



ODS bank management

A global roadmap and guidelines

Problems

1

Global roadmap on ODS bank management

Management and destruction of existing ozone depleting substances banks

2

Guideline to conduct an ODS bank inventory

Management and destruction of existing ozone depleting substances banks

3

Guideline on policy measures for the management and destruction of ozone depleting substances

Management and destruction of existing ozone depleting substances banks

4

Guideline to establish a collection system for equipment containing ODS

Management and destruction of existing ozone depleting substances banks

5

Guideline for the transboundary movement of ODS waste

Management and destruction of existing ozone depleting substances banks

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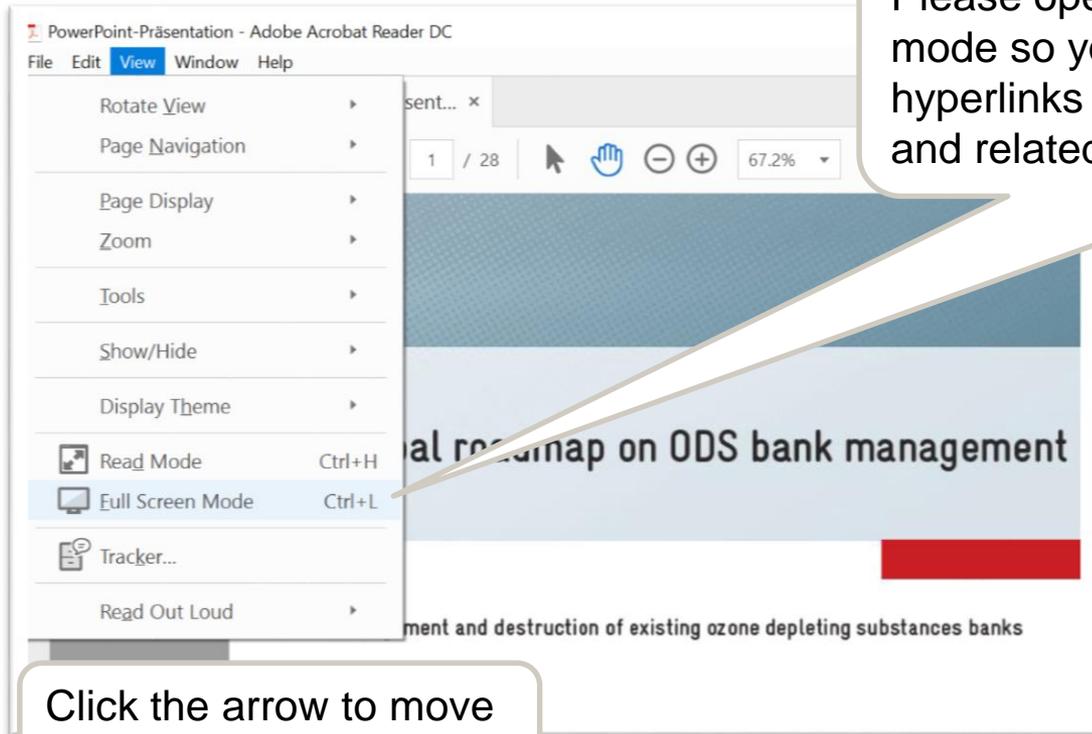
On behalf of:
Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
of the Federal Republic of Germany

At any point in the presentation, go back to the content overview by clicking here

Welcome to the ODS bank management tool

To learn more about the management and destruction of ODS banks, click through this PDF tool at your own speed.

Please open this PDF tool in full-screen mode so you can click on the internal hyperlinks to access additional information and related documents online (underlined) !



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1 Introduction

The challenge: The excessive use of ODS as refrigerants and foam blowing agents in the past has led to the accumulation of large amounts of ODS, e.g. in old refrigerators, insulation foam or cylinder.

The emissions from these so called **ODS banks** significantly contribute to both ozone layer depletion and climate change: **1.5 Gt CO₂eq** is the amount of annual emissions from the global ODS bank. This equals the annual emissions from **441 coal power plants**.

E-waste containing ODS can also release other toxic, cancer-causing substances: lead, cadmium, polychlorinated biphenyl (PCB), flame retardants and many more.

As neither the Montreal Protocol nor any other international environmental convention regulates the management and destruction of existing ODS banks, it is each country's own responsibility to establish a successful ODS bank management scheme to handle this important source of emissions.

Our common goal is:

No leakage or release of ODS to the atmosphere!





2 Background

Publication: Global roadmap on ODS bank management



This tool is designed for policy makers and other stakeholders who are addressing ODS bank management. It provides an overview over core processes and documents regarding this cross-cutting topic.

All the information compiled in this tool can be found in more detail in the publication:

Global roadmap on ODS bank management.
Management and destruction of existing ozone depleting substances banks (GIZ 2017a)

