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Report on the legal framework governing the use of nutrient rich side streams (NRSS) as biobased fertilisers (BBFs)

EU legislation

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Report on the legal framework governing the use of nutrient rich side streams (NRSS) as biobased fertilisers (BBFs)

EU legislation

COMPILED BY SYLVIA KRATZ (JKI) AND LUDWIG HERMANN (PROMAN CONSULTING)



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LEX4BIO aims to reduce the dependence upon mineral/fossil fertilisers, benefiting the environment and the EU's economy. The project will focus on collecting and processing regional nutrient stock, flow, surplus and deficiency data, and reviewing and assessing the required technological solutions. Furthermore, socioeconomic benefits and limitations to increase substitution of mineral fertiliser for BBFs will be analysed. A key result of LEX4BIO will be a universal, science-based toolkit for optimising the use of BBFs in agriculture and to assess their environmental impact in terms of non-renewable energy use, greenhouse gas emissions and other LCA impact categories. LEX4BIO provides for the first-time connection between production technologies of BBFs and regional requirements for the safe use of BBFs.

The project runs from June 2019 to May 2024. It involves 20 partners and is coordinated by LUKE (LUONNONVARAKESKUS - Natural Resources Institute Finland).

More information on the project can be found at: <http://www.lex4bio.eu>

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Zusammenfassung

Dieser Bericht entstand als Teil der Projektleistung 1.2 des Arbeitspakets 1 im Projekt LEX4BIO, das im Rahmen des EU Forschungs- und Innovationsprogramm „Horizon 2020“ gefördert wird (siehe acknowledgement). Er beschreibt das Europäische Recht über Düngemittel für die konventionelle und ökologische Landwirtschaft, sowie weitere Europäische Normen, die für die Nutzung nährstoffreicher Nebenströme zur Herstellung biobasierter Düngemittel relevant sind. Insbesondere enthält der Bericht Informationen zum Recht des Abfallmanagements, der Qualität von Grund- und Oberflächengewässern, zu Rechtsnormen über Klimaschutz/erneuerbare Energien sowie zu rechtlichen Regelungen aus dem Bereich der Gemeinsamen Agrarpolitik. Die Zusammenstellung soll Interessenvertretern, Wissenschaftlern und allen anderen, die im Bereich „Biobasierte Düngemittel“ arbeiten oder sich dafür interessieren, als Handbuch und Referenz dienen. Dieser Bericht ist Teil A der Projektleistung von WP 1, welche aus zwei Teilen bestehen wird. Er wird zu einem späteren Zeitpunkt im Projekt durch Teil B ergänzt werden, der sich mit der nationalen Rechtslage in den EU-Mitgliedsstaaten befasst.

Abstract

This report forms part of Deliverable 1.2 from Work Package 1 in the LEX4BIO project, which received funding from the European Union's Horizon 2020 research and innovation programme (see acknowledgement). It describes European legislation on fertilising products for conventional and organic farming, as well as other legislation that is relevant in the context of using nutrient-rich sidestreams (NRSS) as biobased fertilisers (BBFs). In particular, legislation on waste management, ground and surface water quality, climate/renewable energy as well as legislation related to the Common Agricultural Policy (CAP) is covered in this report. The report is intended as a handbook and reference for stakeholders, researchers and all others working or interested in the field of biobased fertilisers. This report forms part A of a deliverable from WP1 that will consist of two parts. It will be complemented at a later stage of the project with part B, which will cover national legislation of the European Member States.

European legislation on fertilising products for conventional and organic farming, waste management, ground and surface water quality and other aspects relevant in the context of using nutrient-rich sidestreams (NRSS) as biobased fertilisers (BBFs)

At EU level, the legal framework consists of regulations and directives.

Regulations are binding legislative acts decreed by the European Parliament and Council, following a proposal by the European Commission. They are directly valid in all Member States and must be applied in their entirety, without room for diverging national interpretation.

Directives are legislative acts setting a goal that must be achieved by all Member States. To this end, directives need to be transposed into national legislation which shall define how the member state is going to reach that goal. The transposition usually happens by means of national regulations/ordinances/decrees (which are authorised by national legal acts).

The following EU legislation relates to the use of NRSS as BBFs and are described here with respect to their key contents:

1. Fertilising products and fertilisation

Fertiliser Regulation 2003/2003/EC and Fertilising Products Regulation (EU) 2019/1009

The **Regulation (EC) No 2003/2003** relating to fertilisers laid down rules for products which are placed on the market as fertilisers designated 'EC fertiliser' (Art. 1). Its aim was to provide EU wide **harmonized rules for the composition and definition types of these fertilisers, the designations of these types and their identification (labelling) and packaging** (see recitals preceding the legal text). This regulation **only** encompasses **inorganic (mineral) fertilisers**, organic chelating and complexing agents for micronutrients, nitrification and urease inhibitors and liming materials (Art. 16-28 and Annex I). **Organo-mineral and organic fertilisers are not included.**

If a fertiliser meets the requirements laid down in the type designations of this regulation, it may be sold as 'EC fertiliser' (Art. 3). This EC designation guarantees the farmers a minimum nutrient content and solubility, as well as safety of use. If a producer wants to sell a new product which is not listed in Annex I as EC fertiliser, they must lodge a request with a national competent authority, including technical documentation of their product (Art. 31 and Annex V). This request is then considered by the European Commission based on the advice of an expert committee set up according to the Regulation. According to Art. 14, a type of fertiliser may only be included in Annex I if

- a) it provides nutrients in an effective manner
- b) relevant sampling, analysis, and if required, test methods are being provided and
- c) under normal conditions of use it does not adversely affect human, animal, or plant health, or the environment.

