

Sewage Sludge Directive (SSD) Evaluation – Targeted stakeholder consultation

Response ID:323 Data

1. Introduction

1. It is possible that we will contact some stakeholders to request data on specific issues. If you consent to be contacted please tick this box.

Yes, I consent to being contacted

2. General information about respondent

2. In what capacity are you completing this questionnaire?

Company/business organisation

3. If you represent a Business association or a Company/business organisation or Other, which of the following SSD areas of operation is more relevant to you:

Relevant areas:

Sewage sludge processing

If other, are you a provider or a user of sludge:

Please specify here the exact area of your operation:

4. Please indicate your name, the name of your company, organisation, or institution:

EurEau

5. If your organisation is registered in the Transparency Register, please give your Register ID number:

EurEau

6. Please provide a contact email address (it will not be published):

bertrand.vallet@eureau.org

7. Please indicate the location of your organisation:

Belgium

If other please specify:

8. Please indicate the level at which your organisation operates:

EU

9. Please indicate the size of your organisation:

Micro (1 to 9 employees)

10. Publication privacy settings

The Commission may publish the responses to this consultation. You can choose whether you would like your details to be made public or to remain anonymous by clicking the relevant box.

Public:

Your personal details (name, organisation name and size, transparency register number, country of origin) will be published with your contribution.

If you agree with the [personal data protection provisions](#), please tick the box below:

I agree with the personal data protection provisions

3. 1. Targeted questions for all types of stakeholders

11. From your experience, to what extent do you agree that the SSD has led to the following changes or results in your country (or on average in the EU if you represent an EU-level organisation)?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I do not know / no opinion
a Led to a generally sustainable framework for the use of sewage sludge in agriculture		X				
b Led to increased safe use of sewage sludge in agriculture		X				
c Led to increased phosphorus and nutrient recycling and carbon sequestration		X				
d Led to minimisation of pollution and health risks from sewage sludge use		X				

12. Did the SSD lead to any other significant changes or results (expected or unexpected) other than those described in the previous question?

It established the principle that sewage sludge must be treated before its use and the obligations for the authorization of this practice. It led to provide organic matter in certain soils, improve the fertility of soils, carbon sequestration and water storage in soil. The nutrient content of the sludge is also of great agronomic value. The P (phosphorus) content is also significant, it must be taken into account that it is a limited resource and that the world's phosphorus reserves are being depleted, which is why the implementation of recycling strategies are more necessary.

13. a. Please indicate which of the following elements constitute a positive factor that contributed to the achievement of the SSDs objectives:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I do not know / no opinion
Stricter limit values of one or more heavy metals concentrations in sewage sludge set by Member States		X				
The development of quality assurance processes, labels and standards, or good practices by the competent authorities of Member States or other stakeholders		X				
Increased skills of workers dealing with wastewater treatment and sewage sludge			X			
New wastewater purification and sewage sludge treatment technologies			X			
Enhanced cooperation between Member States' competent authorities and SSD stakeholders						X

b. Please specify any other positive factors that contributed to the achievement of the SSD objectives:

Kept sludge used in agriculture away from the general waste regime so making sludge reuse is possible

14. a. Please indicate which of the following elements constitute a negative factor that hampers the achievement of the SSD's objectives:

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I do not know / no opinion
The negative perception of sewage sludge by the food industry due to potentially contaminated soils or agricultural products						
The negative perception of sewage sludge by the general public due to potentially contaminated soils or agricultural products						
Limited use of the data gathered in each Member State as part of the Directive implementation						
The scope of the Directive that focuses only on agricultural use of sewage sludge, excluding other uses of sludge, such as land restoration						
Insufficient provisions on contaminants to prevent harmful effects on soil, vegetation, animals, and humans						

b. Please specify any other negative factors that hamper the achievement of the SSD objectives:

The objective of the SSD is to define the quality of sludge and the amount to apply to soil so the receiving environment and human health is protected. The points listed above are influencing the use sewage sludge in agriculture itself which should be done according to the SSD. As no performance or target is set in the SSD, the factors above are not linked to the objectives of the SSD and it is not possible for us to give answers.

15. How effective has enforcement of the SSD in your country of operation (or in Member States in general if you represent an EU-level organisation) been?

To some extent effective

***If not “fully”, please elaborate on your answer here:**

Different political decisions have avoided to apply the sewage sludge to agriculture land in certain countries or region. In other Member States, the transcription enlarged the scope to other type of sludge which gave a bad image to the use of sewage sludge in agriculture. All in all, the SSD has not been able to mainstream the national regulation regarding sludge use in agriculture.

16. Has the SSD encouraged users of sludge to implement changes in their everyday actions regarding the use of sludge in agriculture that focuses on minimising pollution (minimization of plant contamination, minimization of nutrient leakage, etc.)?

It helped to better trace the amount and the origin of sludge spread on land and for different kind of crops.

17. Has the SSD caused any unnecessary administrative burdens* or complexities to your operations?

***According to CEPS (2013), ‘administrative burdens’ are those costs borne by businesses, citizens, civil society organizations and public authorities as a result of administrative activities performed to comply with information obligations included in legal rules. More specifically, administrative burdens are the part of administrative costs which is caused by regulatory requirements: accordingly, they do not include so-called “BAU costs”, i.e. costs that would emerge also in absence of regulation.**

Yes

***If “yes”, please describe the reasons for them here:**

In some countries, the transposition of the SSD led to increase of bureaucratic complexity.

18. Do you have any suggestions for how the administrative burden could be reduced?

a. Please mention here any good practices that you are aware of in certain Member States and/or by certain companies

Implement digital tools at national or regional level

b. Please mention here any general opportunities specifically within your administrative processes that could simplify the legislation or reduce unnecessary regulatory costs without undermining the intended objectives of the SSD

Declaration by industries of the chemical substances they use in their processes and that can be discharged to the sewer with the associated quantities. Industries should also obtain a mandatory water permit associated to a self-monitoring of substances released in sewers during operation. This would allow to anticipate the potential harmful substances in the sludge and the potential contaminants to monitor, or not. There is also a need to phase out hazardous chemicals in consumer products and information to public about avoiding consumer products with hazardous substances.

c. Please mention here potential different circumstances across Member States that you may be aware of

19. In your opinion, is the SSD consistent with the Urban Waste Water Treatment Directive ([91/271/EEC](#))?

To some extent

***If not “fully”, please elaborate on your answer here:**

The UWWTD does not require control at source measures or monitoring of upstream contaminants that could end-up in sludge. However, when necessary the national regulations may require those on the top of UWWTD requirements. To have more control on pollution emissions at sources, the UWWTD could have more provisions to reinforce the requirements to industries connected to sewers.

20. The Fertilising Products Regulation (EU) 2019/1009 lays down rules on placing fertilising products on the EU market. The Regulation harmonises the requirements for fertilising products produced from phosphate minerals and from organic or secondary raw materials and sets harmonised limits for a range of contaminants. In your opinion, is the link between the SSD and the Fertilising Products Regulation made explicit enough

Not at all

***If not “fully”, please elaborate on your answer here:**

The FPR only mentioned that it should apply without prejudice to SSD. In practice compost and digestates produced from sludge are mostly covered by the SSD and are excluded from the FPR. Excluding sewage sludge with the organic material and all different kinds of nutrients from input material for compost and digestate under the FPR sends a negative signal towards the utilisation of sewage sludge because it creates two categories of fertilising products: the one that can be traded and the others, without mentioning that they can also be of good quality. It can seriously harm sustainable recycling practises by deteriorating the image of the fertilisers where sewage sludge is used as a raw material today. It is also bad for the European Commission's ambition for a circular economy and farm to fork strategy for a long-term sustainable agriculture and adaption to climate change, since there is today a lack of organic material in many European soils causing increased risk of draught.

21. The European Commission recently presented the EU strategy to reduce methane emissions. The Strategy aims to curb temperature pathways to 2050, improve air quality and reinforce the EU's global leadership in the fight against climate change. The Strategy's actions focus on three main sectors one of which is agriculture. In your opinion, to what extent is the SSD consistent with the new EU Methane Strategy?

To some extent

***If not “fully”, please elaborate on your answer here:**

Anaerobic digestion is only one of the possible treatment before applying sewage sludge to land and methane emissions are not addressed at all. Therefore the SSD has very little connection with the EU Methane Strategy and does not create any arm to the strategy.