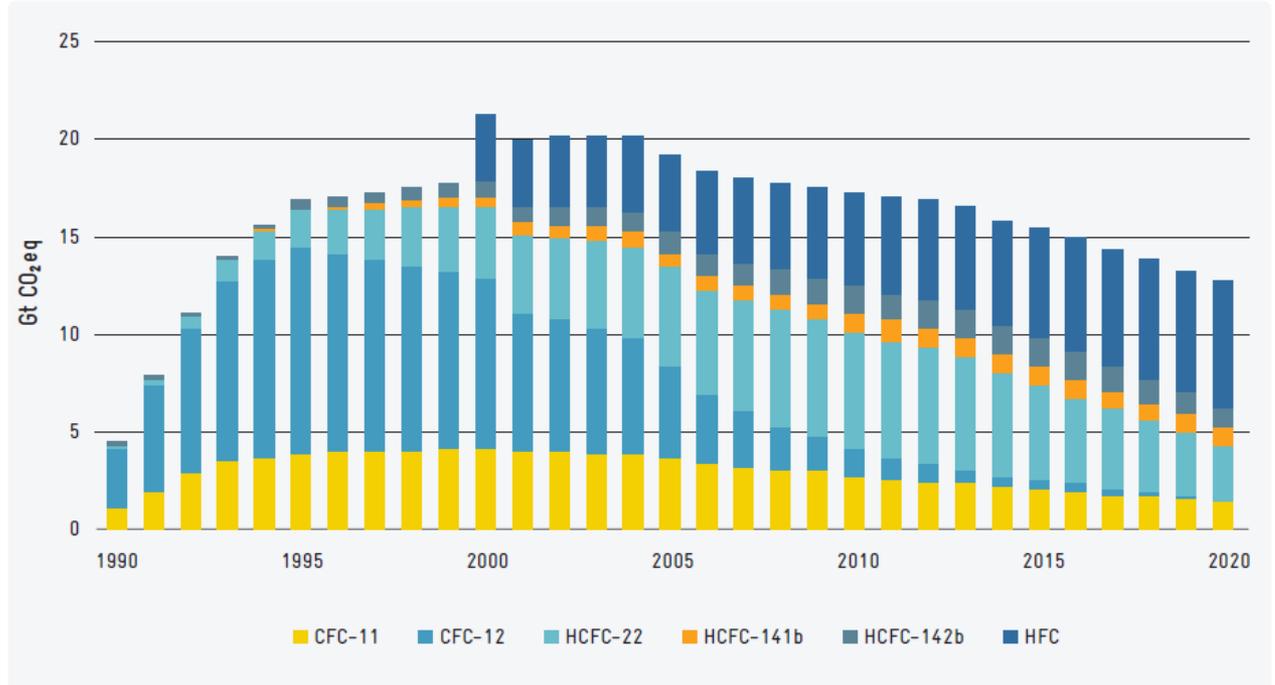
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2a) Global ODS bank development

This figure shows the current and future development of the global ODS bank. The current ODS bank corresponds to 9.2 Gt CO₂eq (year 2016). The global ODS bank is declining. This trend is caused by 1) the reduced consumption of ODS and 2) the emission of ODS from the bank into the atmosphere.



When ODS are released into the atmosphere, they cannot be recovered. In other words: **once the ODS bank has disappeared it will be too late for taking management measures.** The negative effects of emitted ODS from the bank on the ozone layer and the climate cannot be reversed.

A related problem: At the same time the hydrofluorocarbon (HFC) bank is growing. HFCs have no ozone depleting potential (ODP), but do significantly contribute to global warming due to their global warming potential (GWP).

Source: [Global roadmap on ODS bank management](#)

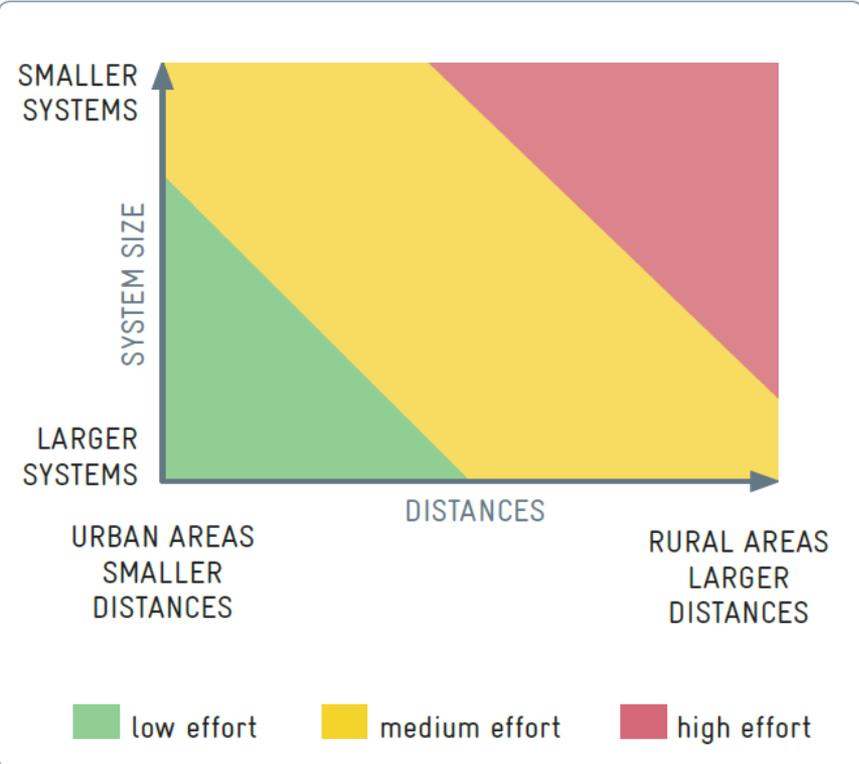




2b) Priorities and technical feasibility (I)

In an ODS bank management scheme, the priorities depend mainly on **technical feasibility**, i.e. the possibility to recover ODS at a reasonable level of effort and cost (ICF, 2010).

TEAP (2009) assigned three categories of effort levels (low, medium, high) to the reachable bank in the RAC&F subsectors.



- Less effort for recovery is required for
1. equipment containing larger quantities,
 2. ODS that is geographically more concentrated, and
 3. non-diluted ODS (e.g. refrigerant) compared to diluted ODS (such as foams).
- Activities requiring less effort will be prioritized for short-term-action.

For more detailed information on defining technical feasibility, consult the [ODS bank management study](#) (GIZ 2015).

