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deep

Sustainable solid waste management (SWM) framework

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LECTURES OVERVIEW

- Introduction - Waste system
- **Classification and current legislation**
- Sustainable waste management

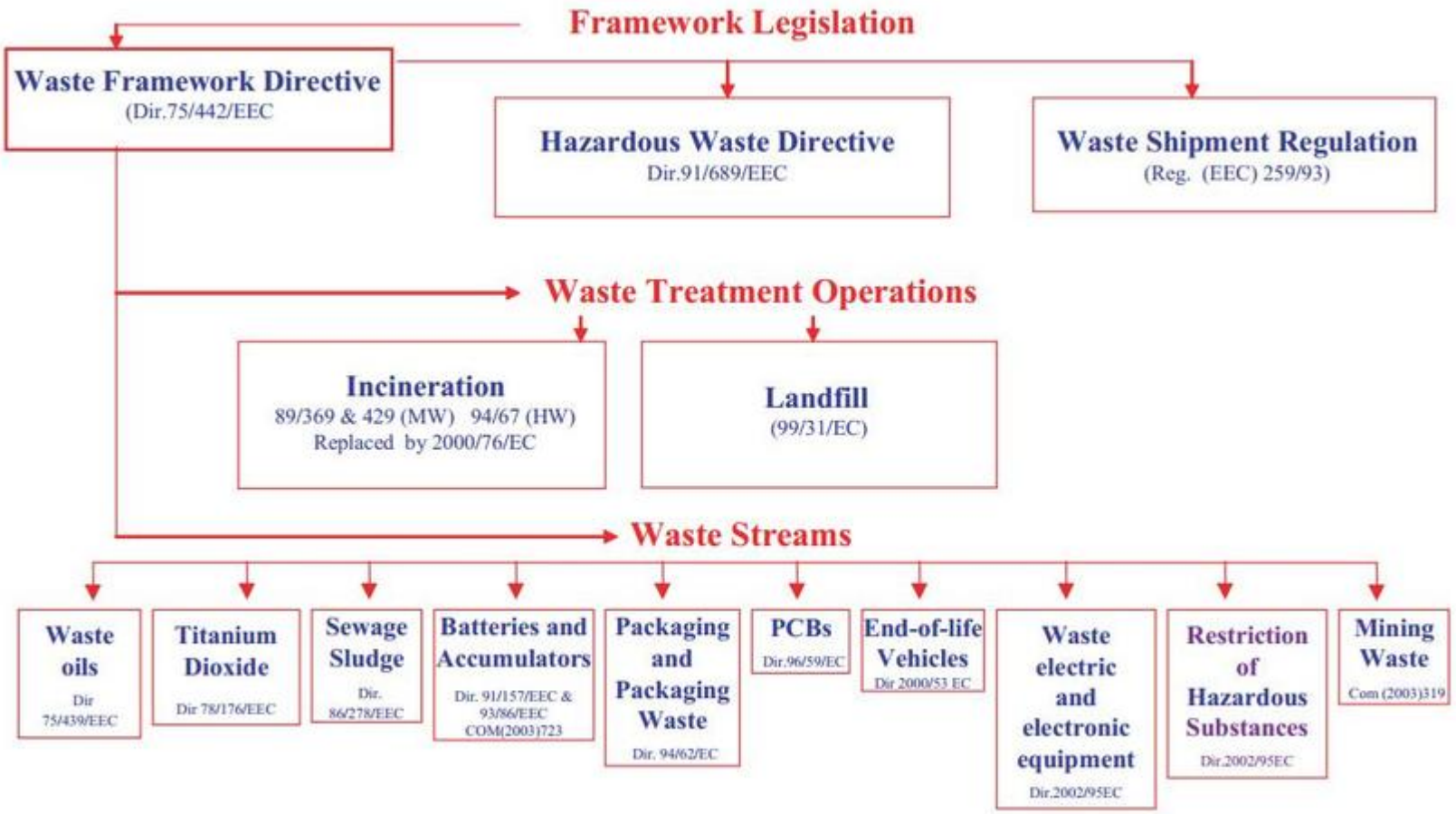
PREAMBLE

How to deal with Europe's waste?

https://youtu.be/ufL3yDs1ZQ8

Europe needs to reduce landfills and food waste, handle and recycle packaging waste better : these are the main goals of the "Waste Package" to be adopted by the European Parliament in Strasbourg.

EC WASTE LEGISLATION



– **horizontal** legislation;

– legislation on **waste treatment operations**;

– legislation on **specific waste streams**.

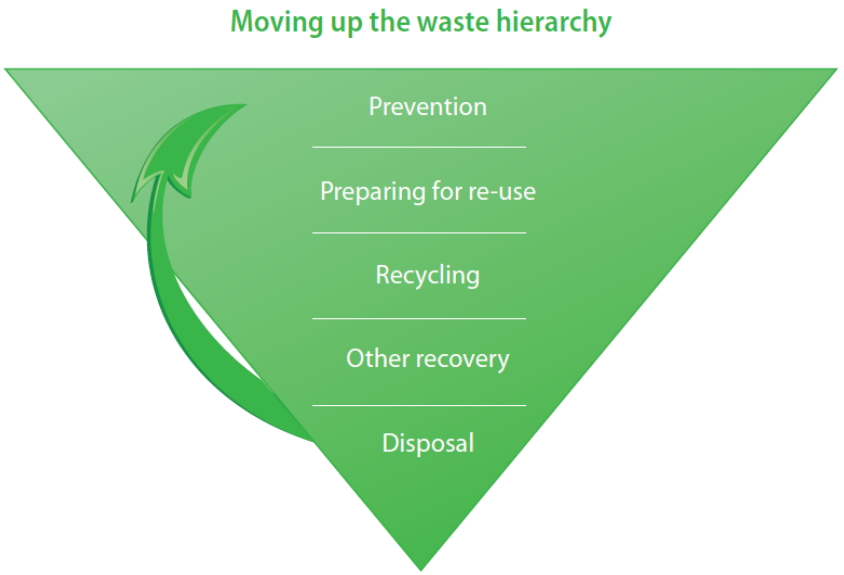
HORIZONTAL LEGISLATION

Horizontal legislation establishes the overall framework for the management of waste.

Council **directive 75/442/EEC of 15 July 1975 on waste** (the "**waste framework directive**" or **WFD**) includes the main definitions and principles concerning waste management. It was comprehensively revised in 1991, 1996 and again in 2008 and finally in 2018 (**Directive (EU) 2018/851**).

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.150.01.0109.01.ENG

WASTE FRAMEWORK DIRECTIVE



In essence, the WFD requires Member States to give priority to

- **Waste prevention** and to
- **encourage re-use and recovery of waste**.

- Member States must also ensure that waste is recovered and disposed of **without endangering human health** and
- **without using processes or methods which could harm the environment.**

- The directive also requires Member States to draw-up **waste management plans** and to establish a system for the authorization of waste management installations.

WASTE FRAMEWORK DIRECTIVE

The WFD defines waste as "**any substance or object in the categories set out in Annex I which the holder discards or intends or is required to discard**." Annex I of the WFD lists 16 categories of waste.

This annex is now replaced by the **EWC** (**European Waste Catalog**)
Finally, the Waste Framework Directive (EU) 2008/98/EC (updated in 2018 - Directive (EU) 2018/851) sets criteria for By-products and End of Waste process

- ✓ *By-product is a substance or object, resulting from a production process, the primary aim of which is not the production of that item. By-products can come from a wide range of business sectors, and can have very different environmental impacts. An incorrect classification could be the cause of environmental damage or unnecessary costs for business.*

  Examples: lacto-serum in a cheese factory, beet pulp from the production of sugar, HCl in aqueous solution from the manufacture of lubricant additive, etc.

WASTE FRAMEWORK DIRECTIVE

What are the end-of-waste criteria, and why are they needed?

