UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Ozone-Depleting Substance Destruction Programme in Article 5 countries

UNIDO PROJECT CONCEPT

by

VICTOR SHATRAUKA

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Outline of the Presentation

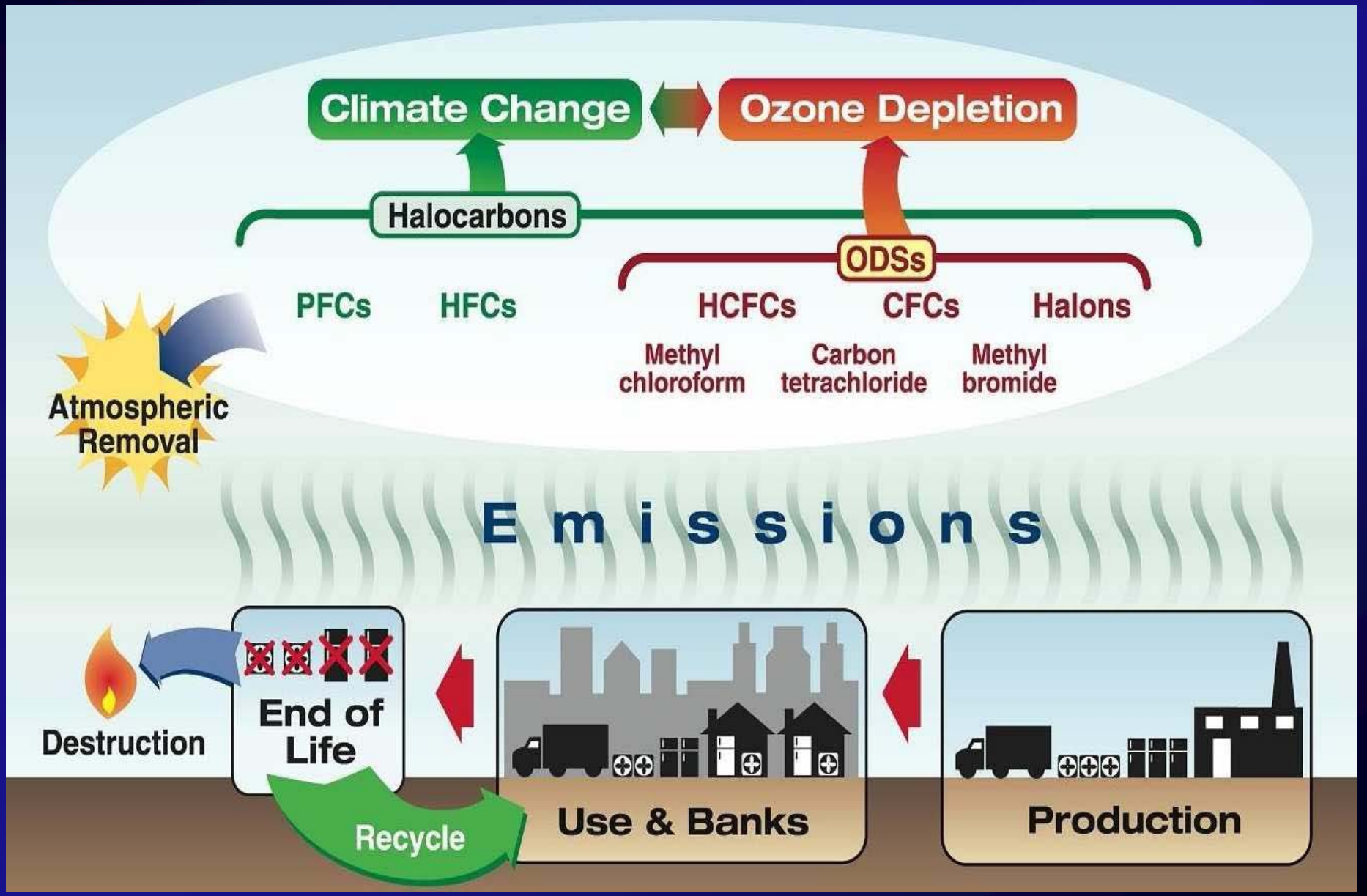
1. Introduction
2. ODS banks management
3. ODS destruction sub-sectors
4. Assessment of destruction technologies
5. National legislation with regard to ODS recovery and disposal
6. Recovery and Recycling network
7. Funding through voluntary carbon markets
8. ODS destruction project (Project concept)

Objectives

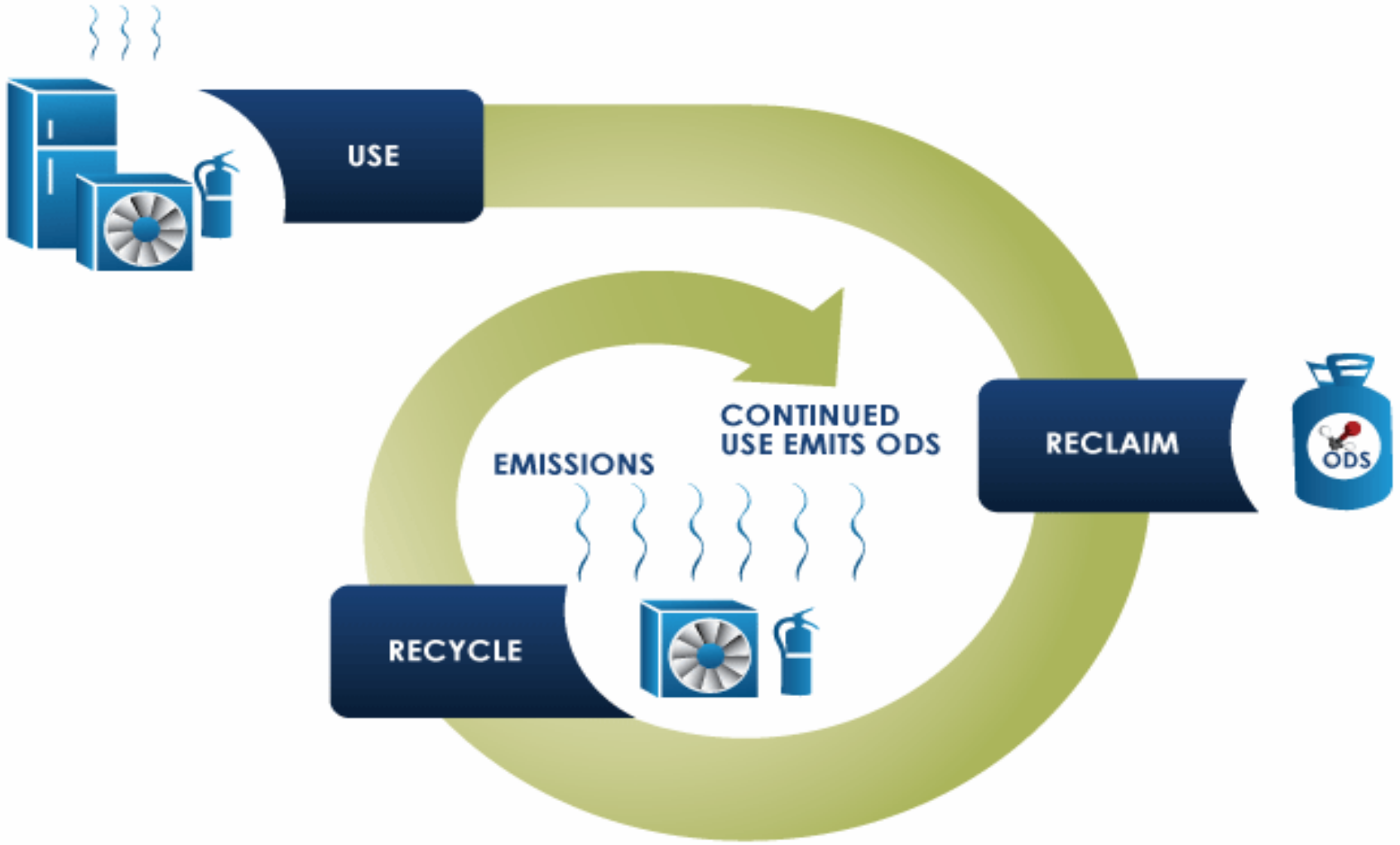
1) Develop a project strategy;
2) Select technologies for ODS recovery and destruction, and
3) Determine opportunities for funding through MP Fund and voluntary carbon markets for destruction of recovered ODS.

1. Introduction

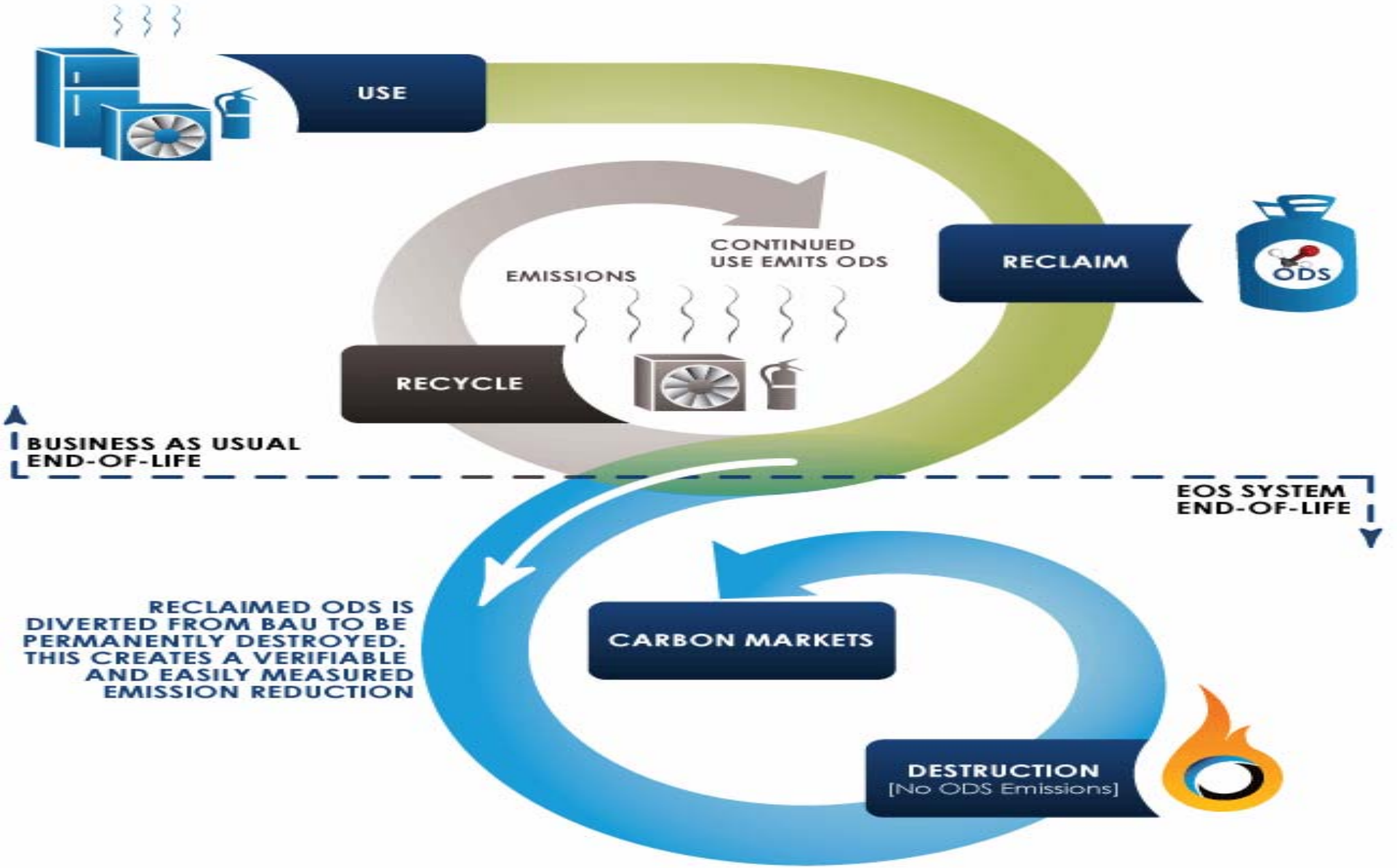
Montreal Protocol, UNFCCC and its Kyoto Protocol



ODS emissions



ODS emission reduction



ODPs and GWPs

Substance	Example	ODP (Ozone Depleting Potential)	GWP (Global Warming Potential)
CFC	CFC 11	1.0	4,750
	CFC 12	1.0	10,720
Halon	Halon 1211	3.0	1,890
	Halon 1301	10.0	7,140
HCFC	HCFC 22	0.055	1,810
	HCFC 141b	0.11	725
	HCFC 142b	0.065	2,310
HFC	HFC 134a	0	1,430
	(R407C)	0	1,774
	(R410A)	0	2,088
PFC	PFC14	0	7,390
	PFC116	0	12,200
SF6		0	22,800