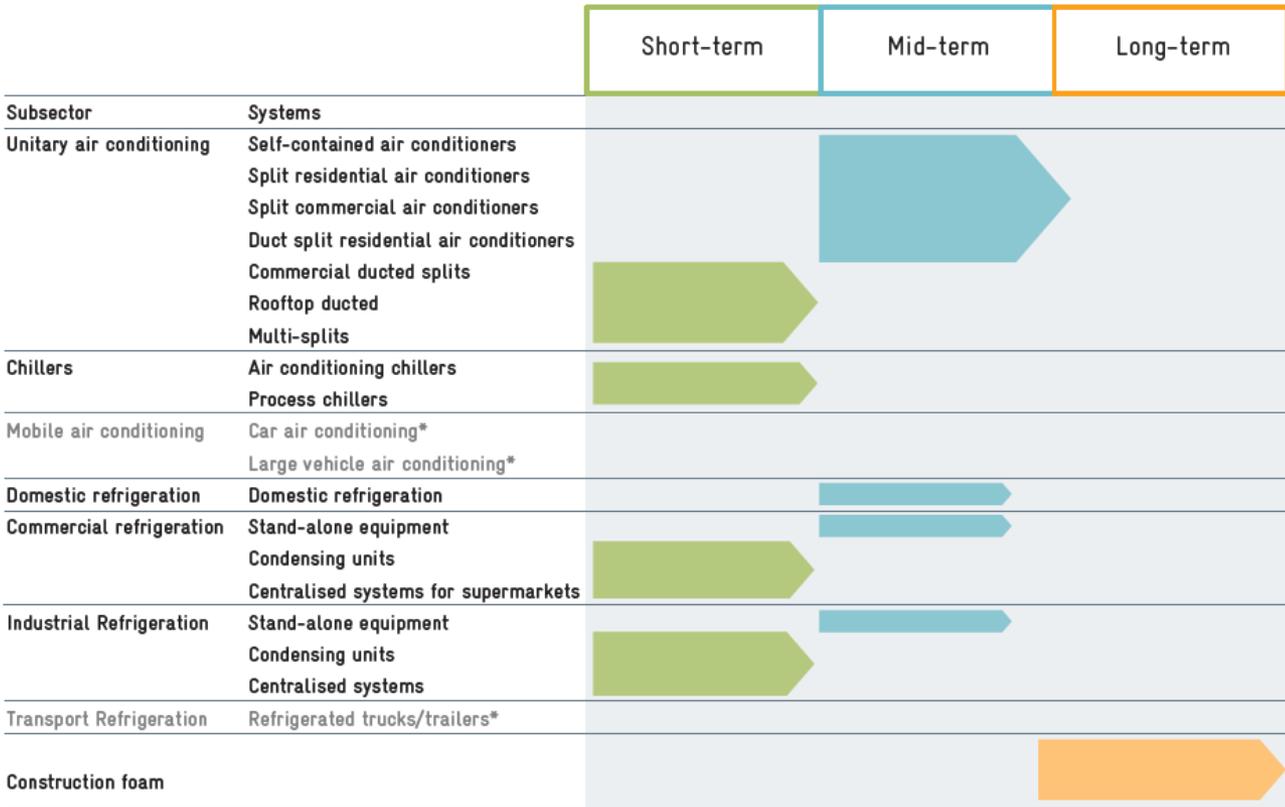
Source: [Global roadmap on ODS bank management](#)





2b) Priorities and technical feasibility (II)

Having considered **technical feasibility** the following short-, mid-, and long-term actions can be derived as shown in this figure.



The short-term actions, i.e. the recovery of ODS from large RAC systems, are already being implemented by many countries and receive financial support from the [MLF](#).

Several developing countries are also working on the recovery of ODS from [RAC](#) appliances (e.g. through replacement programmes).

* The mobile AC and the transport refrigeration subsectors are meanwhile dominated by HFC, hardly any ODS banks will be found in these subsectors.

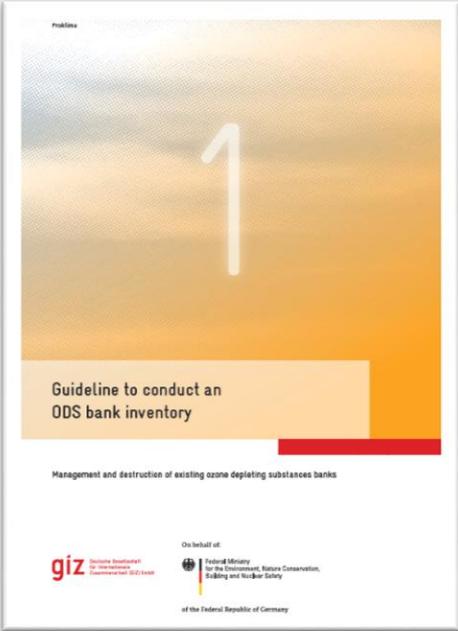
Source: [Global roadmap on ODS bank management](#)





3 The basis: Compiling an ODS inventory

Publication: Guideline to conduct an ODS bank inventory



An understanding of the amount of ODS banks on the country level and the corresponding mitigation potential is the basis for any action and policy decisions in the field of ODS bank management. This guideline provides a methodological approach to conduct an ODS bank inventory and to quantify the mitigation potential:

Guideline to conduct an ODS bank inventory.
Management and destruction of existing ozone depleting substances banks (GIZ 2017b)

[Download publication](#)





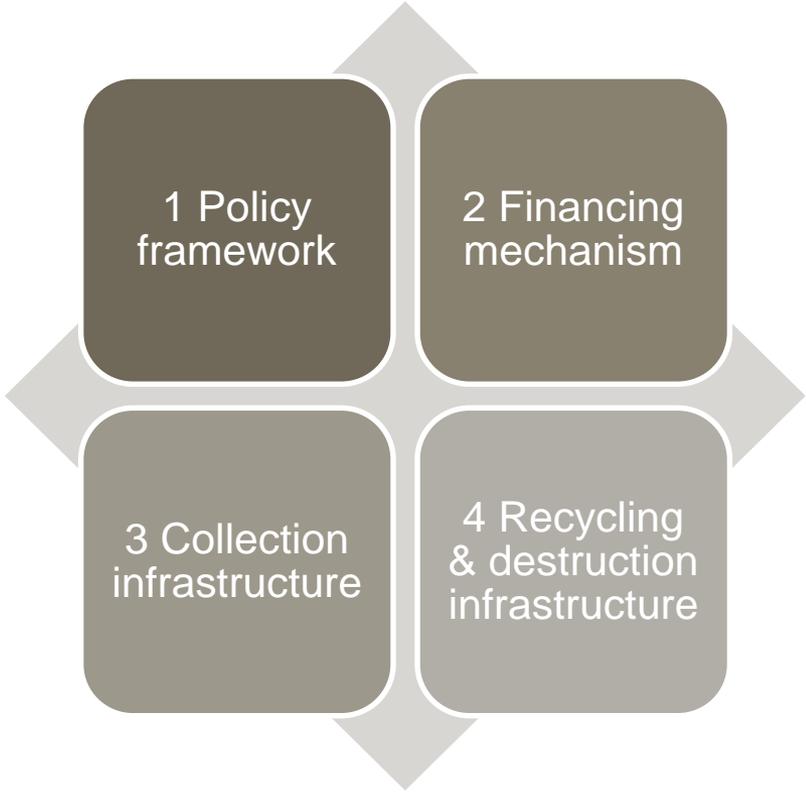
4 The core processes of ODS bank management to save the ozone layer and reduce global warming (I)

The existing ODS banks need to be managed well in order to effectively prevent their uncontrolled leakage or release to the atmosphere.