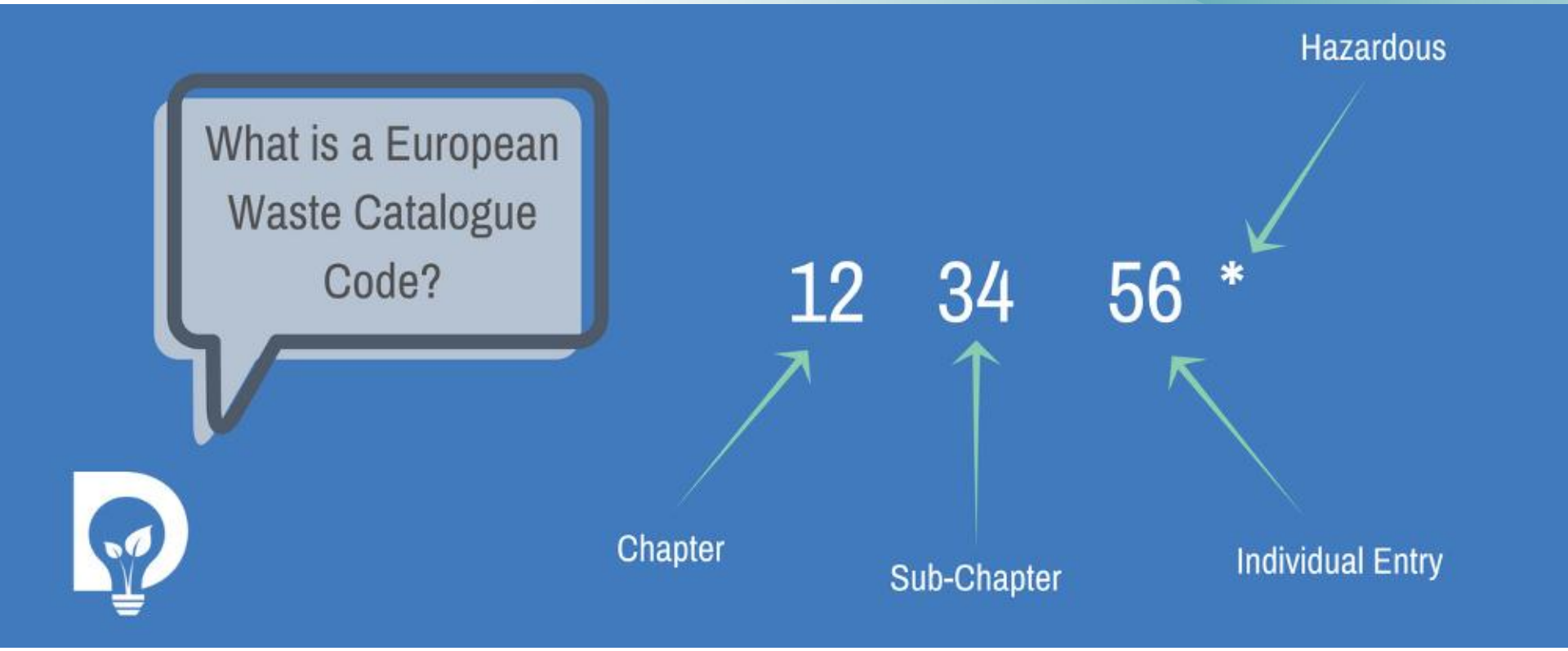
End-of-waste criteria specify when certain waste ceases to be waste and obtains a status of a product (or a secondary raw material).

According to Article 6 of the WFD 2008/98/EC, certain specified waste shall cease to be waste when it has undergone a recovery (including recycling) operation and complies with specific criteria to be developed in line with certain legal conditions, in particular:

- *the substance or object is commonly used for specific purposes;*
- *there is an existing market or demand for the substance or object;*
- *the use is lawful (substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products);*
- *the use will not lead to overall adverse environmental or human health impacts.*

Examples: a plywood panel made with a certain percentage of packaging wood chips, a fleece jacket made from waste plastic bottles ...

WASTE FRAMEWORK DIRECTIVE



An EWC Code is a 6-digit code used to identify waste as listed in the EWC. It is formatted as 3 pairs of numbers, for example 12 34 56.
It identifies and classifies waste into categories according to how these wastes have been produced. It adequately describes the waste being transported, handled or treated.

WASTE FRAMEWORK DIRECTIVE

What is the structure of the EWC Code?

Chapters

The EWC is divided into 20 chapters, numbered 01 to 20.

Some chapters are based on the type of industrial process or business activity that produced the waste. For example:

- ✓ ***Chapter 04: Wastes from the Leather, Fur and Textile Industries***

Other chapters are based on the type of waste. For example:

- ✓ ***Chapter 13: Oil Wastes and Wastes of Liquid Fuels (except edible oils, and those in chapters 05, 12 and 19)***

The titles of these chapters are important. The waste must fall within the scope of the title to be considered within it. Some titles, like that for chapter 13, also exclude certain wastes from that entire chapter.

WASTE FRAMEWORK DIRECTIVE

What is the structure of the EWC Code?

Sub-chapters

Most chapters contain several sub-chapters. These divide the chapter into sub-groups based on either industrial process and business activity, or type of waste..

Each sub-chapter is given another two-digit number (creating a four-digit number with the chapter number). For example:

- ✓ ***Sub-chapter 04 02: wastes from the textile industry***
- ✓ ***Sub-chapter 13 01: waste hydraulic oils***

The sub-chapter title, like the chapter title, is also important.

WASTE FRAMEWORK DIRECTIVE

What is the structure of the EWC Code?

Individual entries

Within each sub-chapter are the classification codes for individual wastes.

These are given an additional two-digit number, to create a six-digit number with the chapter and sub-chapter numbers. For example

- ✓ ***04 02 16* dyestuffs and pigments containing hazardous substances***
- ✓ ***13 01 10* mineral based non-chlorinated hydraulic oils***

The description accompanying the code explains the scope of the code. It may do this in a variety of ways including references to the type of waste, the activity or process that produced it, its composition, or properties.

WASTE FRAMEWORK DIRECTIVE

What is the structure of the EWC Code?

The asterisk (*)

The asterisk (*) indicates that the waste is hazardous, however there are 2 types of hazardous waste entries in the catalogue:

- ✓ **"Absolute entries":**
  Those entries with an asterisk (*) and without a specific or general reference to "dangerous substances". Wastes covered under these entries are hazardous waste regardless of the concentration of any "dangerous substance" within the waste. "Absolute entries" are highlighted in red and marked with an "A".

- ✓ **"Mirror entries": Those entries with an asterisk (*) and with a specific or general reference to "dangerous substances", which are generally identified by the word "containing" in the description and have a corresponding entry without an asterisk (*). "Mirror entries" are highlighted in blue and marked with an "M".**

✓ *01 03 04* acid-generating tailings from processing of sulphide ore* *A*
✓ *01 03 05* other tailings containing dangerous substances* *M*

WASTE FRAMEWORK DIRECTIVE

Hazardous Waste Directive & Waste Shipment regulation

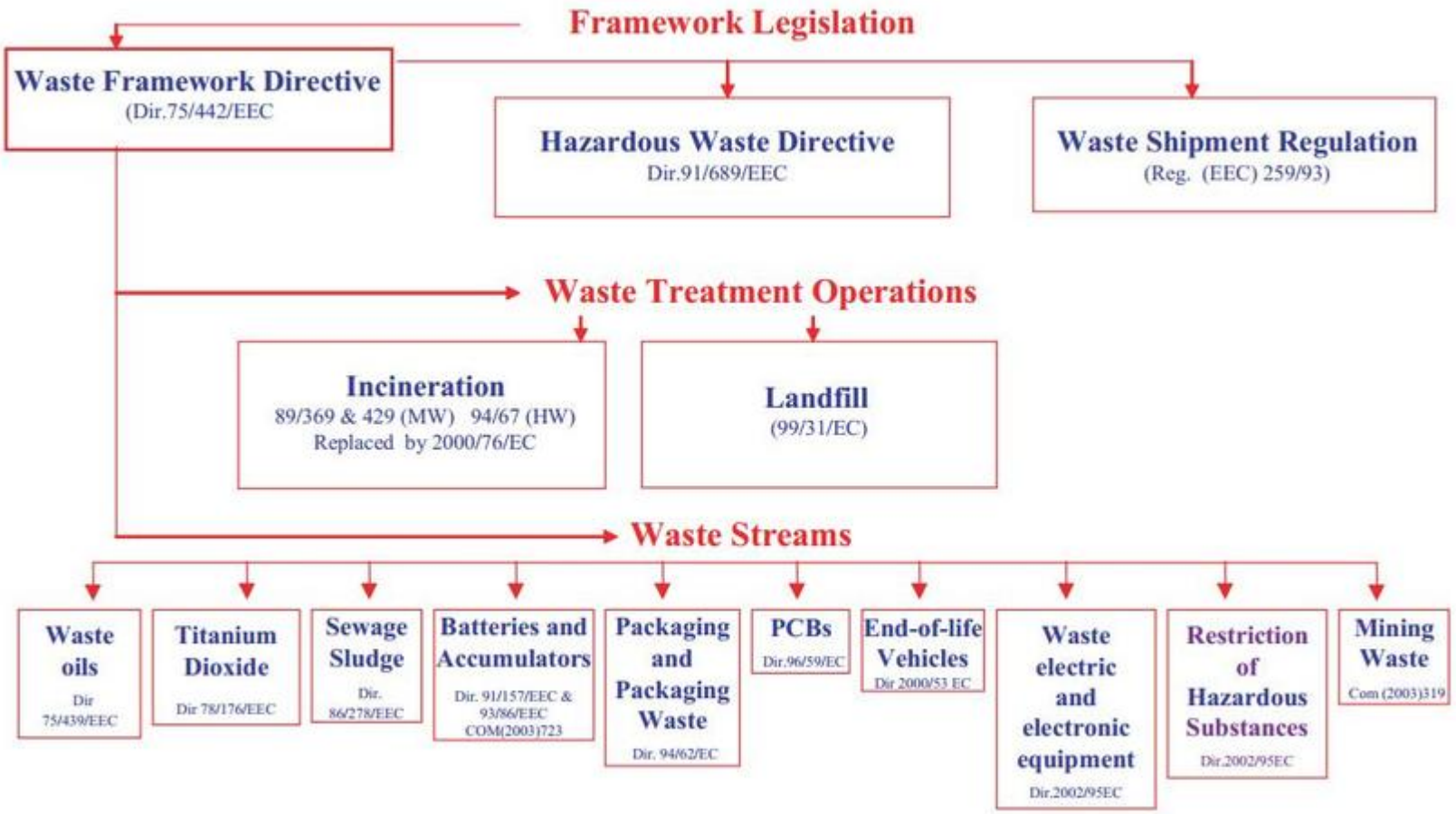
Council directive 91/689/EEC of 12 December 1991 on hazardous waste, as amended, complements the WFD for hazardous waste.
Annex III of the directive lists 15 properties of waste which render them hazardous within the meaning of the directive.

