website: http://data.worldbank.org/country/nigeria

2.2 NIGERIA AND THE MONTREAL PROTOCOL

2.2.1 STATUS OF NIGERIA'S RATIFICATION TO THE MONTREAL PROTOCOL

Nigeria is a party to the Montreal Protocol and is listed as an Article 5 country. The following are the dates on which Nigeria had ratified the Montreal Protocol and its amendments[4]:-

Table4 *DATES OF RATIFICATION OF NIGERIA TO THE MONTREAL PROTOCOL*

TREATIES	DATE OF RATIFICATION
Vienna Convention	31st October, 1988
Montreal Protocol	31st October, 1988
London Amendment	27th September, 2001
Copenhagen Amendment	27th September, 2001
Montreal Amendment	27th September, 2001
Beijing Amendment	24th May, 2004

2.2.2 INSTITUTIONAL SET-UP

The Federal Ministry of Environment of the Government of Nigeria has the overall responsibility for the implementation of the Montreal Protocol in Nigeria. Within the Ministry is established the National Ozone Office (NOO) with the responsibility for coordinating the activities for the implementation of the Protocol. A National Ozone Advisory Committee (NAOCOM) to assist in carrying out the mandate of meeting the country's obligations under the Protocol has also been established within the Ministry. The Committee is chaired by the Minister of the Environment. The National Ozone Office acts as the secretariat to the NAOCOM whose membership is drawn from the various government agencies.

The Ozone Program Implementation and Management Unit (OPIAMU) is an administrative unit created by the Government and UNDP and has played a key role in the implementation of the National CFC Phase-out Plan.

In addition to the special institutions created within the Ministry of Environment, under the institutional arrangements, other government agencies also play significant roles in the activities for the implementation of the Montreal Protocol in Nigeria, in particular in data collection and monitoring of import and export of ozone depleting substances (ODS) and generally in the operation of the licensing system. These organizations include the National Agency for Food and Drug Administration (NAFDAC) and the National Customs Service (NCS).

2.2.3 CONSUMPTION OF CFCs, HALONs AND HCFCs IN NIGERIA

The following table shows the total consumption of CFCs, Halons and HCFCs in Nigeria in ODP tonnes from 2000 to 2010 as reported by the Ozone Secretariat website:-

Table 5 *ODS CONSUMPTION (IN ODP TONNES) IN NIGERIA*

YEAR	CONSUMPTION IN ODP TONNES		
	CFCS	HALONs	HCFCs
2000	4,094.80	486.7	48
2001	3,665.50	412	56.2
2002	3,286.70	412.1	60.7
2003	2,662.40	191.2	66.2
2004	2,116.10	151	66.8
2005	466.1	0	31.5

YEAR	CONSUMPTION IN ODP TONNES		
	CFCS	HALONs	HCFCs
2006	454	0	35.8
2007	17.5	0	96
2008	16.5	0	296.2
2009	15.1	0	370
2010	0	0	426.4

SECTION 3 – PROJECT DESCRIPTION

3.1 PROJECT DESCRIPTION

The current project, carried out by the United Nations International Development Organization (UNIDO) and the National Ozone Unit (NOU) of Nigeria consists of the development of an approach for the collection and destruction of unwanted ODS, followed by a domestic appliance replacement project.

This project would give Nigeria a comprehensive experience in use of the best techniques, policies and strategies for the collection, transportation, disposal and destruction of unwanted ODS as well as bring in the more energy efficient appliances thereby promoting energy efficiency and climate change issues in Nigeria apart from creating several jobs in the country.

3.1.1 BACKGROUND

Since becoming a Party to the Montreal Protocol, the Federal Government of Nigeria has met its obligations to the Protocol through institutional arrangements that take advantage of the relationships of the functions of various organizations under the legislations governing the protocol. The Federal Government of Nigeria has worked in tandem with United Nations Development Program (UNDP), the United Nations Industrial Development Organization (UNIDO) and the Government of Japan over the years to implement ODS Phase Out investment projects that have assisted over 188 Nigerian industries in the Foam and Refrigeration Sectors to convert to low ODP technologies.

Another major achievement for Nigeria in this regard is that it has successfully phased out CFC-11 by 1995, in line with the Protocol's provisions and its ODS phase-out schedule. Focus is now on complete phase out of CFC-12, HCFCs, Halons.

The Federal Republic of Nigeria has received financial assistance from the Multilateral Fund for the implementation of the Montreal Protocol on substances that deplete the Ozone Layer for the phase-out of CFCs.

At its 60th Meeting (April, 2010), the Executive Committee approved funds for the Preparation for pilot demonstration project on ODS waste management and disposal. The National Ozone Unit of the Ministry of Environment is the national authority in charge of the ODS destruction project and other programs under the Montreal Protocol.

3.1.2 PURPOSE

The purpose of the project is to develop a strategy to destroy stocks of unwanted and recollected ODS, essentially CFC-12 based on the technological suitability, financial and logistical viability of the various disposal options available across the world.

The stocks for which destruction strategy is to be developed include 84 tons of CFC-12. Of these stocks, 66.5 tonnes of CFC-12s have been recovered from oil companies, servicing companies, government companies. Another 17.5 tonnes of CFC 12 is to be recovered from chillers installed across the country and 30 tonnes will be collected through the equipment replacement programme.

3.2 QUANTITIES OF ODS IMPORTED IN NIGERIA

Nigeria does not have any ODS production facilities, so the entire requirement of all ODSs in the country is met by imports only. Also, it does not export any of the imported ODSs. Thus, it can be inferred that the total imports equal the consumption of ODSs in Nigeria.

Consumption can therefore be regarded as the established quantities of ODS that are presently in circulation in various installations and the recovered quantities which are awaiting reuse or disposal.

The following table shows the total quantities of all types of CFCs imported into Nigeria from 2006 to 2009 in metric tonnes. The data presented has been verified by the Nigerian Customs Department and the Nigerian National Ozone Unit.

Table 6 *ODS IMPORTS IN NIGERIA*

	2006	2007	2008	2009	Total
IMPORTS(MT)	454.04	16.5	16.5	15.1	**502.14**

3.3 COLLECTED CFC BANKS IN NIGERIA

The collection of CFCs in Nigeria has been organized to start with the larger installations, thereby guaranteeing large volumes of stock from fewer and less dispersed end-users. Therefore, collection activities started with large industry and will move on to progressively cater for smaller more dispersed installations.

3.3.1 NON-DOMESTIC COLLECTION SCHEME

Through the 1st phase of the industrial collection scheme, the roles and responsibilities of the various actors have been defined in the following activities:

- Policy: The policy driver for the collection of ODS wastes is the National Environmental (Ozone Layer Protection) Regulations 2009, created by NESREA. This regulation specifies that

  "*No person shall dispose of equipment or fire extinguishing equipment that contains an ozone-depleting substance without first ensuring that the ozone-depleting substance is recovered".*

  Thus, the collection scheme was organized to create a mechanism for the enforcement of the regulation and overall management of ODS banks. This policy is enforced by NESREA with the NOU acting as an authorized agent.
- Awareness-raising: Awareness-raising has been carried out by the NOU and NESREA to inform stakeholders on the impact of the legislation and to encourage them to adhere to it by participating in the collection scheme.
- Collection: Conversion of ODS-based equipment and the recovery of the refrigerants contained is financed by end-users and carried out by trained and accredited contractors either on-site or at a designated recovery facility
- Storage: To create a viable system for the collection of ODS wastes, the government established a central facility for the storage of ODS wastes at the Ozone Village, Ikenne. Bulk ODS wastes

can be transferred to this central facility to await destruction. Interim storage and its attendant costs are assumed by the companies while central storage for final disposal is managed and financed by the government.

- Transportation: For interim storage, the responsibility lies with the companies, however they receive training on best practices in transferring hazardous wastes from the government.
- Monitoring: The National Ozone Unit has the responsibility for monitoring the collection scheme and does so in the following ways
    - Ensuring that only contractors accredited for the handling of ODS wastes are contracted to undertake such activities
    - Ensuring proper documentation of all recovered refrigerants and their sources and maintaining an inventory of collection activities and data on amounts of ODS wastes
    - Training refrigeration technicians on the best practices in refrigerant handling

Collection of wastes from the non-domestic refrigeration and air-conditioning sector in Nigeria is from the following groups:

- Large Industry
- Chillers from Large Establishments
- Small Industry & Commercial

<u>Large Industry</u>

The government conducted a survey which identified stocks of ODS awaiting recovery from end-of-life installations in the oil industry, being the largest single industry in Nigeria. The amounts of ODS installed in the companies were quantified and the respective companies listed. The government requested the companies to collect the ODS at their own cost and worked together with the companies to establish a collection scheme. As a result, the collection of CFCs is financed currently by the end-users and the government monitors the process, ensuring that only contractors accredited for the handling of ODS wastes are contracted to undertake such activities and provides a central storage facility for banking. Following their recovery, the quantities were stored at the installations of these companies, while some were transported to the Ozone Village, Ikenne and are awaiting disposal, as all of these companies have shifted to non-ODS technologies and thus there is no market demand for these gases. After the successful phase-out of CFCs in Nigeria, there may not be much market demand for these gases to be used in servicing. The gases are expected to be 90 % pure. Mostly, recovered gases have heavy impurities like metal particles, ions, water, oils etc. and need to be at least 95 % purified before they can be used for servicing. It should also be kept in mind that there is no effort by the oil companies or any other agency to purify these recovered gases. Thus the only option available is to dispose the gases; else with time they are bound to be released into the atmosphere, thereby negating the good effects of recovering them. From the survey done, over **66** tons of CFC-12 have been recovered and awaiting disposal.

