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Date: 16/04/2025 17:20:31

LAN BREF frontloading survey

WELCOME!

Welcome to the LAN BREF frontloading survey!

The European Bureau for Research on Industrial Transformation and Emissions (EU-BRITE, formerly the European IPPC Bureau) has started the preparation of the BAT Reference Document (BREF) on Landfills, hereafter referred to as the 'LAN BREF', with the letter for setting up the TWG sent to the IED Article 13 Forum Members on 22 November 2024 (BATIS > Forum > Landfills > 01 TWG Activation).

The LAN BREF is being developed as part of the implementation of the revised Industrial Emissions Directive (IED)[1] and covers the activity specified in Annex I, point 5.4, of the revised IED, namely:

- 5.4. Landfills as defined in Article 2(g) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste with a capacity exceeding 10 tonnes per day or with a total capacity exceeding 25 000 tonnes, excluding landfills of inert waste.

The LAN TWG members are invited to "frontload" the information exchange for the preparation of the LAN

BREF. The 'BREF Guidance' (currently under review) provides general information on the process of exchanging information to draw up and review BREFs as well as on their structure and content. Please coordinate your response and submit only one survey per delegation.

Completing this survey will require approximately one and a half to two hours of your time, in addition to the time needed to gather the necessary information.

In order to ensure transparency, which is one of the cornerstones of the Sevilla Process, once you have completed the survey, you are kindly requested to convert it to pdf format and upload it to BATIS (BATIS > Forum > Landfills > 02 Frontloading > 02 Survey), together with any other supporting documents uploaded with the survey. The TWG may also supplement these documents with additional files if needed.

To this end, TWG members are invited to respond to this frontloading survey by providing their views and information by 16 April 2025.

If you have any questions on this survey or on other issues related to the LAN BREF, please contact the LAN BREF Team at: JRC-B5-EUBRITE-LAN@ec.europa.eu

LAN TWG Activation Letter [Download]
LAN_TWG_Activation_letter_ARES.pdf

[1] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial and livestock rearing emissions
https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:02010L0075-20240804.

GENERAL INSTRUCTIONS

A. General overview of the survey

This survey is composed of 18 sections that correspond to different topics on which information and inputs from the TWG members are of paramount importance. It also includes a "Welcome" section, a "Contact details" section, a "Request for general information" section and this "General Instructions" section. At the end of the survey there is for "Survey Submission" section where you will be asked for feedback on the survey before submitting it.

The 18 areas for which information and opinions from the TWG are requested are listed below:

1. Scope
2. Emissions to water
3. Emissions to air
4. Auxiliary materials and chemicals consumption
5. Energy consumption
6. Water management
7. Circular economy – residues generation and management
8. Decarbonisation and greenhouse gas emissions
9. Emerging techniques and link with INCITE
10. Monitoring

11. Normal operating conditions and other than normal operating conditions
12. Confidentiality issues
13. Proposed structure of the BREF
14. Selection of sites for the data collection
15. Data collection procedure
16. Site visits
17. Permits
18. Any other relevant information

B. Content of the survey

Throughout this survey you will find a number of EU-BRITE initial proposals as well as some requests for information related to the proposals and bulk information on landfills.

These initial proposals are based on a comprehensive research study carried out by EU-BRITE on the context of the landfill sector, with a particular focus on the existing environmental acquis, information available through the European Industrial Emissions Portal (IEP)[1] and through several Member States' portals (e.g. Pollutant Release and Transfer Register (E-PRTR)). In addition, a number of permits issued to landfills were examined. Information on potential KEI has also been provided by ECHA.

As a TWG member, your opinion and input are now being sought on these initial proposals. EU-BRITE will use the information gathered through this survey, to prepare a Background Paper (BP). This BP will provide members of the TWG with a detailed outline of the key matters that will be discussed and decided upon at the upcoming Kick-off Meeting (KoM).

In some of the EU-BRITE initial proposals there are references to Key Environmental Issues (KEIs), to be covered by the LAN BREF. A KEI is defined as an environmental issue that is considered important for the landfill activities. Information on the KEIs should be collected through questionnaires and/or as bulk information. The purpose of collecting this information may then differ from one KEI to another (e.g. to derive BAT, BAT-AELs, BAT-AEPLs and/or benchmarks). The KEIs will be decided by the TWG at the KoM.

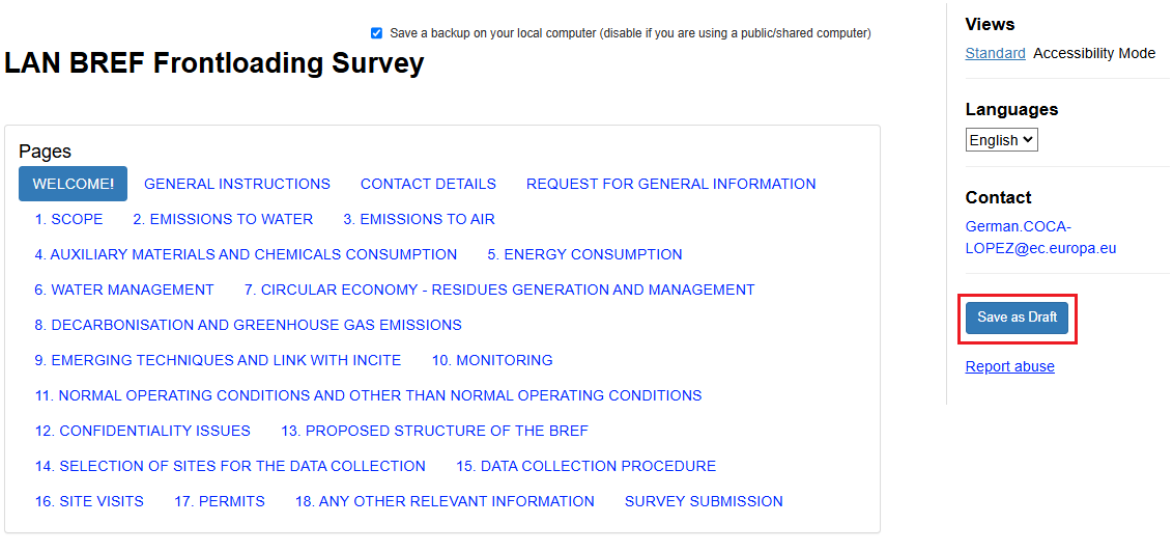
[1] European Industrial Emissions Portal: http://industry.eea.europa.eu

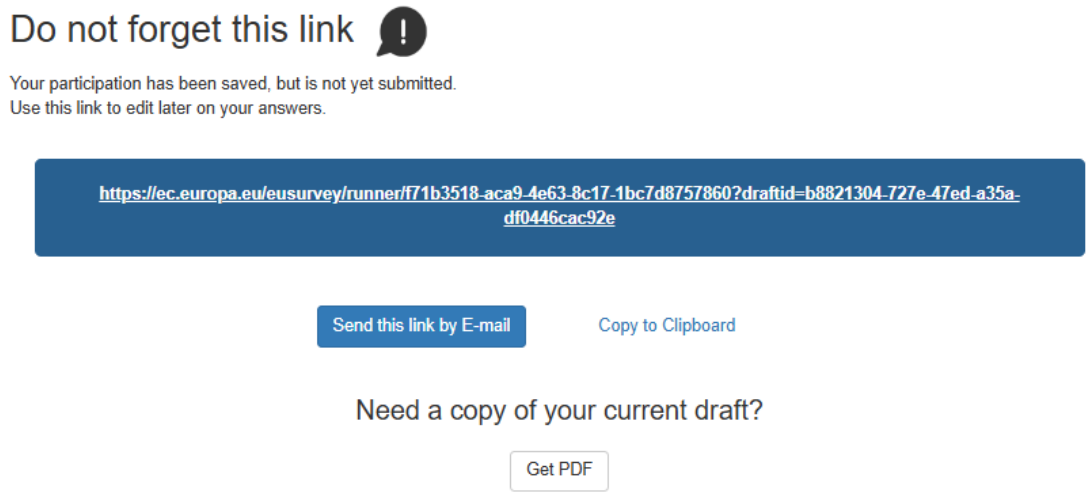
C. Fill in information

Each section of the survey can be completed independently. You can also go back to completed sections at any time to change your input. We strongly recommend that you save your progress regularly.

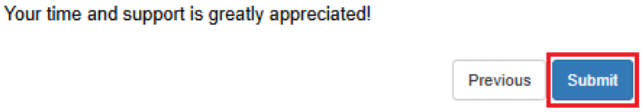
Once saved, the survey can be shared with other users through the link provided by EU-Survey. Other users will be able to complement the survey, which will be unique to each delegation. Modifications to the survey must be made individually. Two or more users cannot contribute to the survey simultaneously.

Please coordinate your response and submit only one survey per delegation.