The directive also contains substantive requirements concerning, for example :

- ✓ the **permitting of installations handling hazardous waste**.
- ✓ **it contains additional requirements concerning**, for example,
  - **limitations of mixing** of hazardous waste,
  - **record keeping** and the **shipment of waste at national level**, which must be accompanied by a **tracking form**.

The Community has also adopted legislation concerning the **cross-border shipment of waste.** The main legal instrument in this field is **Council regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste** within, into and out of the European Community, as amended.

EC WASTE LEGISLATION



– horizontal legislation;

– legislation on waste treatment operations;

– legislation on specific waste streams.

LEGISLATION ON WASTE TREATMENT OPERATIONS

Landfill

Directive 1999/31/EC of 26 April 1999 on the landfill of waste ("the landfill directive") sets out a number of administrative requirements, including:

- **permit conditions**,
- **technical requirements** and **environmental standards** applying to landfills accepting various categories of waste (**inert, non-hazardous and hazardous waste**),
- **reduction of biodegradable waste** disposed of in landfills,
- **banning of the landfilling of certain types of waste**, such as liquid wastes, infectious waste and most tires.

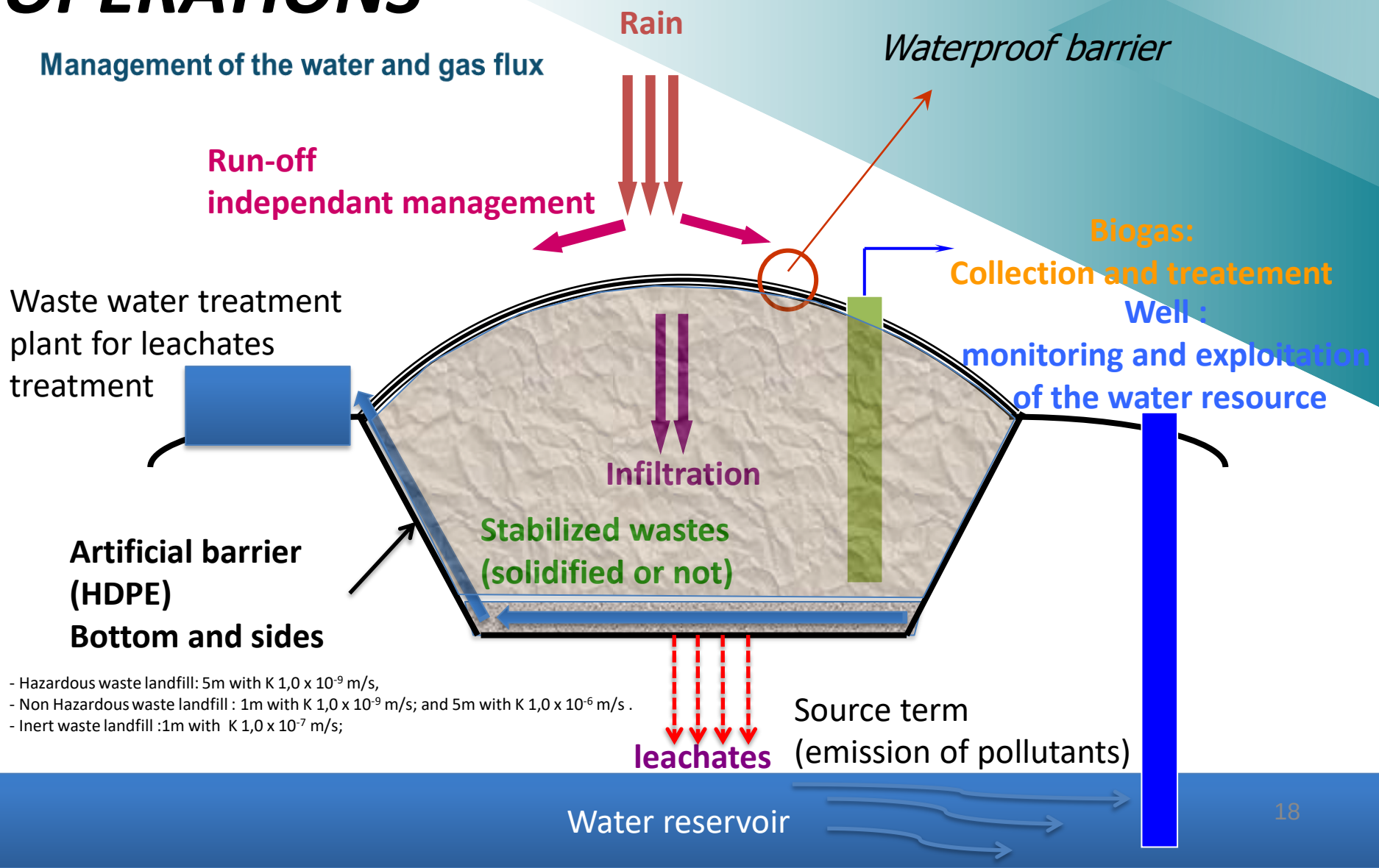
LEGISLATION ON WASTE TREATMENT OPERATIONS

Main principles to ensure environmental protection

The landfill directive also requires **all costs** relating to the **establishment, operation and closure of a landfill** are **internalized into the price charged by the operator**.

Description and illustration of **general criteria** for the Landfill Directive in order to protect the environment

LEGISLATION ON WASTE TREATMENT OPERATIONS



LEGISLATION ON WASTE TREATMENT OPERATIONS

Criteria for the limitation of the source term (via the leaching of waste prior to acceptance)

	L/S=10 l/kg dry matter in mg/kg			C_0 (essai de percolation) mg/l		
	inertes	non dangereux	dangereux	inertes	non dangereux	dangereux
As	0,5	2	25	0,06	0,3	3
Ba	20	100	300	4	20	60
Cd	0,04	1	5	0,02	0,3	1,7
Cr total	0,5	10	70	0,1	2,5	15
Cu	2	50	100	0,6	30	60
Hg	0,01	0,2	2	0,002	0,03	0,3
Mo	0,5	10	30	0,2	3,5	10
Ni	0,4	10	40	0,12	3	12
Pb	0,5	10	50	0,15	3	15
Sb	0,06	0,7	5	0,1	0,15	1
Se	0,1	0,5	7	0,04	0,2	3
Zn	4	50	200	1,2	15	60
Chlorures	800	15 000	25 000	460	8500	15 000
Fluorures	10	150	500	2,5	40	120
Sulfates	1 000,00	20 000	50 000	1500	7000	17 000
Indice phénols	1	-		0,3	-	
COT sur éluat **	500	800	1000	160	250	320
FS (fraction soluble)***	4 000	60 000	10 000	-	-	

10%

LEGISLATION ON WASTE TREATMENT OPERATIONS

The makeover of one of Europe's largest landfills

https://www.youtube.com/watch?v=c36kP3vp_kk

International Finance Corporation

LEGISLATION ON WASTE TREATMENT OPERATIONS

Incineration

Directive 2000/76/EC of the European Parliament and of the Council of December 2000 on the incineration of waste ("the incineration directive")

It replaces 3 older directives and thus consolidates the Community's legal requirements concerning :