22. Nutrient Management Plans in agriculture aim at ensuring that the nutrients applied to land in an area do not leach into soil or surface and ground water, by regulating appropriate nutrient application practices, rates, timings, and locations. Such plans can derive from national or EU legislations. If there are such management plans implemented in your country/region, to what extent do you think the SSD is consistent with the implementation of these plans?

To a large extent

***If not “fully”, please elaborate on your answer here:**

There is no requirements for the nutrient contents in the SSD, however it mentions that the sludge shall be used in such a way that account is taken of the nutrient needs of the plants and that the quality of the soil and of the surface and ground water is not impaired. In that sense, a nutrient management plan should take this into account when considering the use of sludge in agriculture together with other Directives like the Nitrate Directive, the WFD and the Groundwater Directive in order to protect the quality of groundwater.

23. The following table lists various EU legislation, policies, strategies and initiatives. To what extent do you agree that the SSD is coherent with them?

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	I do not know / no opinion
New Circular Economy Action Plan			X			
Waste Framework Directive				X		
Water Framework Directive			X			
Fertilising Products Regulation				X		
The EU's chemicals legislation				X		
The Energy Efficiency Directive			X			
The energy systems integration strategy						X
The air quality and industrial emissions policies				X		
The Marine Strategy Framework Directive						X
Farm to Fork Strategy				X		
Farm to Fork Strategy				X		
EU Biodiversity Strategy for 2030						X
European Green Deal			X			

24. If you wish to elaborate on any of the answers above, please do so here:

New Circular Economy Action Plan: The SSD is an instrument that allow the recycling of nutrients so it is in-line with the NCEAP. However, despite the mention of the revision process, no clear incentive to recycle nutrients and organic matter from sewage sludge is mentionned

Waste Framework Directive: The SSD specifically mention that sludge used in agriculture is excluded from the Waste Framework Directive. However, sewage sludge is considered as a waste under the waste framework directive. Perhaps a precision that sewage sludge under the scope of the SSD should not be covered by the Waste Framework Directive would help.

Water Framework Directive: The pollutants referred in the WFD are not aligned with the one mentioned in the SSD. However, some specific decision can be taken under the WFD at catchment level to avoid that sludge potentially containing these pollutants are spread on land.

Fertiliser Product Regulation: Compost and digestates produced from sludge are mostly covered by SSD but they are excluded from the Fertilising Regulation sending a negative input towards the utilisation of sewage sludge.

REACH: A declaration by industries of the chemical substances they use in their processes and that can be discharged to the sewer with the associated quantities would allow to anticipate the potential harmful substances in the sludge and the potential contaminants to monitor, or not. There is also a need to phase out hazardous chemicals in consumer products and information to public about avoiding consumer products with hazardous substances. The SSD is also not aligned with recent updates in chemical legislation regarding contaminants of emerging concern or PFAS

Energy Efficiency Directive: There is no link between the SSD and the EED

IED: The quality of industrial effluent discharged into sewers is not well regulated to protect quality of sludge and allow to anticipate its influence on the quality of sludge and its safe use in agriculture

F2F strategy: The Strategy encourages farmers to diversify their income through biogas production and states that "Farms also have the potential to produce biogas from other sources of waste and residue including sewage and waste water". We insist that measures should lead to sustainable solutions, respecting the investments already made by the water sector in order to minimise the production of sludge and maximise the production of biogas. The future enabling environment should allow cross-sector working to maximise the value of existing assets. Furthermore, the liquid matter (liquors) from the digestion process, either from digesting waste water sludge or manure, should be treated and this can be done in a waste water treatment plant in a more sustainable and continuous way.

In this context, it is worrying to see that France recently banned to co-digestion of sorted biowaste together with sewage sludge by waste water operators.

We also have to make sure that the digestates can be used as fertiliser at least at national level and then under the application of the SSD.

Biodiversity strategy: There is no awareness of the state of knowledge related to the effect of sludge on soil biodiversity, especially with reference to microbial content. .Sewage sludge helps to the development of soil microorganisms that is useful for soil and ecosystems biodiversity.

25. a. In your opinion, is the SSD coherent with the national legislation of your country (or in Member States in general if you represent an EU-level organisation)?

To a large extent

***If not "fully", please elaborate on your answer here:**

Most of EU countries have more stringent requirements than the SSD but not all

b. There are many MS that have gone further from the requirements of the SSD and others have banned the use/disposal of sewage sludge for certain practices. Please tick below the practices of sewage sludge on which your country has imposed a ban (you can tick more than one boxes):

- Gasification
- Landfilling
- Land spreading for landscaping
- Land spreading for forestry / re-forestation
- Land spreading for agriculture
- Nutrient recovery (other than from land spreading)
- Other

If "Other", please specify here for which practices your country has banned the use of sewage sludge:

EurEau members reported the ban ticked above in different MS in Europe.

c. For these countries that have banned the use of sewage sludge for certain practices, is it possible for them to export sludge for treatment elsewhere (in another EU Member State or outside the EU)?

Yes

If you wish to give examples on this issue, please do so here:

Not from ban but from capacity limitation in local incinerators for example. Transfer from one country to another with use of sludge in agriculture

26. Are there any important pollutants found in sewage sludge that can pose a threat to human health that the SSD does not take currently into account?

Yes

If “yes”, please specify which ones:

Probably some of the organic compounds like PFAS should be regulated but the transfer to plants or groundwater and direct exposure to humans have to be taken into account.

27. Are there any pollutants that no longer need to be regulated by the SSD?

Not keeping the current metals may lead to new bad practices from certain stakeholders connected to sewers. It is better to keep them in.

28. Are there any important sewage sludge treatment and utilisation technologies, which affect the implementation of the SSD, that are not taken currently into account in the SSD?

I do not know/ no opinion

If “yes”, please specify which ones:

29. Is the SSD still relevant as a standalone legislative instrument or should it be integrated into other EU legislative instrument?

Standalone instrument

If “integrated into another legislative instrument”, please specify and elaborate on your answer:

30. Many Member States have implemented stricter limit values for heavy metal concentrations in soils than those stipulated by the SSD. Many Member States have also implemented stricter limit values for heavy metal concentrations in sewage sludge. In your country of operation, are there any rules to safeguard human health and the environment directly related to sewage sludge that offer higher protection than the Directive?

Yes

If “yes”, please specify which ones:

Most of countries in Europe, at least for certain metals

31. If there are any provisions (such as reporting requirements) within the SSD that you consider obsolete, please specify which and why here:

32. In your country of operation, are there any certification systems for waste water treatment plants that are used to ensure that the treated sewage sludge meets specific quality requirements?

Yes

If “yes”, please specify which ones:

Different system exist in Europe like BAS in the UK or REVAQ in Sweden. France (Standard NF 44 095) and Germany also have systems in place.

33. In your opinion, are there any additional advantages brought about by the action of the Directive at EU level that would otherwise not have happened if only done through national legislation?

Yes

If “yes”, please specify which ones:

Bringing a minimum level of treatment for sludge used in agriculture across Europe, preserve the quality of soils across Europe, preserve the quality of groundwater that is also a transboundary issue. At the same time it promotes the circular economy.

34. There are actions at Member State or regional level that target recovery of nutrients and energy from sewage (e.g. German phosphorus recovery ordinance, Sweden phosphorus recycling policy, HELCOM sewage sludge handling Recommendation, etc.). In your opinion, how could the SSD facilitate such actions?

Nutrient recovery:

By enlarging the scope of the SSD to other use than agriculture and by bringing an End-of-Waste criteria to different products extracted from sludge. It can also create a basis to become a CMC inside the Fertiliser Regulation with defining different categories for sewage sludge of sufficient quality aiming at being traded on the EU market (water content, quality control on certain parameters and pollutants needed because there is no possibility to control the quality of the receiving environment) and a category for sludge aiming at being used locally, compatible with the local soil quality and local risk assessment (no possibility to transfer pollutant to groundwater, poor level of organic matter, pre-set amount of sludge to be spread...). There could then be a dedicated category to become acceptable input material for CMC 3 and CMC 5 in the FPR, as it is done for example with the regulation on animal by-products.

Energy recovery:

Again it would require the enlargement of the scope of the Directive. Any energy target should be avoided as the capacity to produce biogas is very dependent of the local conditions (WWTP capacity, capacity to co-digest). However, an End-Of_Waste criteria for sludge intended for biogas product could help to develop a suitable capacity to bring some sludge from smaller WWTP to a centralised digester where sludge from different origin can be combined. The waste status for those sludge bring more administrative burden. With a proper traceability system, the digestate could then be identified as one of the 2 categories mentioned above and being used as national or CE marked fertiliser.