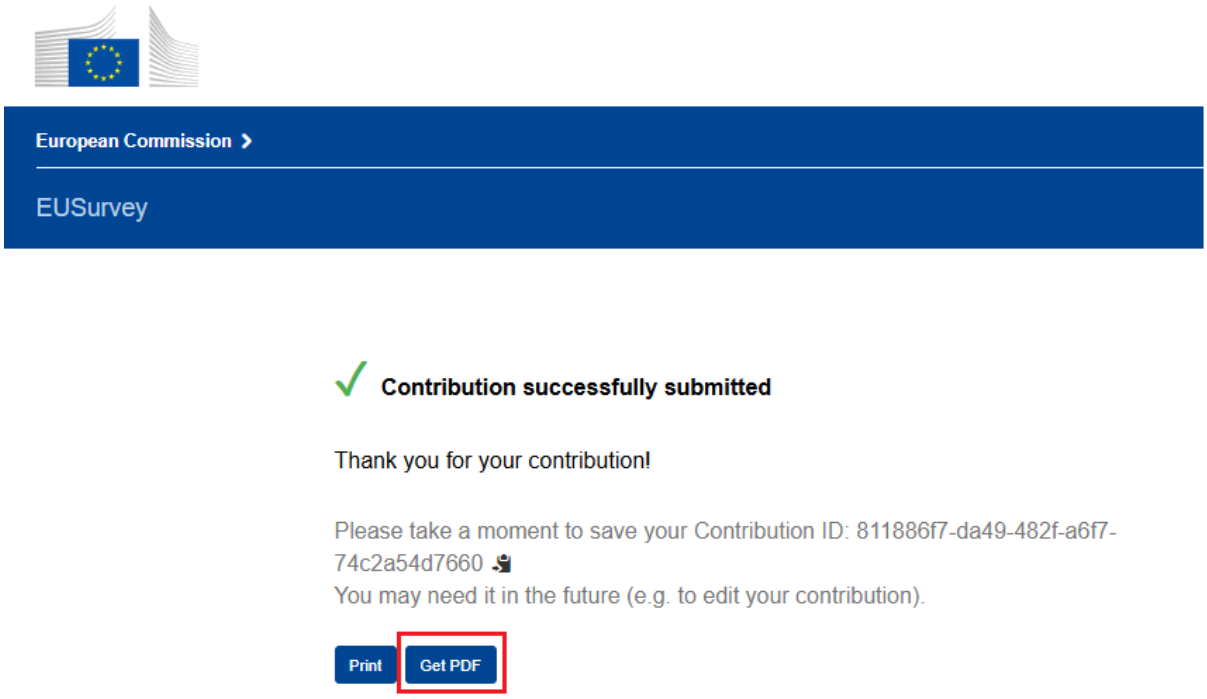




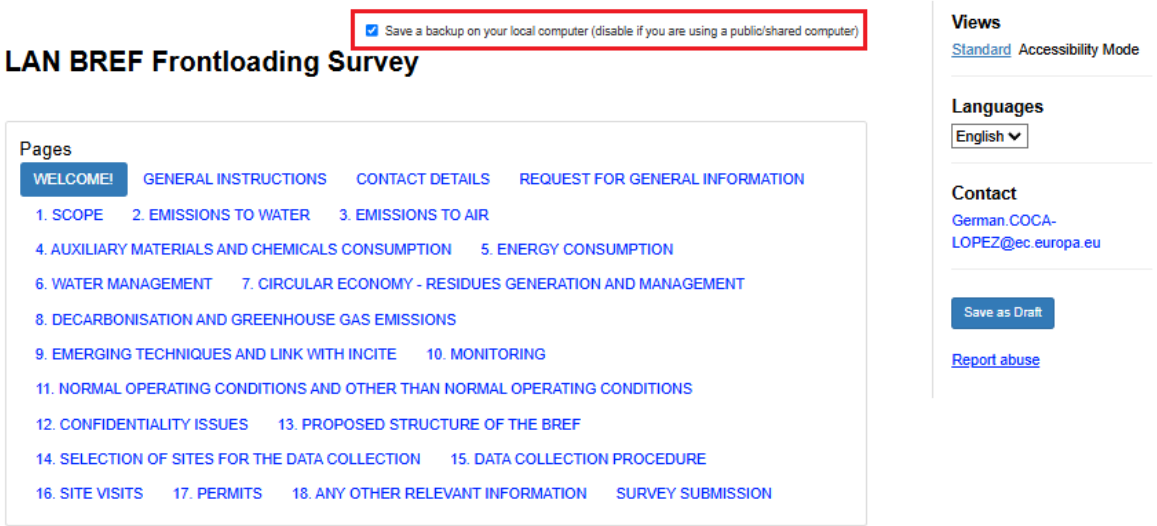
Once completed, you can submit the survey by going to the "Survey submission" section and clicking on the "Submit" button at the bottom of the page.



This will take you to a new page where you will be given the option to download a pdf. Please download the pdf with your response to the survey by clicking on the "Get PDF" button and upload it to BATIS (BATIS > Forum > Landfills > 02 Frontloading > 02 LAN frontloading survey) together with any other accompanying documents related to the survey or any other information you wish to share with the TWG.



You may exceed the session time while completing the survey. To avoid losing information it is important to click on the option at the top of the survey: "Save a backup on your local computer (disable if you are using a public/shared computer)". Please remember to uncheck this option if you are using a public computer.



Throughout the survey, you will be asked to indicate whether you agree, partly agree or disagree with the EU-BRITE proposals. You will be asked to justify the rationale of your opinion.

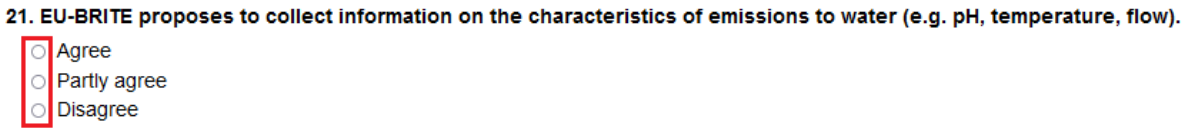
For complex tables (as in proposals 22, 31 and 41), please note the following:

- Although only 5 columns are seen, they are composed of 8 columns which are related to the following items: KEI, type of landfill, available data, monitoring units, monitoring frequency, type of monitoring, impact and comments.

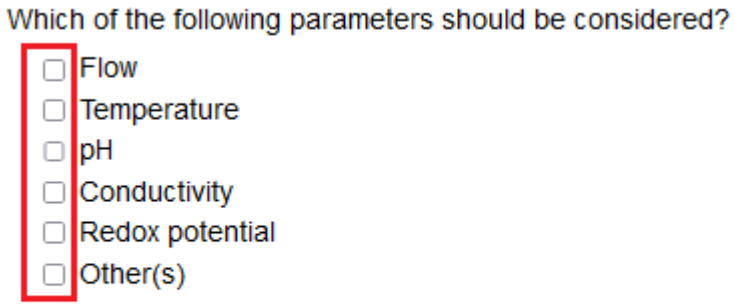
- In order to show all the columns, it is necessary to use the scroll bar located at the end of the table.
- It may be useful to use the 'Tab' key to move from one column to another in the same row. Note that using the 'Tab' key will take you through all the options in a row.
- It is possible to propose KEIs other than those suggested in the table. To do so, please download the Excel file at the end of the table and fill it in with those KEIs you consider relevant. Please use a separate row for each additional KEI. This Excel template is pre-filled with some pollutants to standardise the nomenclature and facilitate the management of incoming data, but these are not EU-BRITE proposals for KEIs.

As for the questions with more than one answer, there are two types: single choice (only one answer can be chosen) and multiple choice (more than one answer can be chosen). Single choices are indicated by a round box and multiple choices by a square box. See image below.

Single choice



Multiple choice



Finally, please note that ticking some answers may lead to new questions or requests for information (e.g. suggestion 61, figures below).

61. EU-BRITE proposes to include water management (consumption, drainage system, treatment and discharge) as a KEI.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

For which type of landfill should this KEI be considered?

- [ ] Hazardous waste
- [ ] Non-hazardous waste: municipal
- [ ] Non-hazardous waste: other than municipal

Would your organisation have reliable and representative data on the water consumption and water discharge of landfill sites?

- ( ) Yes
- ( ) No

Would your organisation have information on techniques/measures applied to reduce water consumption and waste water discharge?

- ( ) Yes
- ( ) No

Would your organisation have information on the water management techniques applied at the site in terms of water intake, surface and groundwater flows, water collection and discharge, etc.?