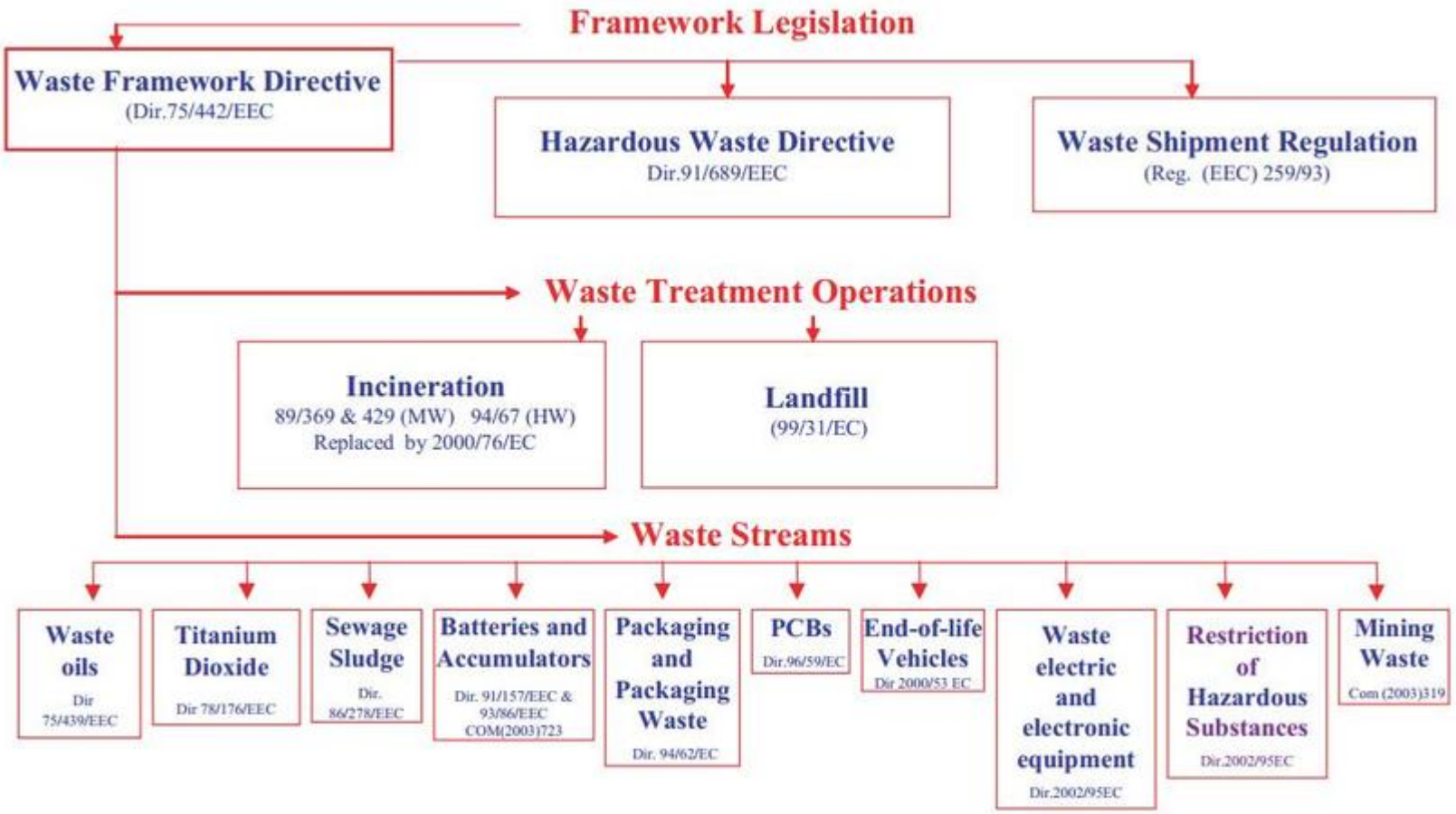
- **the incineration and co-incineration** of waste
- of **non-hazardous and hazardous waste**.

The directive establishes the **permitting conditions** for incineration plants, including under abnormal operating conditions, as well as limit values in relation to, for example, emissions to air and discharges to water.

The directive includes requirements concerning the **delivery and reception of waste** and concerning the management of **incineration residues**, including the requirement that when appropriate the residues be recycled.

Finally, it also includes requirements on **control, monitoring and measurement**.

EC WASTE LEGISLATION



- horizontal legislation;
- legislation on waste treatment operations;
- legislation on specific waste streams.

SPECIFIC WASTE STREAMS

This section is limited to the most important legal instruments and focuses on their provisions that directly affect recycling.

- **European Parliament and Council directive 94/62/EC of 20 December 1994 on packaging and packaging waste** is perhaps the best known directive concerning a specific waste stream. It is certainly the one for which most practical experience exists. The directive sets :
  - ✓ **Quantitative targets for the recovery and recycling of various packaging materials**. These targets are currently being revised, with a view to their substantial increase.
  - ✓ The Commission initiated this **review** on the basis of studies of the **environmental and economic costs and benefits of recycling**, which aimed at identifying **optimum recycling rates differentiated** for each of the materials covered by the directive;

SPECIFIC WASTE STREAMS

- **Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles** is currently being implemented by Member States.

  - ✓ Article 7(2)(a) provides for a "**re-use and recovery" target of 85%** and a "**re-use and recycling" target of 80%,** both of which should be achieved since the 1 January 2006.
  - ✓ Article 7(2)(b) provides that these targets have been **increased to 95%** reuse and recovery and **85% re-use and recycling since the 1 January 2015**. This directive is the first piece of Community legislation making producer responsibility mandatory.

SPECIFIC WASTE STREAMS

- **The directive on Waste Electrical and Electronic Equipment (WEEE) adopted in January 2003** contains a number of targets concerning the recovery of WEEE – these are described in Article 6 and must be met since the 31 December 2006. The recycling targets range from 50% to 80% depending on the type of equipment and recovery rates are also set for the different types of equipment. This directive also makes producer responsibility mandatory.

- **…**

SPECIFIC WASTE STREAMS

- **Extended producer responsibility (EPR)** is a policy approach that makes producers responsible for their products along the entire lifecycle, including at the post-consumer stage. By doing so, it helps achieve environmental goals such as recycling targets. At the same time, EPR generates funding from producers that help to pay for the collection, sorting and recycling of waste products, as well as generates detailed information on production, products, waste generation and treatment.

- **The OECD's guidance identifies principles on the use of EPR, outlines possible options and details the benefits and trade-offs of different approaches. In this way, the OECD helps to harmonize the use of EPR schemes across countries.**

Extended Producer Responsibility: Basic facts and key principles : https://www.oecd.org/en/publications/extended-producer-responsibility_67587b0b-en.html

LECTURES OVERVIEW

- Introduction - Waste system
- Classification and current legislation
- **Sustainable waste management**

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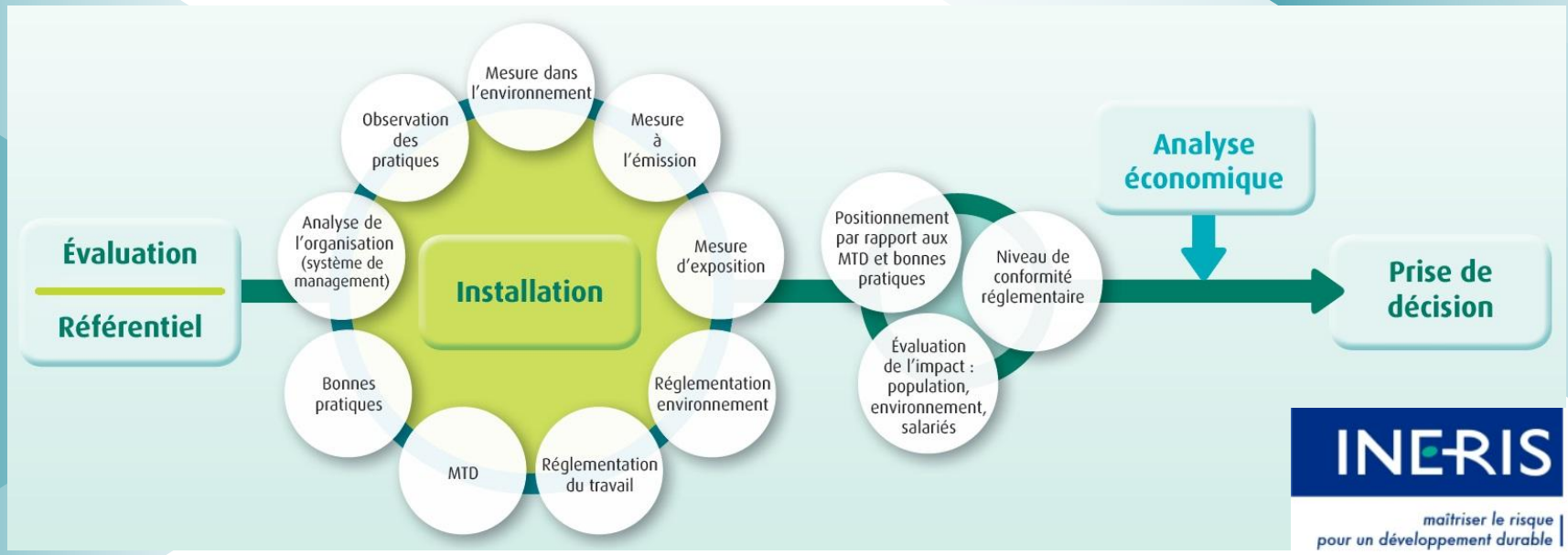

Waste Management and Best Available Techniques (BAT) in relation to Life Cycle Assessment (LCA)

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INTRODUCTION

In a world where resource management and the reduction of environmental impacts are becoming crucial, businesses and communities must adopt innovative and sustainable techniques to manage waste.