Only well-informed decision makers with access to sufficient resources, will be able to tackle the **four key processes** of good ODS bank management:

To establish

- 1. A suitable set of policy measures
- 2. A sustainable financing mechanism
- 3. An effective collection mechanism
- 4. A functioning recycling and destruction infrastructure





4 The core processes of ODS bank management to save the ozone layer and reduce global warming (II)

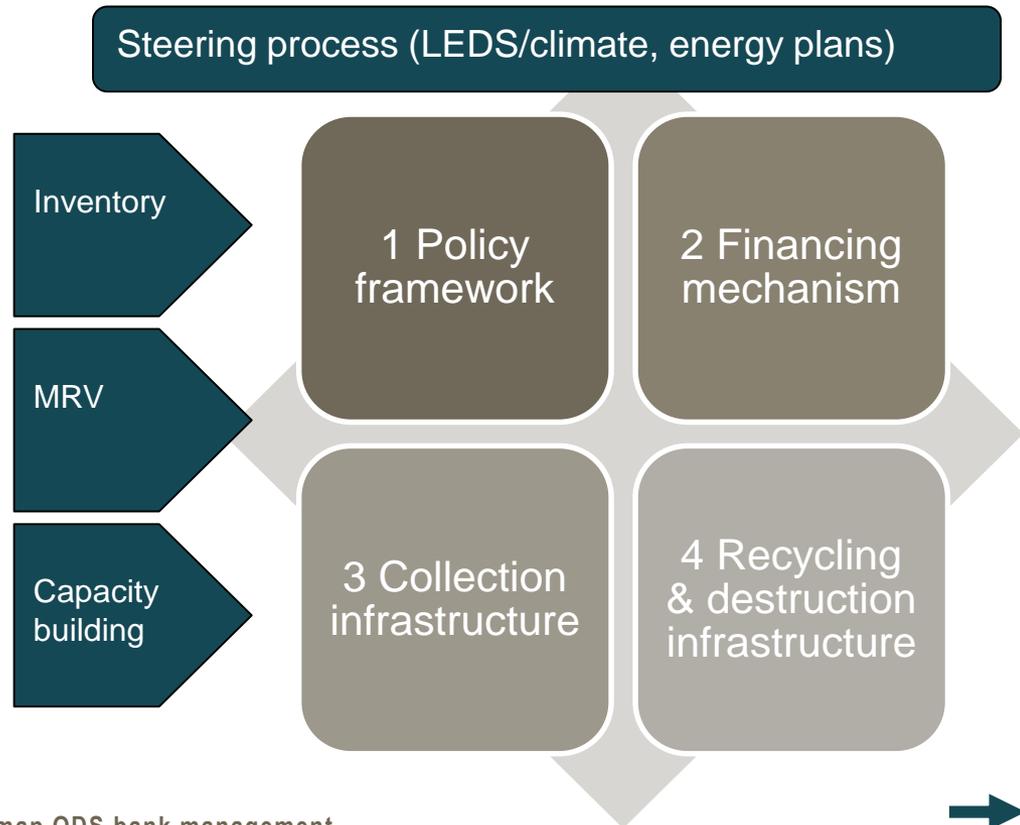
Building a **steering committee** with representatives from various working areas and ministries (ozone, climate, energy, waste etc.) is a key success factor for this cross-cutting topic.

The steering committee interprets the progress and results from the core processes and, if necessary, adapts these with a view to reaching the envisaged objectives.

The core processes are embedded in a **larger steering process** such as the LEDS or other national climate and energy plans.

Important accompanying or support processes include:

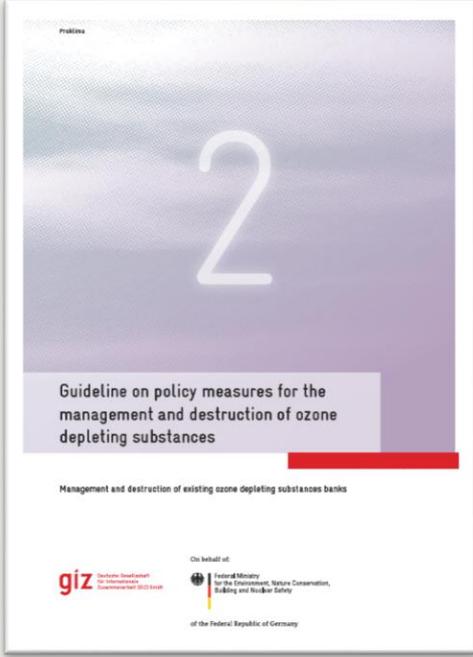
- the compilation of an ODS bank inventory
- the establishment of an MRV system;
- and capacity building (e.g. technician training to properly recover ODS from equipment).





4a) Core process 1: Policy framework (I)

Publication: Guideline on policy measures for the management and destruction of ODS



This guideline intends to give policy-makers guidance on suitable policy measures that can prevent the accumulation of and emissions from ODS banks. The document presents a stepwise set of policy measures for a sustainable management and destruction of ODS:

Guideline on policy measures for the management and destruction of ozone depleting substances.
Management and destruction of existing ozone depleting substances banks (GIZ 2017c)

[Download publication](#)





4a) Core process 1: Policy framework (II)

In a suitable policy framework,

- a venting ban and mandatory recovery for destruction, recycling or reclamation are essential,
- operators of equipment are obligated to conduct leak checking, adhere to national standards and comply with monitoring schemes,
- the related technician training and certification is mandatory.