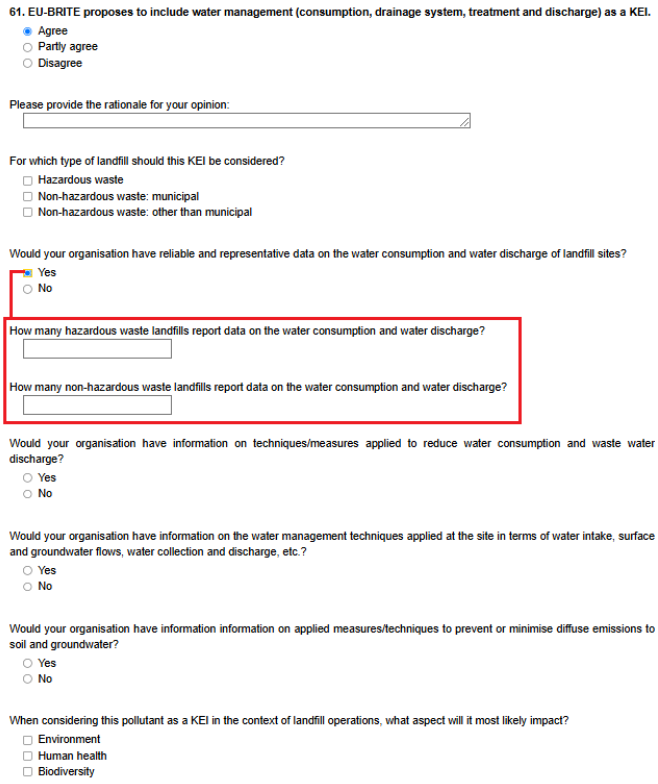
- ( ) Yes
- ( ) No

Would your organisation have information information on applied measures/techniques to prevent or minimise diffuse emissions to soil and groundwater?

- ( ) Yes
- ( ) No

When considering this pollutant as a KEI in the context of landfill operations, what aspect will it most likely impact?

- [ ] Environment
- [ ] Human health
- [ ] Biodiversity


61. EU-BRITE proposes to include water management (consumption, drainage system, treatment and discharge) as a KEI.
- (•) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

For which type of landfill should this KEI be considered?
- [ ] Hazardous waste
- [ ] Non-hazardous waste: municipal
- [ ] Non-hazardous waste: other than municipal

Would your organisation have reliable and representative data on the water consumption and water discharge of landfill sites?
- (•) Yes
- ( ) No

How many hazardous waste landfills report data on the water consumption and water discharge?

How many non-hazardous waste landfills report data on the water consumption and water discharge?

Would your organisation have information on techniques/measures applied to reduce water consumption and waste water discharge?
- ( ) Yes
- ( ) No

Would your organisation have information on the water management techniques applied at the site in terms of water intake, surface and groundwater flows, water collection and discharge, etc.?
- ( ) Yes
- ( ) No

Would your organisation have information information on applied measures/techniques to prevent or minimise diffuse emissions to soil and groundwater?
- ( ) Yes
- ( ) No

When considering this pollutant as a KEI in the context of landfill operations, what aspect will it most likely impact?
- [ ] Environment
- [ ] Human health
- [ ] Biodiversity

Thank you for your contribution!

CONTACT DETAILS

First name of the respondent

Fynn

Last name of the respondent

Hauschke

Email

fynn.hauschke@eeb.org

Which of the following groups does your delegation belong to?
- ( ) Industry
- ( ) Member State or Norway
- (•) NGO promoting human health or environmental protection
- ( ) ECHA

Please select the NGO promoting human health or environmental protection you represent:
- (•) EEB
- ( ) Other

REQUEST FOR GENERAL INFORMATION

Please provide a general overview of landfill sector, landfill operations and directly associated activities (e. g. spread and compaction, covering, waste water management, leachate management, landfill gas management, odour control, capping systems) using the text box below or uploading a file.

The landfill sector does not exist in isolation. It is important for the landfill BRED (LAN BREF) to consider, as separate questions, what might be best practice regarding what happens to waste, and what might be the sorts of pollution control activity and associated limit values that should apply to the landfill activity itself. This is critical if the EU is to fulfill its ambition to move towards a more circular economy. In this context, we note that the IED, which gives rise to the BREF process, defines an installation as (Art 3(3)):

a stationary technical unit within which one or more activities listed in Annex I or in Part 1 of Annex VII are carried out, and any other directly associated activities on the same site which have a technical connection with the activities listed in those Annexes and which could have an effect on emissions and pollution;

The requirement is to permit the installation, or (given the range of activities included under Annex 1), then as per Art 4, there may be more than one installation included within a permit for a given site. Our concern is to ensure that, whilst retaining consistency with Article 4 to ensure that all installations comply with the IED, and recognising, therefore, that conditions affecting other installations need not be a matter of concern for this BREF, the BREF does need to consider the appropriateness of the inclusion of other activities (installations) as a means to deliver BAT. This is also likely to be important in order to give substance to the ECJ Ruling of October 2014 (case C-323/13 European Commission v. Italian Republic, the European Court of Justice), as well as to support the preference ordering in the waste hierarchy.

It is important to realise that landfills are disposal facilities, not production facilities. Scope and structure of the LAN BREF can therefore deviate from the “normal” BREF scope and structure. A BREF essentially considers all activities until the complete dismantling of the facility. Landfills are intended to be a final sink and hence they are not likely to be dismantled. While the facility remains, it might still cause a hazard to the environment and human health and consequently aftercare should be part of the LAN BREF. Article 11(h) of the IED requires Member States to ensure that installations are operated so that: ‘the necessary measures are taken upon definitive cessation of activities to avoid any risk of pollution and return the site of operation to the satisfactory state defined in accordance with Article 22.’ It is important for the landfill BREF to address the potential long-term issues associated with landfills.

The scope of the LAN BREF very much depends on the intentions of the European Commission (EC) for the Landfill Directive (1999/31/EC) (LFD) and the Council Decision on waste acceptance criteria and procedures (2003/33/EC) (WAC), not least in the wake of this first BREF for landfills. These intentions have (to our knowledge) not been clarified. A LAN BREF will need to consider the relationships with the LFD and the WAC. Updated limit values and requirements in a BREF, may contradict non-updated requirements and limit values in LFD and WAC. The LFD Annexes I, II and III contain a mixture of environmental goals, requirements and limit values. The WAC contains mainly requirements and limit values. Limit values and requirements could be transferred to a BREF, which could become the sole location for these to be set out. Environmental goals / targets could be moved to the Waste Framework Directive in the spirit of simplification. To properly discuss the scope of the LAN BREF, EC should explain how coherence in the relationship between LAN BREF, LFD, WAC and WFD will be guaranteed, how potential contradictions will be avoided, and how the approach can support moves to a more circular economy.

--> please see uploaded document for full elaboration

If there is some further information that you want to share, please upload your file(s).

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1. SCOPE

11. EU-BRITE proposes to cover in the LAN BREF activity 5.4 of Annex I to Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial and livestock rearing emissions:

5.4 Landfills, as defined in Article 2(g) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25 000 tonnes, excluding landfills of inert waste.

Please give your feedback in the box below.

It is important for the BREF to define its scope in a manner that will support Article 2(g) definition references 'a waste disposal site for the deposit of waste onto or into land'. We believe there may be some merit in at least exploring whether the scope should exclude sites that some Member States classify, perhaps contentiously, as 'recovery' installations. Some such installations might involve the deposit of waste onto/into land, but they may be characterised as something other than disposal. Such activities may be a source of considerable concern, not least since they may (in some cases) be exempt from permitting as per Article 24 of the WFD. There is, we believe, a discussion that ought to take place concerning where and when the activity of landfilling becomes a recovery activity, and what such BAT for such activities might be. It is not clear that the activities we are considering are otherwise covered by activities under Annex 1 of the IED.

We would also be concerned regarding the exclusion of inert waste landfills. These have geological barrier requirements (LFD Annex I) and waste acceptance procedures and criteria. Excluding inert waste landfills from scope could result in uncontrolled landfill of wastes that are not appropriate for inert waste landfills and in turn result in undesired emissions. For reasons of coherence and clarity, inert waste landfills should be within the scope of the LAN BREF. Where countries apply landfill taxes at different rates for 'active' and 'inert' materials, the misdescription of waste, and the movement of waste across sites with different classifications is a key compliance issue. The matter also links to the 'recovery' issue noted above since a major area where exemptions from Article 24 of the WFD are claimed is the 'recovery' of inert wastes, typically from construction and demolition activities.

Using a definition linked to the LFD might, more generally, give rise questions as to whether, for example, other aspects of the LFD are relevant to scoping that definition. For example, the LFD, Art 3(4) allows for some things to be excluded under specified conditions. In our view, it may be problematic for a definition to explicitly 'cross-reference' a Directive unless it is intended that all the meaning of that Directive follows with the Definition. We would prefer a scope that is more appropriate to the task at hand, and which supports the objectives of the IED.

12. EU-BRITE proposes to cover in the LAN BREF activity 5.6 of Annex I to Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial and livestock rearing emissions:

5.6 Underground storage of hazardous waste with a total capacity exceeding 50 tonnes.

Please give your feedback in the box below.

> Yes. We assume (see above) this includes activities sometimes described as ‘recovery’.

13. EU BRITE proposes to cover in the LAN BREF hazardous waste and non-hazardous waste landfills.

Please give your feedback in the box below.