- **Concept of Best Available Techniques (BAT): the most effective and advanced stage of development of activities and their operating methods, allowing the avoidance and, when that is not possible, the reduction of emissions and the overall environmental impact.**

- **By techniques, we mean the technologies used (production processes and/or waste treatment methods), but also the design of the installation, its construction, maintenance, and operation (organizational arrangements and preventive measures), as well as its decommissioning.**

- **Connection between waste management, Best Available Techniques (BAT), and planetary boundaries**

INTRODUCTION

EUROPEAN WASTE REGULATION

European Directive IPPC 96/61/EC of 24 September 1996 on Integrated Pollution Prevention and Control (IPPC) (now replaced by the European Directive on Industrial Emissions No. 2010/75/EU known as 'IED' - https://aida.ineris.fr/guides/directive-ied)

- Achieve a **high level of protection of the overall environment** and human health through an integrated approach to pollution and consumption prevention and reduction (within the framework of the **BAT concept**).

Scope: Regulatory requirement for the evaluation of environmental performance for most new or existing industrial and agricultural activities.

Environmental limits: Different fields include water, air, soil, waste, energy... and various scales...

INTRODUCTION

BAT – A TOOL FOR INDUSTRIAL ECOLOGY

Reminder / Principles of Industrial Ecology

***Two main objectives**:*

- Control the environmental impacts of anthroposystems
- Organize industrial systems based on the model of ecosystems

***Three principles to achieve this**:*

- Strive for the eco-compatibility of industrial systems
- Promote the cycles of materials and energy
- Encourage territorial approach

INTRODUCTION

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INTRODUCTION

BAT – A TOOL FOR INDUSTRIAL ECOLOGY

Methods and tools for the operational implementation of industrial ecology principles

1. **Striving for the eco-compatibility of industrial systems**
   a) **BAT (Best Available Techniques) ⇒ for process eco-design**
   b) Environmental Management System (EMS)
   c) Environmental evaluation methods, multi-criteria analysis, decision support tool
2. **Promoting material and energy cycles**
   a) Circular economy
   b) Product eco-design

3. **Optimizing energy and material flows on a territorial scale**
   Territorial industrial ecology

STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

1. **Optimization of production processes :**

   → **BAT (Best Available Techniques) ⇒ for process eco-design**

   → Environmental Management System (EMS

   → Environmental evaluation methods, multi-criteria analysis, decision support tool

STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

DEFINITION OF BAT (BEST AVAILABLE TECHNIQUES)

- The term "**Best**" refers to techniques that, compared to others, are the most effective in protecting the environment.
- "**Techniques**" includes both the technologies used and the way installations are designed, built, maintained, and operated.
- "**Available**" means that these techniques are developed to a point where they can be realistically applied in the economic and technical conditions of the installation in question, taking into account the costs and benefits.

STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

OBJECTIVES OF BAT

The aim of is to ensure that industrial activities, particularly in waste management, are carried out in the least polluting way possible, optimizing resource efficiency while respecting economic constraints.

BAT are implemented to address environmental concerns such as:

- **Reducing emissions into air, water, and soil**
- **Improving energy efficiency**
- **Managing and treating waste**
- **Rational use of raw materials**

BAT = BEST AVAILABLE TECHNOLOGIES

Criteria for defining BAT :

BAT are selected based on 12 criteria, such as :

- **Efficiency:** How does the technique reduce emissions or resource use?
- **Technical feasibility:** Is the technology feasible with current knowledge and infrastructure?
- **Cost**: Is the implementation cost justified by the environmental benefits obtained?
- **Overall environmental impact:** A local reduction in emissions should not cause an increase elsewhere (e.g., shifting pollution from one medium to another).

This approach leads to the adoption and publication of **BAT reference documents** (BREF).

BAT REFERENCE DOCUMENTS (BREF)

These **documents** result from the exchange of information between member states, industry, and non-governmental organizations. They describe techniques, emissions, and consumption, as well as what will be considered the **Best Available Techniques** for a given sector.

The chapter comprising the Conclusions on BAT is published in the form of an Implementing Decision by the Commission and is binding regarding the application of BAT and compliance with the associated emission levels.

The Aida site provides access to BREF documents, national guides related to the IED directive, and a summative search tool that allows full-text keyword searches across all past and current BREF documents in both French and English.

https://aida.ineris.fr/guides/directive-ied

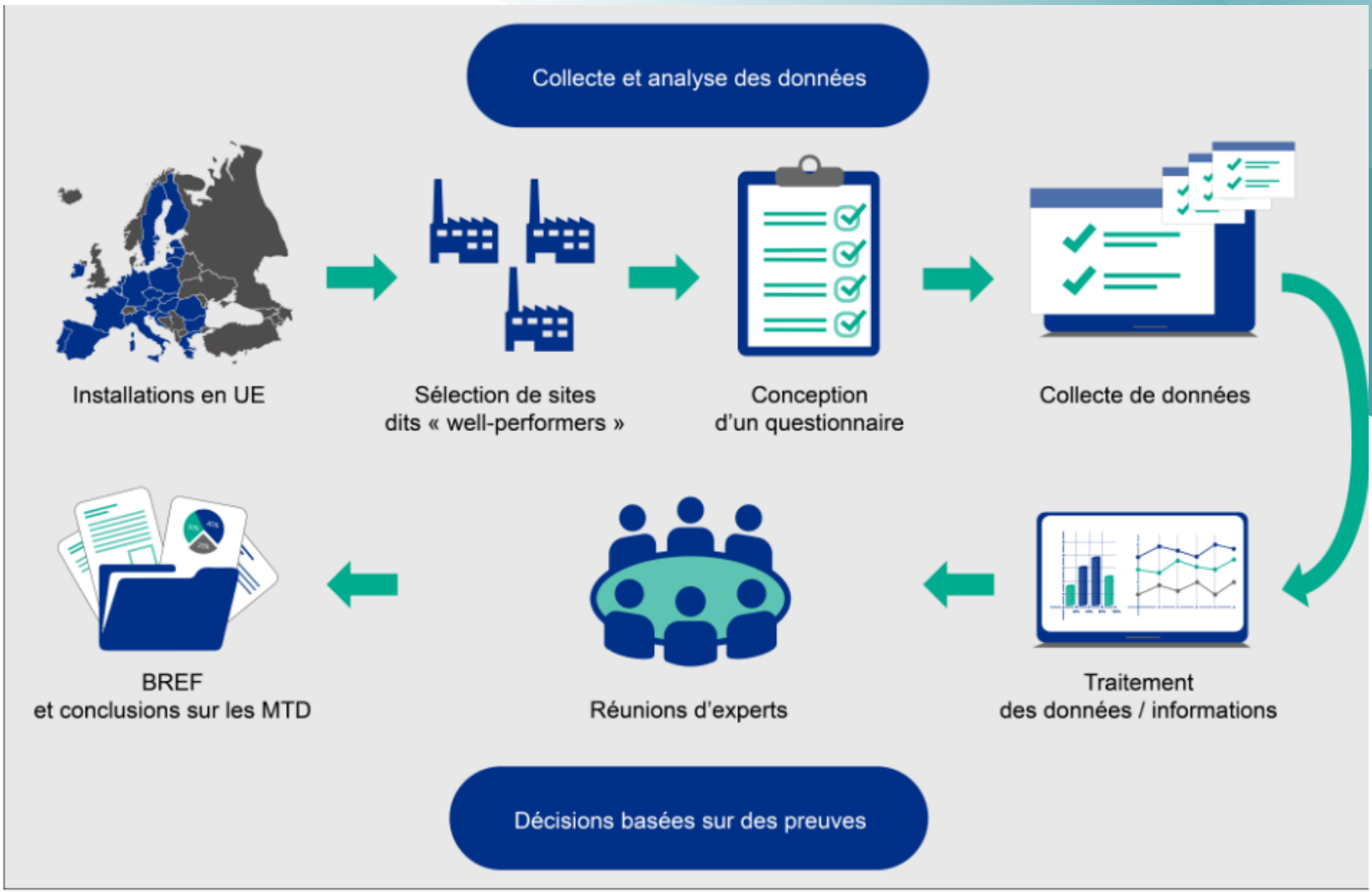
BAT REFERENCE DOCUMENTS (BREF)

The BREF documents are categorized by sectors of activity and include in a single document :

- a technical and economic overview of the sector;
- an inventory of the techniques implemented in the sector at the time of drafting the BREF,
- an inventory of associated consumptions and emissions;
- a presentation of techniques eligible for BAT status;
- a presentation of the selected BAT and associated environmental performance;
- a presentation of emerging techniques.