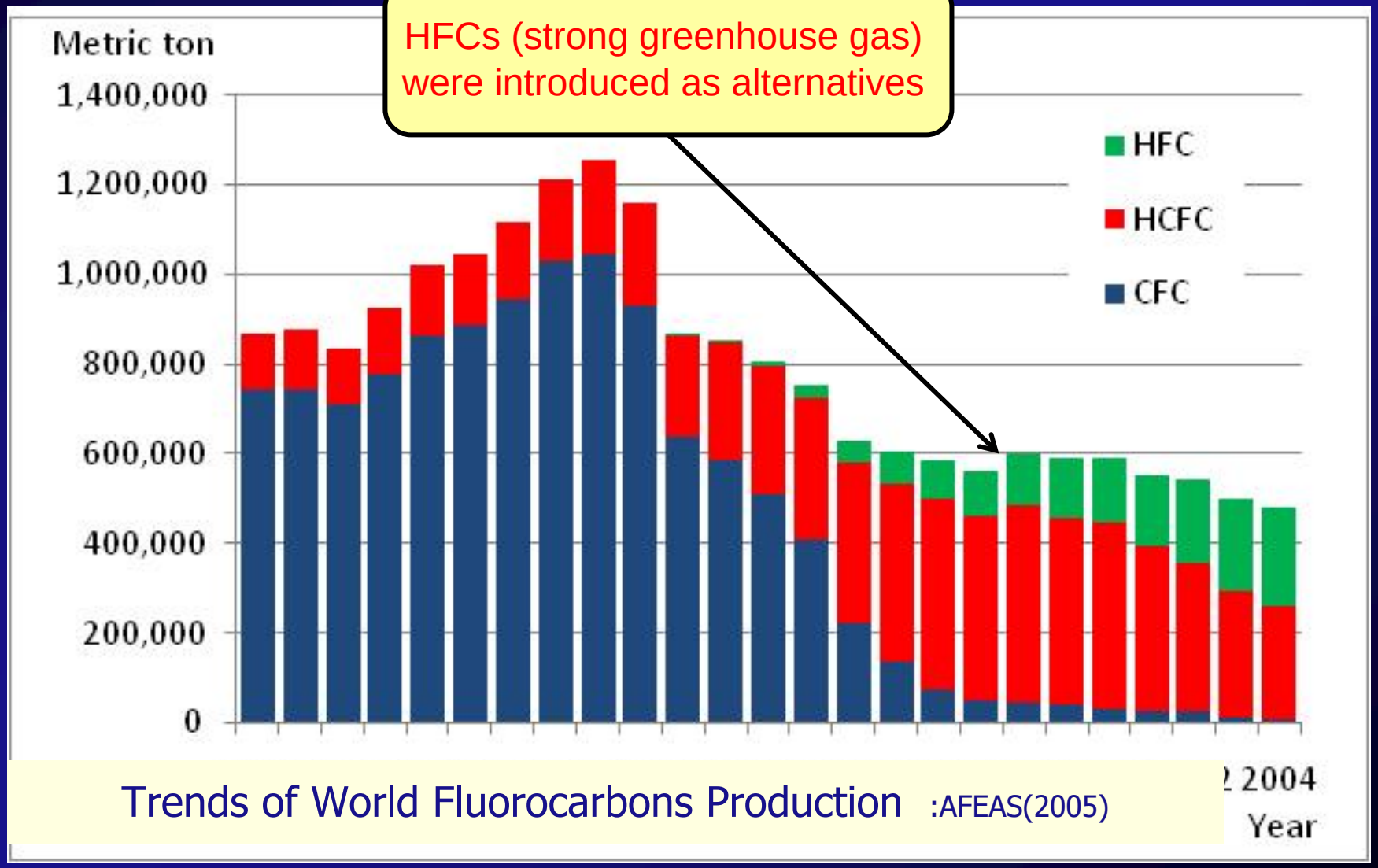
Also have a high GWP value!

Emissions functions derived for various foam types and applications

Foam type	First year release, (%)	Release rate, (%/yr)	Time to total release, (yrs)	Lifetime of foam, (yrs)	Total remaining at decommissioning, (%)
PU Integral Skin	95	2.5	2	15	0
PU Cont. Panel	5	0.5	190	50	70
PU Disc. Panel	6	0.5	188	50	69
PU Appliance	4	0.25	384	15	92
PU Com. Refrig.	6	0.25	376	15	90
PU Cont. Block	35	0.75	86	15	54
PU Discont. Block	40	0.75	80	15	49
PU Cont. Lam.	6	1.0	94	50	44
PU Spray	25	1.5	50	50	0
PU Reefers & Transp.	6	0.5	188	15	86.5
PU Pipe in Pipe	6	0.25	376	50	81.5
Phen. Cont. Lam.	6	1.-0	94	50	44
Phen. Discont. Block	40	0.75	80	15	49
XPS Board	35	2.5	30	50	0

2. ODS Bank Management

Trends of Fluorocarbons Production in the World

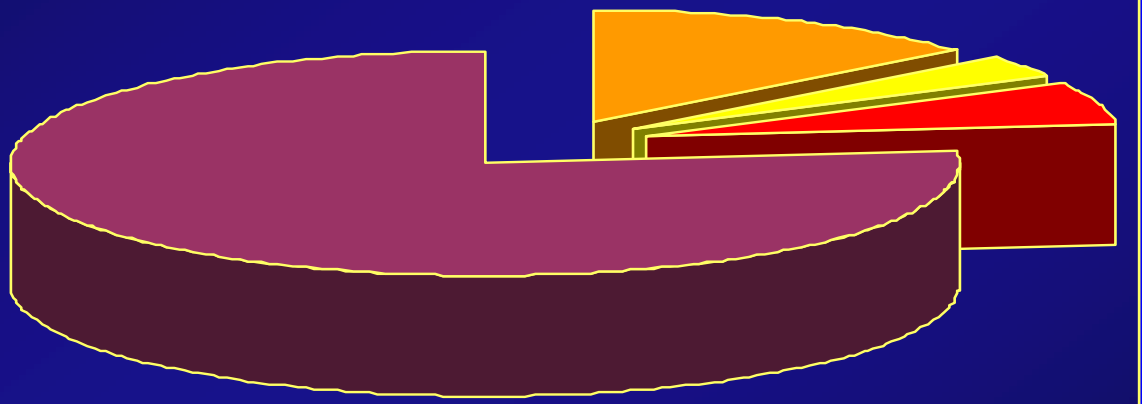


Trends of World Fluorocarbons Production :AFEAS(2005)

Breakout of ODS Banks in MT

CFC banks by ODS Type (2002)
3.78 million tones
Emissions 252,000 OP MT/year
=4x2007 ODS consumption)

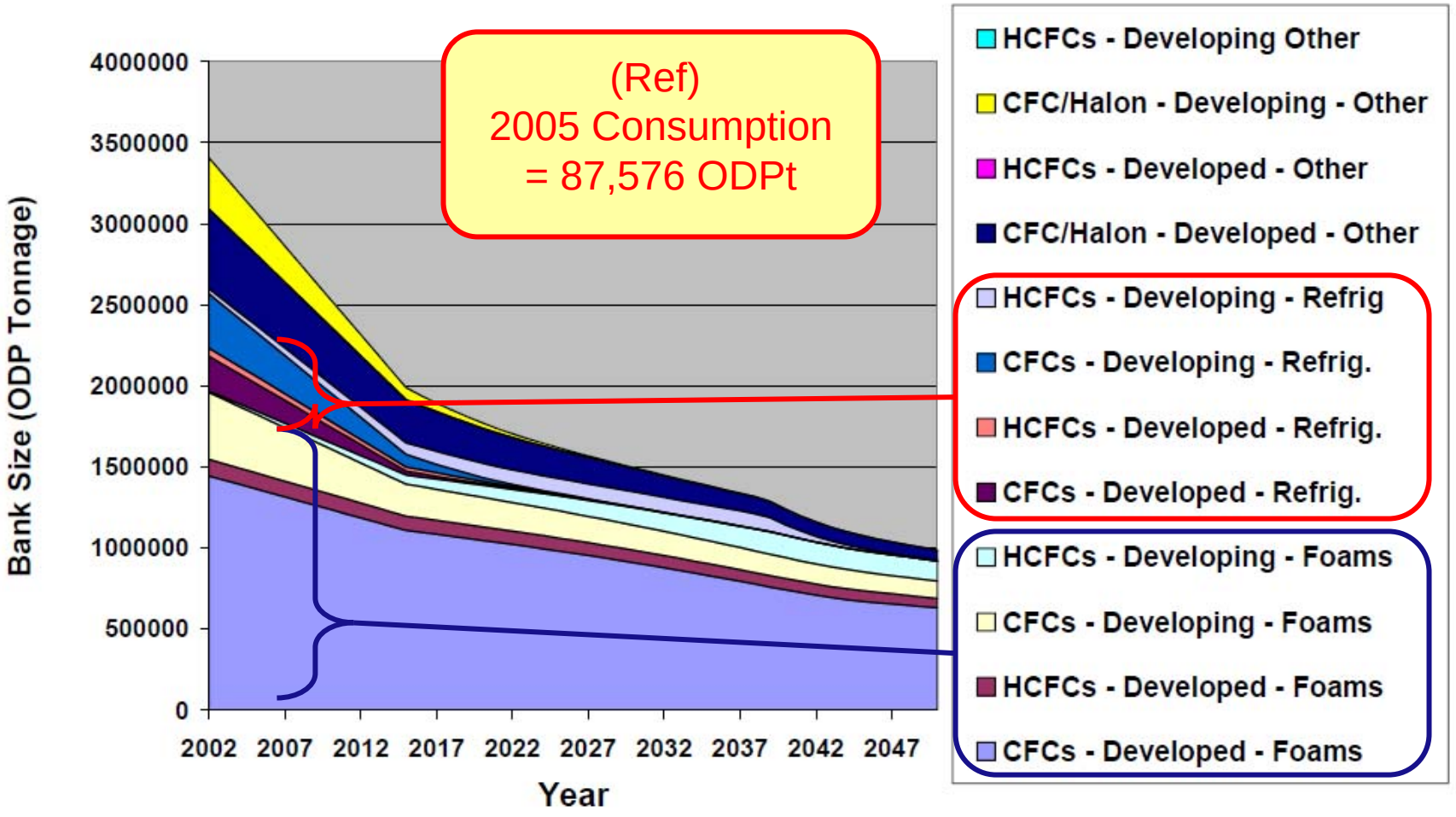
CFC banks by Sector (2002)



- Refrigeration 14%
- Stationary AC 3%
- Mobile AC 6%
- Foams 77%

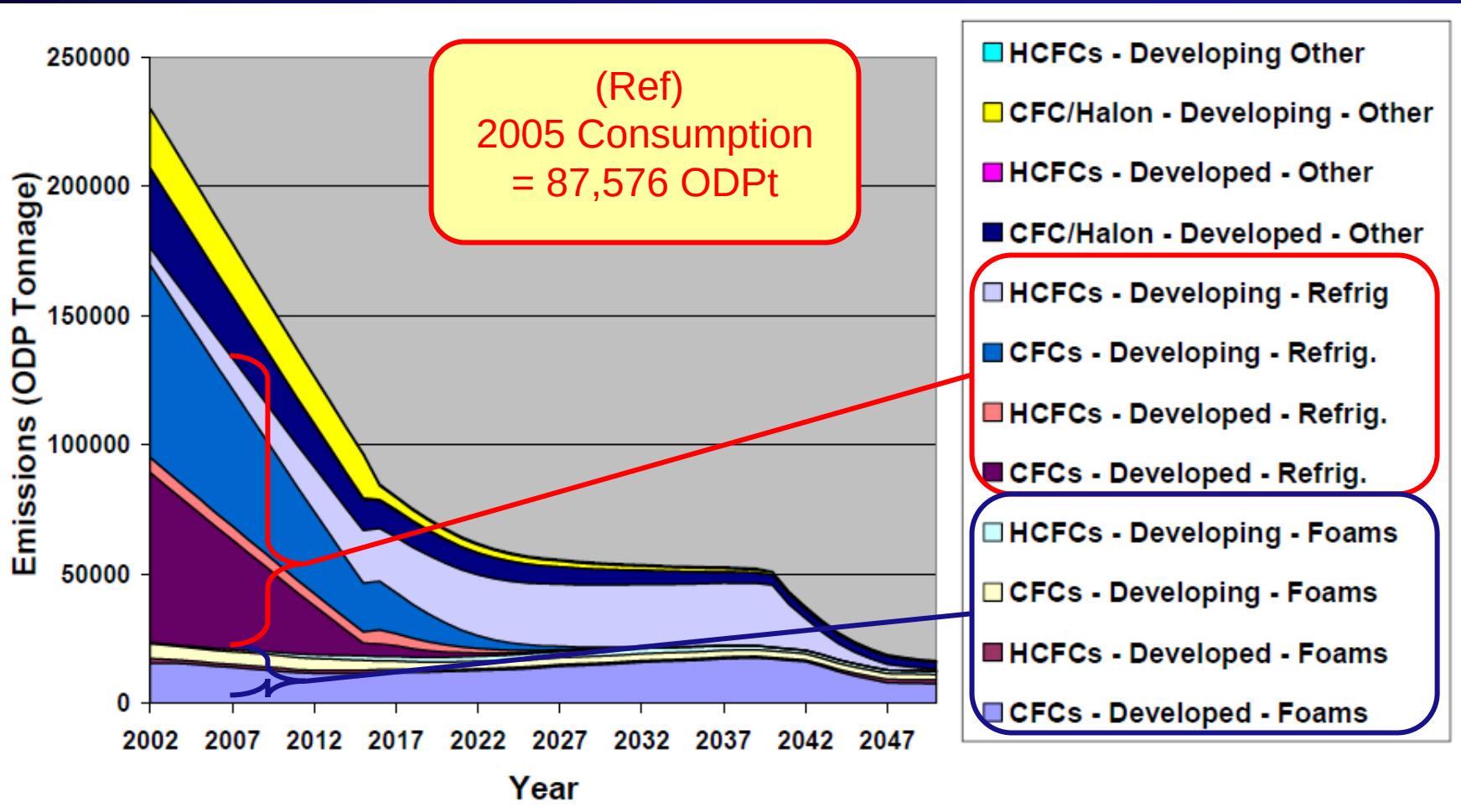
The largest source of accessible ODS that can most easily recovered is in the refrigeration/AC sector. The Multilateral Fund (2006) estimated that in 2010, the worldwide "reachable" bank of CFCs will comprise 514,652 MT, 50% of which will be refrigerant and 50% will be contained in foams. This will translate into a flow of nearly 23,000 MT of CFCs accessible for recovery per year. 1/3 is to be vented by 2015.