> Agree. Landfills for non-hazardous and hazardous waste should be addressed separately.
> These wastes have different leaching characteristics, and there are reasons why they were separately addressed in the LFD and WAC.
> Note also that the distinction between landfills for non-hazardous municipal and non-hazardous other waste (non-municipal), which is indicated in the structure (Q131), is likely to be superfluous / irrelevant unless the purpose for the distinction is made clearer. Such wastes are often disposed of at the same landfill. It is a complication that is not necessary and cannot be found in LFD, the WAC or the European Waste Catalogue.

14. EU-BRITE proposes to cover the following landfill operations/phases in the LAN BREF:

- **Waste characterisation and acceptance procedure**
- **On-site transport and handling of waste for disposal**
- **On-site transport and handling of materials**
- **Disposal and uniform distribution of waste**
- **Leachate management**
- **Landfill gas management**
- **Surface water management**
- **End-of-life cell capping**
- **Closure phase**
- **After-care phase**
- **Other(s)**

Please give your feedback in the box below.

The long-term emissions of a landfill are determined by the geological barrier and waste acceptance. Once these decisions are made and executed, they can no longer be reversed. This means that apart from waste acceptance, site selection procedures should be included in the LAN BREF. Site selection procedures include investigation of soil and subsoil, surface water and groundwater, flooding risks, geological barriers, geohydrology, distance to sensitive areas, ...

It would be useful to clarify how wind-blown litter (and dust/ particulate matter) would be dealt with (will it be included in 'on-site transport and handling'?). Given this, and recognising that most transport issues off-site may fall under different regimes, how materials are transported to the site might be given some consideration to make sure some non-controversial issues are dealt with – for example, where waste is transported in a careless manner (wind-blown materials lost from the vehicle) or in highly-polluting vehicles, what should be the response of the operator?

Depending on how 'closure' and 'after-care' are defined (the periods concerned), some consideration should be given to longer-term monitoring (some countries are considering continuing monitoring even after 'release' from aftercare obligations).

15. EU-BRITE proposes to cover in the scope of the LAN BREF the activity in point 6.11 of Annex I to the IED (independently operated treatment of waste water not covered by Directive (EU) 2024 /3019) if the main pollutant load originates from the activity covered in points 5.4 and 5.6 of Annex I to the IED, as addressed in recent BREFs.

Please give your feedback in the box below.

Leachate treatment should be covered by the LAN BREF (see Q16). The only reference to leachate treatment in the LFD (Annex 1 paragraph 2) states: '- treat contaminated water and leachate collected from the landfill to the appropriate standard required for their discharge.' That is all there is about leachate treatment, with no substance given to what the 'appropriate standards' should be.

The limited information on leachate treatment in the Waste Treatment BREF by no means covers all the types of leachate, that can be found in European landfills or the most suited technology to treat those leachates.

16. EU-BRITE proposes to cover in the scope of the LAN BREF the combined treatment of waste water from different origins if the main pollutant load originates from the activity covered in points 5.4 and 5.6 of Annex I to the IED, as addressed in recent BREFs.

Please give your feedback in the box below.

Agreed, with some additional concerns. It needs to be clarified (the Questionnaire is ambiguous) whether the intent is to allow treatment of 'combined' leachate ('points 5.4 and 5.6') or whether it was intended to imply treatment of leachate principally from one or the other. The question as phrased is at risk of pre-judging what the BREF does – the LFD sought to end co-disposal (hazardous / non-hazardous). Presumably, we are not now saying it's OK to combine the leachate? We expect that BAT would be to keep wastewater / leachate of different quality apart and to treat them separately using the most appropriate treatment method for the quality of the specific wastewater. Otherwise, we risk simply diluting a problem.

17. EU-BRITE proposes not to cover the waste treatment activity carried out on site, to avoid overlaps with the scope of other IED BREFs.

Please give your feedback in the box below.

We agree with this as regards emissions and associated limit values to be applied to other installations on the same site. The BREF should not duplicate that effort.

We believe, however, that the BREF should consider what 'waste treatment activity' is necessary for a landfill to demonstrate BAT (and how compliance with the Malagrotta ruling can be given substance through the BREF). Two very important issues that the LAN BREF should address are 1) how it gives substance to, for example, means through which methane emissions are minimized, and how it gives substance to one of the objectives of the LFD: ensuring that waste that can be recycled is not landfilled. In what way the BREF gives substance to that is for discussion, but to treat landfills as a technology that bears no relation to the rest of the system that leads to waste being delivered to a landfill would be to miss the opportunity to place 'landfills' in their proper place, and would likely lead to emissions beyond what is necessary.

18. EU-BRITE proposes not to cover the waste incineration activity carried out on site, to avoid overlaps with the scope of other IED BREFs.

Please give your feedback in the box below.

Agree.
With the law, as it currently stands, there might be a question to be asked – especially where installations are at the same site – as to what wastes should go to which installation, consistent with Article 4 of the WFD.

19. EU-BRITE proposes not to duplicate in the LAN BREF information already covered in the LCP BREF and in the MCPD, but to instead cross-reference these documents where applicable.

Please give your feedback in the box below.

The term 'where applicable' is important. It would not be appropriate, for example, to use LCP / MCPD where the issue of PFAS in landfill gas is concerned. We consider it would be appropriate to establish safeguards so that when an LCP or MCP is fed with landfill gas, the PFAS is as much as possible mineralised. A cross-reference to the LCP BREF and MCPD doesn't solve that issue. LCP or MCP in general do not have a 2-3 second retention time in 1100 degrees Celsius that is required for full mineralisation of PFAS in the landfill gas.

It should be noted that landfill gas may also be injected into the gas grid in which case, ensuring PFAS are removed pre-combustion is also likely to be important.

2. EMISSIONS TO WATER

21. EU-BRITE proposes to collect information on the characteristics of emissions to water (e.g. pH, temperature, flow).

- (●) Agree

- ○ Partly agree
- ○ Disagree

Please provide the rationale for your opinion:

Please note that as a general comment in response to the questions regarding information collection, we generally agree that information should be asked for. At the same time, the potential scope of coverage of the information requests being envisaged, and the potential complexity of questionnaires that also seek contextual information, suggest that an operator confronted with such a questionnaire might be rather daunted. That might have an effect on the response rate from the operators being surveyed. Consequently, and considering also what might be the intention (in terms of analysis) of data being returned, we would suggest that some early thought is given as to what information is considered likely to be useful, and for what purpose. Otherwise, we fear that a) limited responses might be received, and b) much of the information being gathered might not be well used.
Our generally supportive view in response to the questions regarding collection of information should be considered in this context.

Agree, but please note that where landfills are concerned, there should be a distinction made between emissions to surface water and emissions to groundwater (relevant for groundwater monitoring). The parameters given below are mainly relevant to the leachate treatment plant. It would be interesting to clarify the intention to collect information on emissions to water – which emissions are being considered in scope of the information collection?

Which of the following parameters should be considered?

- ☑ Flow
- ☑ Temperature
- ☑ pH
- ☑ Conductivity
- ☑ Redox potential
- ☑ Other(s)

If you have selected ‘other(s)’ in the previous question, please indicate which parameter(s) should be considered:

The parameters above are mainly important for the operation of a leachate treatment plant. The parameters in the table below can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Parameters that are missing are ammonium, antimony, cobalt, manganese, molybdenum, tin, vanadium, BTEX, chlorinated hydrocarbons, PCB's. COD should be replaced by TOC. The determination of COD requires very toxic chemicals. A toxic-free environment requires an alternative, which is available in TOC determination.

22. Please provide your feedback on the following pollutants proposed by EU-BRITE as key environmental issues (KEIs) for emissions to water.
Please, for each pollutant, indicate whether you consider it to be a KEI for emissions to water. Also indicate the information requested for each pollutant if available.

In this survey, a KEI is understood as an environmental issue that is considered so important for the landfilling activities and operations that it may be covered by the LAN BREF. Information about the KEI should be collected through questionnaires and/or as bulk information. The aim of collecting such information may then differ from one KEI to another (e.g. deriving BAT, BAT-AELs, BAT-AEPLs and/or benchmarks). The KEIs will be decided by the TWG at the Kick off Meeting.

Please, note the following while filling in the table:

- Although only 5 columns are seen, it is composed of 8 columns which are related to the following items: KEI, type of landfill, available data, monitoring units, monitoring frequency, type of monitoring, impact and comments.
- In order to show all the columns, it is necessary to use the scroll bar located at the end of the table.
- It may be useful to use the 'Tab' key to move from one column to another in the same row. Note that using the 'Tab' key will take you through all the options in a row.
- It is possible to propose other pollutant besides than those proposed in the table. To do so, please download the Excel file provided at the end of the table and fill it in with as many pollutants as considered relevant. Please, enter a different line for each pollutant.