The model for the industrial collection scheme is illustrated below:

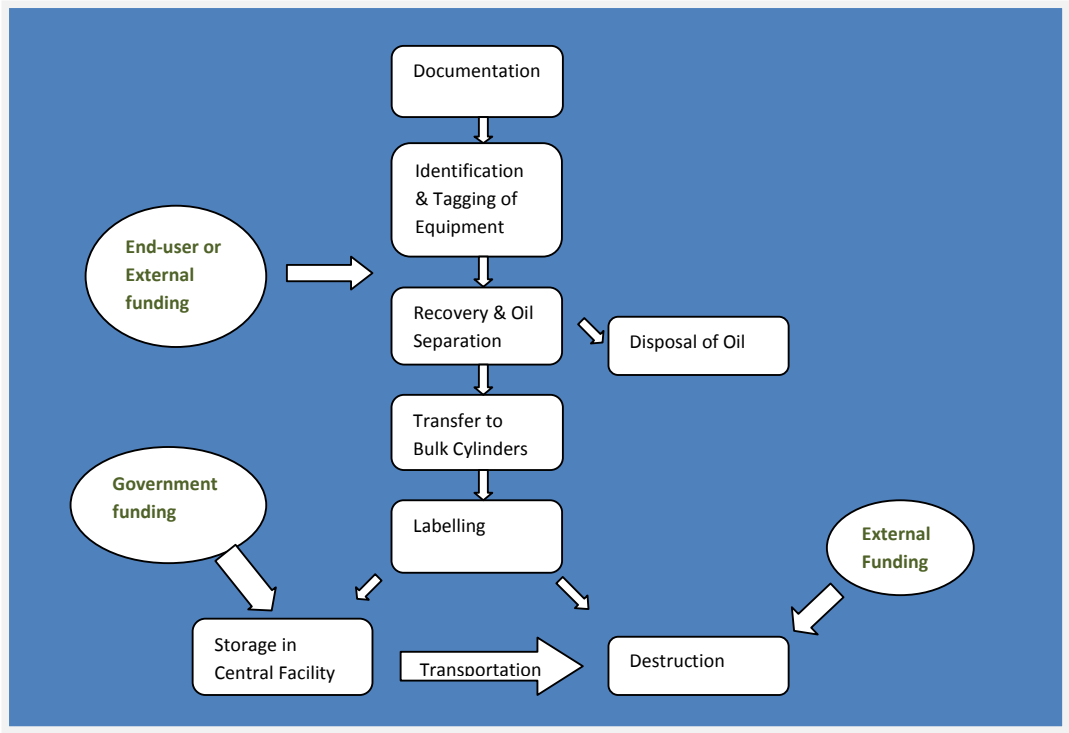


Fig 3: Collection Mechanism for Non-domestic wastes

Chillers from Large Establishments

The following CFC 12 based chillers have been installed in Nigeria. There is over 17 tons of CFC-12 in 36 installed Chillers in different organizations. In Nicon Hilton Hotel, Abuja with 3 installed chillers; there is over 2.25 tons of CFC-12 present. While Egbin Thermal Station, Egbin and Hydro Electric Plant, Shiroro both has 1.5 tons of CFC-12 each in their 2 installed Chillers, Abuja Sheraton with its 3 installed Chillers has 1.2 tons.

Table 7: *QUANTITIES OF CFC-12 IN CHILLERS INSTALLED IN NIGERIA*

ORGANIZATIONS	CFC 12 (KG)	NO OF CHILLERS
Rivers State Secretariat, P/H	690	2
Horizon Fibres Nig. Plc, Lagos	1674	3
Niger House, Lagos	372	1
Egbin Thermal Station, Egbin	1500	2
Afprint (Nig) Ltd, Lagos	744	2
Nichemtex Industrial Plc, Lagos	714	2
Royale Spinners, Lagos	744	2
Arcee Textile Industrial Ltd, Lagos	744	2
Globe Spin Textile, Lagos	1116	3
Alkem (Nig) Ltd, Lagos	998	2
Aswani Textile Mills, Isolo, Lagos	372	1
Iwopin Paper Mills, Iwopin	744	2
Hydro Electric Plant, Shiroro	1500	2
Abuja Sheraton, Abuja	1200	3
Nicon Hilton Hotel, Abuja	2250	3
Asaba Textile Mills Plc, Asaba	499	1
General Cotton Mills, Onitsha	588	1
Unity Bank Plc, Kano	998	2
TOTAL	**17,447**	**36**

Under the African Fund for Replacement Of Chillers (AFROC): Strategic Demonstration Project for accelerated conversion of CFC Chillers in 6 African Countries, both the Montreal Protocol and Global Environment Facility (GEF) have come together to replace existing chillers with more energy efficient ones in Nigeria. The project which was presented by UNIDO in the 47th Meeting of the Parties to the Montreal Protocol and subsequently funded by the Executive Committee through it Decision 47/26. This project is expected to assist the country in replacing existing chillers. It is important to note that the project does not specify how the old refrigerant is managed and does not pay for any activities related to the recovery, handling, treatment or storage of the refrigerants. The chiller project only has to report on the outcomes. Under the framework of the non-domestic CFC collection scheme, the chiller establishments will be requested to recover and collect their CFCs at their own cost following the model established with the industrial sector. The process will be monitored by the NOU with all the different players in the scheme involved.

Small Industrial and Commercial

The next phase of the industrial collection scheme will focus on other industrial and large commercial sub-sectors where there is previous knowledge of installed CFCs. 39 establishments have been identified that may still be installed with CFCs or have CFC stocks. These are companies mainly operating cold rooms, large freezers and ice-making plants. A survey will be carried out by the government to establish the installed capacity of CFCs in these companies before the end of the year. Again, once their capacities are established, they will be requested to collect the refrigerants at the end-of-life of the equipment. Again, the collection activity will be financed by the respective end-users using the model already established for industry.

3.4 CFC BANKS (FOR FUTURE COLLECTION) IN THE DOMESTIC APPLIANCES IN NIGERIA

UNIDO and Nigerian Govt. are launching an equipment replacement program for energy inefficient domestic refrigerators and air conditioners, which also happen to have a huge installed quantity of CFCs. The project would consist of two phases – the first would concentrate on replacing domestic refrigerators and second would include domestic air conditioners as well.

UNIDO and the Nigerian Government seek to partner with EOS Climate, Inc. to ensure the safe disposal of CFCs collected in Nigeria and to execute the project under the Climate Action Reserve (CAR) Protocol.

EOS has a strong track record of project execution across multiple geographies, with operations meeting the highest standards of environmental responsibility including:

- 100% compliance with all national and international regulations and standards, and all applicable
- laws including the U.S. Clean Air Act and U.S. Resource Conservation and Recovery Act (RCRA)
- Compliance with all relevant industry standards (e.g., AHRI, ASHRAE) pertaining to ODS
- recovery, materials handling and chemical processing and analysis
- 99.99% destruction efficiency, in conformance with Montreal Protocol TEAP guidelines
- 100% success in verification and registration of our projects
- Chain of custody, transparent monitoring system
- Over 2 million CRTs (Climate Reserve Tons) produced and sold to date
- 3-month average project timeline from listing to completion

- Exclusive preferred developer relationship with the only U.S. destruction facility qualified for this project.

In general, and assuming eligibility criteria are met under the CAR Protocol, UNIDO would seek to establish a contract with EOS whereby EOS would pay for a portion of the project costs related to the transport and destruction of the CFCs.

EOS Climate partners with Jaco Environmental, the largest appliance recycler in the U.S., with 35 facilities using advanced technologies to ensure 100% recovery of component materials, including ODS refrigerants and Insulation foam, from refrigerators, freezers, air conditioners, and water heaters. Jaco manages end-of-life appliance programs for retailers and appliance manufacturers and over 80 U.S. utilities. EOS and Jaco would work together to deliver training, equipment, technology and operational support to help establish an appliance recycling infrastructure and system.

3.4.1 STAKEHOLDERS – ROLES AND INCENTIVES IN APPLIANCE REPLACEMENT

For ensuring effective environment and economic benefits, the project has been designed in such a way that each stakeholder has some kind of incentive to effectively participate in the implementation process. It would require cooperative action and higher synergies between various public and private sector stake holders. The roles and responsibilities of various stakeholders along with planned incentives for participation are highlighted in the table below:

Table 8: *STAKEHOLDER ROLES AND INCENTIVES IN APPLIANCE REPLACEMENT PROJECT*

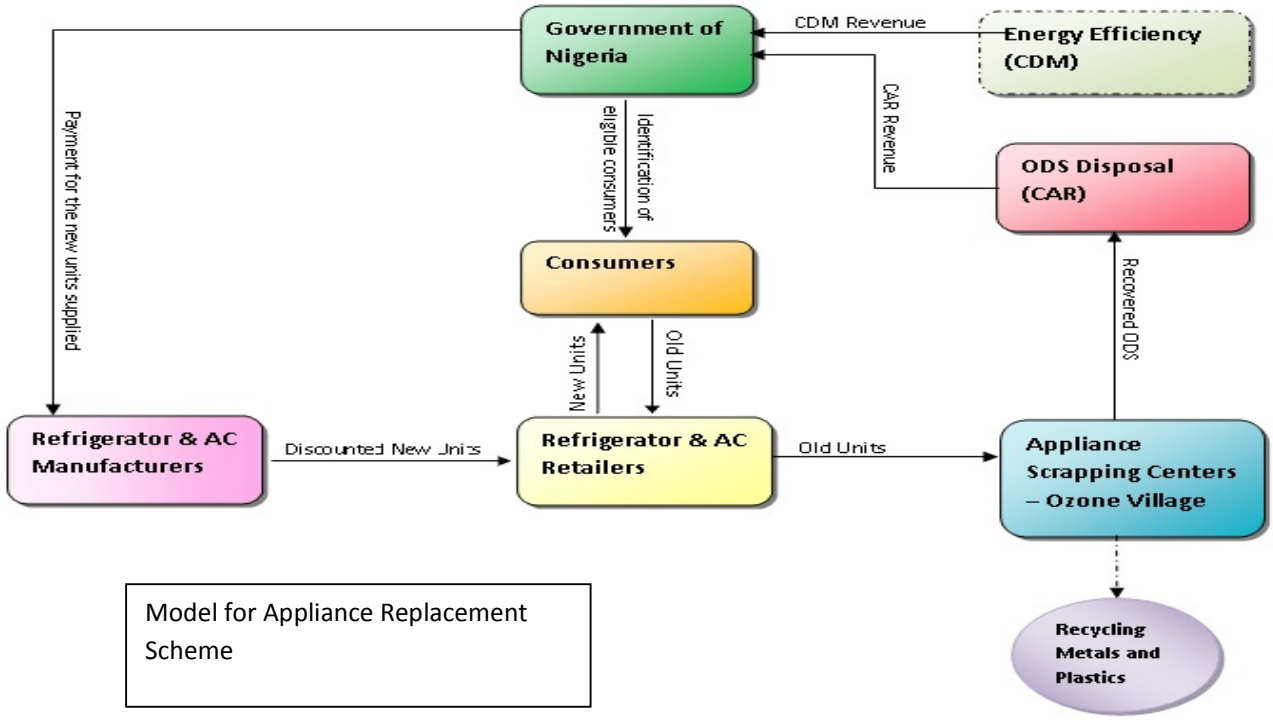
STAKEHOLDER	ROLE	INCENTIVE FOR PARTICIPATION
Government of Nigeria with UNIDO	Financing, Capacity Building and Project Management	Reaffirming commitment towards climate change mitigation, enhancing energy security in Nigeria
Refrigerator/AC Manufacturers/Importers	Rebate on new appliances	Capturing new energy efficient domestic appliances market in Nigeria. Fulfilling legislative requirements.
Retailers	Providing consumers with new unit, sending old units to scrapping units	Increased sales of new equipments
Scrapping and Recovery Centre- Ozone Village	Dismantling old units, recovering Metals, Plastic and ODS	Income from sales of ODS gases can be ploughed back into the centre
Voluntary Carbon Market Partners	Attaining co-finance through ODS destruction in CAR	Emission offsetting under CSR activities by buyers of the carbon credits
Compliance Carbon Market partners	Implement CDM POA project due to increased energy efficiency	Mandatory emission offset targets reached by the buyers of the carbon credits

The implementation of the project will be started by the 3rd quarter of this year by bringing together all stakeholders identified (mentioned in the project document), followed by the setting up of the necessary infrastructure. The actual replacement is expected to start by the end of 2013 and last for 3 years.

