Position Paper

ELO European Landowners' Organization

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European Landowners' Organization takes a strong interest on the proposal from the Italian Ministry for the Environment and Energy Security to amend the Decree- Law No. 99 of 27 January 1992 on the implementation of Directive 86/609/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture[1]. It is currently under consideration by the Commission and for which a decision is expected by the end of June.

Introduction

The provisions of Legislative Decree No 99 of 27 January 1992[2] transposes Directive 86/278/EEC[3] on the use in agriculture of sludge from treatment of civil waste water and its assimilation. In supranational legislation there are no specific provisions with clear technical parameters for determining reduction of the fermentable power of sewage sludge; this situation creates difficulties for industry operators in terms of unambiguously identifying the appropriate parameters to integrate the fulfilment of the condition described above. The regulatory proposal in question, which consist of a single article, aims to overcome these critical issues introducing specific quantitative indicators in order to integrate the condition contained in the definition of "treated sludge" in Article 2 (1)(b) Legislative Decree n. 99 del 1992, relating to the reduction of the fermentable power of the sludge subjected to treatment. The preliminary work on defining the legislative proposal was carried out with the support of the Italian Institute for Environmental Protection and Research (ISPRA)[4].

Amendment to Decree- Law No 99 of 27 January 1992

This amendment consists in adding in Article 3 of the aforementioned Decree after paragraph 6:

"6-bis. The condition for the reduction of the fermentability of treated sludge within the meaning of Article 2(1)(a) and (b) of this Article shall be met if the sludge complies with at least one of the following biological stability limits:
a) an oxygen uptake rate, pursuant to standard UNI EN 16087-1, not exceeding 25 mmol O2/kg of organic matter per hour;
b) a potential to produce residual biogas, within the meaning of standard UNI/TS 11703, not exceeding 0.25 L biogas per gram of volatile solids."

[1] https://technical-regulation-information-system.ec.europa.eu/en/notification/26792
[2] https://www.gazzettaufficiale.it/eli/id/1992/02/15/092G0139/sg
[3] https://eur-lex.europa.eu/eli/dir/1986/278/oj/eng
[4] https://mongoos.eurogoos.eu/members/ispra-institute-for-environmental-protection-and-research/

Impact of the amendment

Due to the technological limitations at the time the legislative decree was drafted in 1992 and, more precisely, the lack of availability of consolidated and standardised measurement methods and instruments applicable to the matter in question, in the current situation there are difficulties in identifying the appropriate parameters to fulfill the conditions required by the Decree-Law No 99 of 27 January 1992.
In the definition given by Art.2 c.1 lett. b) "treated sludge" is "sludge which has undergone biological, chemical or thermal treatment, long-term storage or any other appropriate process, in such a way as to significantly reduce its fermentable capacity and the health problems associated with its use".
However, the aforementioned legislative decree does not provide for any quantitative indicators, compliance with which would allow the relevant reduction in fermentability. From a technical point of view that means the possibility that the treated sludge could trigger biological degradation phenomena, with the consequent foul-smelling fumes.
The legislative proposal in question, therefore, by adding the indicators aims to overcome these difficulties by clarifying the parameters for determining the reduction in the fermentable power of sewage sludge for agricultural use following specific treatments.

Parameters

The proposal identifies these parameters in line with those chosen for compost and digestate under Regulation 2019/1009/EU on fertilising products[5]. Supplement the current rules with this parameters ensure that the use of treated sewage sludge in agriculture complies with hygiene and health requirements, reducing the olfactory impacts of the sludge and, therefore, increasing the degree of acceptability of its use by citizens, while promoting the achievement of the circular economy objectives.

a) an oxygen uptake rate, pursuant to standard UNI EN 16087-1, not exceeding 25 mmol O2/kg of organic matter per hour