35. Over the next 10 years, how do you expect the overall volume of sewage sludge generated to change?

Slightly increase

If "yes", please specify which ones:

36. Over the next 10 years, how do you expect the volume of sewage sludge applied to agricultural land to change?

Slightly decrease

If "yes", please specify which ones:

37. The table below presents the most common treatment techniques, disposal and nutrient recovery methods applied to sewage sludge in the EU. Over the next 10 years, how do you expect the use of the following sewage treatment/disposal/recovery techniques to evolve?

Pre-treatment/ processing of sewage sludge:

	Greatly increase	Slightly increase	Stay the same	Slightly decrease	Greatly decrease	I do not know/ no opinion
Drying* *The process of removing the water from sludge		X				
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture			X			
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to "thicken" (dewater) it without the addition of chemicals		X				
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application		X				
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time		X				
Other						X

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

It will greatly depend on the future of the requirements under the SSD and the UWWTD. Traceability of pollutants and sludge and control at source measures may change the perspectives. It will also depend the signal that a new regulation may give and how the market will react to it.

Disposal/ end of life use:

	Greatly increase	Slightly increase	Stay the same	Slightly decrease	Greatly decrease	I do not know/ no opinion
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge		X				
Incineration* *Sewage sludge is combusted with or without energy recovery		X				
Landfilling			X			
Land spreading for landscaping			X			
Land spreading for forestry / re-forestation						X
Land spreading for agriculture				X		
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.						X
Other						X

If "Other", please specify here which disposal/ end of life use method you mean:

Pyrolysis will very much depend on the energy performance of the current systems. All the answers above, depend very much on the future requirement for the UWWTD and the SSD that will influence the possibilities with sludge to land in general.

Nutrient recovery

	Greatly increase	Slightly increase	Stay the same	Slightly decrease	Greatly decrease	I do not know/ no opinion
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.		X				
Other						

If "Other", please specify here which nutrient recovery method you mean:

Recovery of nutrient from sludge might also increase without the necessity to incinerate the sludge first. Aside from nutrient recovery, other products can be recovered from the waste water like cellulose and bioplastics. There is a space to bring a legal framework for these products to enter the circular economy with the SSD.

38. What impact do you expect the following aspects to have on the volume of sewage sludge applied to agricultural land?

Regulatory action:

	High	Medium	Low	None	I do not know/ no opinion
EU-wide legislation (such as the New Circular Economy Action Plan, the Waste Framework Directive, Water Framework Directive, etc.)			X		
EU-wide strategies (such as the Farm to Fork Strategy, the Biodiversity Strategy to 2030, the Green New Deal, etc.)			X		
National-level legislation and initiatives		X			

Demographics:

	High	Medium	Low	None	I do not know/ no opinion
Population growth				X	
Urbanisation				X	
Behaviour change (such as increased environmental awareness, changes in consumption patterns, willingness to recycle etc.)		X			
Public perception regarding the use of sewage sludge in agriculture		X			

Innovation:

	High	Medium	Low	None	I do not know/ no opinion
New treatment technologies and techniques			X		
Industry mega trends					X

Environment and Health Impacts:

	High	Medium	Low	None	I do not know/ no opinion
Chemicals present in sewage sludge		X			
Emissions from sewage sludge management/ treatment			X		

Economic incentives for other treatment/disposal:

	High	Medium	Low	None	I do not know/ no opinion
Nutrient recovery		X			
Energy generation			X		

4. 2. Targeted questions for waste water and sewage sludge industry stakeholders, sewage sludge producers and intermediate users

39. a. Has the demand for sewage sludge use in agriculture changed in the past five years in your country (or on average in the EU if you represent an EU-level organisation)?

No, it is more or less the same

b. If “yes”, which are the most important factors that led to this change?

Some countries increase the use due to quality system, for other it is a decrease but in general the trend is quite stable. This issue is really correlated to local circumstances.

40. a. The table below presents the most common treatment techniques and disposal and nutrient recovery methods applied to sewage sludge in the EU.

Based on your understanding, please select the percentage of total dry matter produced by each treatment process, the percentage of total dry matter used by disposal/each end-of-life method, and the percentage of total dry matter used by each nutrient recovery method in your country (or on average in the EU if you represent an EU-level organisation)

Pre-treatment/ processing of sewage sludge:

	0-10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Drying* *The process of removing the water from sludge							X
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture		X					
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to “thicken” (dewater) it without the addition of chemicals	X						
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application			X				
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time							X
Other							X

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

We put the numbers that were reported in different countries. If the numbers were too different we put I don't know as it is difficult to have a correct evaluation.

Disposal/ end of life use:

	0-10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge							X
Incineration* *Sewage sludge is combusted with or without energy recovery			X				
Landfilling	X						
Land spreading for landscaping	X						
Land spreading for forestry / re-forestation							X
Land spreading for agriculture			X				
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.							X
Other							

If "Other", please specify here which disposal/end of life use method you mean:

These numbers are taken according to our own data report under preparation. However, some disposal/end of life use are not reported explicitly and thus checked as I don't know

Nutrient recovery

	0-10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico-chemical methods.	X						
Other							

If "Other", please specify here which nutrient recovery method you mean:

41. In case techniques have been implemented that produce P-rich fertilising materials (e.g. struvite) through precipitation at waste water treatment plants:

a. Please select the percentage of incoming sewage that is subject to phosphorus precipitation in your country (or on average in the EU if you represent an EU-level organisation)

1-5%

b. Please indicate the proportion of the phosphorus present in the sewage influent that can be recovered as a fertilising material through precipitation

40-100%

c. Please indicate the fate of the precipitated materials:

Other - Please specify: Storage until a market demand it

42. What are the costs of the individual treatment and disposal methods, or the combinations of them as indicated above?

43. Cost estimates in €/tonne of dry matter

Pre-treatment/ processing of sewage sludge:

	<€10/tonne of dry matter	€10- 20/tonne of dry matter	€20- 50/tonne of dry matter	€50- 100/tonne of dry matter	>€100/tonne of dry matter
Drying* *The process of removing the water from sludge					
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture					
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to "thicken" (dewater) it without the addition of chemicals					
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application					
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time					
Transport					
Other					

If "Other", please specify here which pre-treatment/processing of sewage sludge method you mean:

Disposal/ end of life use:

	<€10/tonne of dry matter	€10-20/tonne of dry matter	€20-50/tonne of dry matter	€50-100/tonne of dry matter	>€100/tonne of dry matter
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge					
Incineration* *Sewage sludge is combusted with or without energy recovery					
Landfilling					
Land spreading for landscaping					
Land spreading for forestry / re-forestation					
Land spreading for agriculture					
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.					
Other					

If "Other", please specify here which disposal/end of life use method you mean:

Nutrient recovery

	<€10/tonne of dry matter	€10-20/tonne of dry matter	€20-50/tonne of dry matter	€50-100/tonne of dry matter	>€100/tonne of dry matter
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.					
Other					

If "Other", please specify here which nutrient recovery method you mean:

43. Cost estimates in €/m3 of dry matter

Pre-treatment/ processing of sewage sludge:

	<€10/m3 of dry matter	€10- 20/m3 of dry matter	€20- 50/m3 of dry matter	€50- 100/m3 of dry matter	>€100/m3 of dry matter
Drying* *The process of removing the water from sludge					
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture					
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Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time					
Transport					
Other					

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

Disposal/ end of life use:

	<€10/m3 of dry matter	€10- 20/m3 of dry matter	€20- 50/m3 of dry matter	€50- 100/m3 of dry matter	>€100/m3 of dry matter
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge					
Incineration* *Sewage sludge is combusted with or without energy recovery					
Landfilling					
Land spreading for landscaping					
Land spreading for forestry / re-forestation					
Land spreading for agriculture					
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.					
Other					

If "Other", please specify here which disposal/ end of life use method you mean:

Nutrient recovery

	<€10/m ³ of dry matter	€10-20/m ³ of dry matter	€20-50/m ³ of dry matter	€50-100/m ³ of dry matter	>€100/m ³ of dry matter
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.					
Other					

If "Other", please specify here which nutrient recovery method you mean:

43. Cost estimates in another format (other than €/tonne of dry matter or €/m³ of dry matter)**Pre-treatment/ processing of sewage sludge:**

	Cost data (please indicate unit)
Drying* *The process of removing the water from sludge	
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture	
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70°C in order to "thicken" (dewater) it without the addition of chemicals	
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application	
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time	
Transport (per unit, indicating density/per distance)	
Other	