3.4.2 FRAMEWORK OF THE APPLIANCE REPLACEMENT PROJECT

The model for implementing the project has been designed to be financially self sustaining, contributing to real GHG emissions and clearly defining the roles of each stakeholder. The basic aspects of the project would comprise of the following:

1. Manufactures of Refrigerators and Air conditioners provide new energy efficient units to consumers at a discounted price. The existing retailer network can be used to supply the appliances.
2. The Nigerian Government will identify the consumers who would be eligible for this program. The indicators like income levels can be used for identifying the target groups. The identified consumers are given vouchers to ensure that they get the new energy efficient appliances at discounted price.
3. Retailers sell the new units to consumers at the discounted prices, collect the old units and send them to the Ozone Village scrapping center for dismantling.
4. Scrapping unit sells off recovered metals and plastics while the ODS recovered is handed over to ODS Disposal Project Developer.
5. ODS Disposal Project Developer destroys ODS under CAR, revenue generated through CAR is handed over to Nigerian Govt., after paying for the project costs under CAR.
6. CDM consultant is appointed and CDM project is registered with UNFCCC under energy efficiency, the monetary benefits of which will be handed over to Nigerian Govt.
7. CAR and CDM revenue will be pumped back into the appliance replacement project and cover for activities like capacity building for consumers, service providers etc.



Model for Appliance Replacement Scheme

Fig 4: Model for Appliance Replacement Scheme

The criteria for identifying qualified consumers that would receive vouchers will be as follows:

- Economic condition of the consumers
- No. of appliances and the energy consumption at the home through utility bills
- Condition of the appliance and refrigerant in it (CFC based appliances and appliances running for more than 10 years to be considered first)
- The appliance has to be run at home only (no commercial units are to be considered) and should have a capacity of at least 7 cubic feet.
- The new appliance has to be approved by the Nigerian Government and has to be at least 5 % or more energy efficient than the old one.
- The new appliance can have maximum 2 or 3 cubic feet of more capacity than the old one (otherwise the price of the new one will be very high).

3.5 FINANCIAL PLAN FOR APPLIANCE REPLACEMENT

Different sources of direct and indirect finance have been identified for the project, which also creates synergies between the various other ODS projects in Nigeria, without directly seeking money directly from the MLF.

Funding Sources

Sources dedicated to the Appliance Replacement Project:-

a. Nigerian Government- Ozone Village, Funding for Appliance Replacement: 1.5 Million USD committed for the next 3 years.
b. Appliance Importers and Manufacturers: TBD; the first batch of vouchers will be funded by the Nigerian government to encourage importers and manufacturers. After the start of activities and sustained momentum of the sales, the responsibility of the vouchers will be handed over to the manufacturers and importers.
c. Climate Action Reserve (CAR)- For destruction of ODS from the industrial collection scheme
d. Clean Development Mechanism (CDM)- For achieving energy efficiency

The below assumptions were made based on discussions with industry personnel that have indicated interest in investing in the replacement programme.

ASSUMPTIONS

TABLE 9: ASSUMPTIONS FOR CALCULATION OF APPLIANCE PROJECT FINANCIALS

ASSUMPTION AREAS	UNITS
Overall Time Period for the Project	3 years
Approximate Number of Refrigerators for replacements in 3 years (@ 100,000 per year)	300,000
Average Volume of recoverable refrigerant from each Refrigerator	100 gm
Average Energy saved per refrigerator	2.25 MW-hr

These would result in the recovery of 30M tonnes of CFC-12. The collected CFC-12 would then be

destroyed and credits sold in the voluntary carbon markets.

The financial estimates for the running of the appliance replacement project including costs for designing a destruction project and a CDM project are as follows:

NET COSTS FOR 3 YEARS

TABLE 10: COSTS OF SETTING UP AN APPLIANCE REPLACEMENT SCHEME IN NIGERIA

ACTIVITIES FOR 3 YEARS	COSTS (USD)
Awareness raising & setting up of helpline phone number	150,000
Retailer set-up, Equipment dismantling & Storage space rental (For 300,000 fridges over 3 years time)	1,850,000
Design & Implementation of ODS Destruction Project for 3 years	435,000
Design & Implementation of CDM Energy Efficiency Project for 3 years	150,000
Overall Project Management Costs (for Project Management Unit (PMU) for 3 years)	300,000
Mid Term Evaluation (Once at the end of 1.5 years)	50,000
TOTAL	**2,935,000**

NET REVENUES FOR 3 YEARS

TABLE 11: REVENUES EXPECTED FROM APPLIANCE REPLACEMENT SCHEME

REVENUE SOURCES	REVENUES FOR 3 YEARS (USD)
Sale of CERs from CDM Project (based on the estimation of energy saved from 300,000 fridges)	2,475,000
Sale of CRTS from ODS Destruction (based on the estimation of CFCs collected from 300,000 fridges)	675,000
Sale of scrap metals and plastics from the dismantled fridges (from 300,000 fridges)	2,700,000
TOTAL	**5,850,000**

SECTION 4 – PROJECT IMPLEMENTATION STRATEGY

4.1 IMPLEMENTATION STRATEGY

The following sections give descriptions on the implementation strategy for this project

4.1.1 SELECTED DESTRUCTION FACILITY

After extensive discussions with destruction facilities around the world and project developers, it was decided that destruction of the collected ODS from Nigeria will take place at Clean Harbors Environmental Service's facility in El Dorado, Arkansas which is permitted by the U.S. EPA to process hazardous waste under the U.S. RCRA program. This facility employs rotary kiln incineration technology, and is the largest of its kind in the U.S., recognized by UNEP/TEAP with ODS destruction and removal efficiency exceeding 99.99%. It is the only destruction facility that would be qualified to conduct destruction for this project. EOS Climate has an exclusive preferred developer relationship with Clean Harbors, the largest hazardous waste disposal company in North America, allowing EOS to reliably meet project timelines and CAR requirements. EOS' deep CRT-focused destruction experience and ongoing relationship with Clean Harbors is unmatched.

Fig 5: Control Room and Feed System at Clean Harbors, El Dorado

Features of the Clean Harbors El Dorado Facility

- Accepts any size DOT approved container
- High Temperature Rotary Kiln incinerators
- Incineration capacity of 42,410 lb/hour
- Secondary combustion chamber with 39,011 lb/hour capacity
- Direct feed system
- Compressed gas cylinder management
- Resource recovery boiler

The operating conditions for the rotary kilns are as follows:

- Depending on the conditions of the waste, the gases are fed into the kiln at temperatures of between 1200 and 2150 F or directly into the SCC at operating conditions of between 1,800 and 2,300 F.
- Off gases from the kilns are passed through individual vertical cyclones where ash is removed. Exiting ash from the kilns and vertical cyclones is collected and stabilized in an enclosed building.
- After exiting the cyclone, the gases travel to the SCC. Additional liquid wastes are injected into the SCC to maintain temperature and react all the remaining organics with oxygen to produce water vapor, carbon dioxide, and acid gases.
- Air pollution control system has been designed to meet Maximum Attainable Control Technology (MACT) requirements. The MACT process is shown below:

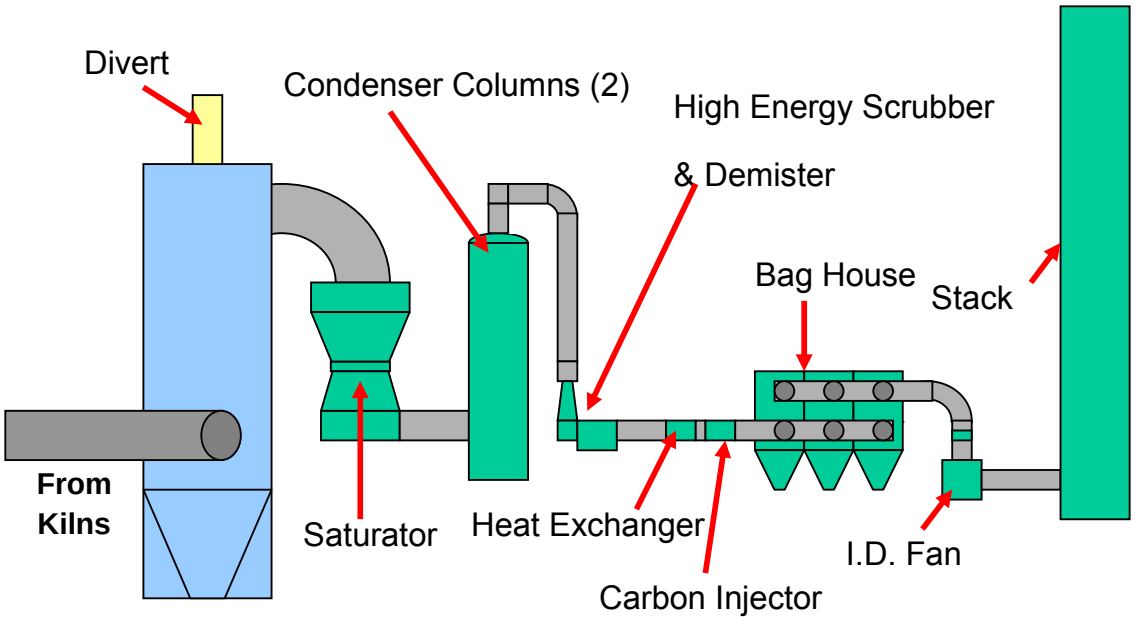


Fig 6: MACT Process at Clean Harbors, El Dorado

The MACT rule was established by the USEPA and specifies strict emissions standards for dioxins, furans, mercury, cadmium, lead, particulate matter, hydrochloric acid, chlorine, hydrocarbons, carbon monoxide, and several low-volatile metals. MACT emissions test results for the Clean Harbors site, which significantly out-perform the MACT rules and TEAP maximum allowable concentrations of pollutants in stack gases are shown below:

TABLE 12: EMISSION TEST RESULTS FROM CLEAN HARBOURS, EL DORADO

HAP	Result	MACT Std.	Future Proposed
PM, gr/dscf	0.0032	0.015	0.015
CL, ppm	0.9	77	2.6/9.3
SVM, ug/dscm	4.1	240	59
LVM, ug/dscm	2.5	97	84
Hg, ug/dscm	30.7	130	130
Dioxin, ng/dscm	<0.01	0.4	0.2

4.1.2 DESTRUCTION FACILITIES IN NIGERIA

Destruction facilities in Nigeria had previously been surveyed to establish the capacity for ODS waste Disposal in the country and willingness of plant operators to destroy ODS. The results of the survey are below:

- **Cement Kilns**

  The local cement kilns, which are owned by companies like Lafarge, Dangote and UniCem, have not shown any interest in executing these projects, because of the costs of modification involved. Also, they are apprehensive about the end products of the ODS destruction, which they believe can also lower the quality of the cement manufactured. Modification of cement kilns can be a lengthy process because of the level of stakeholder engagement that must take place before a decision is made to modify the facilities. This is because the primary aim of cement kilns is to produce cement and care has to be taken to maintain the quality of the final product and get acceptance from consumers.

  It must be noted here that UniCem in Nigeria is also a part of Holcim Cement, which has already modified a facility in Indonesia, but cannot destroy these quantities because the Indonesian laws prohibit the import of the ODSs for all purposes.