	To consider the pollutant and its compounds as a KEI for emissions to water.	For which type of landfill should this KEI be considered?	Would your delegation have reliable and representative data on this pollutant?	What are the typical units used to express the ELV (e.g. mg/Nm3, g/kg,...) in the permits?	What are the average monitoring frequencies in the permits?	What is the typical monitoring/measurements frequency that appears in the permits for this pollutant?	When considering this pollutant as a KEI in the context of landfill operations, what aspect will it most likely impact?	Method most frequently used (C/E/M) to report data	Comments/additional information
Arsenic and compounds (as As)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.

Cadmium and compounds (as Cd)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Chlorides (as total Cl)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Chromium and compounds (as Cr)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Copper and compounds (as Cu)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Fluorides (as total F)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.

Halogenated organic compounds (as AOX)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Lead and compounds (as Pb)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Mercury and compounds (as Hg)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Nickel and compounds (as Ni)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Phenols (as total C)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.

Polycyclic aromatic hydrocarbons (PAHs)	KEI Agree Partly agree Disagree	Type of landfill Hazardous waste Non-hazardous waste (municipal) Non-hazardous waste (other)	Available data Yes No	Monitoring units	Monitoring frequency Daily Monthly Half-yearly Yearly Other	Type of monitoring Continuous Discontinuous Both	Impact Environment Human health Biodiversity	Method Calculated Estimated Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Total nitrogen (TN)	KEI Agree Partly agree Disagree	Type of landfill Hazardous waste Non-hazardous waste (municipal) Non-hazardous waste (other)	Available data Yes No	Monitoring units	Monitoring frequency Daily Monthly Half-yearly Yearly Other	Type of monitoring Continuous Discontinuous Both	Impact Environment Human health Biodiversity	Method Calculated Estimated Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Total organic carbon (as total C or COD/3)	KEI Agree Partly agree Disagree	Type of landfill Hazardous waste Non-hazardous waste (municipal) Non-hazardous waste (other)	Available data Yes No	Monitoring units	Monitoring frequency Daily Monthly Half-yearly Yearly Other	Type of monitoring Continuous Discontinuous Both	Impact Environment Human health Biodiversity	Method Calculated Estimated Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Total phosphorus (TP)	KEI Agree Partly agree Disagree	Type of landfill Hazardous waste Non-hazardous waste (municipal) Non-hazardous waste (other)	Available data Yes No	Monitoring units	Monitoring frequency Daily Monthly Half-yearly Yearly Other	Type of monitoring Continuous Discontinuous Both	Impact Environment Human health Biodiversity	Method Calculated Estimated Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Zinc and compounds (as Zn)	KEI Agree Partly agree Disagree	Type of landfill Hazardous waste Non-hazardous waste (municipal) Non-hazardous waste (other)	Available data Yes No	Monitoring units	Monitoring frequency Daily Monthly Half-yearly Yearly Other	Type of monitoring Continuous Discontinuous Both	Impact Environment Human health Biodiversity	Method Calculated Estimated Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.

Microplastics	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
PFAS	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Bisphenols	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Brominated flame retardants	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.
Heat stabilisers (e.g. organotin compounds)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.

Phthalates	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information The parameters in the table can all constitute an important environmental issue. That depends on the waste characteristics and the sensitivity of the environment. It requires a site-specific assessment to determine which of these parameters is relevant for the specific landfill.

Please indicate in the comments/additional information section, if applicable, the types of PFAS monitored.

If there is any other pollutant that your delegation considers to be a KEI for emissions to water, please upload your proposal.
For each pollutant proposed, please indicate the information requested as per the EU-BRITE proposal if available (type of landfill, available data, monitoring frequency, type of monitoring, impact and any other additional comment).
Please download the Excel template and fill it in with as many KEIs as you would like. Please use a separate row for each KEI.
This Excel template is pre-filled with some pollutants to standardise the nomenclature and facilitate the management of incoming data, but these are not EU-BRITE proposals for KEIs. They should be deleted if you do not want to propose them as KEIs.

KEI_emission_to_water_proposals_template.xlsx

4b2bb3d6-3d30-439b-9840-16620231e38f/2025_LAN-BREF_Frontloading-Survey_KEI_emission-to-water.xlsx

3. EMISSIONS TO AIR

31. Please provide your feedback on the following pollutants proposed by EU-BRITE as key environmental issues (KEIs) for emissions to air.
Please, for each pollutant, indicate whether you consider it to be a KEI for emissions to air. Also indicate the information requested for each pollutant if available.

In this survey, a KEI is understood as an environmental issue that is considered so important for the landfilling activities and operations that it may be covered by the LAN BREF. Information about the KEI should be collected through questionnaires and/or as bulk information. The aim of collecting such information may then differ from one KEI to another (e.g. deriving BAT, BAT-AELs, BAT-AEPLs and/or benchmarks). The KEIs will be decided by the TWG at the Kick off Meeting.

Please, note the following while filling in the table:

- Although only 5 columns are seen, it is composed of 8 columns which are related to the following items: KEI, type of landfill, available data, monitoring units, monitoring frequency, type of monitoring, impact and comments.
- In order to show all the columns, it is necessary to use the scroll bar located at the end of the table.
- It may be useful to use the 'Tab' key to move from one column to another in the same row. Note that using the 'Tab' key will take you through all the options in a row.
- It is possible to propose other pollutant besides than those proposed in the table. To do so, please download the Excel file provided at the end of the table and fill it in with as many pollutants as considered relevant. Please, enter a different line for each pollutant.

	To consider the pollutant and its compounds as a KEI for emissions to air.	For which type of landfill should this KEI be considered?	Would your delegation have reliable and representative data on this pollutant?	What are the typical units used to express the ELV (e.g. mg /Nm3, g/kg,...) in the permits?	What are the average monitoring frequencies in the permits?	What is the typical monitoring/measurements frequency that appears in the permits for this pollutant?	When considering this pollutant as a KEI in the context of landfill operations, what aspect will it most likely impact?	What type of emissions should be consider for this pollutant?	Method most frequently used (C/E /M) to report data	Comments/additional information
Ammonia (NH3)	KEI? (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Type of emission [ ] Channelled [ ] Diffuse	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information

Carbon dioxide (CO_2)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Type of emission [ ] Channelled [ ] Diffuse	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information
Chlorofluorocarbons (CFCs)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Type of emission [ ] Channelled [ ] Diffuse	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information
Hydrochlorofluorocarbons (HCFCs)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Type of emission [ ] Channelled [ ] Diffuse	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information
Hydrogen sulphide (H_2S)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Type of emission [ ] Channelled [ ] Diffuse	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information
Methane (CH_4)	KEI (•) Agree ( ) Partly agree ( ) Disagree	Type of landfill [ ] Hazardous waste [ ] Non-hazardous waste (municipal) [ ] Non-hazardous waste (other)	Available data ( ) Yes ( ) No	Monitoring units	Monitoring frequency [ ] Daily [ ] Monthly [ ] Half-yearly [ ] Yearly [ ] Other	Type of monitoring ( ) Continuous ( ) Discontinuous ( ) Both	Impact [ ] Environment [ ] Human health [ ] Biodiversity	Type of emission [ ] Channelled [ ] Diffuse	Method ( ) Calculated ( ) Estimated ( ) Measured	Comments/additional information

Nitrogen oxides (NOx)	KEI ○ Agree ○ Partly agree ◉ Disagree	Type of landfill ☐ Hazardous waste ☐ Non-hazardous waste (municipal) ☐ Non-hazardous waste (other)	Available data ○ Yes ○ No	Monitoring units	Monitoring frequency ☐ Daily ☐ Monthly ☐ Half-yearly ☐ Yearly ☐ Other	Type of monitoring ○ Continuous ○ Discontinuous ○ Both	Impact ☐ Environment ☐ Human health ☐ Biodiversity	Type of emission ☐ Channelled ☐ Diffuse	Method ○ Calculated ○ Estimated ○ Measured	Comments/additional information
Nitrous oxide (N2O)	KEI ◉ Agree ○ Partly agree ○ Disagree	Type of landfill ☐ Hazardous waste ☐ Non-hazardous waste (municipal) ☐ Non-hazardous waste (other)	Available data ○ Yes ○ No	Monitoring units	Monitoring frequency ☐ Daily ☐ Monthly ☐ Half-yearly ☐ Yearly ☐ Other	Type of monitoring ○ Continuous ○ Discontinuous ○ Both	Impact ☐ Environment ☐ Human health ☐ Biodiversity	Type of emission ☐ Channelled ☐ Diffuse	Method ○ Calculated ○ Estimated ○ Measured	Comments/additional information
Non-methane volatile organic compounds (NMVOC)	KEI ◉ Agree ○ Partly agree ○ Disagree	Type of landfill ☐ Hazardous waste ☐ Non-hazardous waste (municipal) ☐ Non-hazardous waste (other)	Available data ○ Yes ○ No	Monitoring units	Monitoring frequency ☐ Daily ☐ Monthly ☐ Half-yearly ☐ Yearly ☐ Other	Type of monitoring ○ Continuous ○ Discontinuous ○ Both	Impact ☐ Environment ☐ Human health ☐ Biodiversity	Type of emission ☐ Channelled ☐ Diffuse	Method ○ Calculated ○ Estimated ○ Measured	Comments/additional information
Particulate matter (PM)	KEI ◉ Agree ○ Partly agree ○ Disagree	Type of landfill ☐ Hazardous waste ☐ Non-hazardous waste (municipal) ☐ Non-hazardous waste (other)	Available data ○ Yes ○ No	Monitoring units	Monitoring frequency ☐ Daily ☐ Monthly ☐ Half-yearly ☐ Yearly ☐ Other	Type of monitoring ○ Continuous ○ Discontinuous ○ Both	Impact ☐ Environment ☐ Human health ☐ Biodiversity	Type of emission ☐ Channelled ☐ Diffuse	Method ○ Calculated ○ Estimated ○ Measured	Comments/additional information
Sulphur oxides (SOx)	KEI ◉ Agree ○ Partly agree ○ Disagree	Type of landfill ☐ Hazardous waste ☐ Non-hazardous waste (municipal) ☐ Non-hazardous waste (other)	Available data ○ Yes ○ No	Monitoring units	Monitoring frequency ☐ Daily ☐ Monthly ☐ Half-yearly ☐ Yearly ☐ Other	Type of monitoring ○ Continuous ○ Discontinuous ○ Both	Impact ☐ Environment ☐ Human health ☐ Biodiversity	Type of emission ☐ Channelled ☐ Diffuse	Method ○ Calculated ○ Estimated ○ Measured	Comments/additional information