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

Disposal/ end of life use:

	Cost data (please indicate unit)
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge	
Incineration* *Sewage sludge is combusted with or without energy recovery	
Landfilling	
Land spreading for landscaping	
Land spreading for forestry / re-forestation	
Land spreading for agriculture	
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.	
Other	

If "Other", please specify here which disposal/ end of life use method you mean:

Nutrient recovery

	Cost data (please indicate unit)
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.	
Other	

If "Other", please specify here which nutrient recovery method you mean:

43. How likely is landfilling of sewage sludge the only option for sludge management in your Member State?

I do not know/no opinion

Please justify your answer:

44. Has the SSD had an impact on costs of treatment and disposal of sewage sludge?

Pre-treatment/ processing of sewage sludge:

	Yes, the costs increased due to the requirements of SSD	Yes, the costs decreased due to the requirements of SSD	The costs are more or less the same	I do not know/ no opinion
Drying* *The process of removing the water from sludge				
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture				
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to "thicken" (dewater) it without the addition of chemicals				
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application				
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time				
Other				

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

Disposal/ end of life use:

	Yes, the costs increased due to the requirements of SSD	Yes, the costs decreased due to the requirements of SSD	The costs are more or less the same	I do not know/ no opinion
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge				
Incineration* *Sewage sludge is combusted with or without energy recovery				
Landfilling				
Land spreading for landscaping				
Land spreading for forestry / re-forestation				
Land spreading for agriculture				
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.				
Other				

If "Other", please specify here which disposal/ end of life use method you mean:

Nutrient recovery

	Yes, the costs increased due to the requirements of SSD	Yes, the costs decreased due to the requirements of SSD	The costs are more or less the same	I do not know/ no opinion
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.				
Other				

If "Other", please specify here which nutrient recovery method you mean:

If "yes" in any of the treatment/disposal processes, please elaborate on the reasons that caused this change in your opinion:

45. To what extent do you consider that the SSD resulted in economic costs that could have been avoided, without undermining the intended objectives of the Directive?

I do not know / no opinion

If you agree, please elaborate on the reasons for the avoidable costs:

46. Please estimate your costs of complying with the requirements of the SSD, excluding, to the extent feasible, the costs of compliance with other related legislation, such as the UWWTD:

	Hours per year	Cost per hour (€)	Other costs (€ per year) (e.g. software or training)
Monitoring (e.g. sampling and testing costs etc.)			
Data Collection (e.g. collection of information regarding the chemical composition of sewage sludge, weight of materials recovered, etc.)			
Reporting (e.g. submitting reports or data on the chemical composition of sewage sludge, weight of materials recovered, etc.)			
Technical compliance (e.g. preparation of technical guidance notes)			

If Other(s), please describe):

If you do not have information on the costs of compliance with SSD, please state why.

47. Are there any actions undertaken by your country (or in general Member States if you represent an EU-level organisation) that have had an impact (positive or negative) on the costs of implementing the SSD for your industry?

48. In your operation, are you obliged by national regulation to keep records on sewage sludge quality for a specific time period?

49. To what extent is the SSD fit for purpose with respect to technical and scientific progress?

Not at all

If not “fully”, please elaborate:

There is no mechanism to adapt the SSD to technical and scientific progress. However, some MS took measures to increase the requirements along the discovery of new contaminants

50. To what extent has the SSD stimulated the adoption of new technologies for sewage sludge treatment in order to decrease the risks for the environment and human health, increase energy recovery and nutrient recovery?

	Fully	To a large extent	To some extent	Not at all	I do not know / no opinion
Environmental and human health				X	
Energy recovery			X		
Nutrient recovery			X		

51. Has the development of new technologies for sewage sludge treatment and use contributed to changing the cost of sewage sludge management?

Yes, it increased the cost

52. In your country of operation, how often is the quality of sewage sludge monitored by your country’s competent authorities?

I do not know/no opinion

53. Do you consider this frequency of monitoring sufficient to detect potential issues with regard to the quality of sewage sludge that could result in surface water/groundwater, environmental, and/or human health damage.

I do not know/no opinion

54. In your opinion, are SMEs disproportionately affected by incurred costs due to the SSD compared to bigger companies?

No

If “yes”, please elaborate:

55. To what extent do you think that contaminants of emerging concern (such as those in pharmaceuticals, cosmetic products, and industrial waste) could pose a challenge to the increased use of sewage sludge as a resource?

They are the principle concern regarding the direct use of sewage sludge in agriculture even if no study revealed issues of transfer of these contaminants to crops nor to human. Other use or recovery techniques are less problematic.

56. In your opinion, which chemicals of emerging concern could pose the biggest challenge to sewage sludge use as a resource?

Pharmaceuticals, PFAS and microplastics because how they behave in the Environment or for political reasons. More research is needed on this field to clearly establish the behaviour of contaminants from sludge to other environmental compartments.

57. In your opinion, which are the most promising emerging technologies for sewage sludge treatment systems? By this we mean which technologies will have the highest impact in the future in terms of safe application of sewage sludge on land, greater removal of chemicals of emerging concern from wastewater or sewage sludge, greater use of sludge as an energy source, and greater nutrient recovery from sludge?

Please explain why you think these technologies have the highest potential.

Technologies for safe application of sewage sludge on land:

It is impossible to answer to this question as control at source will be, as for the current SSD, the best option to improve sludge quality with the best return on investment possible and the application of the polluter pays principle

Technologies for greater removal of chemicals of emerging concern (including microplastics) from wastewater or sewage sludge:

Again control at source is the best option

Technologies for greater use of sewage sludge as an energy source:

Anaerobic Digestion is still the best option to recover energy due to the high content of water into sludge

Technologies for greater nutrient recovery from sewage sludge:

d. Technologies for greater nutrient recovery from sewage sludge: At present and probably in the future the most cost effective technique, out of direct application to land, is mono-incineration with P recovery from ashes.

58. Where sewage sludge is treated via composting or anaerobic digestion, what share of the compost / digestate produced in your Member State is further used for the following purposes?

	<10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Used as a material in fertilisers/fertilising products							
Used directly on land							
Incinerated							
Not used (i.e. disposed of in a landfill)							
Other	X						

If "Other" please specify here:

No data at EU level on this.

59. From your experience, how does the treatment of sewage sludge differ between sludge intended for spreading on agricultural land, compared to sludge intended for other land-related applications (landscaping, forestry, re-cultivation, re-forestation uses)?

No difference

60. In your Member State, to what extent has sewage sludge been mixed for treatment with bio-waste?

It is common where authorised as co-digestion produce more biogas. It is also common for the production of sludge compost with higher agronomic value (right C/N and humidity ratios)

61. To what extent is that likely to change after 2023 when the obligation for separate collection of bio-waste is implemented

?

Improvement of biowaste collection will provide larger amount of biowaste that may be use for sludge composting. It is a question of interpretation by MS as the separate collection does not impose not to regroup waste that can be combined to be recycled. The exclusion of sludge from compost and digestate in the FR might create an issue if one wants to trade compost or digestate on the EU market.

62. Is there currently a demand for sewage sludge use in your Member State?

Demand

	Yes	No	I do not know/ no opinion
For spreading on land in agriculture	X		
For spreading on land in uses other than agriculture	X		
For use in fertilisers/fertilising products	X		
For energy produced from sewage sludge	X		
For nutrients recovered from sewage sludge	X		

If you answered the above with Yes or No, please elaborate.

	Please explain the reasons
For spreading on land in agriculture	all routes have demand in the EU
For spreading on land in uses other than agriculture	all routes have demand in the EU
For use in fertilisers/fertilising products	all routes have demand in the EU
For energy produced from sewage sludge	all routes have demand in the EU
For nutrients recovered from sewage sludge	all routes have demand in the EU

63. Which of the following market trends do you believe are possible to occur in the future in the sewage sludge market in the EU?

	It will increase	It will decrease	It will remain the same	I do not know / no opinion
Production of sewage sludge	X			
Demand for sewage sludge				X
Imports of sewage sludge into your country				X
Exports of sewage sludge out of your country				X
Treatment costs of sewage sludge	X			
Agronomic value of products containing sewage sludge	X			
Energy produced from sewage sludge	X			
Nutrients recovered from sewage sludge	X			

Please justify your answers here:

Production of sewage sludge will increase because of the increase of the population, the increase of compliance with the UWWTD and the potential increase of requirements. The different demand and cost will depend on the local circumstances and the evolution of the legislative environment but generally the trends will increase with the production of sludge.