- **Rotary Kilns**

  There are two rotary kilns in Nigeria, which currently engage in the disposal of industrial wastes from the oil and other sectors. One of these is owned by International Tools and Supply, but have not shown any interest in ODS Destruction. The other facility, which is owned by DEL Waste Management, has shown interest and their emission norms meet EU Regulations as well as TEAP 2002 recommendations. They might be willing to install a feeding system for ODS, stack monitoring systems and waste water neutralization/management systems. However, they have quoted a rate of 25 USD/kg for below 5 tonnes of ODS and 15 USD/kg for above 5 tonnes. But having seen the global average rates of 6 to 8 USD/kg and the minimal costs for modification, these rates are very high, beyond the MLF funding, especially when the total quantity is above 80 tonnes.

<u>Improving Capacity of Local Destruction Facilities</u>

If cost of modification is provided by the external sources, then there are good chances that local cement kilns and DEL waste management would go ahead with upgrading their facilities for ODS destruction. However modification costs would include technology costs of upgrading as well other related costs such as capacity building, emission monitoring etc. The proposed project plans to utilise carbon credits gained to organise capacity building for local facilities.

4.2 FINAL STRATEGY TO IMPLEMENT THE PROJECT

The Assessment of carbon market co-financing for the project resulted in the selection of CAR as the suitable carbon market protocol for the project. Based on this selection and the high cost of destruction quoted within the country, the scenario of destruction of the ODS inside Nigeria was ruled out. Thus it was decided to destroy the ODS in the United States at the Clean Harbors facility El Dorado, which is an EPA approved facility and also which is acceptable to CAR. This is because CAR mandates generation of carbon offsets only for destruction inside the United States.

Based on the above analysis, the project has been divided into two stages to be executed in two years. The following has been selected as the most suitable strategy for ODS disposal for Nigeria. A suitable and qualified Project Developer needs to be appointed to take care of both the stages of the project. One of the parameters on which the Project Developer should be appointed is the percentage of the CRTs shared with the country, apart from other parameters such as quotation for the project costs etc.

Stage 1: Destruction of the stocked ODS quantities

Step 1 – Application for MLF funding (for the entire stock of 84 tonnes of CFCs

Step 2 – Appointment of EOS as Project Developer in the United States

Step 3 – Application for clearance from the Nigerian government to export the stocks and also from the US EPA for import into the United States

Step 4 – Aggregation of the 66 tonnes of CFCs in ISO tanks, followed by their purity testing

Step 5 – Transportation of the stocks to the United States, followed by their destruction

Stage 2: Destruction of the future ODS quantities

Step 1 – Application for clearance from the Nigerian government to export the stocks and also from the US EPA for import into the United States

Step 2 – Aggregation of the 17.5 tonnes of CFCs from the chiller replacement project in ISO tanks, followed by their purity testing

Step 3 – Transportation of the stocks to the United States, followed by their destruction

Step 4 – Appointment of external verification agency approved under CAR ODS methodology and Listing of project at CAR

Step 5 – Project Registration in CAR, followed by generation of CRTs

Step 6 – Sale of CRTs, and returns to be given back to Nigeria for investment in other ODS projects after paying for the project management costs in CAR.

4.3 DETAILS OF PROJECT IMPLEMENTATION STRATEGY

The following project components will be implemented over two years:

4.3.1 Year 1

- **Monitoring and Management**: Establish modalities for project monitoring and management including modalities for collection of CFC-12 from chillers for destruction in Year 2. A stakeholder meeting will be held to inform relevant stakeholders of the targets and implications of the project and to kick-off project activities. A project management & monitoring unit will be set up made up of key stakeholders and a project developer will be appointed in the US.
- **Policy**: Policy on release of ODS into the atmosphere will be strengthened. A stakeholder workshop will be held to sensitize all the key players on the benefits of the project and inform stakeholders of coming changes to the legislation. Regulations mandating the destruction of Ozone-depleting substances will be established with a timeline beginning at the end of the appliance replacement scheme to encourage participation in the scheme and conversion of remaining industrial and commercial facilities.
- **Aggregation and Testing**: All already collected CFCs will be aggregated to a central facility and testing of purity of substances will be carried out.
- **Destruction**: Terms of reference will be prepared for the transport and destruction of collected CFCs. Destruction will take place at the Clean Harbors facility, El Dorado in the United States of America after approval has been given by both governments to export the

substances into the US.

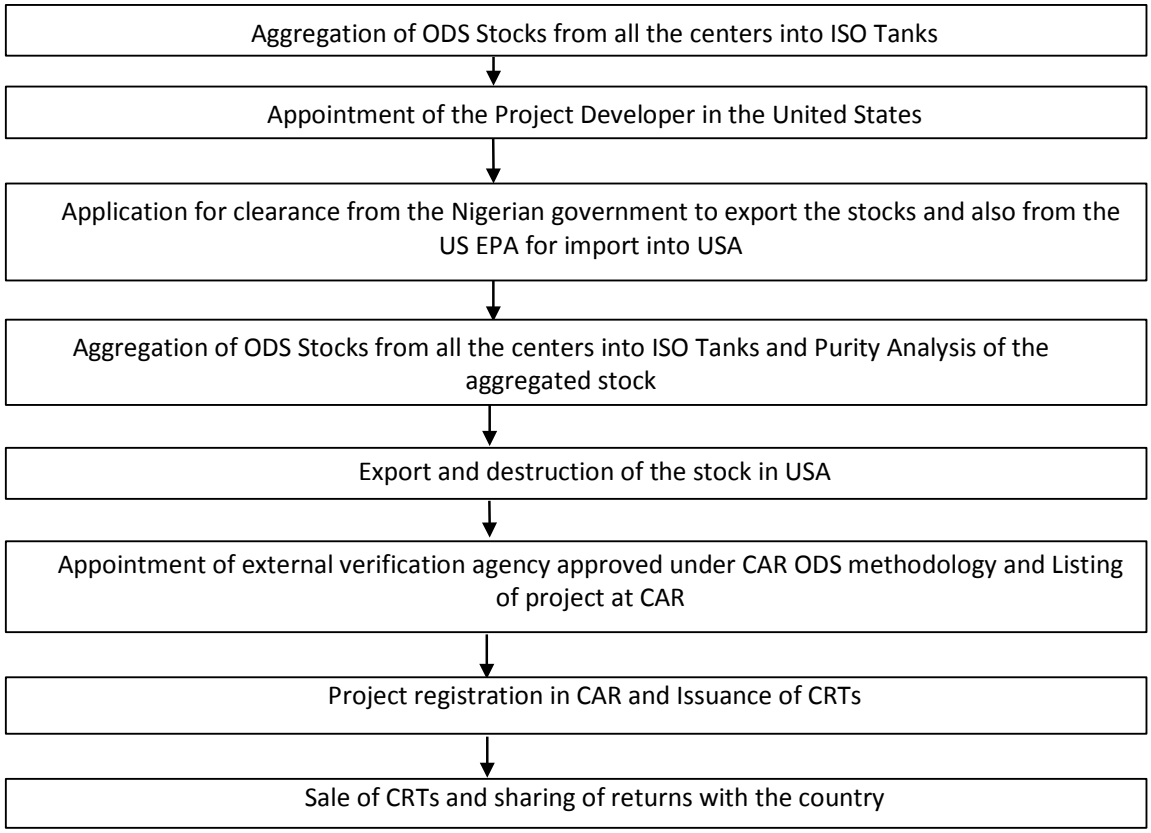
- **Technical**: International expert will be recruited to carry out health, safety and environment training for technicians especially those who will be involved in the recovery of CFCs from chillers. This will ensure a high level of technical and safety competence in the recovery of refrigerants
- **Collection of CFCs from chillers**: CFCs will be recovered from chillers where operators have committed to converting these chillers and will be stored in cylinders awaiting transportation to a central facility.

4.3.2 Year 2

- Capacity Building: a 2nd stakeholder & public awareness workshop will be held to disseminate results from 1st year.
- Aggregation and Testing: All CFCs collected at the end of the 1st year will be aggregated to a central facility and testing of purity of substances will be carried out.
- Destruction: Destruction will take place in the United States of America after approval has been given by both governments to export the substances into the US.
- Carbon financing: Project documentation and verification methodology will be prepared for ODS destruction through CAR.

GRAPHICAL REPRESENTATION FOR IMPLEMENTATION STRATEGY

The following flow chart shows the implementation strategy for the project:-



4.3.3 MONITORING AND MANAGEMENT OF THE ODS DISPOSAL PROJECT

The institutional set-up for both the MLF-funded disposal scheme will include the NOU, project developer, UNIDO, representatives from the Energy Commission and NARAP. This set-up will be expanded during the appliance replacement scheme to include Standards Organisation of Nigeria (SON), the Consumer Protection Council (CPC), manufacturers and retailers. The NOU with the assistance of UNIDO and the project developer will be responsible for the monitoring of the projects.

The management protocol for the domestic collection scheme will be similar to the established responsibilities in the non-domestic collection scheme but will be tailored to suit the needs of the appliance replacement scheme. Therefore, the Project Monitoring Unit will:

- Organise implementation procedures and progress of the project
- Connect all stakeholders on project initiation
- Identify qualified consumers to benefit from replacement scheme
- Supervise collection activities
- Create a database of all equipment replaced and amounts of refrigerant and materials recovered
- Organise formulation of any laws or regulations related to both projects
- Supervise training of technicians on Health/safety issues related to the transport and destruction of ODS wastes

The three coordinating bodies in the PMU will have the following roles

1. **The National Ozone Unit** as the national coordinating body will be responsible for the overall coordination and monitoring of project activities in the country including

- Setting up the project Management unit
- Connecting and Coordinating the activities of all stakeholders in the project
- Identifying relevant stakeholders in the project
- Organising the export permit for destruction of ODS wastes in the U.S.
- Maintaining project management database
- Monitoring all aspects of project implementation within Nigeria
- Submitting progress reports on the activities of the project to UNIDO

2. **UNIDO** as the implementing agency in charge of this project will be responsible for the overall management of the project including

- Appointing the project developer
- Monitoring the overa**ll** implementation of all aspects of the project
- Preparing contracts and procuring any necessary services
- Reporting to the Ex-com on the implementation of the project

3. **The Project Developer** will have the following responsibilities

- Executing the project in CAR
- Managing the project in the U.S.
- Contracting key services related to the transport and destruction of ODS wastes in the U.S.
- Identifying key technical partnerships for the execution of the appliance replacement scheme.

4.3.4 ASSOCIATIONS AND OTHER BODIES INVOLVED IN THIS PROJECT

The following are the various associations that will be involved in the implementation of the ODS Disposal project and Appliance Replacement Project:-

- The **National Association of Refrigeration and Air-conditioning Practitioners (NARAP)** is the association that controls the practice of the Refrigeration and Air Conditioning in Nigeria. They have membership all over the country and were useful during the implementation of the National CFC Phase-out Plan and the Government is collaborating with them with regards to the ODS Disposal project. NARAP will work with the NOU to identify accredited technicians and companies that will participate in collection activities and be trained on best practices for ODS waste management. They will also identify and work with importers and manufacturers of refrigeration equipment to establish the level of discounts and organize the equipment replacement programme. They will assist the NOU in identifying more installed stocks of CFC in various sectors in the country.