- ✓ Given the evolution of techniques, BREF documents are intended to be reviewed periodically. The first revision took place in 2006 ➔ ***1/3 of BREF documents are under revision each year (typically over a span of 3 years)***
- ✓ Translation of all BREF documents developed up to 2009 (**with the English version being the only official one**) and, often, a technical summary focused on BAT, captu ring the essential information from the BREF."
- ✓ **Public access** to all these documents.

BAT REFERENCE DOCUMENTS (BREF)



Source EIPPCB-JRC

BAT REFERENCE DOCUMENTS (BREF)

Sectors of activity concerned

Energy activities (refineries and large combustion plants), the production and processing of metals, the mineral industry, chemistry, the waste sector (incine -ration and treatment), and other activities such as agro-food, paper mills, or intensive poultry and pig farming.

En France

450 000
installations soumises à déclaration

15 000
établissements soumis à enregistrement

28 000
établissements comprenant au moins une installation soumise à autorisation dont :
> 7 000 établissements soumis à la directive IED dont 3 500 élevages,
> 5 000 élevages,
> 3 700 carrières,
> 1 300 établissements présentant des risques d'accidents majeurs (SEVESO) dont 700 SEVESO seuil haut.

EXAMPLE OF A BREF

https://aida.ineris.fr/guides/directive-ied

https://aida.ineris.fr/guides/directive-ied/documents-bref

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Documents BREF et conclusions MTD

Seule la version anglaise d'un BREF fait foi.

Pour connaître les BREF en cours de révision, se reporter au site du Bureau Européen IPPC

Pour télécharger la version sommative des documents IPPC/IED (fichier .zip, indexation full text, 700 Mo), cliquer ICI

Pour vous aider à utiliser cette version sommative, un tutoriel est disponible en cliquant ICI

Industries d'activités énergétiques

Code	Titre	BREF	Conclusions sur les MTD	Résumé technique
REF	Raffineries (avril 2015)	Version anglaise	BAT Conclusions 10/2014 corrigées Conclusions sur les MTD corrigées	
LCP	Grandes installations de combustion (juillet 2017)	Version anglaise	Bat conclusions 07/2017 Conclusions sur les MTD	

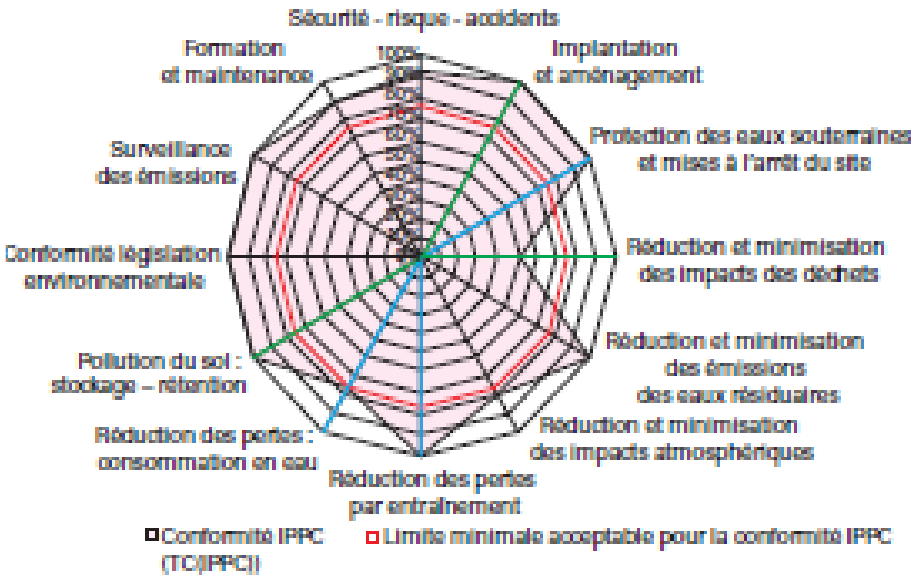
Production et transformation des métaux

Code	Titre	BREF	Conclusions sur les MTD	Résumé technique

EVALUATION OF THE ENVIRONMENTAL PERFORMANCE OF BAT

- **Development of specific methodological tools (L-BAT…) based on the 12 criteria and the expectations of the IED directive**

- **5 levels of control defined to assess the performance level of techniques**



Classes	Libellé	Niveaux de maîtrise
A	MTD existantes dans le BREF et respect des VLE	Bonne maîtrise
B	Action non référencée dans le BREF mais conforme à l'arrêté ministériel du 2 février 1998 ou à un arrêté par branche dit « IPPC compatible »	
C	MTD en cours de mise en œuvre et respect actuel des VLE	Maîtrise moyenne
D	Technique ayant des performances équivalentes aux MTD des BREF mais écart sur les VLE (*à justifier absolument*) ou Solution technique non conforme aux exigences réglementaires et/ou de sécurité (*à justifier*) mais conformité actuelle aux VLE	Maîtrise insuffisante
E	MTD en cours de mise en œuvre et non-conformité actuelle aux VLE (*à justifier absolument*)	Maîtrise très insuffisante
F	Non-conformité technique en termes d'exigences réglementaires, de sécurité et de VLE	Aucune maîtrise

BAT REFERENCE DOCUMENTS (BREF)

Definition of the emission levels associated with BAT (BATAEL for Best Available Techniques Associated Emission Level)

➔«Range of emission levels obtained under normal operating conditions using one of the BAT or a combination of BAT, in accordance with the indications found in the BAT conclusio ns, expressed as an average over a given period, under specified reference conditions **».**

Do not use the values defined in the BREFs as exposure limit values

BAT : EXAMPLE

Zoom sur les MTD Incinération

- 37 MTD à respecter
- Quelques exemples de MTD :

3.12.2019 FR Journal officiel de l'Union européenne L 312/55

DÉCISION D'EXÉCUTION (UE) 2019/... DE LA COMMISSION

du 12 novembre 2019

établissant les conclusions sur les meilleures techniques disponibles (MTD) pour l'incinération des déchets, au titre de la directive 2010/75/UE du Parlement européen et du Conseil

[notifiée sous le numéro C(2019) 7987]

(Texte présentant de l'intérêt pour l'EEE)

MTD1

Mettre en place un système de management environnemental

MTD2

Déterminer l'efficacité de valorisation énergétique

MTD15

Mettre en œuvre des procédures pour adapter les réglages par exemple au moyen d'un système de contrôle avancé

MTD17

Afin de réduire les émissions, s'assurer que le système d'épuration des fumées et la station d'épuration des effluents aqueux sont conçus de manière appropriée

MTD25 à 31

Concernent les émissions atmosphériques, avec des Niveaux d'Emission Associés sous forme de plage : seuils haut et bas

BAT : EXAMPLE

MTD 25 à 31: les seuils rejets atmosphériques

			Seuils actuels (valeur EOT)	Seuils hauts (valeur NOC) ↑	Seuils bas (valeur NOC) ↓
Moyenne jour (mesures en continu)	HCl	(mg/Nm³)	10	8 / 6(3)	2
	SO2	(mg/Nm³)	50	40 / 30(3)	5
	NOx	(mg/Nm³)	200	150 / 120(3) /180(1)	50
	CO	(mg/Nm³)	50	50	10
	COT	(mg/Nm³)	10	10	3
	Poussières	(mg/Nm³)	10	5	2
	NH3	(mg/Nm³)	30	10 /15(2)	2
	HF	(mg/Nm³)	1	1	1
	Mercure	(µg/Nm³)		20	5
Mesures en semi-continu	Dioxines	(ng/Nm³)	0,10	0,08 / 0,06(3)	0,01
	Dioxines + PCB dioxines like	(ng/Nm³)		0,1 / 0,08(3)	0,01
Mesures semestrielles	Dioxines	(ng/Nm³)	0,10	0,06 / 0,04(3)	0,01
	Dioxines + PCB dioxines like	(ng/Nm3)		0,08 / 0,06(3)	0,01
	Cd + Tl	(mg/Nm³)	0,05	0,02	0,005
	Hg	(mg/Nm³)	0,05		
	Métaux	(mg/Nm³)	0,50	0,30	0,01