64. Which treatment techniques and management options are likely to become more favoured in the next 10 years and why?

It will depend on the capacity of EU legislation to control at source pollutants to protect the quality of both waste water and sewage sludge

65. Based on your experience, for example based on plants you / your members operate, what energy yields have been obtained per tonne or m3 of sewage sludge dry matter treated using the following:?

	Net electricity (kWh)	Net heat (kWth)	Additional information
Anaerobic digestion			Great variability depending on the size of the WWTP, geographic area and the characteristics of the wastewater
Incineration			
Other thermal treatment (please specify)			

B. Has the energy produced been exported?

No

If "yes" state what share of electricity and what share of heat here:

66. A. What investments do you plan in the next 10-20 years in UWWTP you operate, in order to (where possible, please provide information on the number of plants that will be invested in and their size):

B. What are the main obstacles for these types of investments?

67. A. Based on your experience across the plants you operate, what nutrient yields have you been obtaining per tonne or m3 of sewage sludge dry matter treated using the following:?

	Recovered phosphorous (kg)	Recovered nitrogen (kg)	Other
Precipitation from waste water treatment process			
Recovery from incineration ash			
Other (please specify)			

What is the current price in your Member State per kilogram of the following recovered nutrients:

Recovered phosphorus:

Recovered nitrogen:

Other nutrients (please specify):

68. If you are manufacturing fertiliser products, do you currently use the following waste water treatment / sewage sludge derivatives in your products:

If no, please state the reasons

B. How is the use of waste water and sewage sludge derivatives likely to change in the next 10-15 years? What are the drivers for these changes?

The possibility of using sludge in agriculture in the future will strictly depend on the control over the pollutants that can cause damage to health and/or the environment, in particular with regard to hygiene and health protection and to the impact that sludge may actually have on soil and crops. Therefore, the SSD must define a system that gives certainty to operators in the sector, users of sludge and the preservation of the quality of crops interested by land application of sludge based on scientific evidences. This system need to include prevention measures like avoiding certain industrial wastewater from being discharged into the urban sewer systems.

At EU level, REACH restrictions need to prohibit the use of certain chemical products to avoid consumer goods to have an impact on wastewater and then on sludge.

69. If your Member State has a quality assurance scheme for sewage sludge:

Have you been participating?

I Do not know / no opinion

What benefits have you experienced from participating?

Recognition of a valuable product, enforcement of control at source, open dialogue with other stakeholders, recognition of the public of the benefit to use sewage sludge on land.

5. 2. Targeted questions for waste water and sewage sludge industry stakeholders, sewage sludge producers and intermediate users

61. a. Has the demand for sewage sludge to use in agriculture changed in the past five years in your country (or on average in the EU if you represent an EU-level organisation)?

b. If “yes”, which are the most important factors that led to this change?

62. a. The table below presents the most common treatment techniques and disposal and nutrient recovery methods applied to sewage sludge in the EU.

Based on your understanding, please select the percentage of total dry matter produced by each treatment process, the percentage of total dry matter used by disposal/each end-of-life method, and the percentage of total dry matter used by

each nutrient recovery method in your country (or on average in the EU if you represent an EU-level organisation)

Pre-treatment/ processing of sewage sludge:

	0-10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Drying* *The process of removing the water from sludge							
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture							
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to "thicken" (dewater) it without the addition of chemicals							
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application							
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time							
Other							

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

Disposal/ end of life use:

	0-10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge							
Incineration* *Sewage sludge is combusted with or without energy recovery							
Landfilling							
Land spreading for landscaping							
Land spreading for forestry / re-forestation							
Land spreading for agriculture							
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.							
Other							

If "Other", please specify here which disposal/end of life use method you mean:

Nutrient recovery

	0-10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico-chemical methods.							
Other							

If "Other", please specify here which nutrient recovery method you mean:

63. In case techniques have been implemented that produce P-rich fertilising materials (e.g. struvite) through precipitation at waste water treatment plants:

a. Please select the percentage of incoming sewage that is subject to phosphorus precipitation in your country (or on average in the EU if you represent an EU-level organisation)

b. Please indicate the proportion of the phosphorus present in the sewage influent that can be recovered as a fertilising material through precipitation

c. Please indicate the fate of the precipitated materials:

What are the costs of the individual treatment and disposal methods, or the combinations of them as indicated above?

65. Cost estimates in €/tonne of dry matter

Pre-treatment/ processing of sewage sludge:

	<€10/tonne of dry matter	€10- 20/tonne of dry matter	€20- 50/tonne of dry matter	€50- 100/tonne of dry matter	>€100/tonne of dry matter
Drying* *The process of removing the water from sludge					
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture					
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to "thicken" (dewater) it without the addition of chemicals					
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application					
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time					
Transport					
Other					

If "Other", please specify here which pre-treatment/processing of sewage sludge method you mean:

Disposal/ end of life use:

	<€10/tonne of dry matter	€10-20/tonne of dry matter	€20-50/tonne of dry matter	€50-100/tonne of dry matter	>€100/tonne of dry matter
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge					
Incineration* *Sewage sludge is combusted with or without energy recovery					
Landfilling					
Land spreading for landscaping					
Land spreading for forestry / re-forestation					
Land spreading for agriculture					
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.					
Other					

If "Other", please specify here which disposal/end of life use method you mean:

Nutrient recovery

	<€10/tonne of dry matter	€10-20/tonne of dry matter	€20-50/tonne of dry matter	€50-100/tonne of dry matter	>€100/tonne of dry matter
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.					
Other					

If "Other", please specify here which nutrient recovery method you mean:

66. Cost estimates in €/m3 of dry matter

Pre-treatment/ processing of sewage sludge:

	<€10/m3 of dry matter	€10- 20/m3 of dry matter	€20- 50/m3 of dry matter	€50- 100/m3 of dry matter	>€100/m3 of dry matter
Drying* *The process of removing the water from sludge					
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture					
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to "thicken" (dewater) it without the addition of chemicals					
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application					
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time					
Transport					
Other					

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

Disposal/ end of life use:

	<€10/m3 of dry matter	€10- 20/m3 of dry matter	€20- 50/m3 of dry matter	€50- 100/m3 of dry matter	>€100/m3 of dry matter
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge					
Incineration* *Sewage sludge is combusted with or without energy recovery					
Landfilling					
Land spreading for landscaping					
Land spreading for forestry / re-forestation					
Land spreading for agriculture					
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.					
Other					

If "Other", please specify here which disposal/ end of life use method you mean:

Nutrient recovery

	<€10/m ³ of dry matter	€10-20/m ³ of dry matter	€20-50/m ³ of dry matter	€50-100/m ³ of dry matter	>€100/m ³ of dry matter
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.					
Other					

If "Other", please specify here which nutrient recovery method you mean:

67. Cost estimates in another format (other than €/tonne of dry matter or €/m³ of dry matter)**Pre-treatment/ processing of sewage sludge:**

	Cost data (please indicate unit)
Drying* *The process of removing the water from sludge	
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture	
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70°C in order to "thicken" (dewater) it without the addition of chemicals	
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application	
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time	
Transport (per unit, indicating density/per distance)	
Other	

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

Disposal/ end of life use:

	Cost data (please indicate unit)
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge	
Incineration* *Sewage sludge is combusted with or without energy recovery	
Landfilling	
Land spreading for landscaping	
Land spreading for forestry / re-forestation	
Land spreading for agriculture	
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.	
Other	

If "Other", please specify here which disposal/ end of life use method you mean:

Nutrient recovery

	Cost data (please indicate unit)
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.	
Other	

If "Other", please specify here which nutrient recovery method you mean:

68. How likely is landfilling of sewage sludge the only option for sludge management in your Member State?

Please justify your answer:

69. Has the SSD had an impact on costs of treatment and disposal of sewage sludge?

Pre-treatment/ processing of sewage sludge:

	Yes, the costs increased due to the requirements of SSD	Yes, the costs decreased due to the requirements of SSD	The costs are more or less the same	I do not know/ no opinion
Drying* *The process of removing the water from sludge				
Lime treatment* *Hydrated lime can be used to sanitise biosolids and convert sewage sludge into a usable product for land application. It can be added in the sewage sludge to raise the pH and the temperature and reduce moisture				
Heating for pasteurisation* *It aims to inactivate/destroy pathogenic organisms and involves heating sewage sludge to around 70 °C in order to "thicken" (dewater) it without the addition of chemicals				
Composting* *It is a process by which naturally occurring microorganisms break down organic matter into a humus-like product for land application				
Anaerobic digestion* *It is a process by which, in the absence of oxygen, bacteria break down organic matter into a humus-like product for land application, producing biogas at the same time				
Other				