4a) Core process 1: Policy framework (III)

Steps to establish a suitable set of laws and regulations

1. Definition of scope and setting of objectives

- Analyse existing policies and activities in ODS bank management as well as stakeholders and institutions
- Set focus on
 - reduction of existing bank
 - prevention of accumulation of additional amounts
 - treatment or destruction of collected ODS
 - or the reduction of emissions.

2. Sector prioritisation

- Identification of available ODS amounts
- A definition of (sub)sectors is available in the „[Inventory guideline](#)“
- Determine technical feasibility
 - High reduction potential where large amounts with high [ODP](#) can be recovered with low effort (e.g. in urban areas)

3. Selection of policy options

- Identify appropriate regulatory, fiscal, and non-regulatory measures.
- A detailed list of measures with their description and examples can be found in the „[Policy guideline](#)“

4. Detailed assessment of pre-selected policy options

- Asses the pre-selected policy measures according to the costs for all involved stakeholders, their benefits in terms of emission saving potential as well as other positive or negative effects that may be associated with their introduction.
- Discuss implementation modalities and enforcement measures: Without enforcement, policy instruments will have no effects.



4b) Core process 2: Financing mechanism (I)

A sustainable financing mechanism

- includes extended producer responsibility (EPR) schemes, where the producers of equipment are responsible for handling the waste components.
- combines various funding sources, such as the use of revenues from carbon dioxide allowance auctions.





4b) Core process 2: Financing mechanism (II)

Extended producer responsibility

EPR is defined as ‘an environmental policy approach in which a producer’s responsibility for a product is extended to the post-consumer stage of a product’s life cycle’, i.e. after decommissioning (OECD Guidance, 2001).

EPR schemes are usually a mix of instruments from four intervention areas (OECD, 2014):

- product take-back requirements,
- economic and market-based instruments,
- regulations and performance standards, and
- accompanying information-based instruments.

A good example for defining an EPR scheme can be found in the [EU Directive 2012/19/EU](#).

For detailed guidance on how to establish EPR schemes, please see [OECD \(2016\)](#).

Further financing options are described in the [global roadmap \(GIZ, 2017a\)](#).



4b) Core process 2: Financing mechanism (III)

Support through industrialised countries' contributions to climate financing and ozone layer protection

There are various options to receive financial support for ODS bank management by industrialised country's contributions to climate financing and ozone layer protection.

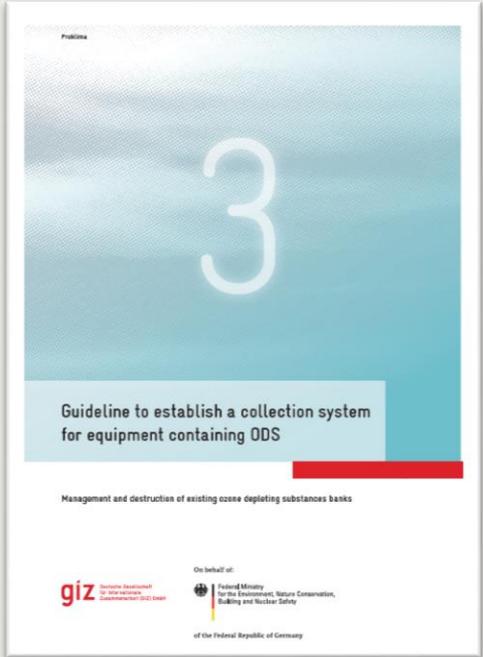
- The Multilateral Fund of the Montreal Protocol (MLF)
- Climate programmes such as the German International Climate Initiative (IKI)
- The Green Climate Fund (GCF)
- Global Environment Facility (GEF)
- World Bank

Their support can kick-start the process for ODS bank management, e.g. by establishing pilot projects. However, sustainable financing concepts, such as [EPR schemes](#), should be established for long-term financing.



4c) Core process 3: Collection mechanism (I)

Publication: Guideline to establish a collection system



This guideline focuses on the collection of ODS containing equipment offering a step-by-step process for setting up a collection system:

Guideline to establish a collection system for equipment containing ODS.
Management and destruction of existing ozone depleting substances banks (GIZ 2017d)

[Download publication](#)



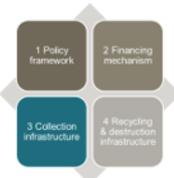


4c) Core process 3: Collection mechanism (II)

In a functioning recycling and destruction infrastructure,

- sufficient recycling and reclaim facilities prevent the accumulation of disused ODS which would have to be destroyed,
- as a rule of thumb, ODS are destroyed in a local destruction facility if a critical amount of more than 10 tonnes is available per year,
- ODS are exported for destruction following the established procedure under the Basel Convention if less than 10 tonnes are available per year.





4c) Core process 3: Collection mechanism (III)

