ECN Statement

Risk management and risk management options: Digestate and compost as fertilisers

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The European Compost Network request from the EU Commission to recall the study 'Digestate and compost as fertilisers: Risk assessment and risk management options' as the outcome of the study will have an adverse effect on placing compost and digestate as recycled fertilising products on the European Market as promoted by the EU Circular Economy.

The indicated 'safe limits' for the use of compost and digestate as fertilising products in agriculture and horticulture are in contradiction to the limit values as set in the newly adopted EU Fertilising Product Regulation, which came into force on 15 July 2019.

It is not acceptable to indicate 'safe limits' for compost and digestate-based products from different input materials and proposing different 'safe limits' for the use of compost and digestate in agriculture and growing media without considering the principles of sustainable recycling of organic materials

The indicated 'safe limits' and potential contaminants are not in line with previous studies of the Commission, nor with actual National assessments and European-wide accepted limit values for compost and digestate.

ECN urges the European Commission to recall this study!

Background

- DG ENV, Unit Sustainable Chemicals launched the study in November 2017
- Contractor: AMEC Foster Wheeler
- Sub-contractors: Peter Fisk Associates and Ramboll
- Published on EU TED eTendering webpage https://etendering.ted.europa.eu/cft/cft-display.html?cftId=5131 on 11 July 2019
- The procurement is related to a project and/or programme financed by European Union funds: 07 02 01 (Life Op.) - Contributing to a greener and more resource-efficient economy and to the development and implementation of Union environmental policy and legislation

Objectives of the study

- Assess the risk to human health and the environment arising from the presence of contaminants in digestate and compost
- Prepare a risk management options analysis (RMOA) to support Commission possible regulatory actions
- Evaluate the socio-economic effects for operators and society of the possible regulatory actions
- Present the findings in the REACH Annex XV dossier for restriction format

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ECN specific comments on the study 'Digestate and Compost as fertilisers: Risk assessment and risk management options'

Topic	ECN comments
General remark and uncertainties of the study	It is questionable that this study has taken all information on the available 'compost' and digestate' materials on the European market into account. Stakeholders organisations were contacted for the market analyses but were not further involved in a critical review process of this study. Finally, only 5 stakeholder organisations responded to the questionnaire. According to the study a *'realistic worst case risk assessments have been carried out for selected priority contaminants'*, but it is indicated as well that *'it is important to note that a relatively simplistic realistic worst-case approach has be used in the risk assessment in order to simplify the process, and* ***the results are subject to a number of uncertainties*** *considered and discussed in the risk assessment'.*
Definition and calculation of 'Safe limits'	'Safe limits' are defined in section 4.1 as such *'for the endpoints where conventional quantitative risk characterisation is appropriate, a limit below which adverse effects are not expected has been calculated. This is referred to as "safe limit" throughout the report. Note that this does not preclude possible other effects at lower concentrations, related to other endpoints for which quantitative risk characterisation was not possible.'* In general, it is not clear, how the 'safe limits' are calculated.
Safe limits for heavy metals	The proposed 'safe limits' especially for Nickel (7.9 mg Ni / kg dry weight) and Zinc (70 mg Zn /kg dry weight) for the use of compost in 'container growing' as well for Mercury (0.2 mg Hg/kg dry weight) for the agricultural use of compost and digestate on land are questionable and unrealistic. In sector 4.1 it is pointed out that for the approach of assessing the risk for heavy metals the *'natural background and active accumulation mechanisms present a challenge'*.
Different safe limits for use of compost and digestate for agricultural and horticultural purposes.	We do not see any reason for defining different 'safe limits' for the application of compost/AD on agricultural land or for the use in 'container growing'. For container growing, it is not clear whether the safe limits are based on phytotoxic effects on the grown plants, or environmental issues related to soil application after the used growing media is applied
The compost and digestion life cycle (page 48, Figure 4.1)	Two scenarios are compared: S 1 use in field as soil amendment (soil conditioner and fertiliser) and S 2 use as growing medium according to the different handling and use of the materials as well as to the "post-use". For S 2 it is determined, that after the growing season the container medium in container growing (hobby consumers and professional growers) were disposed to soil. In praxis it is unusual, that used growing media are returned directly to the garden or agricultural soil. It is treated either by self-composting or industrial composting due to sanitisation requirements primarily. It seems, that this was not taken into account.