- The **Energy Commission of Nigeria (ECN)** is responsible for all strategic planning and co-ordination of national policies in the field of energy and is the national executing agency of the GEF Energy Efficiency project in Nigeria. Therefore, they are a key stakeholder in this project especially the appliance replacement project. The NOU will work closely with the ECN to establish appropriate energy efficiency legislation that will promote the appliance replacement project and also to ensure that there are no conflicting aspects of either project.

- The **Manufacturers Association of Nigeria (MAN)** is an umbrella association for manufacturers and has also membership all over the country. Both their foam and refrigeration group of the association were very useful during the implementation of the National CFC Phase-out Plan. They will be part of the awareness-raising efforts on the use of energy efficiency appliances in the country and will propose activities for the capacity building of appliance manufacturers. They will also be involved in the establishment of discount levels for appliances.

- The **Standards Organisation of Nigeria (SON)** is an organisation charged with developing internationally-recognized standards for Nigerian industry and for monitoring the application of such standards. They are currently serving as the secretariat for the drafting of energy efficiency standards under the UNDP GEF energy efficiency project. Therefore, they will be an important partner in awareness-raising activities for the appliance replacement project and will work closely with NARAP to create appropriate standards for refrigeration and air-conditioning appliances.

- The **Consumer Protection Council (CPC)** is the body responsible for promoting and protecting consumers' interests in Nigeria. Its core activities are: to inform consumers; to eliminate hazardous products from the market and ensure that products and services comply with required standards and to receive, mediate and provide redress to consumer complaints. This body is also a key stakeholder in the GEF energy efficiency project, creating awareness of the project and energy efficiency issues to the public at large. They will also be involved in awareness-raising on the appliance replacement scheme to the general public and will ensure that the interests of the public are protected in the setting of any standards or activities related to this project.

4.5 PROJECT TIME SCHEDULE AND TIME-CRITICAL ELEMENTS

The following shows the time schedules of the two stages each spread over a year:-

Table 13: *PROJECT TIME SCHEDULES*

PROJECT STAGES		SL. NO.	ACTIVITY	MONTHS											
				1	2	3	4	5	6	7	8	9	10	11	12
STAGE 2	STAGE 1	1	Discussion and Stakeholder workshop to engage the chiller owners, service technicians, and others linked to the												
		2	Appointment of Project Developer in the United States												
		3	Aggregation of Collected ODS for export												
		4	Purity Analysis of the aggregated stock inside Nigeria												
		5	Approval of the Nigerian Government to export the stocks												
		6	Approval of US EPA import the ODS												
		7	Exporting of the stock to USA and inland transportation to ODS destruction facility												
		8	Purity test of ODS and Destruction of												

PROJECT STAGES	SL. NO.	ACTIVITY	MONTHS											
			1	2	3	4	5	6	7	8	9	10	11	12
		ODS and Issuance of destruction certificate												
	9	Appointment of external verification agency approved under CAR ODS methodology and Listing of project at CAR												
	10	Verification of the project by CAR, Project registration and issuance of CRTs.												
	11	Sale of CRTs and sharing of value among stakeholders												

4.5.1 TIME-CRITICAL ELEMENTS OF THE PROJECT

The time-critical elements for which the project can be monitored each year are given below:

- Appointment of Project Developer in the United States
- Aggregation of Collected ODS for export
- Approval of the Nigerian Government to export the stocks
- Approval of US EPA to import the ODS
- Destruction of stocks and issuance of destruction certificate

The execution of these elements of the project on time would work towards the timely completion of the project.

4.6 UTILISATION OF CARBON CREDITS

The sharing of the CRTs gained from the destruction of ODS wastes is being proposed as follows:-

- Project Developer to keep the percentage of CRTs necessary to pay for the costs of the carbon market project management and his professional fees for the same
- The rest of the CRTs are to be given to the Nigerian Government, the revenues of which would be invested back in Nigeria in the following manner:-
  - Modifying the local facilities like cement kilns and rotary kilns to enable them to handle ODSs for destruction
  - Co-financing the Appliance replacement project in Nigeria to
  - Training of technicians for better servicing of RAC equipments and recovery of refrigerants
  - Setting up facilities to recover refrigerants and purify them for future use

4.7 SUSTAINABILITY OF THE BUSINESS MODEL

The long-term sustainability of the model created for collection and disposal of ODS wastes, based on the activities undertaken and planned through this project, the forthcoming appliance replacement project and the generation of carbon credits is described as follows:

1. The strengthening of legislation related to collection of ODS has gone a long way in creating the basis for a successful collection scheme at industrial level. This will guarantee a large amount of CFC wastes destroyed in a shorter time-frame and will provide the country with significant credits from the voluntary carbon markets that it can use to assist local destruction facilities and expand on its domestic collection programme. Thus, destroying the stocks initially in the U.S. with MLF funding would yield the maximum possible monetary benefit for the country.

2. Due to the large amounts of second-hand refrigerators that have entered the country and the high consumption of CFCs between the year 2000 and 2006, it is expected that the volume of installed CFCs will be quite high in Nigeria. This is why the development of a comprehensive system for the management and collection of ODS banks across different sectors will ensure that the maximum amount of ODS waste is recovered and build capacity for the handling and destruction of ODS wastes within the country in the future since export abroad in the long-term is not cost-effective. With incentives for the various players, the collection schemes will continue beyond the boundaries of the 2 projects. The monitoring system put in place will ensure that the chain of custody will always be known for ODS wastes and indeed other hazardous chemical wastes.

3. Before any mandatory requirements for destroying ODS wastes are put in place, it is essential that the capacity for destruction facilities to handle ODS wastes is upgraded. Introducing a law requiring destruction when there are no facilities in the country could actually encourage venting of the gases. Therefore, building the capacity of local operators with funds from the voluntary markets would not only ensure future capability to destroy ODS within the country but also prepare the way for the establishment of mandatory laws for destruction. This route is also more cost-effective due to the possibility of future waste streams from the following:

    - ODS collected from Appliance Replacement project after the 1st three years since it is expected that appliance replacement will continue even after the 3 years.
    - Halons in the Halon Bank-
    - ODS collected from the AFROC Project from the other countries
    - Mixed ODS collected in the neighbouring countries, thereby making this a regional facility. There is very low capacity for destruction of hazardous wastes in sub-Saharan Africa let alone destruction of gases. Therefore the facilities that are upgraded would serve as regional destruction facilities for hazardous wastes, reducing the transport costs required to destroy these wastes in a foreign location and also storage costs.

SECTION 5 – PROJECT COSTS

5.1 SOURCES OF CO-FINANCING

The co-financing employed towards other activities in this project are shown in the table below:

TABLE 14: SOURCES OF CO-FINANCING FOR MLF FUNDED DISPOSAL PROJECT

Source of Co-financing	Activity	Level (USD)
Oil Industry	Collection	475,000
Government	Storage and monitoring	450,000
Total		**925,000**

5.2 PROJECT COSTS FOR DESTRUCTION OF CFCS

Storage of CFCs would not generate any revenue until the regulated markets develop in future, but there will be an associated storage and maintenance cost. The financial analysis for stocking the CFC-12 is based on the following estimations:

a) Stock is stored for a long duration at multiple recovery centers or storage centers in the country
b) ISO tanks (for quantities more than 10 tonnes) or Containers (for quantities less than 10 tonnes) are used for safe transportation
c) Most of the owners of ISO tanks rent them for at least one year

Thus the principle cost components for the aggregation of the CFC stocks from multiple locations in the country to a central location before destruction would include the following:-

a. Transportation of CFC-12 to the centrally located facilities
b. Cost of renting 17 tonnes ISO Tanks
c. Rental cost of space for parking ISO tanks

Cost of transportation for aggregation of CFC-12 stocks at a centralized location

Nigeria wants to destroy 84 metric tonnes of CFC 12 but these stocks are distributed at multiple locations in the country (Ozone village, oil industry and other establishments). These stocks need to be aggregated at a central location before export to the USA for destruction. For this scenario, the stocks need to be collected in an ISO tank and tested once before export.

The following chart shows the costs involved in this whole operation of aggregation. The activities stated under aggregation, refers to only the step in which the stocks are to be put into the ISO tanks for testing and then export only, which is part of aggregation and not collection. Project is not seeking any funding for collection during both the phases. In phase 1- already collected stock is disposed off, and in second phase CFCs will be collected as part of existing chiller replacement program.

Renting the tanks is definitely cheaper than purchasing them. Also initially requirement of number of ISO tanks is higher in phase-1 than requirements in phase-2, and hence renting is a better option. These will be stored at the same facility where the stocks are currently collected and stored in Nigeria. The Project Developer who will be appointed will be responsible for their management. These facilities are safe facilities for storage of such tanks. The rental for the tanks is minimum for a period of one year, during which they can be used any number of times or even returned before. This was after receiving quotations from suppliers of these tanks, again the suppliers are all international suppliers based in Nigeria, Europe and USA.

A test before export is needed for getting EPA approval for import into USA. The test just before destruction is mandated by the carbon market protocols. Tests before exports may also be needed by selected project developer to accurately understand destruction requirements.

The destruction costs have been assessed based on discussions with the destruction facilities across the world, including facilities in USA, multiple European counties, Australia, Japan, Indonesia, USA and Saudi Arabia, as well potential destruction facilities in Nigeria.

Table 15: COSTS FOR ALL COMPONENTS OF MLF-FUNDED DISPOSAL PROJECT

AGGREGATION AND TESTING COST FOR 84 TONNES OF CFC 12			
SL. NO.	**COST COMPONENT**	**UNIT COST (USD/UNIT)**	**TOTAL COST (USD)**
1	Transportation of 84 metric tonnes of CFC-12 from different centers to a centralized locations for aggregation	1 per kg	84,000.00
2	Cost of renting 2 ISO tank (20 feet, capacity 17 tonnes)	20000 per tank	40,000.00
3	Rental of parking ISO tanks for one year	8 per tank per day	5,840.00
4	Testing of the stocks before export (Once per tank per trip - Total 5 times)	200 per test	1,000.00
SUB-TOTAL			**13,0840.00**
5	Contingencies	10% of the total	13,084.00
TOTAL COST FOR AGGREGATION AND TESTING			**143,924.00**
TRANSPORTATION AND DESTRUCTION			
SL. No.	**ACTIVITY**	**COST PER UNIT (USD)**	**COST (USD)**
1	ISO Tank Transportation for export to another country, including insurance and GPS tracking systems (5 trips in total by 2 ISO tanks)	10,000 per trip	50,000.00

2	Transportation from port of the country to the destruction site, including insurance and GPS tracking systems	1000 per trip	5,000.00
3	Purification and testing at destruction site by AHRI certified laboratory before destruction	1.0 per kg	84,000.00
4	Destruction of CFC 12	6 per kg	504,000.00
SUB-TOTAL			**643,000.00**
5	Contingencies	10% of the total	64,300.00
TOTAL COST OF TRANSPORTATION AND DESTRUCTION			**707,300.00**
MONITORING, LEGISLATION AND SAFETY			
SL. NO.	**COST COMPONENT**	**UNIT COST (USD/UNIT)**	**TOTAL COST (USD)**
1	Management, Coordination and Monitoring, Improvement/Upgrade of Local Legislation	30000.00	30,000.00
2	Health, Safety, Environment Training (Technical Workshops with International Expert)	25000.00	25,000.00
SUB-TOTAL			55,000.00
3	Contingencies	10% of the total	5,500.00
TOTAL COST FOR MONITORING AND SAFETY			**60,500.00**

Now, addition of the three components above shows the total cost of the project for destroying 84 metric tonnes, excluding the cost of collection and purification of the stocks from the old equipments.