Impact of Bank Management



Bank in ODP tonnes for all ODS applications (2002-2050) :TEAP(2007)

Impact of Bank Management

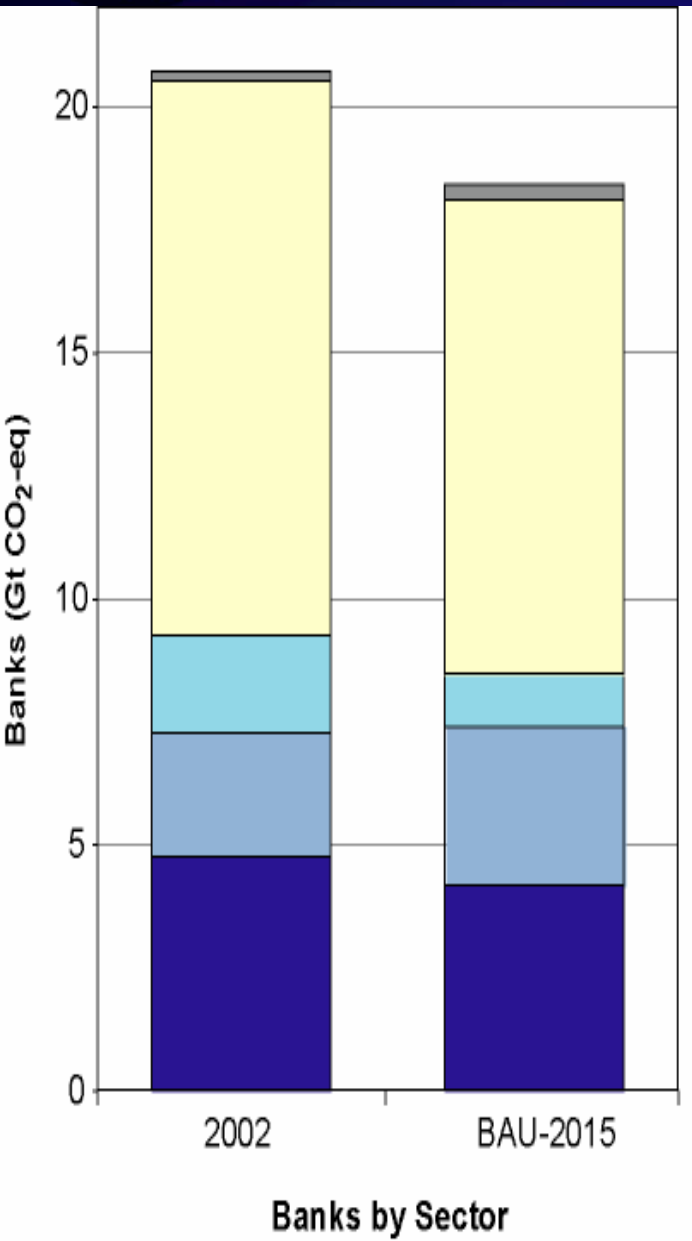


Emission in ODP tonnes for all ODS applications (2002-2050) :TEAP(2007)

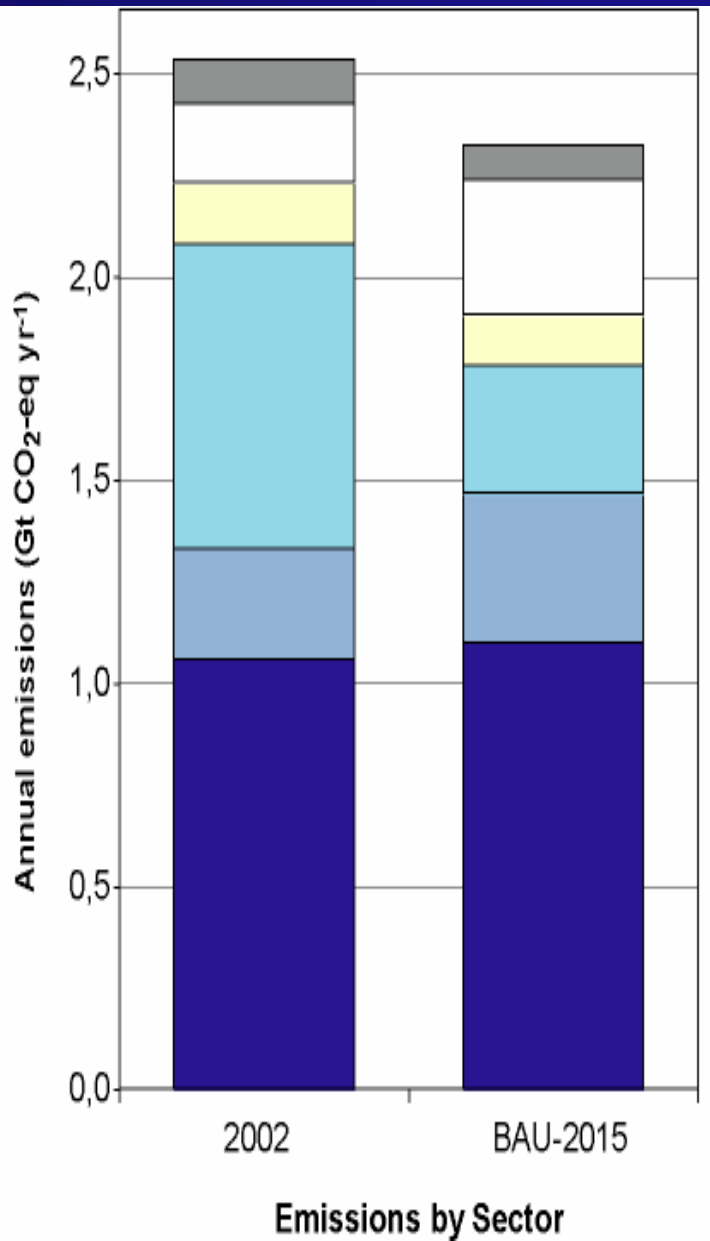
Greenhouse gas CO_2-eqivalent (GWP-weighted) annual emissions of ODS

2002	Annual emission (Mt CO_2-eqivalent yr^{-1})								
	Refrig.	SAC	MAC	Foams	MAs	Fire	HFC-23	Other	Total
Halons	-	-	-	-	-	47	-	-	47
CFCs	726	99	641	117	69	0		0	1651
HCFCs	232	164	15	32	-	0.1		6	447
HFCs	102	9	93	3	6	1	195	25	434
PFCs	0	0	0	0	-	0.1		1	1
Total	1060	271	749	152	75	1	195	32	2534
2015 BAU	Annual emission (Mt CO_2-eqivalent yr^{-1})								
	Refrig.	SAC	MAC	Foams	MAs	Fire	HFC-23	Other	Total
Halons	-	-	-	-	-	12	-	-	12
CFCs	136	50	49	85	17	0	-	0	338
HCFCs	570	210	19	20	-	0.1	-	9	828
HFCs	391	109	247	18	23	4	332	27	1153
PFCs	0	0	0	0	-	0.1	-	0.1	0.2
Total	1097	370	315	124	40	5	332	37	2319

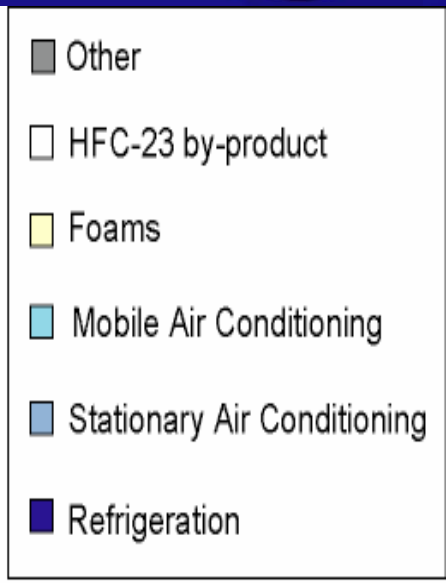
GLOBAL BANKS AND EMISSIONS OF ODS AND HFCs BY SECTOR (IPCC/TEAP 2006)



Banks by Sector



Emissions by Sector



Servicing CFC-based refrigeration equipment in the post 2010 era

It is estimated that the global demand for servicing CFC- based refrigeration equipment in the post 2010 era would amount to as much as 30,000 tones per year in 2010 falling to 3,000 tones in 2015

3. ODS Sectors Intervention

Three major ODS destruction sub-sectors

The three major sectors for ODS destruction:

- *Old fridges and air-conditioners de-manufacturing*
- *Refrigerant servicing*
- *Halons Banking*

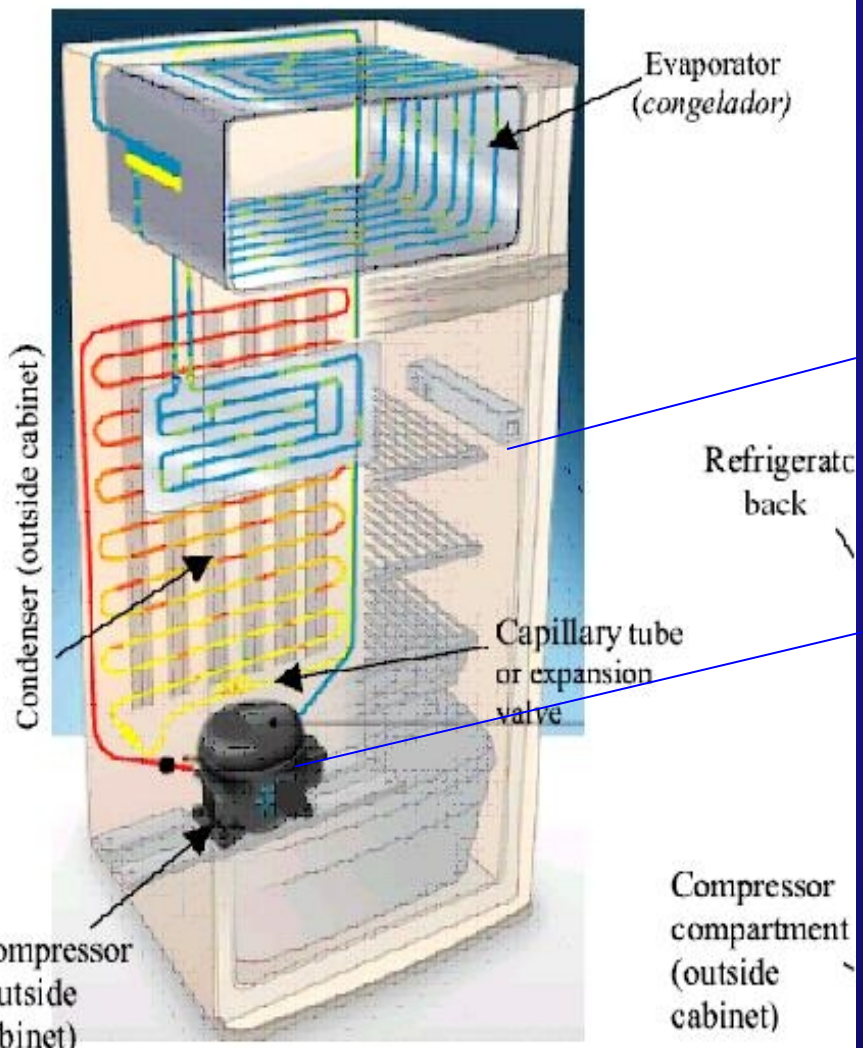
- *Landfills (construction foams panels)*
- *Solvents (by-site products)*

Bank of CFCs in the refrigeration sector

Main ODS uses in refrigeration are:

- CFC-11 (centrifugal chillers)
- CFC-12 (general purpose, normal refrigeration, tropical ambient temperatures, air conditioning, MAC)
- HCFC-22 (air conditioning)
- HCFC-141b (refrigerator isolation foams)

ODS DESTRUCTION METHODOLOGY: CFC-11 AND CFC-12: Non-KYOTO GASES

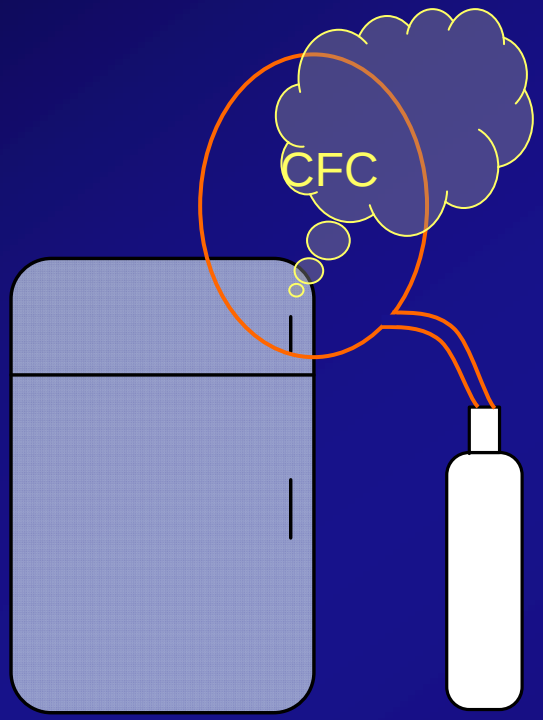


CFC-11 Blowing agent PU foam GWP=4750

CFC-12 Refrigerant cooling circuit GWP=10900

ODS DESTRUCTION METHODOLOGY: CFC-11 and CFC-12

The project activity recovers Chlorofluorocarbons from end-of-life refrigerator and freezer appliances in a more efficient way than the business as usual activities



Business as usual Baseline Recovery

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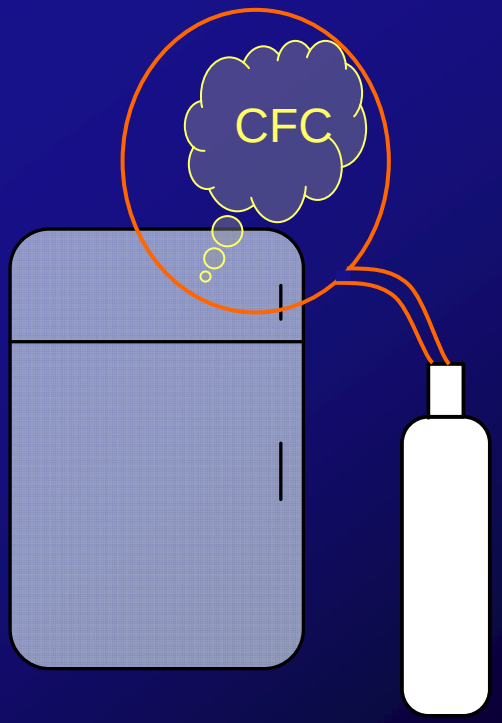


Project activity Recovery

REFRIGERANT SERVICING SECTOR

Standard RMPs may include some or all of the following activities and support measures:

- Public awareness campaigns
- Training and certification do service technicians
- Codes of good practices in refrigeration
- Policy and regulatory support measures
- Ban of import of cfc-based equipment
- Import/export licensing system
- Training of customs and enforcement officers
- Refrigerant recovery and recycling systems
- Economic incentives and disincentives
- System for monitoring of ODS consumption and data reporting
- Improvement of data collection systems
- Refrigerant management/stockpiling to run existing equipment until the end of its economic life
- Disposal/destruction strategies
- Monitoring of RMP implementation

Refrigerant Servicing Sector

MF has approved at least 100 recovery and recycling projects including:

a) Training of technicians

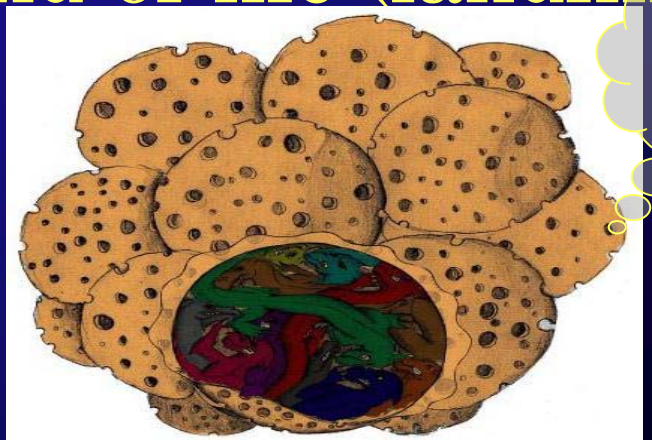
b) Purchase and distribution of recovery and recycling CFCs, establishment of centralized facilities for the recovery and recycling of CFCs

d) Expert group report stated that on the basis of responses received from 11 Parties of 4, 275 MT of CFCs used for servicing refrigeration equipment, only 23 MT were recovered

e) Consideration of the size of the incentive would be needed to encourage more robust recovery in Article 5 countries

Baseline emissions estimates from foams

- It is recognized that there are three prime phases in assessing emissions from foams, These are:
- Foam production and installation (first year losses)
- Installed foam during its use phase
- Decommissioning at end-of-life (landfills)



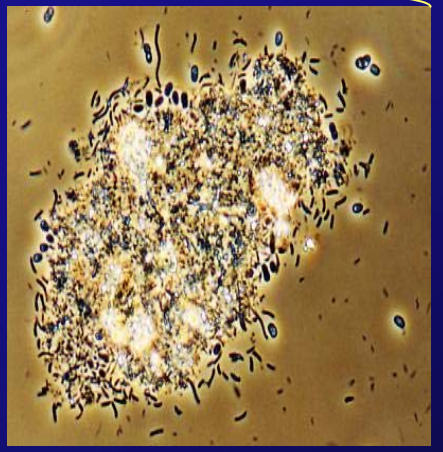
Baseline emissions CFC-11 Adjustment factor

The release of the blowing agent encapsulated in the insulation foam depends on the end treatment practice

The AF shall be based and justified by scientific sources!

During the shredding process approximately **24 %** of the CFC-11 contained in the PUR foams is emitting into the atmosphere

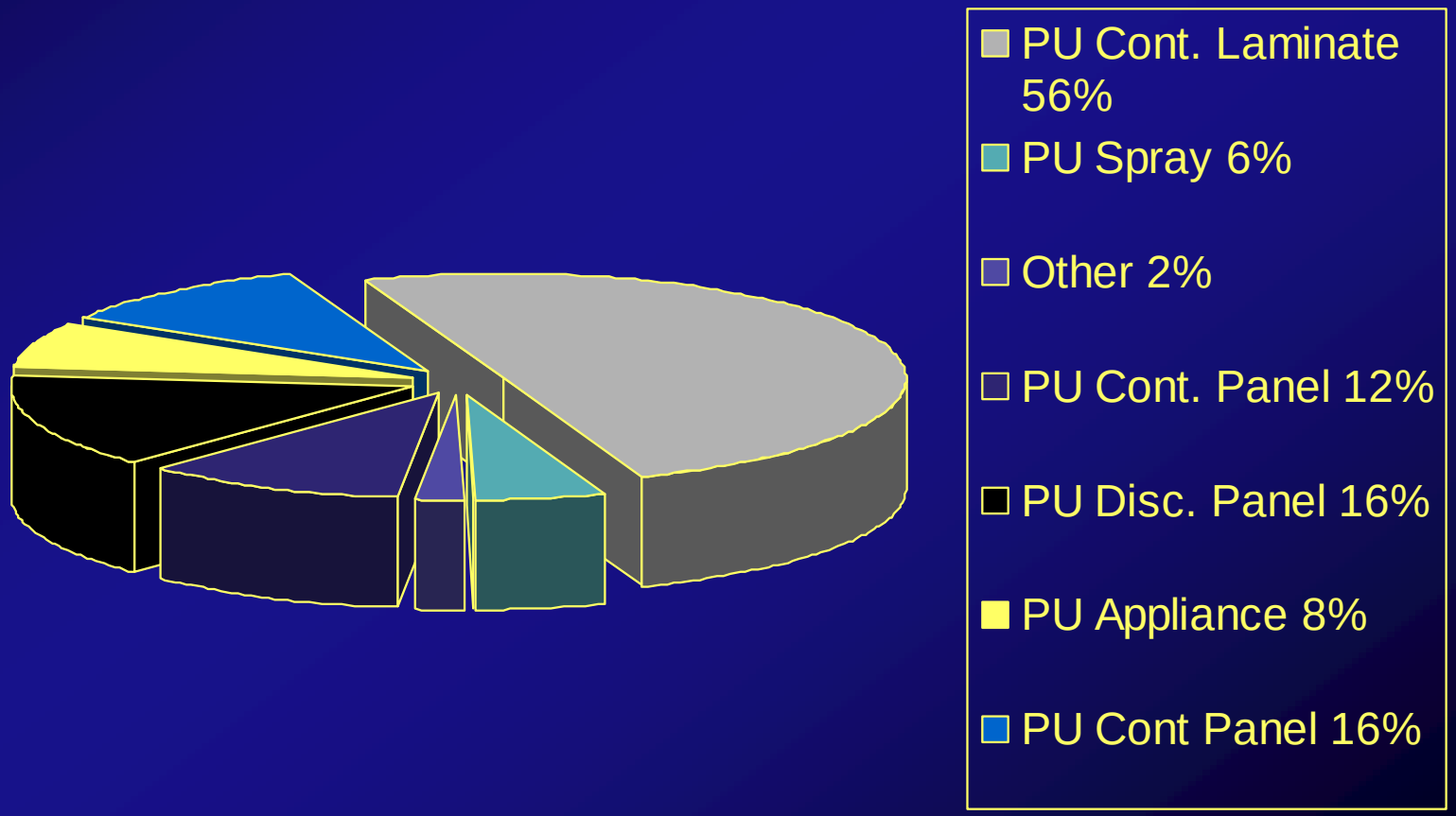
The instantaneous release due to landfill compaction can be estimated with 15 % of the CFC-11 content at disposal, which is equal to 11.4% of the total amount of CFC-11 in the appliances before shredding



The release during microbial inactive period is estimated to be 8% of the total amount of CFC-11 in the appliances before shredding

Remaining CFC-11 in installed foams at 2010

Global CFC-11 Projected in installed foams as at 2010
(approx. 1.12 M tones)



Landfill management

The new EU Directive will prohibit the placing in landfills of materials of high carbon content.

Little measurement or control of specific materials entering into a given site in many countries

Necessary to classify the material as hazardous or special waste.

Necessary to ban the landfilling of end-of-life refrigerators and air conditioners in Article 5 countries.

4. Assessment of ODS disposal technologies

Approved destruction processes

Technology	Annex A, G.I, Annex B, Annex C, G.I	Halons
Destruction and removal efficiency (DRE)	*99.99%*	*99.99%*
Cement kilns	Approved (in some countries, Brazil, Mexico not approved)	Not approved
Liquid injection incineration	Approved	Approved
Gaseous/fume oxidation	Approved	Approved
Municipal solid waste incineration		
Reactor cracking	Approved	Not Approved
Rotary kiln incineration	Approved	Approved
Argon plasma arc	Approved	Approved
Inductivity coupled radio frequency plasma	Approved	Approved
Microwave plasma	Approved	
Nitrogen plasma arc	Approved	
Gas phase catalytic dehalogenation	Approved	
Superheated steam reactor	Approved	

Destruction Technologies

Multipurpose technology

- Rotary kiln incinerators
- Cement kiln incinerators
- Municipal solid waste incinerators

Less capital cost and simple technology

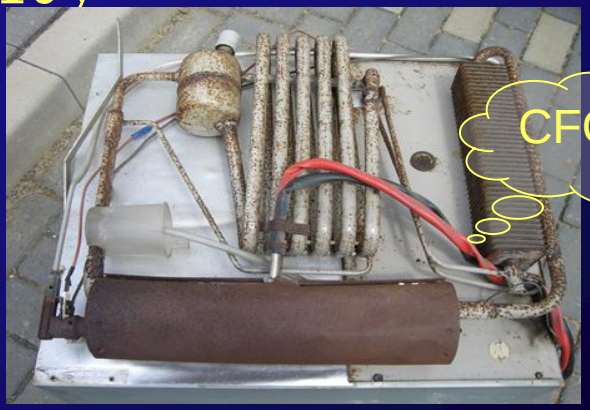
Devoted technology

- Superheated steam reaction
- Plasma destruction
- Liquid injection incineration
- Catalytic reaction

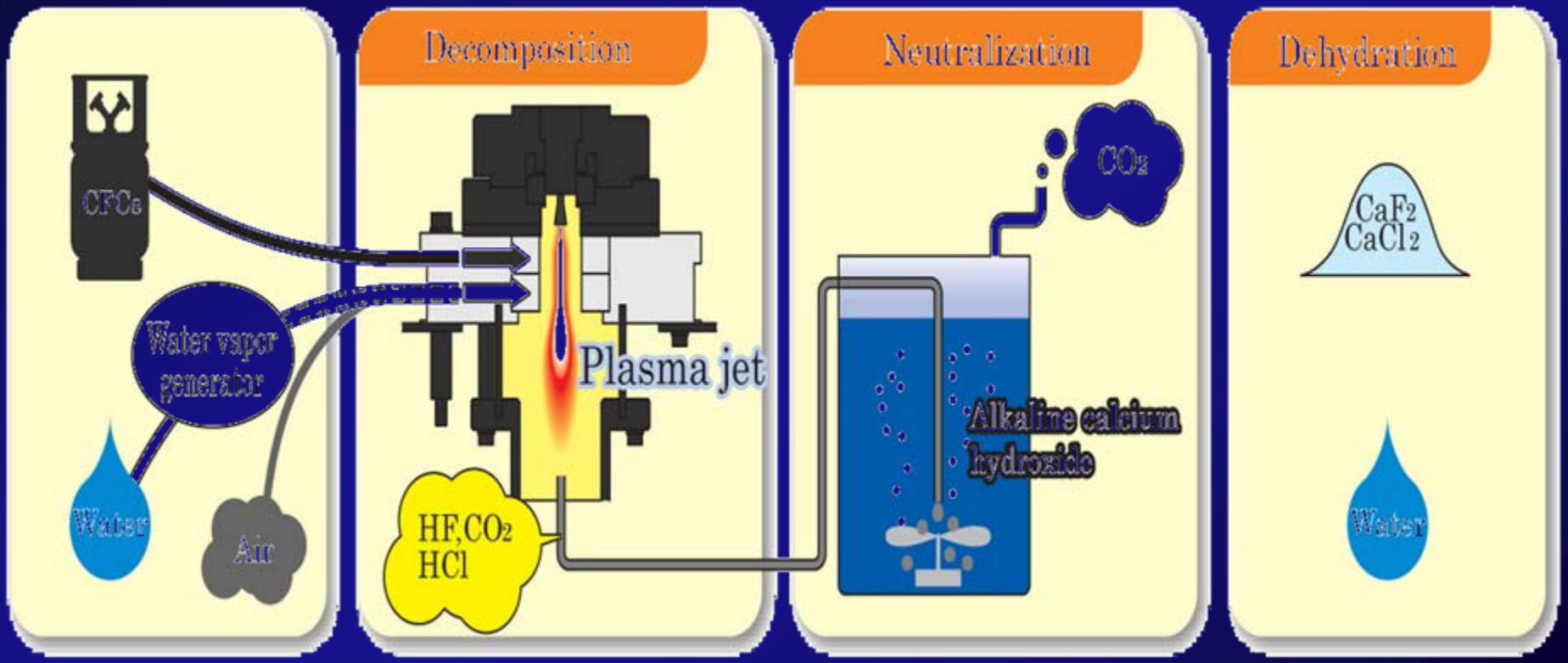
Capable to destroy much ODSs (advantage of scale)

Criteria for Technology Screening

- Destruction and Removal Efficiancy (DRE)
- Emissions of dioxins/furans
- Emissions of other pollutants (acid gases, particulate matter, carbon monoxide
- Technical capability



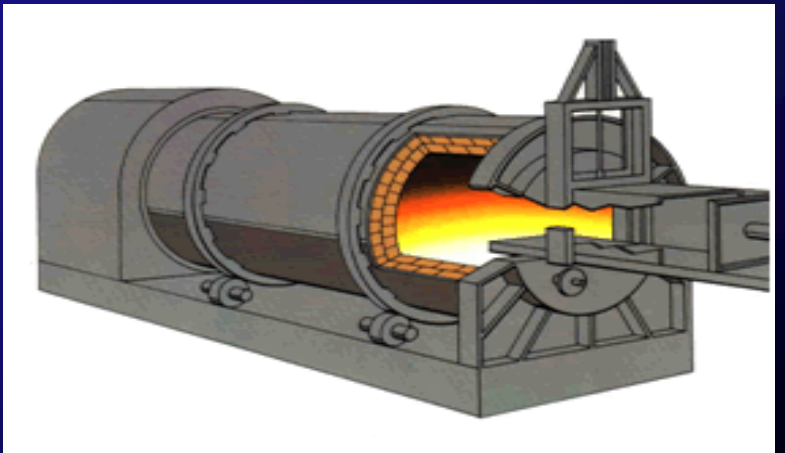
Asada's new Plasma Technology



Refrigerant Decomposition Equipment "Plasma X"