If "Other", please specify here which pre-treatment/ processing of sewage sludge method you mean:

Disposal/ end of life use:

	Yes, the costs increased due to the requirements of SSD	Yes, the costs decreased due to the requirements of SSD	The costs are more or less the same	I do not know/ no opinion
Gasification* *Sewage sludge with low content of water is heated with a controlled amount of oxygen and vaporised, producing a synthetic gas used in gas motors or in drying sludge				
Incineration* *Sewage sludge is combusted with or without energy recovery				
Landfilling				
Land spreading for landscaping				
Land spreading for forestry / re-forestation				
Land spreading for agriculture				
Pyrolysis* *Dried sewage sludge is heated in an anaerobic process producing biochar, pyrolytic oil and biogas. Phosphorus ends up in the biochar.				
Other				

If "Other", please specify here which disposal/ end of life use method you mean:

Nutrient recovery

	Yes, the costs increased due to the requirements of SSD	Yes, the costs decreased due to the requirements of SSD	The costs are more or less the same	I do not know/ no opinion
Recovery of nutrients from incineration ashes* *Extraction of phosphorus from incineration ash through physico - chemical methods.				
Other				

If "Other", please specify here which nutrient recovery method you mean:

If "yes" in any of the treatment/disposal processes, please elaborate on the reasons that caused this change in your opinion:

70. To what extent do you consider that the SSD resulted in economic costs that could have been avoided, without undermining the intended objectives of the Directive?

If you agree, please elaborate on the reasons for the avoidable costs:

71. Please estimate your costs of complying with the requirements of the SSD, excluding, to the extent feasible, the costs of compliance with other related legislation, such as the UWWTD:

Nature of cost

	Hours per year	Cost per hour (€)	Other costs (€ per year) (e.g. software or training)
Monitoring (e.g. sampling and testing costs etc.)			
Data Collection (e.g. collection of information regarding the chemical composition of sewage sludge, weight of materials recovered, etc.)			
Reporting (e.g. submitting reports or data on the chemical composition of sewage sludge, weight of materials recovered, etc.)			
Technical compliance (e.g. preparation of technical guidance notes)			

If Other(s), please describe):

If you do not have information on the costs of compliance with SSD, please state why.

Are there any actions undertaken by your country (or in general Member States if you represent an EU-level organisation) that have had an impact (positive or negative) on the costs of implementing the SSD for your industry?

In your operation, are you obliged by national regulation to keep records on sewage sludge quality for a specific time period?

74. To what extent is the SSD fit for purpose with respect to technical and scientific progress?

If not “fully”, please elaborate:

To what extent has the SSD stimulated the adoption of new technologies for sewage sludge treatment in order to decrease the risks for the environment and human health, increase energy recovery and nutrient recovery?

	Fully	To a large extent	To some extent	Not at all	I do not know / no opinion
Environmental and human health					
Energy recovery					
Nutrient recovery					

Has the development of new technologies for sewage sludge treatment and use contributed to changing the cost of sewage sludge management?

In your country of operation, how often is the quality of sewage sludge monitored by your country’s competent authorities?

Do you consider this frequency of monitoring sufficient to detect potential issues with regard to the quality of sewage sludge that could result in surface water/groundwater, environmental, and/or human health damage.

79. In your opinion, are SMEs disproportionately affected by incurred costs due to the SSD compared to bigger companies?

If “yes”, please elaborate:

To what extent do you think that contaminants of emerging concern (such as those in pharmaceuticals, cosmetic products, and industrial waste) could pose a challenge to the increased use of sewage sludge as a resource?

In your opinion, which chemicals of emerging concern could pose the biggest challenge to sewage sludge use as a resource?

82. In your opinion, which are the most promising emerging technologies for sewage sludge treatment systems? By this we mean which technologies will have the highest impact in the future in terms of safe application of sewage sludge on land, greater removal of chemicals of emerging concern from wastewater or sewage sludge, greater use of sludge as an energy source, and greater nutrient recovery from sludge?

Please explain why you think these technologies have the highest potential.

Technologies for safe application of sewage sludge on land:

Technologies for greater removal of chemicals of emerging concern (including microplastics) from wastewater or sewage sludge:

Technologies for greater use of sewage sludge as an energy source:

Technologies for greater nutrient recovery from sewage sludge:

83. Where sewage sludge is treated via composting or anaerobic digestion, what share of the compost / digestate produced in your Member State is further used for the following purposes?

	<10%	10-25%	25-50%	50-75%	75-90%	90-100%	I do not know
Used as a material in fertilisers/fertilising products							
Used directly on land							
Incinerated							
Not used (i.e. disposed of in a landfill)							
Other							

If "Other" please specify here:

From your experience, how does the treatment of sewage sludge differ between sludge intended for spreading on agricultural land, compared to sludge intended for other land-related applications (landscaping, forestry, re-cultivation, re-forestation uses)?

In your Member State, to what extent has sewage sludge been mixed for treatment with bio-waste?

To what extent is that likely to change after 2023 when the obligation for separate collection of bio-waste is implemented ?

Is there currently a demand for sewage sludge use in your Member State?

	Yes	No	Please explain the reasons	I do not know / no opinion
For spreading on land in agriculture				
For spreading on land in uses other than agriculture				
For use in fertilisers/fertilising products				
For energy produced from sewage sludge				
For nutrients recovered from sewage sludge				

88. Is there currently a demand for sewage sludge use in your Member State?

Demand

	Yes	No	I do not know/ no opinion
For spreading on land in agriculture			
For spreading on land in uses other than agriculture			
For use in fertilisers/fertilising products			
For energy produced from sewage sludge			
For nutrients recovered from sewage sludge			

If you answered the above with Yes or No, please elaborate.

	Please explain the reasons
For spreading on land in agriculture	
For spreading on land in uses other than agriculture	
For use in fertilisers/fertilising products	
For energy produced from sewage sludge	
For nutrients recovered from sewage sludge	

89. Which of the following market trends do you believe are possible to occur in the future in the sewage sludge market in the EU?

	It will increase	It will decrease	It will remain the same	I do not know / no opinion
Production of sewage sludge				
Demand for sewage sludge				
Imports of sewage sludge into your country				
Exports of sewage sludge out of your country				
Treatment costs of sewage sludge				
Agronomic value of products containing sewage sludge				
Energy produced from sewage sludge				
Nutrients recovered from sewage sludge				

Please justify your answers here:

Which treatment techniques and management options are likely to become more favoured in the next 10 years and why?

91. Based on your experience, for example based on plants you / your members operate, what energy yields have been obtained per tonne or m3 of sewage sludge dry matter treated using the following:?

	Net electricity (kWh)	Net heat (kWth)	Additional information
Anaerobic digestion			
Incineration			
Other thermal treatment (please specify)			

B. Has the energy produced been exported?

If "yes" state what share of electricity and what share of heat here:

92. A. What investments do you plan in the next 10-20 years in UWWTP you operate, in order to (where possible, please

provide information on the number of plants that will be invested in and their size):

B. What are the main obstacles for these types of investments?

93. A. Based on your experience across the plants you operate, what nutrient yields have you been obtaining per tonne or m³ of sewage sludge dry matter treated using the following:?

	Recovered phosphorous (kg)	Recovered nitrogen (kg)	Other
Precipitation from waste water treatment process			
Recovery from incineration ash			
Other (please specify)			

What is the current price in your Member State per kilogram of the following recovered nutrients:

Recovered phosphorus:

Recovered nitrogen:

Other nutrients (please specify):

94. If you are manufacturing fertiliser products, do you currently use the following waste water treatment / sewage sludge derivatives in your products:

If no, please state the reasons

B. How is the use of waste water and sewage sludge derivatives likely to change in the next 10-15 years? What are the drivers for these changes?

95. If your Member State has a quality assurance scheme for sewage sludge:

Have you been participating?

What benefits have you experienced from participating?

6. 3. Targeted survey for agriculture/ farmers' association, consumer organisations, and sewage sludge users

To what extent is the agricultural sector in your country (or on average in the EU if you represent an EU-level organisation) aware of sewage sludge as a resource of nutrients?

97. What was the effect of the application of sewage sludge on the quality of the agricultural soils in your country (or on average in the EU if you represent an EU-level organisation)?

What is the reason for this change?

98. Is the agricultural sector in your country (or on average in the EU if you represent an EU-level organisation) willing or reluctant to use sewage sludge on soil?