Steps to establish an effective collection mechanism

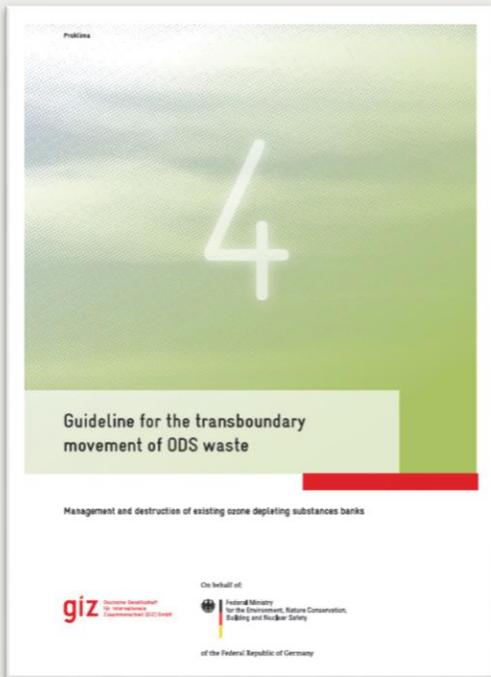
1. Assess existing policy framework	2. Establish steering structure and set up stakeholder process	3. Set a time frame and draft a sector plan	4. Start capacity building and outreach activities	5. Create additional incentives	6. Incorporate the informal sector	7. Endorse sector plan and monitor results
<ul style="list-style-type: none"> • WEEE regulation in place? • Consider EU Directive 2012/19/EC 	<ul style="list-style-type: none"> • Establish an appropriate steering structure; nominate leading government entity • Technical advisory group • Inter-ministerial cooperation • Stakeholder analysis • Thematic technical working groups • Transparent stakeholder process 	<ul style="list-style-type: none"> • Sector study addressing • Sector industries • Adequate technology to handle ODS waste • Current emissions, • Waste streams • Regulatory framework • Sector plan which serves as an agreement for the implementation of the collection system • Including a realistic and binding timeframe 	<ul style="list-style-type: none"> • Environmental awareness campaigns and training programmes for • Service technicians • Personnel dealing with equipment containing ODS when it becomes waste • Ministerial departments or third parties who are responsible for monitoring e-waste 	<ul style="list-style-type: none"> • Direct and indirect incentives may increase the return of recovered ODS 	<ul style="list-style-type: none"> • Alternative employment opportunities • Basic training and certification schemes • Collaboration of formal and informal sector 	





4d) Core process 4: Recycling and destruction infrastructure (I)

Publication: Guideline for the transboundary movement of ODS waste



National Ozone Units have to consider the export of ODS for destruction as part of their ODS management. This guideline links the topics of the Montreal Protocol with the Basel Convention and provides practical information on how to conduct transboundary movements (TBM) of ODS waste:

Guideline for the transboundary movement of ODS waste. Management and destruction of existing ozone depleting substances banks (GIZ 2017e)

[Download publication](#)





4d) Core process 4: Recycling and destruction infrastructure (II)

An effective collection mechanism

- is based on a sector plan which defines the responsibilities of all involved players,
- incorporates the informal sector,
- ensures that both old equipment and refrigerants are accepted without charge by manufacturers, retailers or collection points,
- ensures that equipment returned within replacement programmes is subject to proper waste management.





4d) Core process 4: Recycling and destruction infrastructure (III)

Steps to establish a functioning recycling and destruction infrastructure

1. Assess the amount of ODS available for management

- Quantify available amount of ODS (consult „[Inventory guideline](#)“)
- ODS banks
- ODS potentially available
- ODS effectively available

2. Install reclaim facilities to prevent accumulation of ODS banks

- Re-use of ODS should be prioritised over destruction. Possibilities are
 - Recovery
 - Recycling
 - Reclaim
- Ensure that sufficient recovery, recycling and reclaim facilities are available (under [HPMP](#))

3. Cost assesement for ODS that need destruction

- Estimate and compare costs for
 - Destruction (administration, organisation, cylinders, transport, destruction, VAT)
 - Local destruction (investment, destruction, i.e. operation, personell, administration etc.)
- See [next slide](#) for further details

4. Export or local destruction

- Initiate the procedure of the Basel convention for export of ODS (consult „[transboundary movment guideline](#)“)

or

- Establish local destruction plant when critical amount of 10 tonnes is available





4d) Core process 4: Recycling and destruction infrastructure (IV)

Comparison of destruction costs

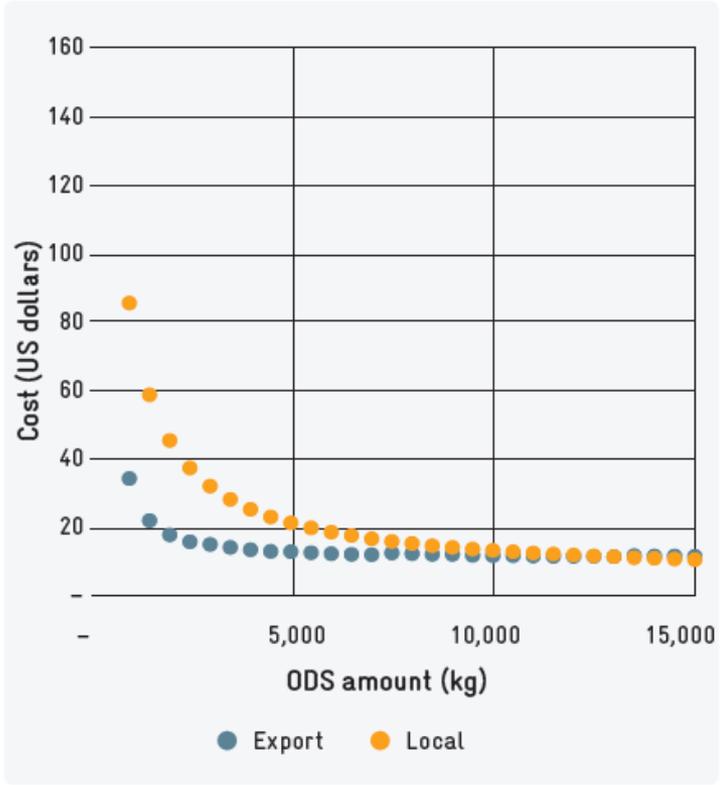
If less than 10 tonnes of ODS are available per year for destruction, possibilities for regional cooperation schemes to increase the available amounts should be explored:

Either the collected ODS are exported to an adjacent country for local destruction, or the collected amounts from the cooperation are exported to another country with a TEAP-approved destruction plant. Both cases involve the transboundary movement of hazardous waste using the established procedures of the Basel Convention.

When more than 10 tonnes of ODS are available for destruction per year, the use of a local destruction plant should be considered. First, conduct a feasibility study. When the local destruction of ODS is viable, possibilities for funding should be assessed to initiate the procurement and installation of a destruction plant.