If there is any other pollutant that your delegation considers to be a KEI for emissions to air, please upload your proposal. For each pollutant proposed, please indicate the information requested as per EU-BRITE proposal if available (type of landfill, available data, monitoring frequency, type of monitoring, impact and any other additional comment). Please download the Excel template and fill it in with as many KEIs as you would like. Please use a separate row for each KEI. This Excel template is pre-filled with some pollutants to standardise the nomenclature and facilitate the management of incoming data, but these are not EU-BRITE proposals for KEIs. They should be deleted if you do not want to propose them as KEIs.

KEI_emission_to_air_proposals_template.xlsx

73b0b642-4373-495d-8fd9-447a55e5882b/2025_LAN-BREF_Frontloading-Survey_KEI_emission-to-air.docx

32. EU-BRITE proposes to consider odour emissions as a KEI.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

> Odour emissions can result in physical and psychological health issues, limit values for a long time are included in permits in various member states, they can be checked by sampling and offering a series of dilutions to an odour panel, odours can also be generated from inorganic waste, an ELV should therefore be considered for all types of landfill, the KEI mainly concerns human health / disamenity.

For which type of landfill should this KEI be considered?

- [x] Hazardous waste
- [x] Non-hazardous waste: municipal
- [x] Non-hazardous waste: other than municipal

When considering this pollutant as a KEI in the context of landfill operations, what aspect will it most likely impact?

- [ ] Environment
- [x] Human health
- [ ] Biodiversity

33. EU-BRITE proposes to collect, during the BREF development process, information on measures /techniques to prevent and/or to reduce diffuse odour emissions.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

Prevention can e.g. be realised by not mixing specific wastes in one landfill cell, reduction can be realised by quick application of an (intermediate) cover soil and/or by adding e.g. bog iron or lime.

Note that there may (should, in our view) be links to the issue of how the requirement for treatment is managed in the BREF process. If this is dealt with adequately, the odour issue might be significantly reduced. Nonetheless, sites at different stages of their life might present problems if not addressed. E.g. the combination of small amounts of biodegradable carbon and gypsum board in C&D waste or residue of C&D waste recycling can cause very high hydrogen sulfide concentrations in a limited amount of gas being generated and still cause huge odour problems and even H&S risks.

4. AUXILIARY MATERIALS AND CHEMICALS CONSUMPTION

41. EU-BRITE proposes to collect, during the BREF development process, information on the auxiliary materials used in landfill operations.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

It is now defined as substances or products used to support the construction, operation, and maintenance of a landfill, as well as to enhance the stability, safety, and environmental performance of the waste disposal facility (e.g. geosynthetic materials, cover soils, drainage materials, leachate collection system components, gas collection system components, capping materials, erosion control materials. Reference construction methods are described in national guidance documents on landfill construction and operation. Information can be collected and compared.

Please provide a list of auxiliary materials and the landfill type and operations in which they are used.

That would follow from the content of national guidance documents on landfill construction and operation.

42. EU-BRITE proposes to include the consumption of chemicals as a KEI.

- ( ) Agree
- (●) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

It would seem appropriate to make the decision as to whether this is a KEI based on the information coming forward. It might be the case, for example, that it is relevant as a KEI for some types of sites, but not others.

Please provide a list of chemicals and the landfill type and operations in which they are used.

-

For which type of landfill should this KEI be considered?

- [ ] Hazardous waste
- [ ] Non-hazardous waste: municipal
- [ ] Non-hazardous waste: other than municipal

When considering this pollutant as a KEI in the context of landfill operations, what aspect will it most likely impact?

- [ ] Environment
- [ ] Human health
- [ ] Biodiversity

43. EU-BRITE proposes to collect, during the BREF development process, data and information on the type, quantity, purpose, function and fate of chemicals used in landfilling operations under the scope of the LAN BREF.

- (•) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

That having been said, this could (should) be a marginal issue. It might apply mainly to leachate treatment which is typically regulated in the permit for discharge of treated wastewater (and which the BREF might reasonably be concerned with).

44. EU-BRITE proposes to collect, during the BREF development process, data and information on the possible substitution options involving alternative or less hazardous chemicals.

- ( ) Agree
- (•) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

The expenditure of effort ought to be commensurate with the potential benefit, so this may or may not be deemed necessary and appropriate depending on what the different chemicals in use are found to be (for the different types of site).

For which type of landfill should this topic be considered?

- [ ] Hazardous waste
- [ ] Non-hazardous waste: municipal
- [ ] Non-hazardous waste: other than municipal

45. EU-BRITE proposes to collect, during the BREF development process, data and information on the recovery and reuse of auxiliary materials and chemicals in landfill operations.

- (•) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

As per the above, we have no objection to the collection of data and information, given that this should inform the BREF. Whilst not wishing to trivialize the use of materials, we are keen to focus the BREF on the key issues for landfilling. Whether this proves to be one seems open to doubt.

For which type of landfill should this topic be considered?

- [ ] Hazardous waste
- [ ] Non-hazardous waste: municipal
- [ ] Non-hazardous waste: other than municipal

5. ENERGY CONSUMPTION

51. EU-BRITE proposes to collect, during the BREF development process, information on energy consumption.

- (•) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

Although there is likely to be some value in obtaining information for benchmarking purposes, some attention should be given to how this would / could inform the BREF. In order to do so, we suggest that the amounts of energy (in energetic units, e.g. MJ, KWh) used are linked to the nature of the fuel sources or power, and the use to which the energy is put. Some functions might be considered more site-specific than others.
In order to inform the BREF, some consideration might need to be given to the changes in energy use in order to achieve different outcomes.

Please provide the list of landfill operations that are the main energy consumers:

-

For which type of landfill should this topic be considered?

- [x] Hazardous waste
- [x] Non-hazardous waste: municipal
- [x] Non-hazardous waste: other than municipal

Would your organisation have reliable and representative data on the energy consumption of landfill sites?

- ( ) Yes
- (•) No

52. EU-BRITE proposes that the TWG identify, during the BREF development process, the contextual information to understand and compare the energy consumption data collected.
(Contextual information includes type of energy used/produced (including fuel types) in the installation, monitoring methods and calculations, landfill configuration and defined boundaries, size and depth of the landfills and waste characteristics).

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

> For discrete functions, changes in energy use might be associated with enhanced performance. The relative value of the performance increment vis a vis the additional energy use might be relevant in determining where the tradeoff between increase in energy use and performance becomes unacceptable.

For which type of landfill should this topic be considered?

- [x] Hazardous waste
- [x] Non-hazardous waste: municipal
- [x] Non-hazardous waste: other than municipal

6. WATER MANAGEMENT

61. EU-BRITE proposes to include water management (consumption, drainage system, treatment and discharge) as a KEI.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

> For reasons already highlighted above (absence of clear standards for leachate treatment in LFD etc.) as well as the general issue regarding the potential for problems to occur at surface waters. We also noted above the distinction between raw and treated leachate and the relevance of the former to (potential) groundwater pollution. This highlights the need to consider, within these considerations, sitting issues, and the nature of the barriers used, to protect groundwater.

For which type of landfill should this KEI be considered?

- [x] Hazardous waste
- [x] Non-hazardous waste: municipal
- [x] Non-hazardous waste: other than municipal

Would your organisation have reliable and representative data on the water consumption and water discharge of landfill sites?

- ( ) Yes
- (●) No

Would your organisation have information on techniques/measures applied to reduce water consumption and waste water discharge?