PLASCON – waste destruction plant

- Electric-arc plasma hazardous waste destruction process
- Eliminates various waste types such as; PCBs, pesticides, ODS, SGGs and halons
- Uses plasma technology, not high temperature incineration which allows for destruction efficiency
- In commercial use in Australia, the US and Mexico



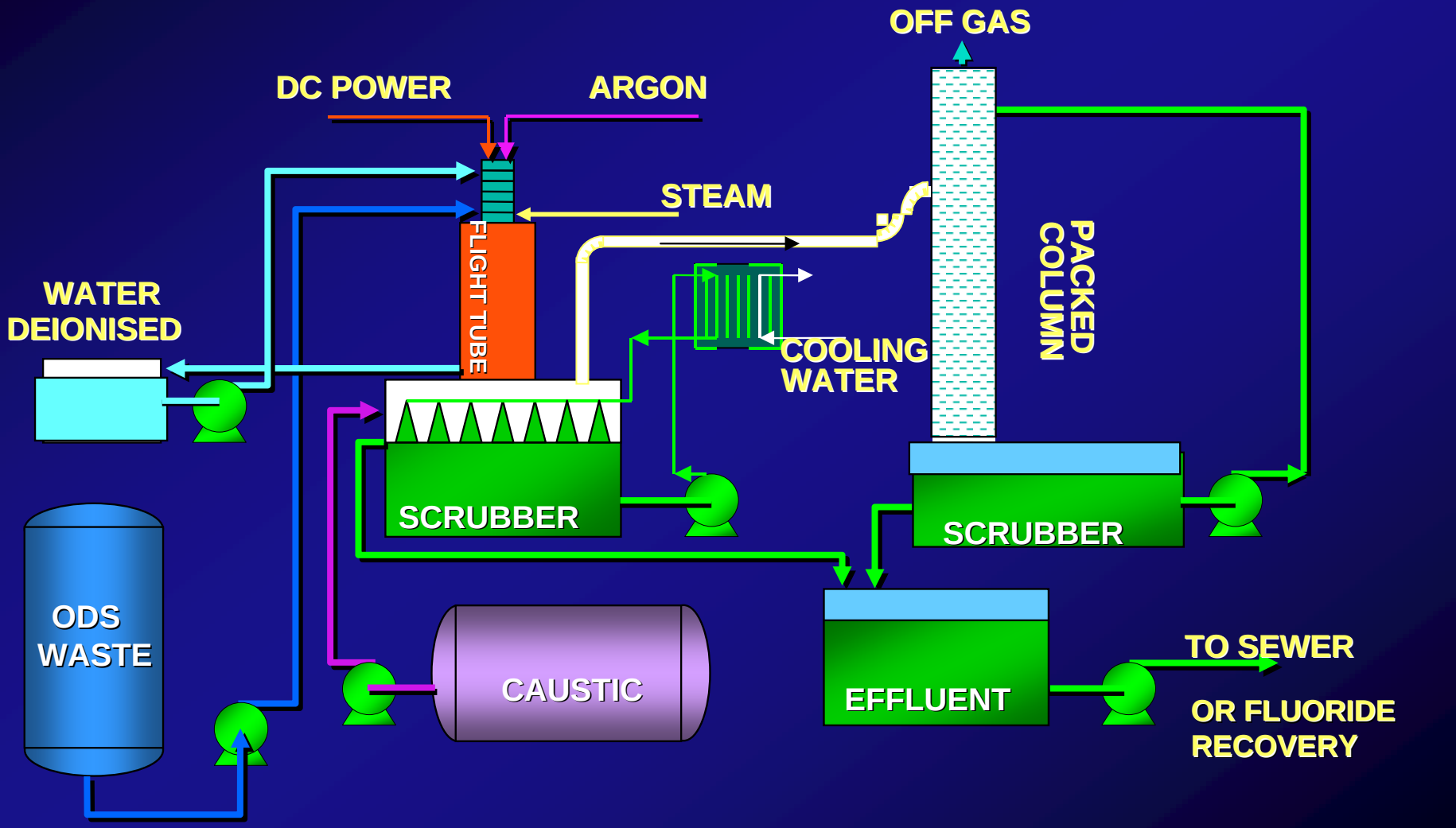
PLASCON – waste destruction plant

Plascon plant with NaOH Gas Scrubber

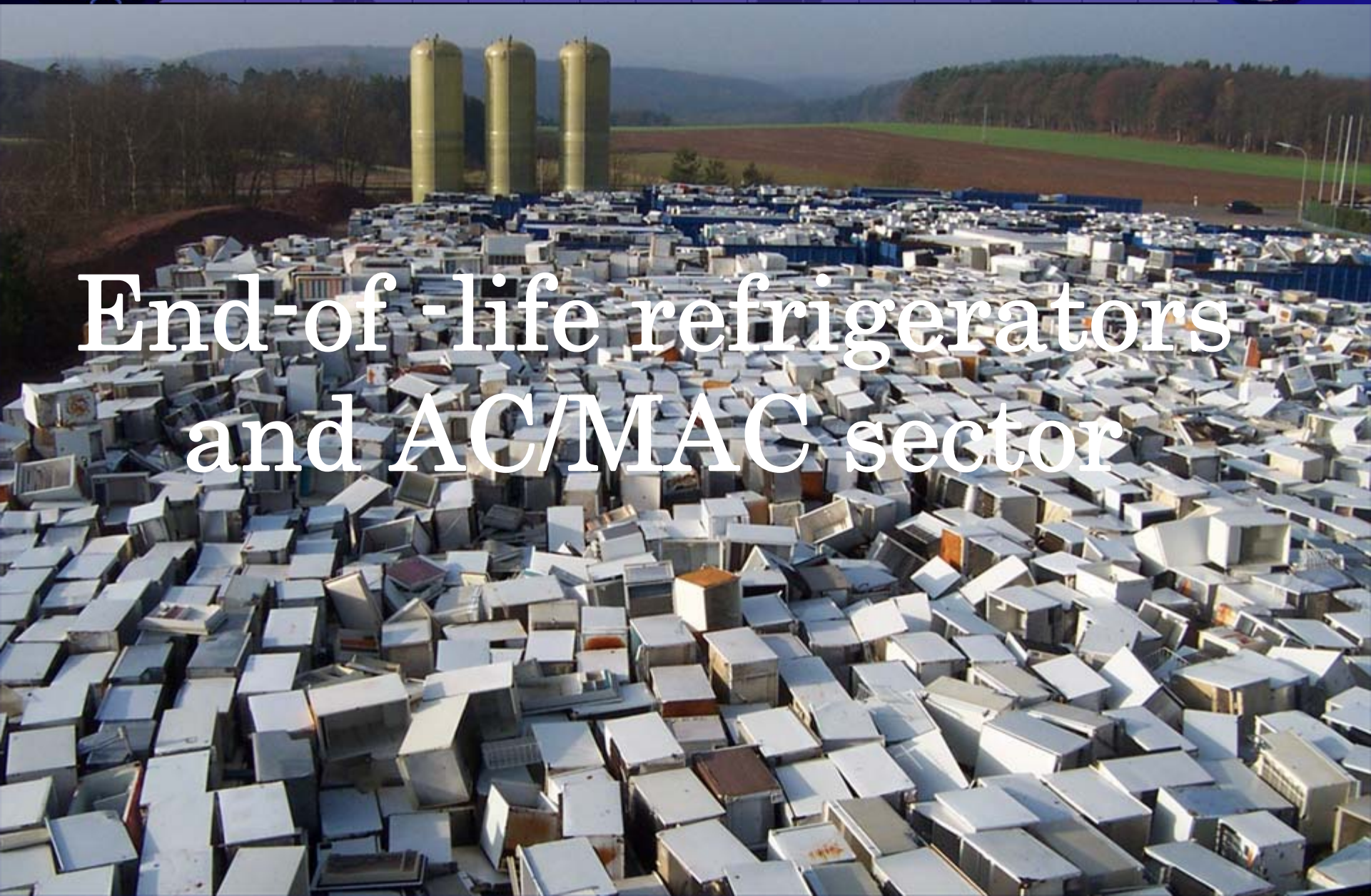
System Characteristics

Operating temperature:	3200^0	
Residence time:	30 msec	
Name plate flow rate:	70 kg/h	R-12
	80kg/h	R-22
	75kg/h	R-134a
Destruction efficiency:	99.999%	
Scrubbing efficiency:	99.9%	
Price:	US$ 2,096,350	

Plascon Fluorocarbon Process



PLASCON – waste destruction plant



End-of -life refrigerators and AC/MAC sector

End-of-used fridges fleet

Why refrigerator/freezer appliance de-manufacturing?

Importance of refrigerator/freezer appliance de-manufacturing

1 kg CFC-R12	10.720 kg CO_2-equivalent
1 kg CFC- R11	4.680 kg CO_2-equivalent
1 REFRIGERATOR	2.800 kg CO_2-equivalent !!!

The Greenhouse Effect

Importance of refrigerator/freezer appliance demanufacturing

1 refrigerator	1 house per year	1 car per year
		
equals 2.8 t CO_2!!! (CFC content)	equals 6.9 t CO_2	equals 3.7 t CO_2

This comparison shows why every single gram of CFC must be recovered and eliminated!

De-manufacturing facilities

Stage 1

70-300 g CFC R12 in the cooling circuit and compressor (pre-treatment)

Stage 2

200-800 g CFC R11 in the polyurethane foam insulation (final treatment)

Mobile

Stationary

Mobile

Stationary

Recovery of approx. 45 kg raw materials per appliance

Savings of 2.8t CO_2 (equivalent) per appliance

The refrigerator/ freezer recycling is the quickest option for promoting climate protection and reducing emissions.

De-manufacturing facilities

- De-manufacturing steps are conducted in a clean modern facility that looks like a combination of warehouse and assembly line

- Recycling processing features state- of-the art equipment from SEG, Germany

Initial De-manufacturing

- Remove shelves and crispers
- Evacuate oil and refrigerant
- Remove the compressor
- Remove posiible hazmats (PCB condencers, mercury switches and thermostats)
- Place on line conveyer belt
- Liquefy CFC-12

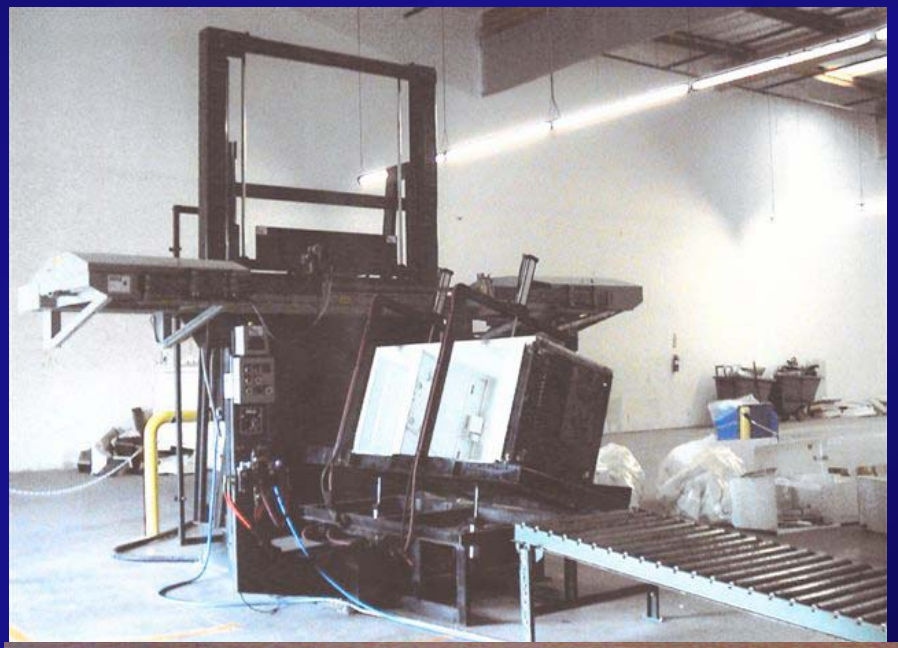
Recovery of CFC-11 from Isolation Panels

- Feed appliance chassis into negative atmospheric pressure chamber for shredding
- Grind CFC-11 foam into powder
- Liquefy CFC-11
- Separate metals and plastic using magnets for steel, eddy currents for non-ferrous metals and air currents for plastics
- Sell metals and plastic to secondary markets
- Destroy CFC-11 at the destruction facility
- Ship degassed powder to plastic recyclers

Low Volume De-manufacturing

- Cut chassis into pieces manually (using saws)
- Separate foam, metals and plastic
- Sell metals and plastic to secondary markets
- Sell CFC-11 foam in bags
- Transport foam bags to a destruction facility
- Destroy foams ina rotary kiln/ plasma arc furnace

Applicable to facilities with annual 50,000-100,000 units/year



5. National legislation

What you may wish to consider

- *Comprehensive strategy for addressing the fluorocarbons and other ODSs, which have strong greenhouse effect*
- *Framework for recovering fluorocarbons from end-of-life equipment (refrigeration systems) and making access to final disposal options available*
- *Choosing environmentally sound alternatives, and Avoiding triple conversion (i.e. CFCs -> HCFCs -> HFCs -> other alternatives)*

Select Management Approach

Implement regulations as foundation

- Prohibit ODS venting and require use of recovery equipment
- Mandate technician certification in ref/AC sector
- Require recordkeeping & reporting from reclamation & destruction facilities

Consider complementary management schemes

- Producer responsibility schemes can be effective when (1) industry is organized and not diffuse, and (2) there is a strong civil and/or government sector
- Voluntary programs can be successful but require public pressure and/or credible threat of regulatory action

Develop Regulations on ODS Disposal

Regulations include:

a) Proper recycling methods for ODS and ODS –containing equipment;

b) Banning the release of OD refrigerants;

c) placing restrictions on the quantity of ODS imported for destruction purposes;

d) Creating hazardous waste regulations that control the restrictions of ODSs

Producer responsibility programmes

Under these programmes a levy, or licensing fee, is imposed on the bulk import of ODSs and ODS-containing equipment. And is set aside to fund the decommissioning of equipment at the end of its useful life and environmentally sound destruction of related ozone-depleting substances. Such systems can be run as voluntary programmes or to be supported by national legislation or regulations requiring participation, which imposes a levy or licensing fee on bulk imports and imports of pre-charged refrigeration equipment.