Specific processes and technique for reducing the contaminants in C/D (page 126, Chapter 5.5.5, Tab. 5.6	Metals can be removed from digestate through a two-stage AD process (Evans 2001). The 1st stage includes hydrolysis/acidification and liquefaction of the substrate and the 2nd stage includes methanogenesis. Research results show that around 70% of the Ni, 40% of the Zn and 25% of the Cd can be removed when the leachate from hydrolysis was circulated over a macroporous polyacrylamide column for 6 days (Lehtomäki, A and Björnsson, L, 2006). It is crucial to propose such techniques based on singular projects and individual techniques and which are not neither validated nor used in practice.
Further uncertainties and uncomplete of the study:	**Page. 105 and further** - **Summary of identified risk:** *'Conventional quantitative risk characterisation was carried out where possible. (…) Note that there are some uncertainties …'as expressed in Footnote 101:* *'In particular, the current calculations assume that there is no loss of the substance from the growing medium by leaching (although the analysis carried out in Appendix D suggests that this may not be so significant for nickel and copper) and that the dietary intake from root and leaf crops occurs entirely from crops grown in such media. This latter assumption, in particular,* ***may lead to an overestimation of the risks associated with compost and digestate containing nickel in this scenario and so the estimated safe limit of 7.9 mg/kg dry weight in compost should be seen as preliminary only.*** *These uncertainties apply similarly to copper…'* **Page. 109:** *'Lastly, with the current methods and data available fugacity modelling is not reliable for microplastics, so a generic estimate of exposure to microplastics resulting from digestate and compost use is provided: (…) Hence, further monitoring of microplastics concentrations in C/D is required to judge the need for further risk management in the future.'* **Page 111:** '*46 million tonnes of digestate (and an uncertain but likely small amount of compost) is produced from organic fraction of mixed municipal solid waste (mechanical biological treatment – MBT'* **There should have be reliable data regarding 'compost-like' material produced form MBT as still several countries rely on MBT of mixed municipal solid waste.** **Page 139:** *'Prices of composts for agricultural were rarely above EUR 5/tonne of compost, often lower or given away to farmers free of charge'* **It should be mentioned as well that it is possible to have higher prices (> 40€/t) as the study should show a wide and complete panorama of the composting sector.**
Risk assessment and limit values for compost and digestate	As the proposed 'safe limits' are not in line with previous studies of the Commission, nor with actual National assessments and European-wide accepted limit values for compost and digestate(see Table 1), we doubt that any of the proposed safe limits are appropriate and we think, that the risk assessment approach failed totally.

	Explanation Limit values for parameters related to the safe use of compost and digestate for application as fertiliser or soil improver (or constituent for growing media) are expressed as maximum concentrations in the product but are also based on the application rate. The **VITO Study (2013)** *"Towards risk-based draft limit values for the use of secondary raw materials as fertilizer or soil conditioner"* describes a dynamic model calculating the maximum allowable concentrations of pollutants in the soil conditioner/fertiliser on the basis of the maximum permitted enrichment of the upper soil layer over a period of 100 years, taking into account all possible input-output fluxes and soil processes. The final set of retained parameters (translated into Flemish legislation for sustainable recycling of biowaste (VLAREMA)) and the corresponding limit values for safe use are way beyond these scientifically derived limit values and are also fully in line with the existing internationally accepted limit values for safe application, such as **ECN-QAS**, the **JRC study on end of waste criteria for compost and digestate (2014)**, the **EU Fertilising Products Regulation**. In the **FATE COMES Study of JRC (2013)**, where numerous practical samples of compost and digestate were sampled and analysed, the importance of separate collection, although this was not considered a full safeguard for organic pollutants, was highlighted. As an outcome, PAH was added as a parameter, whereas other pollutants such as PFAS would only apply in case sewage sludge was used. In all risk assessments, strict input material requirements have been designated as a main driver to pursue high quality end products, which allows the set of parameters to be monitored being kept to the essential ones, excluding those parameters unlikely to be present in separately collected biowaste.

Table 1: Overview of the safety limit values for contaminants in different studies, regulations and quality assurance schemes, including the study 'Digestate and compost as fertilisers: Risk assessment and risk management options' (Wood, 2019).

Criteria	JRC end of waste	EU Fertiliser Regulation	Flemish Materials Decree (VLAREMA)	Flemish Materials Decree (VLAREMA)	ECN-QAS	EC study Wood, 2019
	Compost/ digestate	Organic soil improver	Safety limits based on dynamic model	Compost all applications	Compost all applications	Compost/digestate application on land
Cd (mg/kg dm)	1,5	2	6	2	1,3	-
Cr (mg/kg dm)	100	2 (Cr VI)	150	70	60	-
Hg (mg/kg dm)	1	1	1	1	0,45	0,2
Ni (mg/kg dm)	50	50	100	30	40	-
Pb (mg/kg dm)	120	120	300	150	130	100-150
Cu (mg/kg dm)	200	300	800	150	300	-
As (mg/kg dm)	40	40	20	20	-	-
PAH (16) (mg/kg)	6	6		Individual PAH	-	3-10
PCB (7)	-	-	0,8	0,8	-	0,15-0,8

References:

- Towards risk-based draft limit values for the use of secondary raw materials as fertilizer or soil conditioner, VITO, 2013
- End-of-waste criteria for biodegradable waste subjected to biological treatment (compost & digestate): Technical proposals, JRC, 2014
- Occurrence and levels of selected compounds in European compost and digestate samples: Results of a Pan European Screening exercise FATE-COMES, JRC, 2013
- ECN-QAS the European Quality Assurance Scheme for Compost and Digestate https://www.compostnetwork.info/ecn-qas/