The UNI EN 16087-1:2020[6] is a European standard that describes a method for determining the aerobic biological activity of soil improvers and growing media, or their components, by measuring the oxygen uptake rate (OUR)[7]. The OUR indicates how much biodegradable organic matter is being broken down over a specific period. The standard sets specific OUR limits to ensure that materials are sufficiently stable for their intended use and determining the OUR helps assess the stability of soil improvers and growing media, ensuring they won't cause issues such as overheating or bad odors. Not exceeding 25 mmol O_2/kg of organic matter per hour means that no more than 25 millimoles of oxygen should be consumed per kilogram of organic matter per hour. This limit is set to ensure that the material is not too biologically "active", for example to prevent unwanted fermentation or

[5] https://eur-lex.europa.eu/eli/reg/2019/1009/oj/eng
[6] https://www.uni.com/
[7] This is a measure of how much oxygen is consumed by a material (in this case, organic matter) within a unit of time. It is often used to assess the biological activity (such as that of microorganisms) within a material.

decomposition. A high oxygen uptake rate can indicate that the material is still decomposing or contains unstable organic matter, which may cause unpleasant odors, heat generation, or pose risks to plants or the environment. Keeping the value below 25 mmol O_2/kg/h ensures that the material is stabilized and safe to use.

b) a potential to produce residual biogas, within the meaning of standard UNI/TS 11703, not exceeding 0.25 L biogas per gram of volatile solids.

UNI/TS 11703[8] technical standard defines the method for determining the residual biogas production potential. It is especially used for stabilized organic materials, such as compost, digestate and treated sludge to evaluate their environmental safety and suitability for agricultural use or disposal. Residual biogas potential is a measure of the amount of biogas (mainly methane and carbon dioxide) that an organic material can still produce when subjected to anaerobic conditions (i.e., in the absence of oxygen). This test is used to verify whether the material is stabilized and a high residual biogas potential indicates that the material is not yet stabilized and may still ferment, producing unpleasant odors, unwanted gases, or causing environmental issues. The tested material must not produce more than 0.25 L biogas/ g VS[9] present, this is a maximum threshold to consider the material sufficiently stable and having a value below that limit ensures that the material is essentially "fermentation exhausted" and therefore safer to use or dispose of.

Beneficial use of treated sludge in agriculture

As a number of ELO's members are actively involved in the treatment of sewage sludge we are constantly looking at the innovation[10], technologies[11] and research projects for the valorization of this product.

Agriculture currently depends entirely on imported nutrients needed to produce chemical fertilizers, as 45% of European soils have a low organic matter content and consequently a decline in fertility, especially in the Mediterranean countries.

The outcome that came out shows how the treatment of sewage sludge is useful for promoting the circular economy[12], reduce the dependence from non renewable mineral resources[13] and recuperate important nutrients for the soils; also it can be converted into sustainable fertilizer[14] and biofuels, in line with the current European trends for energy transition and sustainable mobility.

[8] https://www.uni.com/
[9] Volatile solids (VS) are the organic fraction of a material that can biologically decompose. They are measured as the portion that volatilizes (evaporates) when a sample is heated to high temperatures
[10] https://www.sciencedirect.com/science/article/abs/pii/S0964830519303579
[11] https://www.sciencedirect.com/science/article/abs/pii/S0957582020315974
[12] https://www.sciencedirect.com/science/article/abs/pii/S0301479721011373
[13] https://pubs.acs.org/doi/10.1021/acssuschemeng.1c07028
[14] https://www.sciencedirect.com/science/article/abs/pii/S0956053X21000970

This process was studied and developed by different European projects such as SYSTEMIC[15] (Horizon 2020), which developed five demonstration plants across Europe to recover nutrients from sewage sludge, manure, and food waste. The goal was to produce fertilizers and organic soil amendments, promoting the circular economy and reducing dependence on non-renewable mineral resources. The outcomes included the creation of replicable business models and policy recommendations to support large-scale adoption.

In a three-year field trial[16], digestate from sewage sludge was used instead of chemical fertilizers. Despite containing more nitrogen, it did not cause higher nutrient losses in the soil or increase harmful emissions. It gave similar crop yields and helped increase soil carbon content, improving soil quality. The study confirms that digestate can be a valid and eco-friendly alternative to traditional fertilizers.