Table 21: *TOTAL PROJECT EXECUTION COSTS*

SL. NO.	PROJECT COST COMPONENT	USD
1	Aggregation and Testing	14,3924.00
2	Transportation and Destruction	707,300.00
3	Monitoring and Safety	60,500.00
TOTAL		**911,724.00**

5.3 FUNDING REQUESTED FROM THE MLF

The total cost of the project can be summarized as follows:-

Table 16: *TOTAL COST OF NIGERIA ODS DISPOSAL PROJECT*

SL. NO.	PROJECT COST COMPONENT	USD
1	Project Costs not covered by MLF	925,000.00
2	Transportation, Destruction and Management	916,724.00
3	Monitoring and Verification of ODS Destruction for CAR	30,000.00
4	Project Management for CAR	50,000.00
TOTAL		**1,921,724.00**
FUNDING REQUESTED FROM MLF		**911,724.00**
COST EFFECTIVENESS (USD/KG)		**10.91**

It should be noted that the above costs also include the costs for management of the project registration in the carbon markets. The costs total for the carbon markets under CAR add up to 80,000 USD (3,000 USD for Monitoring and Verification of ODS Destruction and 50,000 USD for Project Management). These costs can be recovered from the returns from the sale of the carbon credits generated by CFC destruction in CAR.

The cost effectiveness for the funding requested can be calculated as follows:-

- Funding requested – 911,724 USD
- Quantity of ODS – 84 tonnes

Cost effectiveness – 10.91 USD/kg – This is well within limits of the 13.2 USD/kg of funding available from the MLF as mentioned in the Decision 58/19 of the 58th meeting of the Executive Committee of the MLF.

5.3.1 COMPARING SALEABILITY OF VARIOUS TYPES OF ODS STOCK

Under the CAR specifications not every stock of ODS qualifies for release of carbon credits. The following ODS stocks are eligible:

1. Stockpiled virgin or used ODS refrigerant, including government stockpiles of seized ODS, that can legally be sold in the market
2. Government stockpiles of seized ODS that cannot be legally sold to the market
3. ODS refrigerant recovered from industrial, commercial, or residential equipment at servicing or end-of-life

5.3.2 RETURNS FROM SALE OF CREDITS – APPROXIMATION UNDER CURRENT MARKET CONDITIONS

Extensive discussions have taken place with project developers and buyers of voluntary carbon credits internationally (USA and Europe). Though market is volatile, however during these extensive discussions a price level of 2 USD/CRT and 0.5 USD/VER have been identified as prices could be obtained under

prevailing market conditions. Based on opinions from key buyers in the market, it was found that CRTs may have better demand and prices in USA compared to VCS based credits. However carbon markets are very volatile, and carbon credits generated from ODS destruction are used in voluntary market only and as of now no international compliance regime has allowed use of such credits to meet regulatory requirements. Prices in voluntary markets vary a lot, depending on co-benefits from such credits, buyer specific requirements, timing of sales etc. The table below shows a comparison of the two carbon market protocols, CAR and VCS that accept generation of offsets for ODS disposal. The following is the result of the evaluation for the 84 tonnes of CFC 12 destroyed through this project.

TABLE 17: FUNDING EXPECTED FROM CARBON MARKET PROTOCOLS

CARBON MARKET PROTOCOL	PRICE OF CARBON CREDITS	MAXIMUM FUNDING EXPECTED (USD)	SELECTED PROTOCOL
CAR	2 USD/CRT	1,646,946	CAR
VCS	0.50 USD/VER	441,000	

Based on the trends in global carbon markets, the value of the CRTs generated from the ODS Destruction projects in the USA have found to be around 2 USD per CRT.

For a typical project, if 10 metric tonnes of pure CFC 12 is to be destroyed, taking a GWP of 10900, considering the project related emissions during the execution process, a reduction of

400 CRTs per tonne of ODS destructed is considered, hence the number of CRTs that can be generated would be around (10 * 10500 =) 105000. This is taking into consideration the project emissions which should be reduced from the project on account of the emissions during transport, destruction and other associated activities.

From the comparison of CAR and VCS options for ODS destruction, it is evident that the scenario wherein destruction is carried out in USA and CRTs are claimed, is the ideal scenario which provides maximum environmental and economic benefits. The CAR protocol relies heavily on stringent project verification for its credibility. It requires a Monitoring and Operations Plan to be established for all monitoring, operations, and reporting activities associated with ODS destruction projects. Detailed calculations on the number of CRTs based on total emissions reduced for this project is given in the next Section.

SECTION 6 – LEVERAGING CARBON MARKET CO-FINANCING FOR ODS DISPOSAL PROJECTS

6.1 SELECTION OF SUITABLE VOLUNTARY CARBON MARKET STANDARD FOR DESTRUCTION OF ODS IN NIGERIA:

Upon studying the options that are currently available to earn credits from ODS Destruction, it was revealed that the Verified Carbon Standards (VCS) and Climate Action Reserve (CAR) are the two most suitable options. Both of these carbon market standards have a global repute and well defined methodologies for ODS destruction projects in place.

Table 18: *SELECTION OF SUITABLE CARBON MARKET PROTOCOL*

PARAMETER	DIFFERENCE	IMPLICATION ON NIGERIA ODS DESTRUCTION PROJECT
LOCATION	**CAR** requires ODS must be sourced from Article 5 countries, imported into the US and destroyed within the US or its territories whereas **VCS** allows ODS to be sourced and destroyed within the same country or anywhere else.	Additional costs associated with transporting the ODS to USA from Nigeria and additional overhead in securing export permissions from Nepal and Import permission from USA will be incurred upon choosing CAR standard
ODS ELIGIBILITY	In **VCS,** only ODS recovered from equipment at servicing or end-of-life is allowed whereas in **CAR,** stockpiled virgin or used ODS refrigerant, including government stockpiles of seized ODS is allowed	In this project, only recovered and reclaimed ODS is required to be destroyed. Therefore, both standards are equally applicable
CURRENT STATUS OF ODS DESTRUCTION VERS	As per the information available on **VCS** project database, no project is currently running under VCS ODS destruction methodology whereas there are 12 projects running under ODS destruction protocol of **CAR**	Case studies can be referred to if the project is registered under CAR. No such precedent is available under VCS
SALEABILITY OF ODS CARBON CREDITS	**VCS** is currently the most popular standard in the Voluntary Market. However, due to a profusion of VCS credits in the market, prices have dipped from US$6-8 levels to as low as US$0.6 per ton. Also, projects like ODS destruction or industrial gas destruction, which are large volume and have significantly less visible co-benefits are not favored by buyers. Prices for Climate Reserve Tons (CRTs), which are offsets verified under the **CAR** protocols, are currently the highest in the Voluntary Market (barring Gold Standard offsets). The prices are typically in the	For the project, VCS credits are expected to sell at a conservative figure of US$0.4 per ton. On the other hand, CAR credits can be conservatively expected to sell at a minimum of US$3.50 per ton. Therefore, considering the costs involved and the volume of ODS to be destroyed, the project is only expected to be profitable if the CAR protocol is followed.

	range of US$ 3-4 a ton. These offsets are very attractive to US buyers as CAR is the most likely system to be accepted into the future US emission trading scheme.	

6.2 GUIDELINES TO DEVELOP ODS DISPOSAL PROJECT IN CAR IN THE USA

6.2.1 COLLECTION AND RECOVERY

6.2.1.1 SOURCES OF ODS COLLECTION

The following are the key sources of ODS Collection in most countries

i. Stockpiled virgin or used ODS refrigerant
ii. Government stockpiles of seized ODS, that can be legally sold to the market
iii. Government stockpiles of seized ODS that cannot be legally sold to the market
iv. ODS refrigerant recovered from industrial, commercial, or residential equipment at servicing or end-of-life

Apart from these, if there are some more stocks which can be identified in the country, a list of the same should be prepared. For this purpose, all government agencies and the private sector has to join hands to identify the sources. Private ODS stocks which are virgin material is not eligible under the protocol.

6.2.1.2 CAR ODS METHODOLOGY – MEETING SPECIFIC REQUIREMENTS

The following are the types of ODS which are eligible under CAR protocol and are listed under Annex A, Group I of the MP:

i. CFC 11
ii. CFC 12
iii. CFC 113
iv. CFC 114
v. CFC 115

It should be ensured that they must have been used for refrigeration purposes. ODS Stocks which were used or were destined for all other purposes are not eligible under CAR Protocols.

To qualify as a Green House Gas reduction project under the CAR, any project has to fulfil the following four eligibility rules:-

A. Eligibility Rule I: Location
B. Eligibility Rule II: Project Start Date
C. Eligibility Rule III: Additionalities and Regulatory Compliance
D. Eligibility Rule IV: Proof of Title

The eligibility rules have been discussed in context with this project in details in the following sections:-

6.2.1.3 ELIGIBILITY RULE I: LOCATION

There are two things that need to be discussed under this section:-

i. ODS Type and Source Country: ODS from Article 5 country is only eligible

ii.ODS Destruction Country: Destruction in United States of America is only accepted

6.2.1.3.1 ODS SOURCE COUNTRY

The ODS Source country has to fulfill the following conditions:-

i. The ODS Source Country should have ratified the MP and its amendments
ii. The ODS Source Country has to be listed in the Article 5.

6.2.1.3.2 ODS DESTRUCTION COUNTRY

CAR mandates that all projects for becoming eligible, have to mandatorily destroy the ODS inside USA at specific sites recognized by the US EPA (Environmental Protection Agency). So, in the second part of the project, when the ODS Destruction would actually happen, the stocks would be exported from these countries to USA for destruction.

6.2.1.4 ELIGIBILITY RULE II: PROJECT START DATE

For the project to be eligible for CAR, the project activities starting from the export of recollected ODS stocks from these countries to the USA and then their destruction is supposed to start only after February, 2011. This makes them completely eligible as per CAR Protocols.