Producer responsibility programmes (con-d)

- Including end-of-life disposal fees in the price new refrigeration air conditioner equipment

  The fee may either be imposed by the Government or by industry though voluntary programme.
- Leveraging the interest of alternatives producers to fund ODS destruction
- Leveraging the work done under energy efficiency-related refrigerator or air conditioner exchange programmes to recover and destroy ODSs

  The delivery of the old equipment to a centralized decommissioning site during the implementation of CEF –funded projects to replace older, less-efficient refrigeration equipment

Comparison of Legislative Approaches in Non-Article 5 Countries

Country	Ban on Venting ODS Refrigerant	License/Certification Required for Refrigeration/AC Technicians	Commercial Refrigeration/ AC Equipment	Domestic Refrigerated Appliances		
			Reporting Requirements for Refrigererant Recovery Operators in the Commercial Sector	Foam recovery Required at Appliance Disposal	Standard for Refrigerant Recovery at Appliance servicing and/or Disposal	Standard for Foam Recovery at Apliances Disposal
Australia	☺	☺			☺	
Canada	☺	☺				
Czech Rep.	☺	☺		☺		
Germany	☺	☺		☺	☺	☺
Japan	☺	☺	☺	☺	☺	
UK	☺	☺		☺	☺	☺
US	☺	☺			☺	

Range of other regulatory approaches

Domestic Appliance Disposal –The three European Community countries and Japan have passed laws requiring producer responsibility programs, mandating the recovery of both refrigerant and foam ODS. The US has launched a voluntary partnership program to properly recycle refrigerators and recover ODS refrigerant and foam.

Bulk ODS Disposal –Australia and Canada have implemented producer responsibility programs in which rebates are provided for the return of used refrigerant; the collected refrigerant is destroyed.

Mobile Air Conditioners –Japan has passed a law requiring the recovery and destruction of fluorocarbons from MACs, as well as the recycling of parts at vehicle end of life. In response, industry has implemented a recycling program under which end of life vehicles are sent to registered recovery operators, who recover ODS and are paid based on the number of MACs and quantity of refrigerant recovered.

Halon Banking – In the three European Community countries and Australia, the use of halons is banned in all non-critical uses, while the US and Japan allow its use in existing systems. Many countries have established central halon banks, where halon is purified and stored for critical use or destruction. Critical uses are generally closely monitored in order to prevent misuse. Specifically, Australia, Canada, the Czech Republic, Japan, the US, and the UK all have established halon banks of some form.

Legislations for Recovery & Destruction of Fluorocarbons

Fluorocarbons Recovery & Destruction Act	Commercial Refrigerators Commercial Air-conditioners
End-of-Life Vehicle Recycling Act	Mobile Air-conditioners (Automobiles)
Home Appliance Recycling Act	Domestic Refrigerators Domestic Air-conditioners (+TVs, Washing Machines)

Fluorocarbons Recovery & Destruction Act ~Commercial refrigerators and A/Cs~

Servicing operators

End users

Fee

Fluorocarbons

Consignees
(Building dismantlers, Waste disposal operators)

Fluorocarbons

Fee

Fee
(could be paid via third party)

Fluorocarbons

Registration

Recovery operators

Local Governments

Annual report

Annual report

Fluorocarbons

Fee

Permission

Destruction operators

National Government

Annual report

End-of-Life Vehicle Recycling Act

Car Owners

End-of-life vehicles

Collection operators

Registration

Local Governments

End-of-life vehicles

Recovery operators

Registration

Annual report

Fee

Fluorocarbons

Fee (for recovery)

Annual report

Vehicles manufacturers

Fluorocarbons

Fee (for destruction)

Authorization

National Government

Destruction operators

Annual report

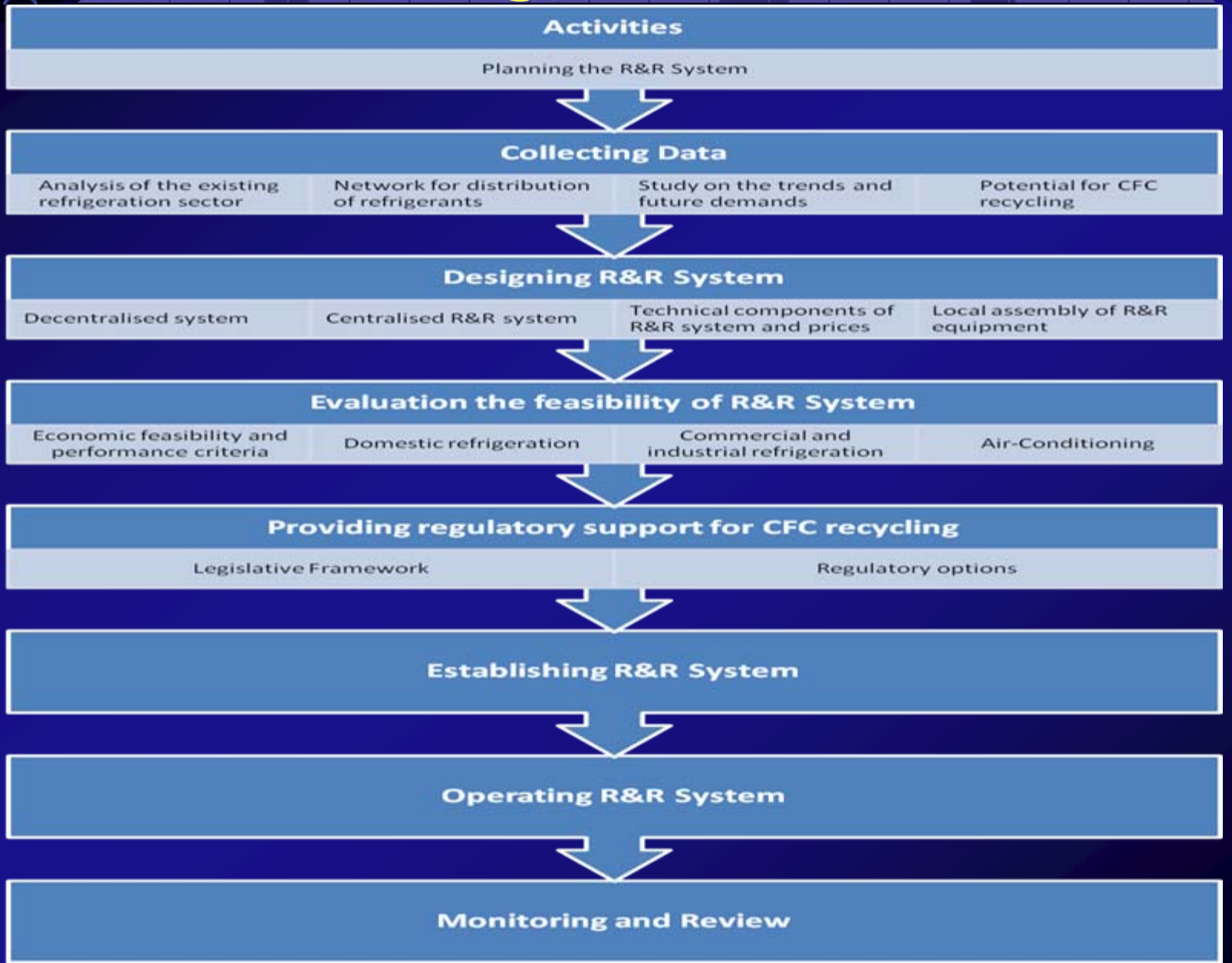
Achievement of recovery & Destruction (2006) in Japan

	Home Appliance Recycling Law		End-of-Life Vehicle Recycling Law	Fluorocarbons Recovery & Destruction Law
Equipment	Domestic A/C: 1,835,000	Domestic Refrigerators: 2,709,000	Automobiles: 2,628,000	Commercial A/C & Refrigerators: 878,000
Recovery	HCFC:1,024 t HFC: 19 t	CFC: 218 t HCFC: 11 t HFC: 68 t	CFC: 258 t HFC: 546 t	CFC: 348 t HCFC:1,987 t HFC: 206 t
Destruction	HCFC: 398 t HFC: 7 t	CFC: 89 t HCFC: 6 t HFC: 17 t	CFC: 590 t HCFC:1,821 t HFC: 772 t	

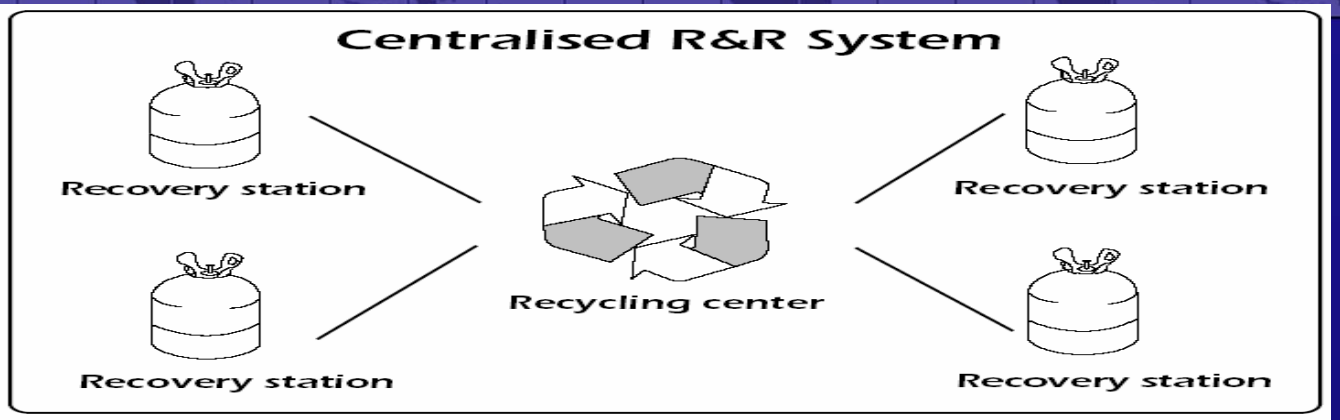
※ refrigerant only

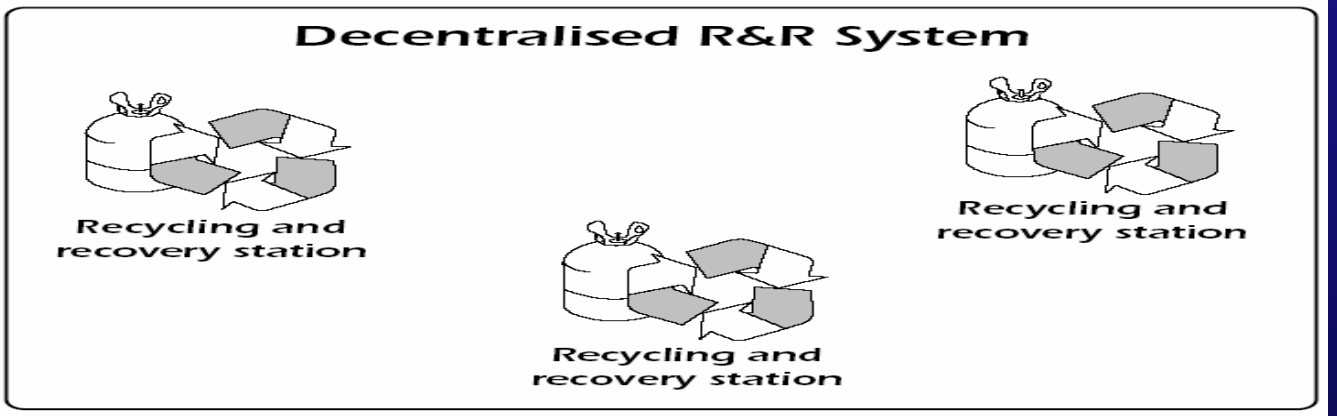
6. Recovery and recycling network

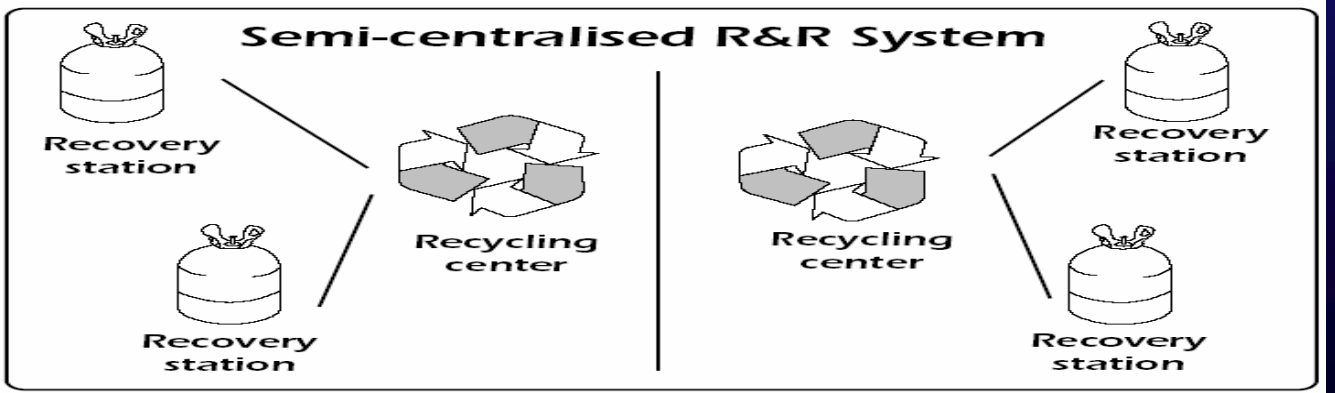
Planning R&R network



Three different ways to organize a CFC/HCFC R&R System







Refrigerant cylinder features

Cylinder features	1	2	3
General size rating	30 pound	100 pound	1000 pound
Application	Domestic, Commercial and AC recovery cylinder, reclaimed container	Commercial, AC and industrial recovery cylinder, reclaimed conatiner	General storage cylinder for use in a recycling center. Recovered, reclaimed and contaminated refrigerant storage container
Height/diametr in mm	451/231	780/305	1.455/762
Water capacity in lbs	26.2	93.5	1000
Water capacity in kg	11.9	42.4	450
Saandard specification US	DOT-4BA-400	DOT-4BW-400	DOT-4BW-400
Similar specification EU	ADR-P200	ADR-P200	ADR-P200
Service pressure PSI	400	400	400
Service pressure Bar	27.6	27.6	27.6
Burst pressure PSI	800	800	800
Burst pressure Bar	55.2	55.2	55.2
Tare weight kg	7.7	22.7	151.7