Please elaborate your answer explaining the reasons.

To what extent are consumers in your country (or on average in the EU if you represent an EU-level organisation) aware about the use of sewage sludge in agriculture?

100. To what extent do food or food processing companies in your country (or on average in the EU if you represent an EU-level organisation) accept products grown on soil fertilised with sewage sludge?

If not "fully", please mention the possible reasons for this here:

To what extent could sludge users use more sewage sludge in their operations than they are currently using?

In your country (or on average in the EU if you represent an EU-level organisation), is the available quantity of sewage sludge sufficient to cover sludge users' needs?

If sludge users were to wish to use more sewage sludge in their operations, what do you think are the main barriers that prevent them from doing so?

104. To what extent has the SSD effectively managed the risks associated with the spreading of sewage sludge on agricultural land?

If not "fully", please describe the risks that you think are not managed effectively:

105. To what extent has your country (or Member States in general if you represent an EU-level organisation) implemented the necessary steps to ensure that limit values are not exceeded where sewage sludge is used in soil?

If not "fully", please specify which steps have not been taken:

106. In your opinion, how do sewage sludge and conventional inorganic fertilising products compare in terms of their fertilising effectiveness for agriculture?

If you wish, you can elaborate your answer here:

Apart from conventional inorganic fertilising products, are there any other important materials that can be used as substitute to the use of sewage sludge in agriculture?

108. To what extent would you agree that the use of sewage sludge in agriculture has reduced the cost of fertilisation for farmers?

If you wish, you can elaborate your answer here:

109. In your country of operations, what is the average price paid to or paid by farmers to accept sewage sludge and spread it on soil or by farmers to use a tonne of treated sewage sludge (please provide an average of the price range in different countries if you represent an EU-level organisation)?

Treated sludge is defined as having undergone "biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use"

If farmers are subsidised / paid to take sewage sludge, please state how much they receive per tonne of dry matter (EUR)

110. From your experience, to what extent are the restrictions included in SSD regarding the limit values of heavy metals concentrations respected by sewage sludge producers in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

111. From your experience, to what extent are the restrictions included in SSD regarding the maximum quantities of sewage sludge used per annum respected by sludge users (farmers) in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

112. From your experience, to what extent are the restrictions included in SSD regarding the length of the period between the use of sewage sludge and putting stock out to pasture or harvesting fodder crops or certain crops that is contact with the soil, sufficient to protect human health in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

In your country of operations, how often is the quality of soil on which sewage sludge is applied monitored by your country's competent authorities?

Do you consider this frequency of monitoring sufficient to detect potential issues with regard to the quality of soil that could result in surface water/groundwater, environmental, and/or human health damage.

How do you ensure that the sewage sludge spread on land is of good enough quality to minimise the risks to the environment and human health?

In your opinion, which chemicals of emerging concern in sewage sludge could pose the biggest risk to the environment and

human health?

117. In your view, is there currently a demand for sewage sludge in your Member State / EU for the following uses?

Demand

	Yes	No	I do not know/ no opinion
For spreading on land in agriculture			
For spreading on land in uses other than agriculture			
For use in fertilisers/fertilising products			
For energy produced from sewage sludge			
For nutrients recovered from sewage sludge			

If you answered the above with Yes or No, please elaborate.

	Please explain the reasons
For spreading on land in agriculture	
For spreading on land in uses other than agriculture	
For use in fertilisers/fertilising products	
For energy produced from sewage sludge	
For nutrients recovered from sewage sludge	

Which of the following market trends do you believe have the highest possibility to occur in the next 10 years in the sewage sludge market in the EU?

	It will increase	It will decrease	It will remain the same	I do not know / no opinion
Production of sewage sludge				
Demand for sewage sludge				
Imports of sewage sludge in your country				
Exports of sewage sludge out of your country				
Treatment costs of sewage sludge				
Agronomic value of sewage sludge products				

7. 3. Targeted survey for agriculture/ farmers' association, consumer organisations, and sewage sludge users

To what extent is the agricultural sector in your country (or on average in the EU if you represent an EU-level organisation) aware of sewage sludge as a resource of nutrients?

120. What was the effect of the application of sewage sludge on the quality of the agricultural soils in your country (or on average in the EU if you represent an EU-level organisation)?

What is the reason for this change?

121. Is the agricultural sector in your country (or on average in the EU if you represent an EU-level organisation) willing or reluctant to use sewage sludge on soil?

Please elaborate your answer explaining the reasons.

To what extent are consumers in your country (or on average in the EU if you represent an EU-level organisation) aware about the use of sewage sludge in agriculture?

123. To what extent do food or food processing companies in your country (or on average in the EU if you represent an EU-level organisation) accept products grown on soil fertilised with sewage sludge?

If not "fully", please mention the possible reasons for this here:

To what extent could sludge users use more sewage sludge in their operations than they are currently using?

In your country (or on average in the EU if you represent an EU-level organisation), is the available quantity of sewage sludge sufficient to cover the sludge users' needs?

If sludge users were to wish to use more sewage sludge in their operations, what do you think are the main barriers that prevent them from doing so?

127. To what extent has the SSD effectively managed the risks associated with the spreading of sewage sludge on agricultural land?

If not "fully", please describe the risks that you think are not managed effectively:

128. To what extent has your country (or Member States in general if you represent an EU-level organisation) implemented the necessary steps to ensure that limit values are not exceeded where sewage sludge is used in soil?

If not "fully", please specify which steps have not been taken:

129. In your opinion, how do sewage sludge and conventional inorganic fertilising products compare in terms of their fertilising effectiveness for agriculture?

If you wish, you can elaborate your answer here:

Apart from conventional inorganic fertilising products, are there any other important materials that can be used as substitute to the use of sewage sludge in agriculture?

131. To what extent would you agree that the use of sewage sludge in agriculture has reduced the cost of fertilisation for

farmers?

If you wish, you can elaborate your answer here:

132. In your country of operations, what is the average price paid to or paid by farmers to accept sewage sludge and spread it on soil or by farmers to use a tonne of treated sewage sludge (please provide an average of the price range in different countries if you represent an EU-level organisation)?

Treated sludge is defined as having undergone "biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use"

If farmers are subsidised / paid to take sewage sludge, please state how much they receive per tonne of dry matter (EUR)

133. From your experience, to what extent are the restrictions included in SSD regarding the limit values of heavy metals concentrations respected by sewage sludge producers in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

134. From your experience, to what extent are the restrictions included in SSD regarding the maximum quantities of sewage sludge used per annum respected by sludge users (farmers) in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

135. From your experience, to what extent are the restrictions included in SSD regarding the length of the period between the use of sewage sludge and putting stock out to pasture or harvesting fodder crops or certain crops that is contact with the soil, sufficient to protect human health in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

In your country of operations, how often is the quality of soil on which sewage sludge is applied monitored by your country's competent authorities?

Do you consider this frequency of monitoring sufficient to detect potential issues with regard to the quality of soil that could result in surface water/groundwater, environmental, and/or human health damage.

How do you ensure that the sewage sludge spread on land is of good enough quality to minimise the risks to the environment and human health?

In your opinion, which chemicals of emerging concern in sewage sludge could pose the biggest risk to the environment and human health?

140. In your view, is there currently a demand for sewage sludge in your Member State / EU for the following uses?

Demand

	Yes	No	I do not know/ no opinion
For spreading on land in agriculture			
For spreading on land in uses other than agriculture			
For use in fertilisers/fertilising products			
For energy produced from sewage sludge			
For nutrients recovered from sewage sludge			

If you answered the above with Yes or No, please elaborate.

	Please explain the reasons
For spreading on land in agriculture	
For spreading on land in uses other than agriculture	
For use in fertilisers/fertilising products	
For energy produced from sewage sludge	
For nutrients recovered from sewage sludge	

Which of the following market trends do you believe have the highest possibility to occur in the next 10 years in the sewage sludge market in the EU?

	It will increase	It will decrease	It will remain the same	I do not know / no opinion
Production of sewage sludge				
Demand for sewage sludge				
Imports of sewage sludge in your country				
Exports of sewage sludge out of your country				
Treatment costs of sewage sludge				
Agronomic value of sewage sludge products				

8. 3. Targeted survey for agriculture/ farmers' association, consumer organisations, and sewage sludge users

To what extent is the agricultural sector in your country (or on average in the EU if you represent an EU-level organisation) aware of sewage sludge as a resource of nutrients?

143. What was the effect of the application of sewage sludge on the quality of the agricultural soils in your country (or on average in the EU if you represent an EU-level organisation)?