END-O-SLUDG[17] transformed sewage sludge into biopolymers and organo-mineral fertilizers (OMFs). The resulting fertilizers were tested as substitutes for conventional products, showing positive results in terms of technical performance and environmental safety. The methodologies developed helped shift the perception of sludge from waste to resource.

BIOPROS[18] promoted the safe and efficient use of sewage sludge and wastewater for irrigation and fertilization of short rotation plantations (SRP). Its objectives included increasing the production of CO_2-neutral woody biomass, reducing the use of chemical fertilizers, and improving soil quality; all while delivering economic and environmental benefits to rural areas.

Water2REturn[19] focuses on producing organic fertilizers and biostimulants, reducing wastewater discharge, and promoting a circular economy in agriculture by the recovery of nutrients from wastewater, including sewage sludge, for use in agriculture.

Another key point of the different studies conducted with different universities showed that all this benefits are safe and helping the environment[20] and provide different benefits to the soil[21]. A stabilized digestate and ammonium sulphate, recovered from sewage sludge, were compared to synthetic fertilizers in maize cultivation. After three years, no significant differences were found in soil quality or pollutant accumulation. The recovered fertilizers ensured equal nitrogen availability and similar crop yields, without increased emissions or environmental risks.

[15] https://systemicproject.eu/
[16] https://www.sciencedirect.com/science/article/pii/S0048969723001158
[17] https://cordis.europa.eu/article/id/180937-turning-sewage-sludge-into-a-useful-resource
[18] https://eu-cap-network.ec.europa.eu/projects/solution-safe-application-wastewater-and-sludge-high-efficient-biomass-production-short_en
[19] https://circular-cities-and-regions.ec.europa.eu/support-materials/projects/recovery-and-recycling-nutrients-turning-wastewater-added-value-products
[20] https://www.sciencedirect.com/science/article/abs/pii/S0960852422005533
[21] https://www.sciencedirect.com/science/article/abs/pii/S0048969722000080

Additionally, efforts to reduce the olfactory impacts of sludge are crucial for improving its acceptance and minimizing potential nuisances, especially in areas where sludge is used for agricultural purposes The use of digestate from organic waste, applied by soil injection, was compared with urea over three years on cultivation. Ammonia emissions were similar for both fertilizers, but digestate produced less odor[22].

Moreover, ensuring that the use of treated sewage sludge in agriculture complies with hygiene and health requirements is essential for promoting its safe and sustainable application in farming practices. Anaerobic digestion not only transforms sewage sludge into biogas and nutrient-rich digestate, but also effectively eliminates pathogens. This study[23] confirmed that high-solid thermophilic digestion significantly reduces sanitary risks, as pathogens like *Salmonella*, *E. coli*, and SARS-CoV-2 were undetectable in the treated digestate.

Conclusion

We support the objective of the amendment, which seeks to supplement the existing framework with clear parameters that are intended to align with those already defined for compost and digestate in the Regulation (EU) 2019/1009 on fertilizing products.

We believe that this alignment is essential to ensure that the use of treated sewage sludge in agriculture fully complies with EU hygiene and health standards.

It will also contribute to reducing the odour impact typically associated with sludge, thereby improving public acceptance and supporting the broader goals of the circular economy.

The adding of well-stabilized organic matter into the soil is comparable, if not better, than the use of traditional chemical fertilizers.

Moreover, we consider that this legislative proposal will have a highly beneficial impact on small and medium-sized enterprises of the sector.

By providing a clear and harmonised definition of the obligations for operators, the proposal will enhance legal certainty, foster innovation, and promote sustainable farming practices.

It will also contribute to increasing soil fertility while respecting citizens' expectations regarding environmental and quality-of-life standards.

[22] https://www.sciencedirect.com/science/article/abs/pii/S0048969721019525
[23] https://www.sciencedirect.com/science/article/abs/pii/S0013935121018867