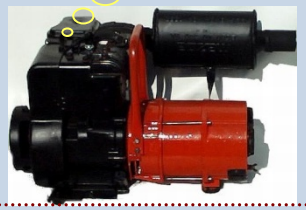
7. Funding through voluntary carbon markets

Project emissions

TREATMENT PLANT

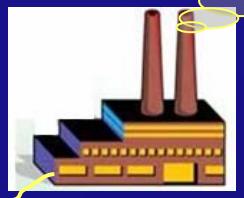
CO2

CO2



FOSSIL FUEL CONSUMPTION

CO2



ELECTRICITY CONSUMPTION

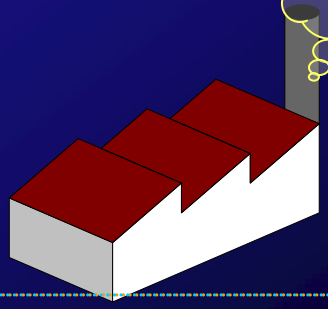
+

CO2

TRANSPORT

+

CO2



CFC DESTRUCTION

Kyoto Protocol: Cap and Trade

Kyoto Protocol

eg. Austria:
has 69 Mio t
needs 88 Mio t

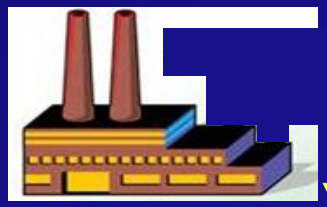
AAUs

AAUs

eg. Slovakia:
has 66 Mio t
needs 49 Mio t

AAUs

EU ETS



Industry
Energy sector

gets 30 Mio t
needs 32 Mio t

EUAs

EUAs

gets 32 Mio t
needs 25 Mio t

GHG Markets : Crediting Mechanism

Annex I

Austria … Australia … Slovakia … Russia

Non Annex I

China … India … Brazil … Kenya

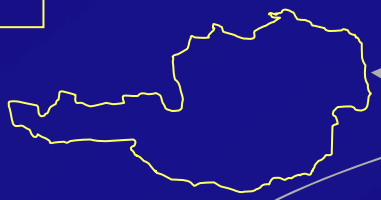
ET, JI

Have 17.9 billion t
Need 18 billion t

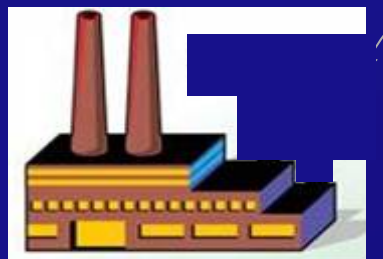
CDM

AAUs

countries



CERs



companies

What is traded

A taxonomy

- **Units defined by the Kyoto Protocol:**
  - Assigned Amount Units (AAUs)
  - Certified Emission Reductions (CERs)
  - Emission Reduction Units (ERUs)
  - Removal Units (RMUs)
- **Units defined by EU and national legislation:**
  - EU Allowances
  - UK Allowances and Credits
  - Australian Abatement Certificates and Sequestration Rights
  - US SOx and NOx Allowances, Regional Greenhouse Gas Initiatives
  - Other
- **Units defined by contracts and non governmental regulated standards:**
  - Verified Emission Reductions (VERs)

Kyoto Protocol Provisions

- Carbon credits and therefore related funding are generally provided only after actual emission reductions have been achieved and certified rather than before a project has than before a project has begun. CDM or other Carbon market opportunities would not obviate the need to mobilize up-front funding to facilitate project development and implementation.
- Kyoto Protocol establishes baselines and emissions targets solely for a specific basket of GHGs that do not include those controlled by the Montreal Protocol
- A decision of the Parties to the Kyoto Protocol is needed regarding the possibilities of using CDM to generate credits for destruction of ODS

CDM Example

CFC-12 – GWP – 10,720

1.0 MT of CFC-12 generates 10,720 certified emissions reduction credits.

Assuming that the current value of a certified credit is approx. US$ 10, the destruction of 1.0 MT of CFC-12 could generate as much as US$ 107,200.

HCFCs would have a much smaller income-providing potential.

It is desirable that the Kyoto Protocol Parties would amend the Kyoto Protocol to facilitate credits of ODS destruction by the post 2012 era.

Greenhouse Gas Markets (Compliance vs. Voluntary)

Compliance markets

- Kyoto Protocol
  - CDM
  - Joint Implementation
  - Regional schemes in the USA
    - CaliforniaAB-3
    - Regional GHG Initiative (RGGI)
    - Western Climate Initiative (WCI)
  - European Carbon Market
- Voluntary Markets
    - Chicago Climate Exchange (CCX)
    - California Climate Action Reserve
    - Voluntary Carbon Standard Association
    - Over the Counter Exchange (OTC)

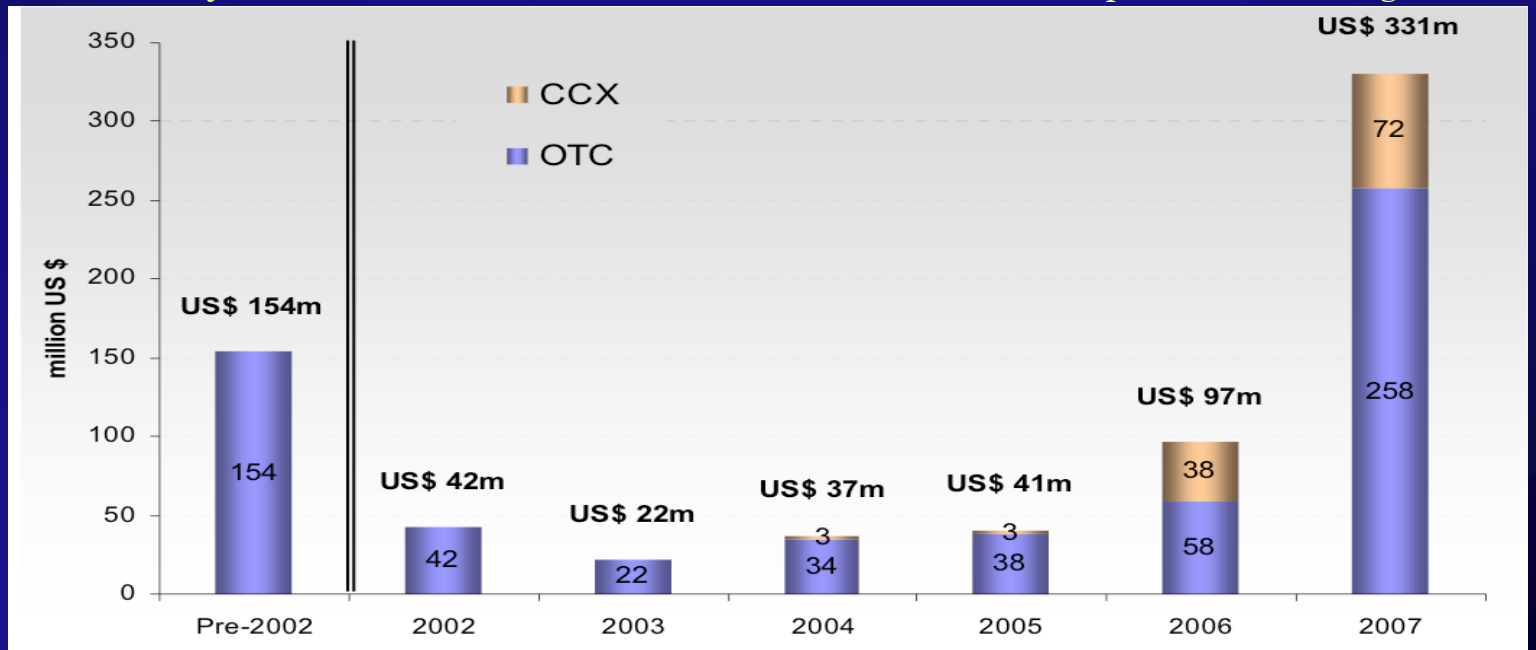
Voluntary Carbon market

- Global Carbon Market set to grow 58% in 2008 to $92 Billion (USD) / 63 Billion (EUR)1
- Voluntary Carbon Market grew 364% from 2006 to 2007 (91$ million to $331 million USD)2
- Voluntary Carbon Market projected to $4 Billion USD in 5 years

1.) http://www.reuters.com/article/pressRelease/idUS226463+26-Feb-2008+BW20080226

2.) State of the Voluntary Carbon Markets 2008 – Ecosystem Marketplace

3.) VCS: Voluntary Carbon Standard. 19 Nov. 2007. 23 Feb. 2008 <http://www.v-c-s.org/news.html>



Source: Ecosystem Marketplace, New Carbon Finance

Inclusion of CFCs under Carbon Credit Mechanism

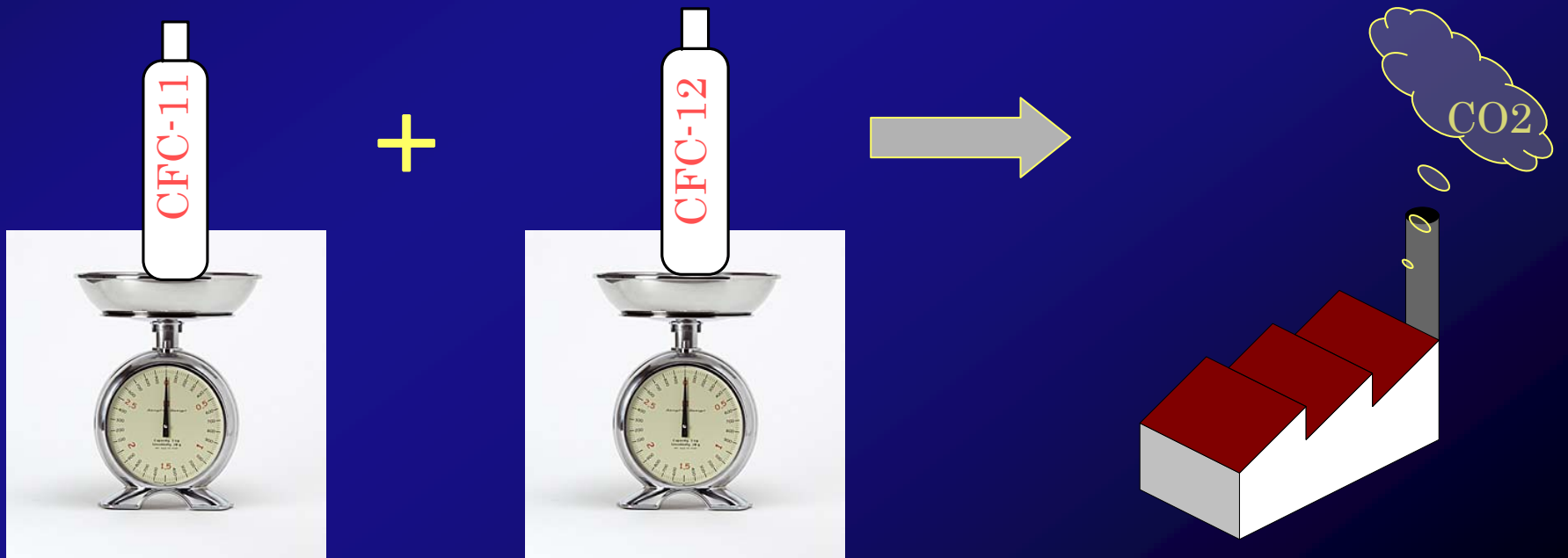
- Originally there has been no market mechanism for the destruction of CFCs
- Recently different Carbon Credit Systems have started to include CFCs into their schemes:
  - Chicago Climate Exchange (CCX)
  - Voluntary Carbon Standard (VCS),
  - California Climate Action Reserve
- First Methodologies have been developed and submitted for registration

Chicago Climate Exchange (CCX) con-d

CCX issues ODS destruction emissions offsets based on CO_2 equivalence less 25 %.