Popular destruction techniques in developing countries are

- Rotary Kiln Incineration
- Cement Kiln
- Plasma technology





5 Guidance and templates

5a) The country factsheet

Before taking decisions, all information on existing ODS bank management within a country should be collected. The template (“country factsheet”) can assist in systematic information collection. It covers the following topics:

- international conventions (Basel, Stockholm Convention, [UNFCCC](#))
- ODS and HFC specific information (amounts, legal mandate, existing ODS bank management activities)
- solid waste and e-waste (general, e-waste, [EPR](#) schemes)
- existing projects
- stakeholder and relevant actors (government, law enforcement, focal points, associations, industry, agencies, informal sector, [NGOs](#))

Next, you should have a look at the [decision tree](#) for ODS bank management.

The factsheet template is available in the annex of the [global roadmap](#) (GIZ 2017a)

1. International conventions	
BASEL CONVENTION	
Party to the Basel Convention?	
Definition of hazardous waste under the Basel Convention?	
Bilateral or regional arrangements under the Basel Convention?	
Import bans reported to the Basel Secretariat?	
Focal point or competent authority?	
Regular transboundary movements (TBM) of other hazardous waste according to Basel Convention?	
STOCKHOLM CONVENTION	
Party to the Stockholm Convention?	
National focal point?	
Activities under the Stockholm Convention?	
UNFCCC	
Ratification of the Kyoto Protocol?	
Ratification of the Paris Agreement?	
Does the country have climate goals, e.g. NDC?	
2. ODS and HFC specific information	
ODS AMOUNTS	
Existing data about ODS banks	If ODS data is available, please specify: <ul style="list-style-type: none"> • According to which methodology was the data collected? • Who was responsible for data collection? • What are the results in metric tonnes (t), ODP-t and GWP-weighted t? • Please specify the substances. • How are these ODS stored (e.g. cylinders, equipment, other)? • Which sectors are these from? e.g. domestic refrigeration, commercial and industrial refrigeration, air-conditioning, foam, etc.
Existing ODS consumption and production (e.g. HPMP, other)	If you use ODS, please specify details as given in the HPMP: <ul style="list-style-type: none"> • Historical time series of HCFC consumption split into substances and sectors • Historical time series for HCFC production, import and export split into substances (in t and ODP-t). • Reduction targets.
Existing HFC consumption and emission inventories	If an existing HFC inventory exists, please specify: <ul style="list-style-type: none"> • According to which methodology the data was collected and processed (e.g. Tier 1 and Tier 2, IPCC)? • Who was responsible for data collection? • Please provide the sector distribution or at least the most important sectors • What are the results in t and GWP-weighted t? • Any HFC stored (e.g. cylinders, equipment, other) for destruction? If so, which sectors are these from, e.g. domestic refrigeration, commercial and industrial refrigeration, air-conditioning, foam, etc.?
Prognosis of future ODS amounts and past substance replacements	<ul style="list-style-type: none"> • What are the growth rates in different refrigeration, air-conditioning and foam sectors (based on consumption, production or sales figures of equipment)? • When have ODS-free systems been introduced in the different sectors (RAC)? Please indicate changes of refrigerant or blowing agent (e.g. HFC-134a and HCFC-141b instead of CFC-11 and CFC-12 for refrigerators). • When were HFC-free systems been introduced in the different sectors (RAC)? Please indicate changes of refrigerant and blowing agent (e.g. R600a and pentane instead of HFC-134a and HCFC-141b for refrigerators). • Which companies have introduced these systems? What are their market shares?
NATIONAL LEGAL MANDATE	
Venting of ODS or HFC	Please list and specify existing or planned (please differentiate) national legal mandates which prohibit the venting of ODS or HFC.
Import and export of ODS or HFC (see also Basel)	Please list and specify existing or planned (please differentiate) national legal mandates which prohibit the import and export of ODS or HFC.
ODS or HFC management during the lifetime of equipment	<ul style="list-style-type: none"> • Please list and specify existing or planned (please differentiate) national legal mandates which regulate the management of ODS or HFC during