- ( ) Yes
- (●) No

Would your organisation have information on the water management techniques applied at the site in terms of water intake, surface and groundwater flows, water collection and discharge, etc.?

- ○ Yes
- ◉ No

Would your organisation have information information on applied measures/techniques to prevent or minimise diffuse emissions to soil and groundwater?

- ○ Yes
- ◉ No

When considering this topic as a KEI in the context of landfill operations, what aspect will it most likely impact?

- ☑ Environment
- ☑ Human health
- ☑ Biodiversity

62. EU-BRITE proposes that the TWG identify, during the BREF development process, the contextual information needed to understand and compare the specific water consumption and waste water discharge data collected through the questionnaires.
(Contextual information includes applied techniques, landfill operations, methods used for monitoring and calculation, water reuse, water recycling rate, site configuration and defined boundaries, level of data aggregation, meteorological data, surrounding topography, landfill topography).

- ◉ Agree
- ○ Partly agree
- ○ Disagree

Please provide the rationale for your opinion:

> One of the key influences is likely to be rainfall patterns at the site(s) concerned which will influence quantities of wastewater.
>
> Consideration should also be given to how the BREF can, and should, influence matters beyond what might already be addressed by competent authorities as regards water legislation.

For which type of landfill should this topic be considered?

- ☑ Hazardous waste
- ☑ Non-hazardous waste: municipal
- ☑ Non-hazardous waste: other than municipal

7. CIRCULAR ECONOMY - RESIDUES GENERATION AND MANAGEMENT

71. EU-BRITE proposes to collect, during the BREF development process, information on the generation of residues and their recovery.

- ◉ Agree

- ○ Partly agree
- ○ Disagree

Please provide the rationale for your opinion:

If, by the term ‘recovery’, one means ‘energy recovery’, then we would suggest that it is not aligned with a Circular Economy. There should be a clear distinction between recycling, other material recovery, energy recovery, and incineration (with or without generation of energy – it is only municipal waste that would classify for ‘recovery at incineration, and so residues would be unlikely to qualify).
Note that we also think it would be appropriate, consistent with our earlier answers, to collect information on the activities taking place at the site which are specifically designed to extract materials for recycling, for other material recovery, or for other forms of recovery (in line with Art 5(3)(f) and (3a) of the LFD). These are not ‘residues’ from the process, but activities that minimise what is to be landfilled. Understanding these might help to inform what acceptance criteria could be established under the BREF for materials being emplaced in the landfill.

For which type of landfill should this topic be considered?

- ☑ Hazardous waste
- ☑ Non-hazardous waste: municipal
- ☑ Non-hazardous waste: other than municipal

What kind of residues are generated in the landfill operations?

Wastewater treatment residues.
There may also be residues from gas cleaning, especially where gas is upgraded for use in vehicles / gas grid etc.. In this case, depending on how one defines the term ‘residue.

As regards the wider interpretation above, then we might expect materials to be pulled out such as mattresses, wood, soil, rubble, etc.

Would your organisation have reliable and representative data on the generation of residues and their recovery on landfill sites?

- ○ Yes
- ◉ No

72. EU-BRITE proposes to collect, during the BREF development process, contextual information on the use of waste with unique properties (e.g. on-site drainage layers, ramp or berm construction).

- ◉ Agree
- ○ Partly agree
- ○ Disagree

Please provide the rationale for your opinion:

8. DECARBONISATION AND GREENHOUSE GAS EMISSIONS

81. EU-BRITE proposes to collect, during the BREF development process, information on techniques related to the reduction of greenhouse gas emissions from the relevant landfill operations covered by the scope of the LAN BREF (e.g. landfill gas capture, prevention of landfill gas emissions, landfill gas uses, electrification).

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

> We believe these should be considered in the context of the age of the landfills concerned (since whatever happens today, emissions from waste already landfilled will continue for the foreseeable future), as well as the nature of the wastes received.

For which type of landfill should this topic be considered?

- [x] Hazardous waste
- [x] Non-hazardous waste: municipal
- [x] Non-hazardous waste: other than municipal

Would your organisation have reliable representative data on green house gas emissions?

- ( ) Yes
- (●) No

Please provide information, if available, on techniques to reduce green house gas emissions from the relevant landfill operations.

> The most important GHG emission reduction measure is to prevent emissions. Either by organic waste diversion or by biological stabilisation prior to landfilling – in line with the Malagrotta ruling (and, arguably, the intent of the LFD, however imprecisely this was articulated at the time).
>
> Any remaining methane being generated should be captured by means of active recovery of landfill gas focusing on minimal emissions (e.g. by means of over-extraction and low-calorific flaring) as long as active recovery is technically feasible.
>
> When methane generation is too low for active recovery, appropriate cover layer, windows or filters designed to oxidise residual methane generation should be installed.
>
> Energy utilisation of landfill methane can be considered when it does not interfere with the overarching goal to minimise diffuse landfill methane emissions.
>
> Use of low emission vehicles on-site.

If preferred, please upload a document with the available information on techniques to reduce green house gas emissions from the relevant landfill operations.

82. EU-BRITE proposes to collect, during the BREF development process, information on on-site combustion plants (e.g. firing landfill gas) and their characteristic (e.g. rated thermal input), and information on the use of heat generated (e.g. direct or indirect leachate evaporation).

- (●) Agree
- ( ) Partially agree
- ( ) Disagree

Please provide the rationale for your opinion:

For the BREF, the objective of eliminating methane emissions should take priority over the generation of energy from gas which has been captured for that purpose. It may be the case that the BREF determines that BAT would involve achieving high recovery and destruction rates of methane and fluorinated and/or chlorinated hydrocarbons, and this might imply there is no 'excess heat' for external use.
Nonetheless, the collection of information should be informative. We believe it would be useful to understand, more generally, what processes are used to manage collected gas (which might not involve on-site combustion).

83. EU-BRITE proposes that the TWG identify, during the BREF development process, the contextual information to understand and compare the collected data.
(Contextual information includes type of energy used/produces (including fuel types) in the installation, monitoring methods and calculations, landfill configuration and defined boundaries, size and depth of the landfills and waste characteristics).

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

We suspect that historical decisions, and the way in which support policies in place in Member States for renewable energy have played / continue to play a role. Also, standards as regards applications of upgraded biogas may play a role.

9. EMERGING TECHNIQUES AND LINK WITH INCITE

91. EU-BRITE proposes to collect, during the BREF development process, information and performance data on emerging techniques (ET) applicable to the activities covered by the LAN BREF and associated with the KEIs to be agreed at the kick-off meeting.
(e.g. emissions to air and to water, consumption of energy, water, raw materials, decarbonisation, chemicals)

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

Agree, especially in relation to PFAS removal and destruction.

10. MONITORING

101. EU-BRITE proposes to collect, during the BREF development process, data related to monitoring of emissions (e.g. to air and to water) and consumption levels (e.g. water, energy).

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

> We are inclined to agree, though we believe EU-BRITE should reassure itself that the collection of all of these data are informative. Monitoring emissions are likely more important than monitoring the consumption though data on consumption levels could indicate otherwise.

102. EU-BRITE proposes to collect, during the BREF development process, data on substances /parameters monitored by process/source during the different landfill operations.

- ( ) Agree
- (●) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

> If the data are collected as above, then presumably, how that is done would be part of the data collection exercise – EU-BRITE would not be able to impose an approach, rather it should understand the approaches taken.

103. EU-BRITE proposes to collect, during the BREF development process, information on the standards used and on the monitoring frequency.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

> We would have seen that as part of Q.101. Without harmonisation of measurement and analysis standards, ELV's are incomparable.

11. NORMAL OPERATING CONDITIONS AND OTHER THAN NORMAL OPERATING CONDITIONS

111. EU-BRITE proposes to collect, during the BREF development process, information on 'normal' operating conditions and 'other than normal' operating conditions for the landfilling operations under the scope of the LAN BREF.

- (●) Agree

- Partly agree
- Disagree

Please provide the rationale for your opinion:

Agree, insight should result in measures to decrease the downtime of gas and leachate treatment plants.

112. EU-BRITE proposes the TWG identify, during the BREF development process, 'normal' and 'other than normal' operating conditions for the different landfilling operations under the scope of the LAN BREF.

- (•) Agree
- Partly agree
- Disagree

Please provide the rationale for your opinion:

Agree, insight should result in measures to decrease the downtime of gas and leachate treatment plants.