What is the reason for this change?

144. Is the agricultural sector in your country (or on average in the EU if you represent an EU-level organisation) willing or reluctant to use sewage sludge on soil?

Please elaborate your answer explaining the reasons.

To what extent are consumers in your country (or on average in the EU if you represent an EU-level organisation) aware about the use of sewage sludge in agriculture?

146. To what extent do food or food processing companies in your country (or on average in the EU if you represent an EU-level organisation) accept products grown on soil fertilised with sewage sludge?

If not "fully", please mention the possible reasons for this here:

To what extent could sludge users use more sewage sludge in their operations than they are currently using?

In your country (or on average in the EU if you represent an EU-level organisation), is the available quantity of sewage sludge sufficient to cover your needs?

If you were to wish to use more sewage sludge in your operations, what do you think are the main barriers that prevent you from doing so?

150. To what extent has the SSD effectively managed the risks associated with the spreading of sewage sludge on agricultural land?

If not "fully", please describe the risks that you think are not managed effectively:

151. To what extent has your country (or Member States in general if you represent an EU-level organisation) implemented the necessary steps to ensure that limit values are not exceeded where sewage sludge is used in soil?

If not "fully", please specify which steps have not been taken:

152. In your opinion, how do sewage sludge and conventional inorganic fertilising products compare in terms of their fertilising effectiveness for agriculture?

If you wish, you can elaborate your answer here:

Apart from conventional inorganic fertilising products, are there any other important materials that can be used as substitute to the use of sewage sludge in agriculture?

154. To what extent would you agree that the use of sewage sludge in agriculture has reduced the cost of fertilisation for farmers?

If you wish, you can elaborate your answer here:

155. In your country of operations, what is the average price paid to or paid by farmers to accept sewage sludge and spread it on soil or by farmers to use a tonne of treated sewage sludge (please provide an average of the price range in different countries if you represent an EU-level organisation)?

Treated sludge is defined as having undergone "biological, chemical or heat treatment, long-term storage or any other appropriate process so as significantly to reduce its fermentability and the health hazards resulting from its use"

If farmers are subsidised / paid to take sewage sludge, please state how much they receive per tonne of dry matter (EUR)

156. From your experience, to what extent are the restrictions included in SSD regarding the limit values of heavy metals concentrations respected by sewage sludge producers in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

157. From your experience, to what extent are the restrictions included in SSD regarding the maximum quantities of sewage sludge used per annum respected by sludge users (farmers) in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

158. From your experience, to what extent are the restrictions included in SSD regarding the length of the period between the use of sewage sludge and putting stock out to pasture or harvesting fodder crops or certain crops that is contact with the soil, sufficient to protect human health in your country (or on average in the EU if you represent an EU-level organisation)?

If not "fully", please describe the problems that you think there are:

In your country of operations, how often is the quality of soil on which sewage sludge is applied monitored by your country's competent authorities?

Do you consider this frequency of monitoring sufficient to detect potential issues with regard to the quality of soil that could result in surface water/groundwater, environmental, and/or human health damage.

How do you ensure that the sewage sludge spread on land is of good enough quality to minimise the risks to the environment and human health?

In your opinion, which chemicals of emerging concern in sewage sludge could pose the biggest risk to the environment and human health?

163. In your view, is there currently a demand for sewage sludge in your Member State / EU for the following uses?

Demand

	Yes	No	I do not know/ no opinion
For spreading on land in agriculture			
For spreading on land in uses other than agriculture			
For use in fertilisers/fertilising products			
For energy produced from sewage sludge			
For nutrients recovered from sewage sludge			

If you answered the above with Yes or No, please elaborate.

	Please explain the reasons
For spreading on land in agriculture	
For spreading on land in uses other than agriculture	
For use in fertilisers/fertilising products	
For energy produced from sewage sludge	
For nutrients recovered from sewage sludge	

Which of the following market trends do you believe have the highest possibility to occur in the next 10 years in the sewage sludge market in the EU?

	It will increase	It will decrease	It will remain the same	I do not know / no opinion
Production of sewage sludge				
Demand for sewage sludge				
Imports of sewage sludge in your country				
Exports of sewage sludge out of your country				
Treatment costs of sewage sludge				
Agronomic value of sewage sludge products				

9. 4. Targeted questions for health and environmental experts and academics

165. Has the SSD been effective in achieving its environmental objectives of protecting ecosystem and human health when sewage sludge is applied on agricultural land?

If not “fully”, please describe the problems that you think there are:

166. Have the (environmental) objectives of the SSD been achieved in an equally satisfactory manner in all Member States?

If not "yes", please specify in which Member States the objectives have been achieved in a less satisfactory manner and why:

167. Beyond its objectives, has the SSD achieved any other significant (environmental) direct or indirect impacts?

If "yes", please specify which ones:

168. To what extent are the pollutants and their respective limit values set by the SSD still appropriate?

If not "fully", please describe the problems that you think there are:

169. To what extent do the pollutants outlined by the SSD still cover the most important pollutants for the protection of human health and the environment?

If not "fully", please describe the problems that you think there are:

170. Do you believe that there are chemicals of emerging concern that should be specifically addressed by the SSD?

If "yes", please specify which chemicals of emerging concern should be particularly addressed and why they are of concern (e.g. toxic properties, increasing levels, etc.):

In your opinion, which chemicals of emerging concern in sewage sludge do you think could pose the biggest risk to the environment and human health?

If you wish to submit additional quantitative data on any of the issues mention in this questionnaire or other issues within the scope of the SSD, please do so here:

It is possible that we will get in contact with some stakeholders to request data on specific issues. If you consent to be contacted please add your contact details here:

174. In your opinion, which are the most promising emerging technologies for sewage sludge treatment systems that will have the highest impact in the future in terms of safe application of sewage sludge on land, greater removal of chemicals of emerging concern from wastewater or sewage sludge, greater use of sludge as energy source, and greater nutrient recovery from sludge? Please mention also why you think these technologies have the highest potential.

Technologies for safe application of sewage sludge on land:

Technologies for greater removal of chemicals of emerging concern from wastewater or sewage sludge:

Technologies for greater nutrient recovery from sewage sludge:

175. Are you aware of any promising methods for recycling/recovery/disposal of sewage sludge originating from treatment of highly polluted wastewater?

If “yes”, please specify which one(s):

176. Are you aware of any promising methods for treating chemicals of emerging concern in highly polluted wastewater and/or sewage sludge?

If “yes”, please specify which one(s):

According to the [EEA \(2019\)](#) European soils face physical, chemical, and biological degradation. How do you see the SSD could help avert such soil degradation?

10. 5. Targeted questions for NGOs and international organisations

178. To what extent are the SSD provisions effective in ensuring that sewage sludge is used safely on agricultural soil?

If not “fully”, please specify what is missing here:

179. To what extent has your country (or Member States in general if you represent an EU-level organisation) implemented the necessary steps to ensure that limit values are not exceeded where sewage sludge is used in soil?

If not “fully”, please specify which steps have not been taken:

180. Do you believe that there are chemical substances (e.g. chemicals of emerging concern) that should be specifically addressed by the SSD?

If “yes”, please specify which one(s): If “yes”, please specify which chemicals of emerging concern should be particularly addressed and why they are of concern (e.g. toxic properties, increasing levels, etc.):

181. To what extent are the SSD provisions adequate to protect human health against heavy metals?

If not “fully”, please specify what is missing here:

Are you aware of any incidents of soil pollution due to sewage sludge application in any EU Member State?

Are there any synergies between the SSD and other environmental legislation that you consider have not been fully exploited?

184. Are you aware of similar legislation that targets sewage sludge use in agriculture in non-EU countries that offer better soil protection than the SSD?

If “yes”, please specify what are the elements of this legislation that could benefit SSD:

If you wish to submit additional quantitative data on any of the issues mentioned in this questionnaire or other issues within the scope of the SSD, please do so here:

186. Are you aware of any promising method for recycling/recovery/disposal of sewage sludge originating from treatment of highly polluted wastewater?

If “yes”, please specify which one(s):

According to the [EEA \(2019\)](#) European soils face physical, chemical, and biological degradation. How do you see the SSD could help avert such soil degradation?

11. 6. Other comments

70. If you wish to add further information, comments or suggestions, including examples of good or bad practice) – within the scope of this questionnaire – please feel free to do so in the box below: (Word limit: 1000).

We are preparing a document with experience across Europe on sewage sludge management. We will send this document to the European Commission as soon as it is finalised.