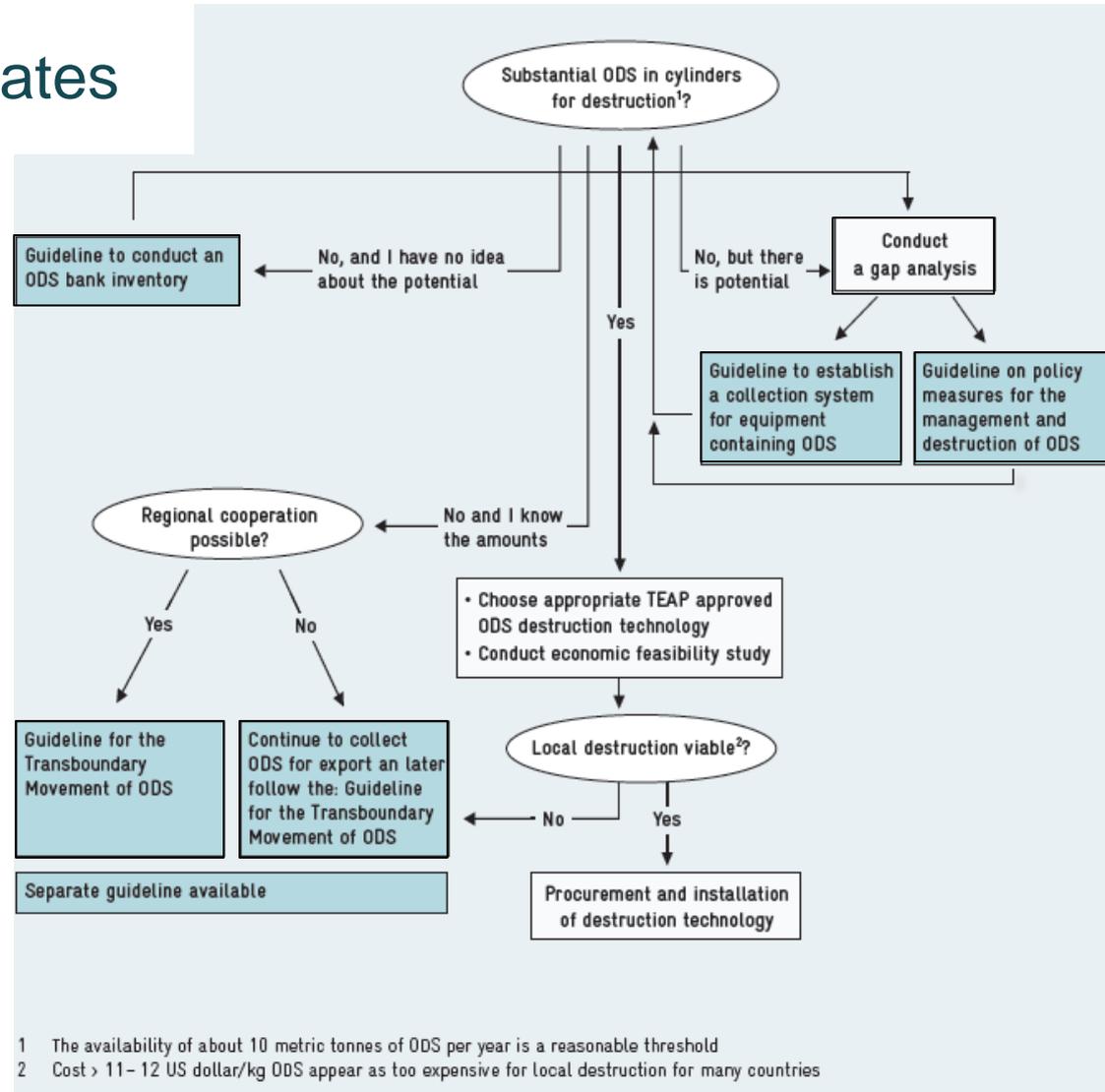


5 Guidance and templates

5b) Decision tree

Start with the question whether there is substantial ODS in cylinders for destruction available in your country: Sector experts and ozone officers are familiar with the situation in the country and can assess whether equipment based on [CFC](#) is still in the country. Another indicator is the current consumption of [HCFC](#) for refill of equipment.

- If there is no substantial amount of recovered ODS and uncertainty about the potential amount available in the country, an [ODS bank inventory](#) should be conducted first.
- If there is no substantial ODS in cylinders for destruction, but still great potential (i.e. large ODS bank in the country), then a [gap analysis](#) is recommended.





The gap analysis templates are available in the annex of the [global roadmap](#) (GIZ 2017a)

5 Guidance and templates

5c) Gap analysis

A gap analysis helps to identify weak and strong points of ODS bank management.

Use the template provided in the global roadmap to conduct your country-specific gap analysis.

The gap analysis considers both the status quo (information from the [factsheet](#)) and key measures of the four [core processes](#).

If a gap or weak point is identified, appropriate measures should be implemented.

6.1 Functioning policy framework			
MILESTONE	Colour shading indicates progress and implementation status in the country	CURRENT STATE	FURTHER ACTIVITIES NEEDED
ODS or HFC			
Regulation of servicing with			
Mandatory			
Development			
Monitoring			
WEEE regulation and EPR scheme			
Assess implementation			
Enforcement			

6.2 Existing sustainable financing mechanism			
MILESTONE	Colour shading indicates progress and implementation status in the country	CURRENT STATE	FURTHER ACTIVITIES NEEDED
Sustainable financing			
International			
Elimination of			
Voluntary car			

6.3 Established collection infrastructure			
MILESTONE	Colour shading indicates progress and implementation status in the country	CURRENT STATE	FURTHER ACTIVITIES NEEDED
A sufficient infrastructure for the collection of recovered ODS is in place with sufficient financial support from the MLF			
Appropriate policy framework is in place, requiring collection and financing mechanisms of WEEE containing ODS → for more details see also 'Functioning policy framework'			

6.4 Established recycling and destruction infrastructure			
MILESTONE	Colour shading indicates progress and implementation status in the country	CURRENT STATE	FURTHER ACTIVITIES NEEDED
Assessment of ODS amount available for management (inventory)			
Installation of sufficient recovery and reclaim facilities			
Cost assessment for ODS that need destruction: comparing export and local destruction costs			
Assess local destruction options when sufficient ODS is available			
Assess local policy regarding export when small quantities of ODS are available			
Assess financing options for most cost effective and sustainable solution → see sustainable financing mechanism			
Implement facility or initiate export			





6 Further reading and resources

For a complete list of references please access the [global roadmap](#).

European Union, 2012. [Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment \(WEEE\)](#).

GIZ, 2015. [Management and destruction of existing ozone depleting substances banks](#).

GIZ, 2017a. [Global roadmap on ODS bank management](#).

GIZ, 2017b. [Guideline to conduct an ODS bank inventory](#).

GIZ, 2017c. [Guideline on policy measures for the management and destruction of ozone depleting substances](#).

GIZ, 2017d. [Guideline to establish a collection system for equipment containing ODS](#).

GIZ, 2017e. [Guideline for the transboundary movement of ODS waste](#).

OECD, 2001. [Extended Producer Responsibility: A Guidance Manual for Governments](#).

OECD, 2016. [Extended producer responsibility – Updated guidance. Working Party on Resource Productivity and Waste](#).



Abbreviations

CFC	chlorofluorocarbons	MLF	Multilateral Fund for the Implementation of the Montreal Protocol
HCFC	hydrochlorofluorocarbons	MRV	Monitoring, reporting and verification
EPR	Extended producer responsibility	NGO	Non-governmental organisation
GCF	Green Climate Fund	ODS	Ozone depleting substances
GEF	Global Environment Facility	ODP	Ozone depleting potential
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	PCB	polychlorinated biphenyl
GWP	Global warming potential	RAC&F	Refrigeration, Air Conditioning and Foam
HFC	hydrofluorocarbons	RAC	Refrigeration and Air Conditioning
HPMP	HCFC phase out management plan	TBM	Transboundary movement
IKI	International Climate Initiative	TEAP	Technology and Economic Assessment Panel
LEDS	Low emission development strategy	UNFCCC	United Nations Framework Convention on Climate Change





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„Management and Destruction of Ozone Depleting
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