(1) Si pas possible d'implanter une SCR (2) Si SNCR sans laveur (3) Seuil pour les unités nouvelles

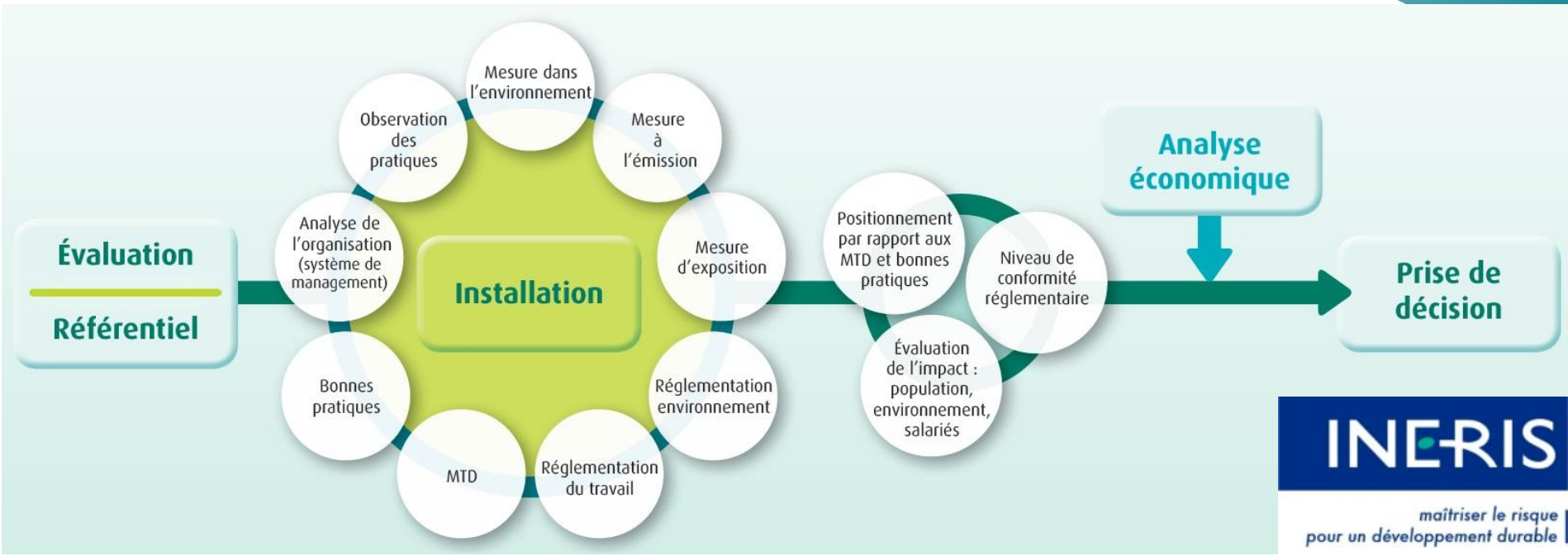
STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

1. **<u>Optimization of production processes :</u>**

   → MTD - Eco-design (of processes)

   → **Environmental Management System**

   → Environmental **<u>evaluation</u>** methods, multicriteria analysis, **<u>decision</u>** support tools



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STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

ENVIRONMENTAL MANAGEMENT SYSTEM (SME)

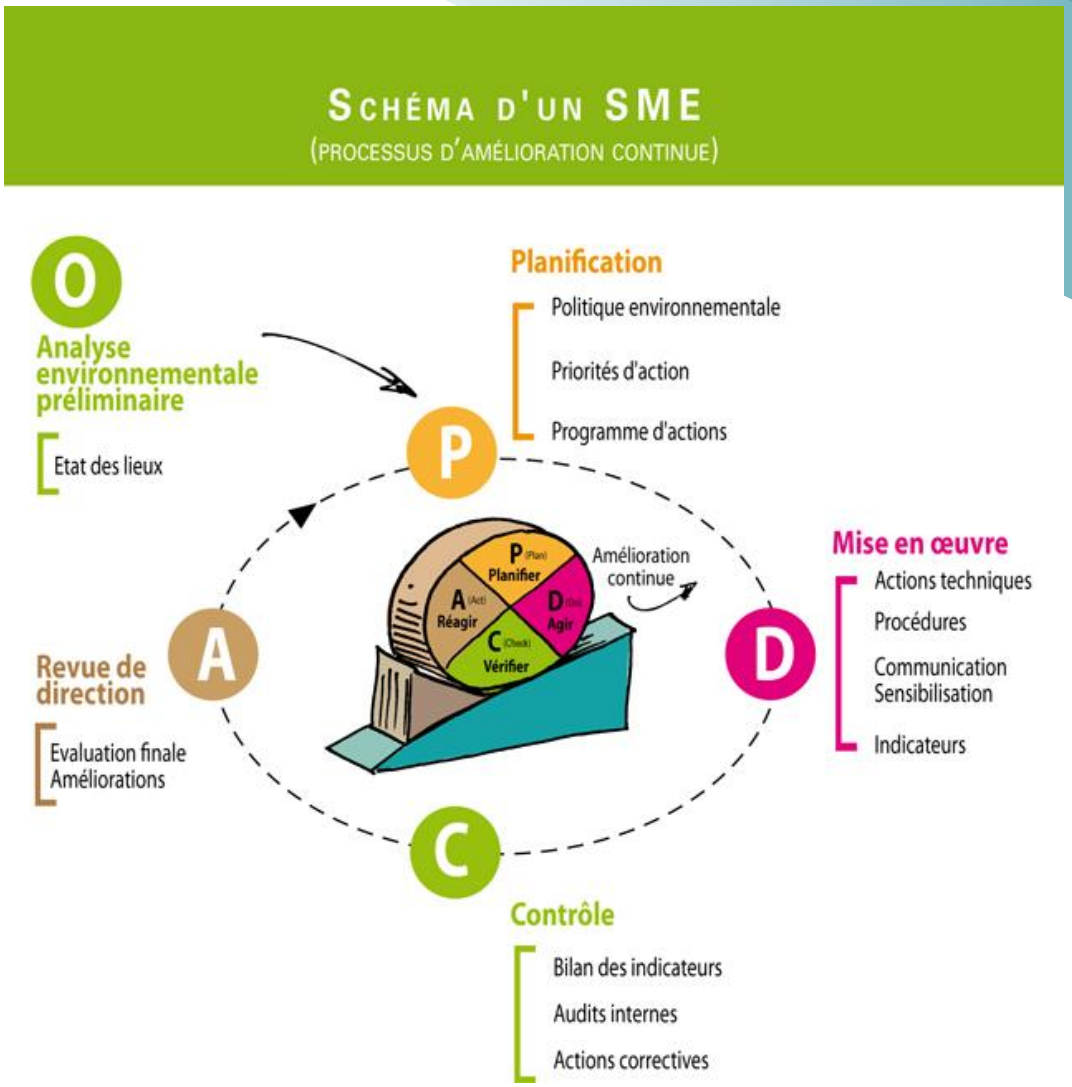
Management tool aimed at organizing to reduce and control its environmental impacts and continuously improve environmental performance

The following ISO standards describe the SME :

- The ISO 14001 [ISO 96-1] and ISO 14004 [ISO 96-2] standards -
  Specifications and guidelines for the use and implementation of SME

- ISO 14010 [ISO 96-3], ISO 14011 [ISO 96-4], and ISO 14012 [ISO 96-5] standards -
  Principles and procedures of environmental auditing, as well as the qualificatio n criteria for environmental auditors

STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS



STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

ENVIRONMENTAL MANAGEMENT SYSTEM (SME)

P:The environmental policy sets the general strategy of the entity and its level of commitment. During the planning stage, the assessment of regulatory non-compliances and the environmental analysis help determine the significant environmental aspects, from which the objectives and the program to achieve them are established.

D:The next step is the implementation and operation of the SME, with the definition of various responsibilities and the implementation of the different constituent actions of the SME.