6.2.1.5 ELIGIBILITY RULE III: ADDITIONALITY AND REGULATORY COMPLIANCE

To fulfill this condition, every project has to meet the following requirements:-

1. The Legal Requirement Test
2. The Performance Standard Test

6.2.1.5.1 THE LEGAL REQUIREMENT TEST

The following prove that the project would pass this test:-

1. The National Ozone Units of the countries have to provide a letter stating the following:-
    a. The origin of the CFC stock, and that it is not privately held virgin stock
    b. The production of CFCs have been stopped completely, and thus there is no possibilities of any virgin CFCs to have been added into this ODS stock
    c. This stock of ODS can be exported to the USA for destruction
    d. There is no law in the country mandating destruction inside country

2. The application letter to US EPA from the National Ozone Unit stating the following:-
    a. Intent to export the ODS stock to USA for destruction only
    b. Documented evidence owners of the stocks attesting their allowance to destroy their CFC stocks, and stating that to National Ozone Unit head the destruction process

6.2.1.5.2 THE PERFORMANCE STANDARD TEST

The following fulfill this requirement:-

1. The documentation necessary to establish the point of origin of the ODS stock:-
    a. The actual ODS stock owner's documents stating the quantities that are available, and how much of it would be transferred for destruction
    b. In case the actual stock owner has the National Ozone Unit or some other agency to manage the destruction project or has sold his stocks to the project developer, then the owner should provide this information in a letter
    c. The detailed logistics plan for the transfer of the stocks from these countries for export to the USA
2. Detailed test reports establishing the composition of the stocks to be transferred to the USA.
3. Detailed reports stating the following:-
    a. The technicians involved in handling these gases, are properly trained and have prior experience in handling such substances.
    b. The laboratory where testing of the stocks is to be done, has proper facilities and trained personnel to meet the requirements of CAR Protocol and also US EPA.

6.2.1.6 ELIGIBILITY RULE IV: PROOF OF TITLE

The documents stating the following should be submitted to prove this:-

1. Current state of ownership of all of the ODS stocks in the country
2. Current rights of the owners on these stocks, once they are identified for destruction
3. Documented evidence owners of the stocks attesting their allowance to destroy their CFC stocks, and stating that to National Ozone Unit head the destruction process
4. Detailed documentation stating the ownership of the CRTs (Climate Reserve Tonnes) or the sharing of the revenues generated from the sale of the CRTs.
5. Detailed documentation of the Project Monitoring Operations of the National Ozone Unit and the agency carrying out the project in the USA.

6.3 INFRASTRUCTURE AND COSTS INVOLVED

The infrastructure for the types of ODS that are accepted by CAR has been mentioned below:-

I. Stockpiled virgin or used ODS refrigerant, including government stockpiles of seized ODS, that can legally be sold to the market
    - The stocks kept in the form of cylinders or tanks should be kept in clean, cool and dry conditions
    - Regular leak checks should be conducted to ensure nothing escapes into the atmosphere
    - Trained technicians should be employed for the task

II. Government stockpiles of seized ODS that cannot be legally sold to the market
    - The stocks kept in the form of cylinders or tanks should be kept in clean, cool and dry conditions
    - Regular leak checks should be conducted to ensure nothing escapes into the atmosphere
    - Trained technicians should be employed for the task

III. ODS refrigerant recovered from industrial, commercial, or residential equipment at servicing or end-of-life

- Recovery centres should be set up for the purpose of extraction of the gases and further dismantling of the equipment
- The technicians should be trained in the use of these equipment
- Storage facilities in these centres should be clean, cool and dry
- The centre operations should be monitored at a central facility with occasional visits to the centres
- The following are the monitoring parameters which should be recorded:-
  - The number and specifications of the equipment collected
  - The quantity and purity of gas collected from each and every equipment
  - The quantity of oil, metals, plastics and foams collected from each and every equipment
  - The photographs of each and every equipment should be kept for records
  - The best solution to this huge data recording process is to develop an online system, so that all the data can get stored in a central system

A central database is to be established jointly by the NOU and the Project Developer to keep all documentation and transport manifests which are to be presented during the project verification.

6.4 TESTING AGGREGATION AND STORAGE

6.4.1 TESTING – EQUIPMENT AND STANDARDS

The CAR protocols mandate the testing of the stocks just before destruction in a lab in the USA certified by AHRI (Air-conditioning, heating and refrigeration institute). This can be taken care of by the project developer or the agency operating in the USA.

There is no mandate in the CAR Protocols for testing in the country of the ODS origin itself, but may be mandated by the US EPA for the granting permission to import the material for destruction inside the USA, although the US EPA has not set any standards for the testing. So, it would be better to adhere to some standards for the testing of the material, as follows:-

i. A Standard Operating Procedure must be developed for the testing and it should be ensured that it is strictly followed
ii. Testing to be done by using GC (Gas Chromatography) or GC-MS (Gas Chromatography with Mass Spectrometer) or using Standard Electronic Analysers (also known as the Refrigerant Identifiers), whichever is available
iii. The equipment must be flushed properly each time before testing
iv. Test results should be accurate by more than 90 %
v. Test results should be certified by an agency certified to do so, like the national standards institute or else samples should be sent to a foreign location for testing.
vi. The cylinders and tanks used for storing the gases must be weighed properly on scales which provide results of more than 90 % accuracy.
vii. It should be ensured that each and every of the cylinders should be tested and weighed also
viii. Proper records for the tests are to be kept and later on submitted to the US EPA and also for CAR verification

6.4.2 AGGREGATION – WHEN AND WHERE

This part can be treated in two ways based on the quantities to be exported for destruction. The reason for this classification is to ease the logistics procedures. The classification can be as follows:-

i. Quantities below 10 tonnes
ii. Quantities above 10 tonnes

The logistics plan inside the countries for aggregation for testing and later on for export should be worked out by the National Ozone Units. A proper plan should be complemented by proper monitoring of the process. In addition, during export, the transcripts of the shipping company responsible for transport to the USA and also GPS records of the trucks transporting the materials inside the USA may also be required later on for CAR verification. So, a proper monitoring plan is also required, which must be worked out jointly by the National Ozone Unit of the country as well as the project developer in USA. The same has to be submitted for CAR verification.

6.4.2.1 QUANTITIES BELOW 10 METRIC TONNES

For quantities below 10 tonnes, the best solution for the logistics would be to aggregate the material in one or two locations in the country for testing. After the testing the stocks can be aggregated in a single location for export.

The stocks may be kept in cylinders or tanks of various sizes and can be transported as such in containers. Since the quantity in each of these cylinders is very less, there could also be losses during transfer to big tanks. So, it is the best if all of the cylinders could be exported to USA.

6.4.2.2 QUANTITIES ABOVE 10 METRIC TONNES

Transporting quantities above 10 tonnes in small cylinders would be difficult due to the large number of these cylinders. The best possible solution would be to transfer the stocks into large ISO tanks from the smaller cylinders. The number of ISO tanks would depend upon the total quantity of the stocks to be exported. These ISO tanks are available from sizes ranging 13 to 17 tonnes.

The cylinders or small tanks can be aggregated in one or more locations in the country depending upon the number of the locations where these stocks are kept. Then the ISO tanks can be moved from one location to the other, and in each of the locations the gases can be transferred into them. The proper route for transport of these ISO Tanks must be worked out by the National Ozone Unit and should involve the least cost option.

After that the all the ISO tanks can be brought into one location where samples can be drawn from them and sent for testing. After the testing, the ISO tanks can be loaded on the ships/trucks for final transport to the USA.

6.4.3 STORAGE INFRASTRUCTURE AND REQUIREMENTS

For storage of ODS, the following infrastructure and requirements must be met:-

- The cylinders/tanks that are being used for storage should be hydro-tested by the manufacturer and test result should be supported by appropriate certificate
- The facility should follow the standards for cleanliness, cooling and moisture control
- Leak tests should be conducted once every alternate day or a frequency advocated

by an expert in the field, using standard leak detectors only

- The technicians involved should have successfully completed prescribed appropriate training
- If transfer from small to bigger cylinder or ISO tanks is being done, it should be done by trained technicians using standard equipment prescribed for the activity etc. Leak detectors should be kept handy during the ODS gas transfer from one container to other to detect and prevent escape of substance into the atmosphere.

6.4.4 CAR ODS METHODOLOGY – MONITORING SPECIFIC REQUIREMENTS ON TESTING, LEAKAGE AND STORAGE

The CAR methodology specifies testing in an AHRI approved laboratory in the USA just before the destruction, but does not have any requirements for testing in the source country. But testing in the source country is very essential for getting US EPA approval for import into USA. Although the US EPA does not have any specific requirements for such a testing, but for getting satisfactory results of accuracy above 90 %, one of the following processes should be used:-

- GC (Gas Chromatography)
- GC – MS (Gas Chromatography with Mass Spectrometer)
- Electronic Gas Analysers

The following emission rates have been prescribed by the CAR Protocols:-

Table 19: *EMISSION RATES PRESCRIBED BY CAR PROTOCOL*

REFRIGERANT ORIGIN	BASELINE SCENARIO	APPLICABLE ANNUAL EMISSION RATE	10-YEAR CUMULATIVE EMISSIONS
ODS obtained from private stockpiles or government stockpiles that can legally be sold into the refrigerant market	Use for recharge of existing or old refrigeration equipment	25%	94%
ODS refrigerants obtained from government stockpiles that cannot legally	Continued storage	Site specific emission rates	$1-(1-ER_{stock})$
be sold into the refrigerant market			
Used ODS refrigerant recovered from end-of-life equipment within the past 12 months	End-of-life release to the atmosphere	100%	100%

The site specific emission rates can be calculated from the CAR methodology.

The CAR methodologies do not have any specific requirements for storage, but certain steps should be taken to ensure satisfactory storage conditions, such as follows:-

- The cylinders/tanks that are being used for storage should be hydro-tested by the manufacturer and the certificate for the same should be available
- The facility should be clean, cool and dry
- Leak tests should be conducted once every alternate day or a frequency advocated by an expert in the field, using standard leak detectors only
- The technicians involved should be trained properly
- If transfer from small to bigger cylinder or ISO tanks is being done, it should be

done by trained technicians using equipment which are also very standard ones like standard vacuum pumps etc. and leak detectors should be kept handy to stop the process immediately during leakage, to prevent escape into the atmosphere

6.5 TRANSPORT

6.5.1 EXPORT APPROVAL FROM NATIONAL GOVERNMENT

6.5.1.1 REVIEW OF NATIONAL POLICIES

Under the international obligations, many of the countries that have ratified the MP and its amendments have banned the export of CFCs except for the EUNs (Essential Use Nominations). Export of ODS for disposal outside the country does not fall under the EUNs. So, any laws preventing the export of ODS for disposal should be studied and arrangements should be made for receiving approval from the national government in order to facilitate export of the stocks.

In addition, laws mandating the ODS disposal inside the country should be relaxed for the export of the stocks for destruction in the USA. Similarly, a thorough review of all the national policies should be carried out to identify and remove all the hurdles which may prevent the exporting of ODS stocks for disposal.