For example:

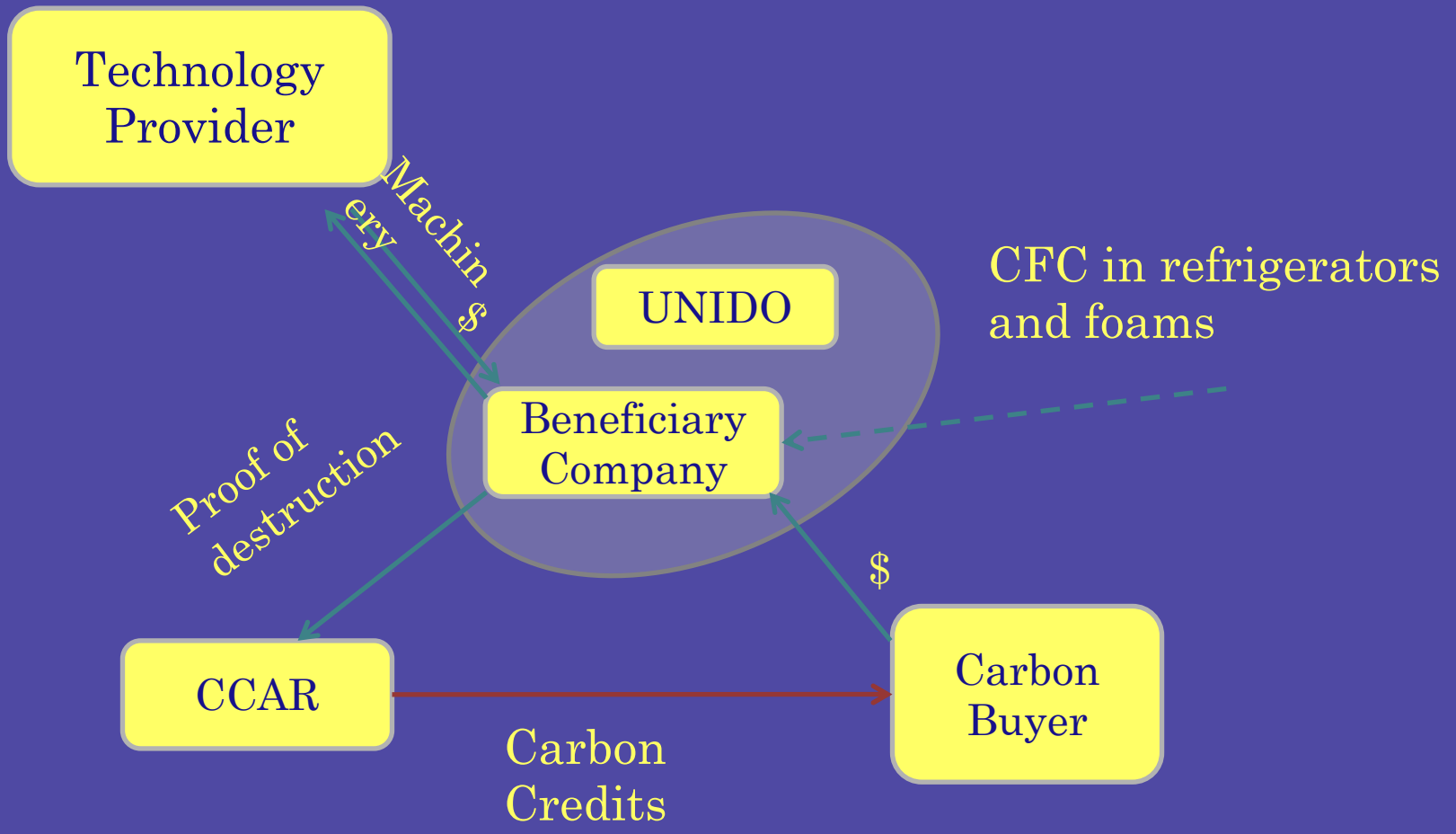
1.0 MT of methyl chloroform was completely destroyed, then the CO_2 equivalence of this destruction would 1.0 MT x 144 $mtCO_{2e}$ x 75% = 108 $mtCO_{2e}$ of offsets

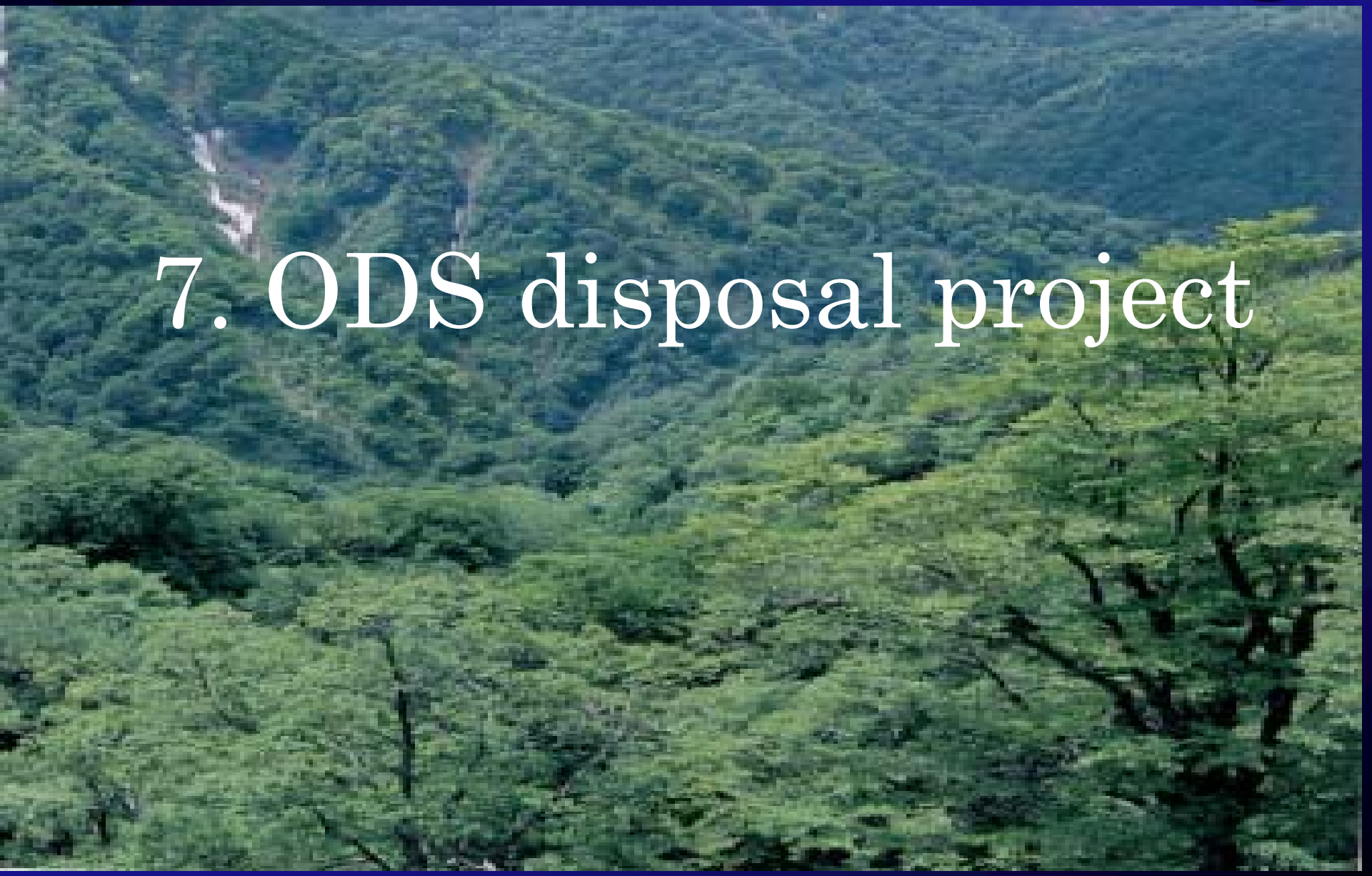


GHG Markets: Buyers in the Carbon Market

- National Compliance Buyers such as Austria, Belgium, Finland, Norway etc.
- Private Compliance Buyers (companies regulated by national or EU GHG laws) such as energy industry etc.
- Private Voluntary Buyers such as private persons (e.g. offsetting travel emissions) or companies not regulated by any GHG law
- Brokers working as intermediaries
- Traders buying and selling on their own books, providing secondary CERs to compliance buyers
- Funds providing carbon investment opportunities for the public

Carbon trading scheme





7. ODS disposal project

The data needed

Refrigerant Servicing Sector

1. Quantity of CFC-12 needed to refill annually CFC-12 -containing equipment in the sub-sectors below
2. Quantity of CFC-12 recovered annually from the CFC-12 -containing equipment in the sub-sectors below
3. Quantities of unwanted CFC-12 already collected for incineration, if available

a) Domestic refrigeration
b) Commercial refrigeration
c) Industrial refrigeration
d) Transportation refrigeration

Halons Servicing Center

1. Quantity of Halons needed to refill annually Halons-containing equipment
2. Quantity of Halons recovered annually from the Halons containing equipment
3. Quantities of unwanted Halons already collected for incineration, if available

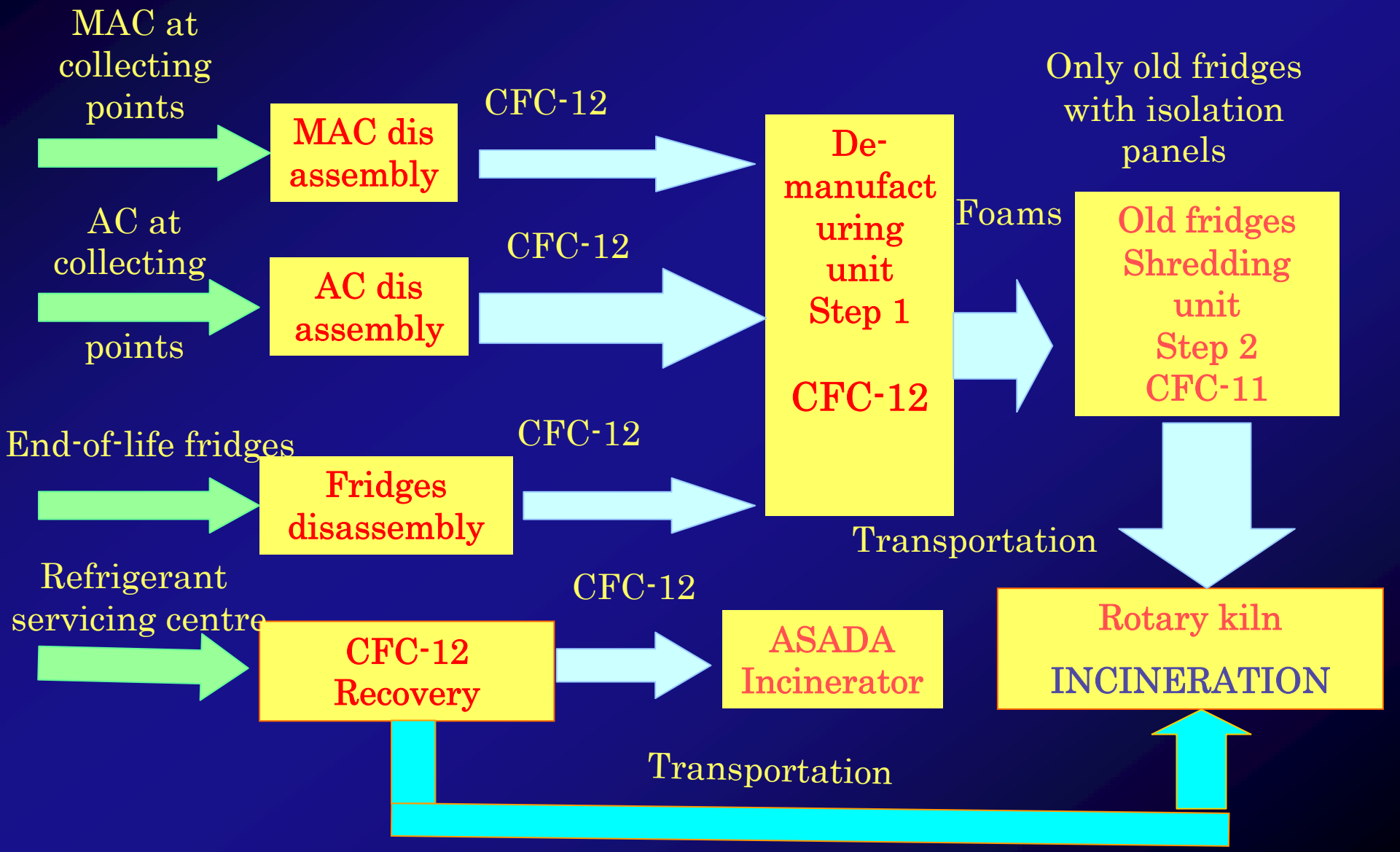
End-of-life Old Fridges, AC and MAC Sector

Number of domestic refrigerators available in the RF now,
out of them refrigerators with CFC-12
Number of air-conditioners available in the RF now,
out of them ACs with CFC-12
Number of Cars available in the RF now
out of them with MACs
out of them MACs with CFC as a cooling agent.

Quantities of ODS to be destructed

Installed capacity, MT	ODS	Facilities collected	Units	CFC content, %	Kg/pc	ODS Destructed, MT
1100	CFC12	Domestic fridges + air cond.	200 000	42	0,1	8.4
5500	CFC 11	Domestic fridges + air cond.	200 000	42	0,5	42
600	CFC12	Cars	10 000	100	0,8	8
1700	CFC12	Chillers	100	100	680	68
0	CFC12	Servicing	-			small
950	Halon 1211	Fire extinguishers	-	1	-	9.5
250	Halon 1301	Fire extinguishers	-	1	-	2.5
40000	CFC 11	Construction panels		?	?	
Total						127,6

Project structure



Project cost-breakdown

The project budget will include:

a) The cost of the CFC-12 recovery machine (Step1)
for old fridge and AC de-manufacturing - US$ 300,000;

b) The cost of six month renting a shredding machine for old fridges de-manufacturing (Step 2) - US$ 1.0 million within 2 years – UNIDO Trust Fund's contribution;

c) CFC-11 an CFC-12 Cylinders for ODS storage – US$ 50,000;

d) The cost of ASADA small incinerator (1 l/hr) for refrigerant servicing center – US$ 100,000;

e) The cost of transportation to the rotary kiln – US$
100 MT x 100 = US$ 10,000;

f) The ODS incineration costs
100MT x US$ 2,000 = US$ 200,000;

g) The cost of CFC-11 de-manufacturing project formulation (Step 2) under carbon credit mechanism – US$ 250,000;

h) Training and programme monitoring including new legislation– US$ 100,000;

Total: MLF – US$ 910,00, UNIDO – US$ 1.0 million

The Cost of Project Formulation Under Carbon Trading Mechanism

Work Package	Content	Cost
Project Structuring	Definition of the project destruction of ODS substances in foams already disposed in landfills It shall be assessed, whether the Project is a feasible CDM project under the Kyoto Rules. At this stage the Parties will address and discuss the following issues: • What could be the system boundaries of the Project? • How could Additionality of the Project be demonstrated? • What could be the conservative CER potential of the Project and the related cash flow?	15,000
Methodology Development	Applicability Criteria Additionality Baseline Emission Project Emissions Leakage Emissions Monitoring	55,000
Validation Support and registration	• Prepare an invitation for tender for DOE services • appoint a DOE; and • co-operate with the appointed DOE in order to facilitate Validation of the Project	25,000
Support of Verification Process	• Prepare the invitation for tender for DOE services; • select a DOE; and • co-operate with the DOE in order to facilitate the first Verification	20,000
	Total	250,000


Thank you