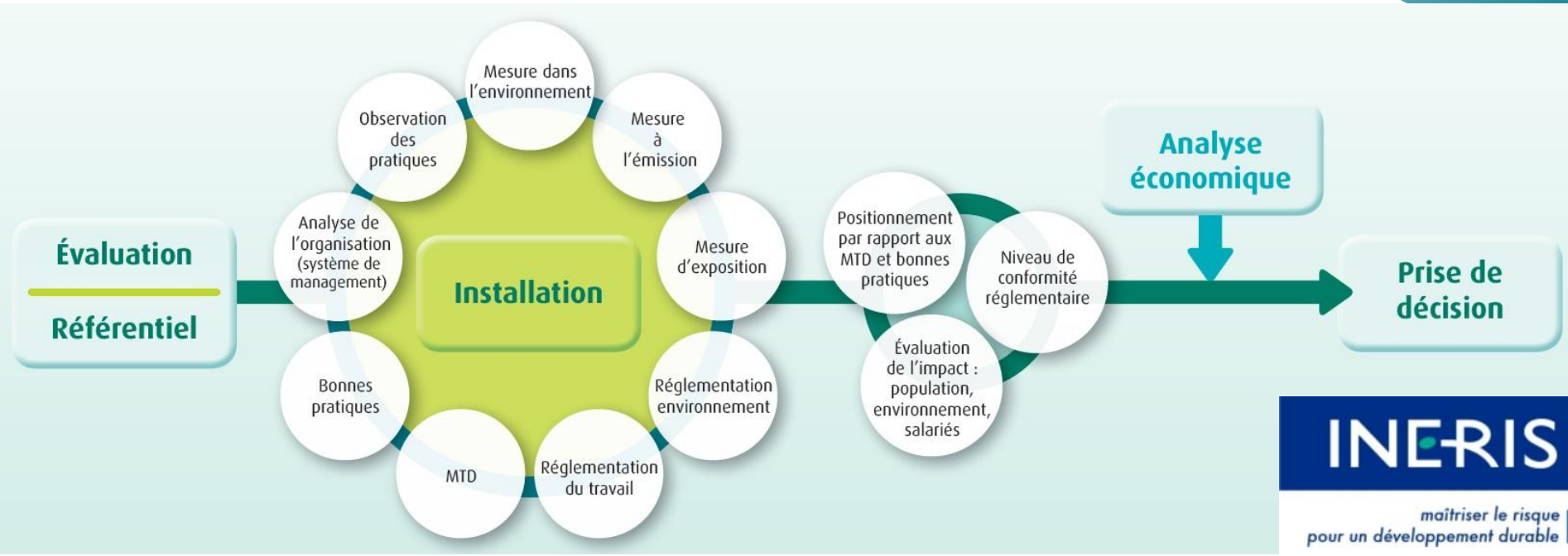
E:It is then important to monitor the actions to determine if their results align with the set objectives. If not, corrective actions should be implemented.

A:Finally, during the management review, an assessment of the SME is carried out, which leads to the evolution of the environmental policy.

STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

1. **Optimization of production processes :**

   → MTD - Eco-design (of processes)
   → Environmental Management System
   → **Environmental evaluation methods, multi-criteria analysis, decision support tools**



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STRIVING FOR THE ECO-COMPATIBILITY OF INDUSTRIAL SYSTEMS

ENVIRONMENTAL EVALUATION METHODS, MULTI-CRITERIA ANALYSIS, DECISION SUPPORT TOOLS

These methods also enable the **eco-design** of processes and products.

The objective of making anthroposystems 'ecocompatible' by controlling environmental impacts involves being able to **identify and quantify these impacts, and to prioritize them if necessary.**

Similarly, in order to promote (or design) the least “penalizing” systems, environmental assessment methods must **enable products or systems to be compared on the basis of all their impacts** => Global assessment

GLOBAL ENVIRONMENTAL EVALUATION METHODS

LCA

Life Cycle Assessment (LCA) aims to evaluate the environmental impacts of a product, service, or activity across all its phases (from cradle to grave).

The method is covered by ISO standards 14 040-43 (1997) and 14 044

CONCLUSION

- The IED Directive aims to prevent and reduce emissions from industry in order to protect the environment and human health throughout the UE.

- **It is based on the concept of BAT defined at European level in sectoral reference documents (BREFs).**

- **These BATs determine the regulatory requirements to be met by the plants concerned.**

- **At European level, development of BAT assessment methods to help operators in the regulatory assessment of their plants' performance.**

- **Harmonized environmental balance sheet requirements for industrial plants promote a level playing field across the UE.**

GLOBAL ENVIRONMENTAL ASSESSMENT METHODS

Complementarities between BAT and LCA :

- **BAT for immediate local improvement, LCA for global optimization :**
  - For example, a plant may implement BAT to reduce its emissions, but a LCA could show that these local improvements are offset by high impacts in another phase of the life cycle (e.g. waste disposal, etc.).
- **LCA for selecting the most relevant BATs :**
  - For example, if a LCA reveals that a product's greatest environmental impact lies in its use phase, this could lead to BAT focusing on energy efficiency or material durability.

GLOBAL ENVIRONMENTAL ASSESSMENT METHODS

Complementarities between BAT and LCA :

- **BAT for implementing LCA recommendations :**
  - Once a LCA has identified the critical points in the life cycle of a product or service, BAT can be used to improve specific processes. Moving from theoretical LCA analysis to the practical application of concrete solutions.

- **BAT for immediate results, LCA for long-term planning:**
  - BAT provides immediate, tangible results in reducing the environmental impact of a plant or process. However, LCA is essential for planning long-term actions, integrating future technological changes, market trends and new environmental standards.

COMPLEMENT

Watch a video (in French) on environmental analysis using BAT
https://youtu.be/-XIy5mLehys

by Valérie Laforest, Head of the Environmental and Organizational Engineering Department at the Institut Henri Fayol, MINES Saint-Etienne (Carnot M.I.N.E.S)

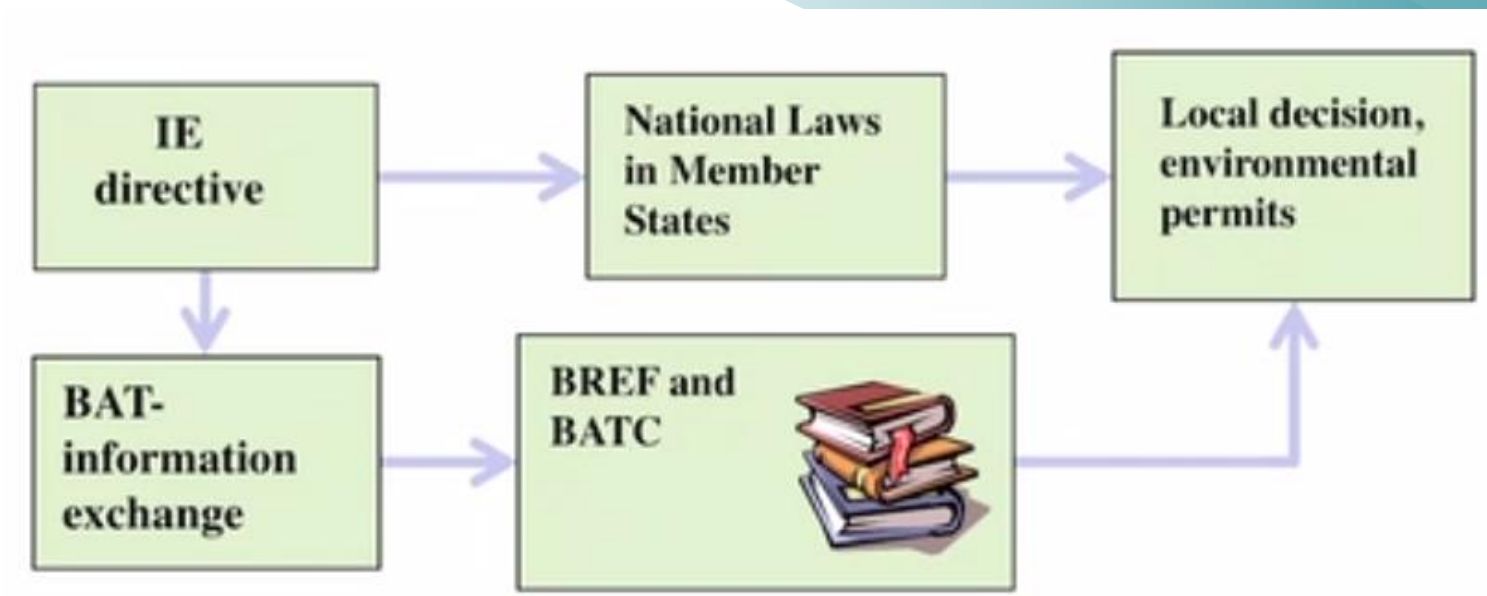
OVERALL CONCLUSION

Waste management is a complex subject, combining technical, regulatory, financial and social aspects, but one in which the stakes are extremely high for local authorities.

Beyond simple disposal, waste management represents an opportunity to develop a circular economy in our territories, through a local approach that enables the development of new activities and the creation of jobs.

APPENDICES

REGULATIONS



1. LEGAL FRAMEWORK

2. INFORMATION EXCHANGE ON BAT

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THANK YOU FOR YOUR ATTENTION