6.5.1.2 APPLICATION TO EXPORT CFC FOR DESTRUCTION BASED ON ANALYSIS

There are two specific requirements to this part:-

- Application to Source Country Government for approval for export -
  This should be a very easy process in case there is no national regulation for preventing export of ODS for any purpose. Otherwise, it has to be dealt accordingly.
- Application to US EPA for approval to import of ODS into the USA for destruction
  There is a petition process for importing used ODS into the U.S. The petition process, as it is currently written, applies to both 1) used material coming in for reuse and 2) used material coming in for destruction.
  If the refrigerant is extracted from the appliance and is in "bulk" form, the import could fall under the petition to import used ODS. The petition regulations are found in 40 CFR 82.13(g) and 82.24(c). One can find information on EPA's petition process at the following website: http://www.epa.gov/ozone/title6/imports.html
  Additional information on the destruction of ODS in the U.S. can be found at: http://www.epa.gov/ozone/title6/destruction.ht
  ml

6.5.1.3 IMPORT APPROVAL PROCESS IN THE USA

The US EPA classifies the CFCs as class-I ODS and they can be further classified into virgin and used class-I ODSs. The approval process for both is given below:-

- Virgin class-I ODSs
  They can be imported provided they are being used for EUNs or for disposal, but if they are privately held stocks they do not qualify under CAR
- Used Class I ODSs
  They can be imported over five pounds into the USA for disposal. For this importers must petition the US EPA and receive a non-objection notice. Petition

requirements and Agency procedures for reviewing and approving petitions are in available in the US Federal Code 40 CFR 82.13(g)(2). Complete petition packages must be sent to the US EPA at least 40 working days prior to the shipment leaving the port of export.

6.5.2 CAR ODS METHODOLOGY – SPECIFIC REQUIREMENTS

The CAR Methodology does not have any specific requirements for transportation, but the GPS systems (described in next section) and the shipping transcripts (described in next section) should be submitted during project verification. This is very important as it is subject to verification by external auditors.

6.5.3 LOGISTICS PROVIDER – TRACKING ODS FROM COUNTRY TO DESTRUCTION FACILITY

The ODS can be tracked by using the following mechanism:-

1. GPS tracking system to be fitted on the truck or the railway, whatever the mode of transport.
2. If the export is done by shipping, then the shipping company contracted will have to arrange satellite tracking systems for the ship.
3. After reaching the USA, again GPS tracking system would be used to track the inland transportation, which could be by truck or railway

6.6 DESTRUCTION

6.6.1 ODS METHODOLOGY – SPECIFIC REQUIREMENTS FOR ODS DESTRUCTION

CAR protocols have very strict rules and regulations when it comes to the destruction facility. Although there may be many facilities which may be able to handle ODSs but CAR mandates the destruction in facilities which are compliant with both the international standards specified in the TEAP Report of the Task Force on Destruction Technologies and Code of Good Housekeeping, as well as the requirements of domestic U.S. laws.

Any ODS destruction activity occurring inside USA is subject to the following regulations:-

- Stratospheric Ozone Protection Regulations under the CAA (40 CFR 82)
- Some destruction facilities are also subject to regulation by the RCRA (Resource Conservation and Recovery Act) on account of them destroying the hazardous ODSs like CFC 113, methyl chloroform, and carbon tetrachloride
- Hazardous waste combustors (HWCs, e.g., incinerators) that destroy ODS classified as hazardous wastes are also regulated by the Maximum Achievable Control Technology (MACT) standard under the CAA (Clean Air Act)

Also as per the CAR protocols, the Destruction Efficiency (DE) should be 98 % and the Destruction Removal Efficiency (DRE) should be 99.99 % at the destruction facility. So, all the facilities which are regulated by the EPA as a RCRA permitted HWC is permitted to destroy the ODS.

The following are the parameters that need to be monitored at the facility during the destruction of ODS, and the records for the same are to be submitted during CAR verification:-

- Feed rate of ODS
- The amount and type of consumables used in the destruction OR one can take the default emission factor for transportation and destruction
- The amount of electricity and amount and type of fuel consumed by the destruction unit OR one can take the default emission factor for transportation and destruction
- Operating temperature and pressure during the destruction
- Effluent discharges measured in terms of water and pH levels
- Continuous emissions monitoring system (CEMS) data on the emissions of carbon monoxide during destruction

The destruction facility is also responsible for issuance of the Certificate(s) of Destruction, which should include the following:-

- Project Developer name
- Destruction facility name
- Generator name
- Certificate of Destruction ID number
- Serial, tracking, or ID Number of all containers for which ODS destruction occurred
- Owner of destroyed ODS
- Weight of material destroyed from each container
- Start destruction date
- Ending destruction date

6.7 CALCULATION OF CARBON BENEFITS

Out of the total stock of ODS under this project, only the quantity of 66 tons of CFC-12 is eligible under any Carbon Market. As discussed above, it is most profitable to opt for ODS waste destruction in Nigeria under CAR.

Since the purity of the CFC-12 stock is not available, we will calculate the revenue generation from CRT sales and baseline emissions 3 different scenarios – purity of gas 50%, 70%, 90%.

6.7.1 BASELINE AND EMISSION REDUCTION CALCULATION METHODOLOGY

We calculate the Baseline Emissions and Project Emissions for each scenario to find out the number of CRT that can be generated and the revenue that can be obtained upon monetization. According to the CAR Protocol, quantity of emission reductions over a reporting period is calculated using the equation:

Emission Reductions

$ER = BE - PE$ (Equation 1) Where

ER: Total quantity of GHG Emission Reductions during the reporting period

BE: Total quantity of GHG Baseline Emissions during the reporting period

PE: Total quantity of GHG Project Emissions during the reporting period

Baseline Emissions

$BE = \sum (Q_i * P_i * GWP_i)$ (Equation 2) Where,

BE: Total quantity of baseline emissions (tCO

Q: Total quantity of ODS (MT)

P: Purity Rate of ODS

GWP: Global Warming Potential of the ODS

Project Emissions:

In case of destruction of CFC-12, project emissions are equal to the sum of Emissions due to ODS transportation and Emissions due to CFC-12 destruction. CAR Protocol has given the option to use a default emission factor to calculate the emissions from these sources, as these emissions are very low. This emission factor, which is an aggregate of both the transportation and destruction emissions, is 7.5 tonnes of CO_2 emitted per ton of any CFC-12 stock, transported and destroyed. Therefore

$PE = Q * P * EF_{td}$ (Equation 3) Where,

PE: Total quantity of project emissions tCO_2)

Q: Total quantity of CFC-12 (MT)

P: Purity Rate of CFC-12

EF_{td}: Default Emission Factor for transportation and destruction of CFC-12

6.7 .2 ACTUAL CALCULATIONS

Purity of CFC-12 at 90%

Baseline Emissions

As per (Equation 2)

BE = Avoided Emissions from Pure CFC-12 (90 % purity)

= Q * P * GWP (For 90% Pure CFC-12)

= (84 * 0.9 * 10900)

= 793,800 tCO_2e

Project Emissions

As per Equation 3

$PE = Q * P * EF_{td}$ (For Pure CFC-12)

= 84 * 0.9 * 7.5

= 567

Emissions Reductions

Therefore the total emission reduction is equal to

ER = BE - PE

=793,800 - 867

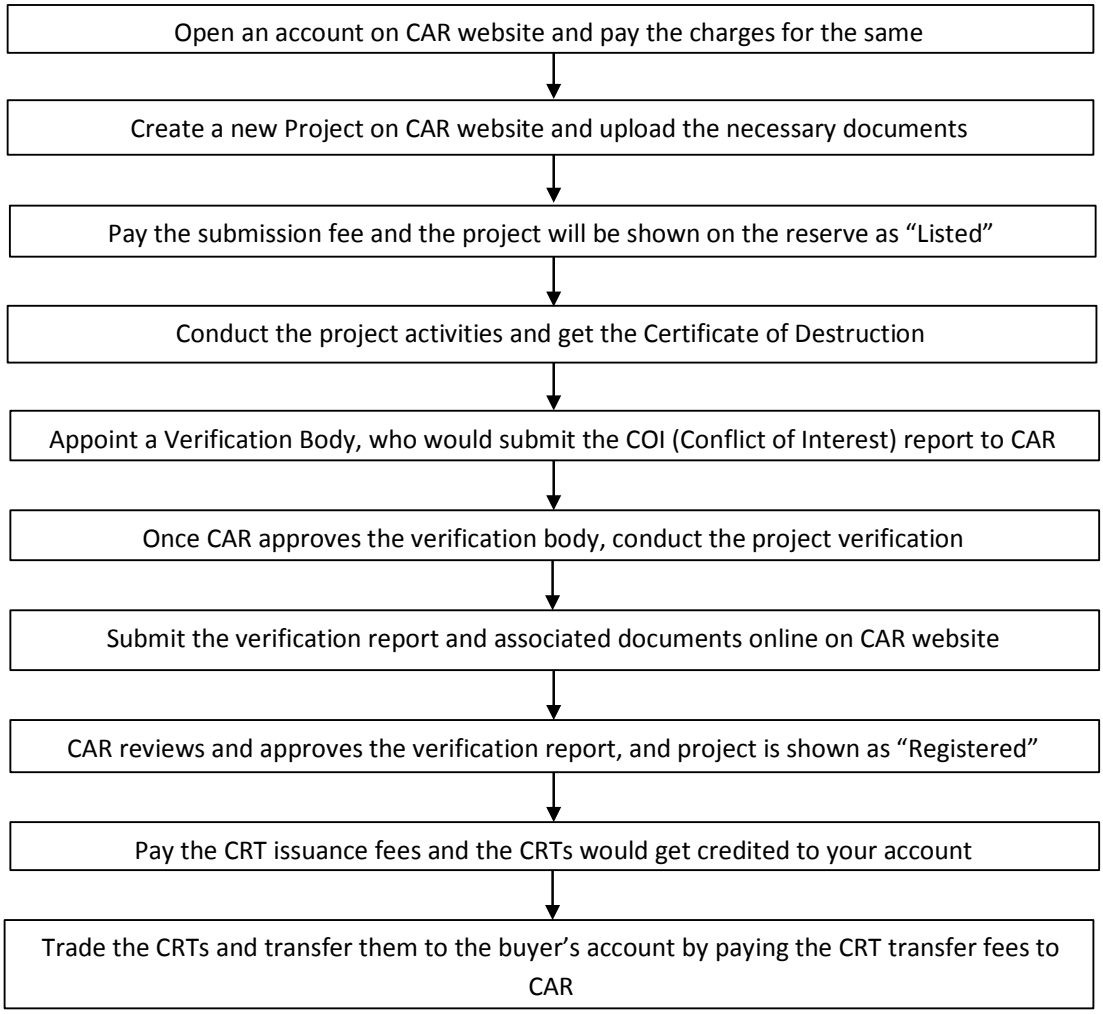
= 823,473 tCO_2e

Table 20: *REVENUE EXPECTED UNDER CAR*

PURITY OF CFC-12 (%)	EMISSION REDUCTIONS (tCO_2e)	PRICE PER CRT(USD)	GROSS REVENUE (USD)
90	823,473	2	1,646,946

6.8 PROJECT SUBMISSION AND REGISTRATION IN CAR

The following flowchart shows the process of submitting and finally registering the project in CAR:-



ANNEX 1- Ozone Regulations (Double Click Page to read full document)

NATIONAL ENVIRONMENTAL (OZONE LAYER PROTECTION) REGULATIONS, 2008

ARRANGEMENT OF REGULATIONS

PART I - PROHIBITION

REGULATIONS

PART II POWERS AND RESPONSIBILITIES

PART III – IMPORT PERMIT

[12] For a distance of 200 to 1000km

[12] For a distance of 200 to 1000km