12. CONFIDENTIALITY ISSUES

121. EU-BRITE proposes, during the BREF development process, not to consider data collected as CBI.

- (•) Agree
- Partly agree
- Disagree

Please provide the rationale for your opinion:

13. PROPOSED STRUCTURE OF THE BREF

131. EU-BRITE proposes to use the following structure of the BREF:

General information on the BREF content	Main findings from all chapters
Preface	Tailored for LANDFILLS
Scope	Describes as precisely as possible which operations and activities are covered by the document. This section will also indicate activities/processes which are intentionally excluded from the scope of the BREF, while providing the reasons for such exclusions. It will also mention the main 'directly associated' activities covered by the document, even when these are not Annex I activities themselves. The relevance of other BREFs will be mentioned when considered necessary, by cross-referencing these relevant BREFs.
Chapter 1	**General information about the sector concerned** It provides recent general information about the landfills (as defined in Article 2(g) of Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste, receiving more than 10 tonnes of waste per day or with a total capacity exceeding 25 000 tonnes, excluding landfills of inert waste) in terms of numbers and size of installations, geographical distribution, production capacity and economics.
Chapter 2	**Applied processes and techniques** Brief description of the processes currently applied in landfills and 'directly associated activities' along with an indication of the techniques used to prevent and reduce emissions. The description will be aided by diagrams or flow charts.
Section 2.1	Hazardous landfills
Section 2.2	Non-hazardous landfills: municipal landfills.
Section 2.3	Non-hazardous landfills: other than municipal landfills.
Chapter 3	**Current emission and consumption levels**
Chapter 4	**Techniques to consider in the determination of BAT and emerging techniques**
Chapter 5	**BAT conclusions (including emerging techniques)**
Section 5.1	Generic BAT conclusions
Section 5.2	Specific BAT conclusions
Section 5.3	Emerging techniques
Chapter 6	**Concluding remarks and recommendations for future work**
Glossary	
References	
Annexes	

Is this proposed structure acceptable to you?

- ○ Agree
- ○ Partly agree
- ◉ Disagree

Please provide the rationale for your opinion:

Landfills for non-hazardous waste should not be split-up in different categories that have no basis in the LFD, the WAC or the European Waste Catalogue. Landfills for inert waste and underground storage should be added.
The proposed structure would require that all relevant emission determining aspects will have to be discussed for each type of landfill. A structure based on the aspects (that clarifies the differences between landfills for inert, non-hazardous and hazardous wastes) is to be preferred. Underground storage is so different it has to be described separately.

Please upload your alternative proposal for the structure of the LAN BREF
477b7de8-e7ab-4a64-92e7-fe8d3e15980a/2025_LAN-BREF_Frontloading-Survey_Alternative_Structure_LAN_BREF.docx

14. SELECTION OF SITES FOR THE DATA COLLECTION

141. EU-BRITE proposes that the TWG submit proposals, during the BREF development process, of well-performing (including best-performing) landfill installations to participate in the data collection.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

Agree, as long as the intention is to collect data not only from such sites. There would seem to be a problem in asking that well- / best-performing sites are identified when the aim of the exercise is to highlight what is BAT. As long as it is understood that such sites are part of a wider data collection exercise, rather than the totality of the exercise, then we agree.

15. DATA COLLECTION PROCEDURE

151. EU-BRITE proposes to follow the established BREF process for the collection of site/plant-specific data via questionnaires including the following:

- the preparation of the draft questionnaire by EU-BRITE followed by the commenting of the TWG;
- the organisation of a questionnaire workshop to finalise the questionnaire;
- the testing of the draft final questionnaire by a selected (small) number of sites;
- the preparation of the final questionnaire by EU-BRITE;
- the distribution of the final questionnaire through Member States' representatives;
- the filling in of the questionnaires by the sites/plants' operators;

- the collection of the filled-in questionnaires by Member States' representatives;
- the quality check of the filled-in questionnaires by MS' representatives (possibly) with the help of a checklist;
- the submission of the quality-checked questionnaires to EU-BRITE by MS' representatives.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

Agree, though we suspect the meeting would be superfluous – once comments have been made, EU-BRITE can finalise. Please note our general comment on information collection above at Q21. There is a danger that the questionnaire becomes overly burdensome for potential respondents without some careful consideration being given to the rationale for seeking specific items of information.

152. EU-BRITE proposes to collect data for the reference years 2024, 2023, 2022 or, if such data is not available, for the last 3 years for which data is available.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

Data available

	2024	2023	2022	2021	2020	2019	2018
What year's data is available in your organisation?	( )	( )	( )	( )	( )	( )	( )

16. SITE VISITS

161. EU-BRITE proposes that the TWG suggests landfills for site visits, during the BREF development process.

- (●) Agree
- ( ) Partly agree
- ( ) Disagree

Please provide the rationale for your opinion:

Agree. That provides an even more tangible basis for determining BAT.

17. PERMITS

171. Please, upload representative landfill permits held by your delegation.

Please upload representative hazardous waste landfill permits.

Please upload representative non-hazardous waste landfill permits.

Please upload representative other kind of landfill permits.

18. ANY OTHER RELEVANT INFORMATION

181. Please let us know any other information you consider relevant for the BREF drafting process at this stage.

Hakeem et.al. (2024) Review: current understanding on the transformation and fate of per- and polyfluoroalkyl substances before, during, and after thermal treatment of biosolids, Chemical Engineering Journal 493 (2024) 152537, https://doi.org/10.1016/j.cej.2024.152537.

IEA Bioenergy (2025) Reduction of methane emissions from biogas systems and landfills - Methane oxidation treatment for systems with low gas fluxes and low methane concentrations, Task 37, February 2025, https://task37.ieabioenergy.com/technical-reports/reduction-of-methane-emissions-from-biogas/.

Lin et.al. (2024) Landfill Gas: A Major Pathway for Neutral Per- and Polyfluoroalkyl Substance (PFAS) Release, Environmental Science & Technology Letters, https://doi.org/10.1021/acs.estlett.4c00364.

Lo, I.M.C. (1996) The role of organic attenuation in saturated clay barrier system, Water Science and Technology, Volume 33, Issue 8, 1996, Pages 145-151, https://doi.org/10.1016/0273-1223(96)00270-3.

Mejri and Oueslati (2024) A Critical Review of Clay Minerals for Groundwater Protection and Treatment, Groundwater Frontiers - Techniques and Challenges, DOI: 10.5772/intechopen.1008385.

Umweltbundesamt (2020) Remediation management for local and wide-spread PFAS contaminations, Texte 205/2020, Project No. (FKZ) 3717 76 231 0, Report No. FB000332/ENG, https://www.umweltbundesamt.de/en/publikationen/remediation-management-for-local-wide-spread-pfas.

Lu, Jingzhao, Hongwei Lu, Dongzhe Liang, SanSan Feng, Yao Li, and Jingyu Li. 'A Review of the Occurrence, Monitoring, and Removal Technologies for the Remediation of per- and Polyfluoroalkyl Substances (PFAS) from Landfill Leachate'. Chemosphere 332 (August 2023): 138824. https://doi.org/10.1016/j.chemosphere.2023.138824.

Pivato, Alberto, Giovanni Beggio, Stefano Maggi, Francesco Marrone, Tiziano Bonato, Federico Peres, Wei Peng, and Maria Cristina Lavagnolo. 'The Presence of PFAS in Waste and Related Implications on the Current and Proposed European Regulatory Framework: A Systematic Critical Review'. Detritus, no. 26 (28 February 2024): 89–105. https://doi.org/10.31025/2611-4135/2024.18352.

Zhang, Man, Xianda Zhao, Dongye Zhao, Te-Yang Soong, and Shuting Tian. 'Poly- and Perfluoroalkyl Substances (PFAS) in Landfills: Occurrence, Transformation and Treatment'. Waste Management 155 (January 2023): 162–78. https://doi.org/10.1016/j.wasman.2022.10.028.

182. Please upload any other information you consider relevant for the BREF drafting process at this stage.

SURVEY SUBMISSION

Thank you for *land-filling* the LAN BREF frontloading survey!

Your input is crucial to understanding the landfill sector and will help shape the future of a cleaner industry across Europe.

You can submit your survey by clicking on the 'Submit' button at the bottom of this page.

Please remember to download the pdf of your survey response by clicking on the "Get PDF" button that appears in the screen after submitting the survey. Once downloaded, upload it to BATIS (BATIS > Forum > Landfills > 02 Frontloading > 02 LAN BREF frontloading survey) together with any other accompanying documents related to the survey or any other information you wish to share with the TWG.

Before submitting, however, we would really appreciate your views on the way in which the LAN BREF has been frontloaded, so that we can continue to improve the procedures for future BREFs.

Please give us your feedback on the following statements related to the survey:

Overall satisfaction:

How would you rate your overall experience with this survey?	
Was the information provided comprehensive and sufficient to complete the survey?	

Survey length and complexity:

How would you rate the length of the survey?	
Were the questions clear and easy to understand?	

Relevance and interest:

How relevant was the survey to the topic of landfills?	
Were the questions engaging and interesting?	

Technical issues

Did you experience any technical issues while taking the survey (e.g. saving or loading problems, errors)?

- ○ Yes
- ◉ No

Suggestions for improvement:

What did you like most about the survey?

What did you like least about the survey?

Do you have any suggestions on how we could improve future surveys related to the frontloading process?

Additional comments:

Is there anything else you would like to share about your experience with this survey?

Thank you for your participation. Your time and support is greatly appreciated!

Contact

JRC-B5-EUBRITE-LAN@ec.europa.eu