While the regulation does specify nutrient contents and solubilities as well as analytical methods for their documentation (Annex IV), **no limit values for contaminants** are defined. However, Member

States can get a **derogation** from Art. 5 of the Regulation (regarding free circulation of products), granting them to apply their own **national cadmium (Cd) limits** (Art. 35).

As a regulation, 2003/2003/EC is directly applicable in the EU Member States and does not need to be transposed into national law. However, **while its aim is to harmonise rules** in order to facilitate trade between Member States (recital 4 and Art. 5), **it still leaves room for regulating fertilisers on national level** (recital 4). Meanwhile, according to the **principle of mutual recognition** stemming from **Regulation (EC) No 764/2008** (to be replaced by Regulation (EU) No 2019/515 as of April 19, 2020) laying down procedures relating to the application of certain national technical rules to products lawfully marketed in another Member State, **Member States are obliged to ensure market access for products that are not subject to EU harmonisation**. This principle guarantees that any product lawfully sold in one EU country can be sold in another, even if it does not fully comply with the technical rules of the other country, as long as valid interests of the destination Member State, such as the protection of health and environment, are not hampered (https://ec.europa.eu/growth/single-market/goods/free-movement-sectors/mutual-recognition_en, last accessed Nov 26, 2019). Member States must implement this principle into their national legislation on fertilising products, see for example §3 DüngG (German Fertiliser Act).

Regulation (EC) No 2019/1009 laying down rules on the making available on the market of EU fertilising products (**repealing 2003/2003/EC** and amending 1069/2009/EC) was published in the Official Journal of the European Union on June 25, 2019 and **will come into force** 3 years after its publication, i.e. **in July 2022**.

A **main objective** of the new Regulation is to further **aid the development of circular economy** and allow a more **resource-efficient general use of nutrients** (recital 1). Therefore, other than 2003/2003/EC, the new Fertilising Products Regulation 2019/1009 **extends its scope from inorganic to organo-mineral and organic fertilisers, including recycled materials**. In addition, it also covers other fertiliser-related product groups intended to improve plants' nutrition efficiency, such as soil improvers and biostimulants (see below).

Like its predecessor, 2019/1009/EC still keeps the possibility open to make non-harmonised fertiliser available on the internal market in accordance with national law. Accordingly, compliance with the harmonised rules of this Regulation remains optional and is required only for those products which are CE marked (recital 5).

2019/1009/EC **gives up the concept of type designations**. Instead, it is based on so-called **product function categories (PFCs) and component material categories (CMCs)**. EC labelled fertilising products may only be produced from designated CMCs.

The Regulation defines **limit values for contaminants and pathogens individually for each PFC** (see Table below). Regarding **cadmium (Cd)**, Member States keep their right to apply their own national limit values until harmonised limit values for Cd are applicable at Union level which are equal to or lower than the national limits (**derogation** from Art. 3 on free movement).

The following **product function categories (PFCs)** are defined and described with regard to their minimum nutrient contents, organic carbon contents, other allowed ingredients, as well as limit values for contaminants and pathogens in **Annex I** of the new Regulation:

PFC 1: Fertiliser

(A) Organic fertiliser

- (B) Organo-mineral fertiliser
- (C) Inorganic fertiliser

PFC 2: Liming material

PFC 3: Soil improver

- (A) Organic soil improver
- (B) Inorganic soil improver

PFC 4: Growing medium

PFC 5 Inhibitor

- (A) Nitrification inhibitor
- (B) Denitrification inhibitor
- (C) Urease inhibitor

PFC: 6 Plant biostimulant

- (A) Microbial plant biostimulant
- (B) Non-microbial plant biostimulant

PFC: 7 Fertilising product blend

In PFC 1, *organic, organo-mineral and inorganic fertilisers are differentiated based on their contents of organic matter* or rather, organic carbon (% C_{org} , by mass).

PFC 1(A) Organic fertiliser

1(A)(I) solid organic fertiliser: at least 15% C_{org}

1(A)(II) liquid organic fertiliser: at least 5% C_{org}

PFC 1(B) Organo-mineral fertiliser

Shall be a co-formulation of:

- a) One or more inorganic fertilisers as specified in PFC 1(C) and
- b) One or more materials containing organic carbon (C_{org}) and nutrients of solely biological origin.

1(B)(I) solid organo-mineral fertiliser: at least 7.5% C_{org}

1(B)(II) liquid organo-mineral fertiliser: at least 3% C_{org}

PFC 1(C) Inorganic fertiliser

An **inorganic fertiliser** shall be a fertiliser containing or releasing nutrients in a mineral form, other than an organic or organo-mineral fertiliser, i.e. with a **C_{org} content of <3% by mass (or 7.5%, for liquid and solid fertilisers, respectively)**.

(If it contains more than 1% C_{org} other than from chelating or complexing agents, nitrification/denitrification/urease inhibitors, coating agents, urea or calcium cyanide, it must comply with limit values for pathogens like those defined for organic and organo-mineral fertilisers, see Table below.)

As specified in Annex III (Labelling requirements), Part II (Product-specific labelling requirements) PFC 1, No. 4(a), the **term 'mineral fertiliser'** may be used only if the inorganic fertiliser **does not contain more than 1% by mass C_{org}** other than from chelating or complexing agents, nitrification/denitrification/urease inhibitors, coating agents, urea or calcium cyanide.

The *differentiation* between organic and inorganic soil improvers is based on the criterion that **PFC 3(A) Organic soil improver** shall consist of *material 95% of which is of solely biological origin*. **PFC 3(B) Inorganic soil improver** is defined as soil improver other than an organic soil improver.

As was pointed out by the European Compost Network (ECN) in their position paper on the new Fertiliser Products Regulation (ECN, 2017; updated 2018), the distinction between PFC 1(A)(1) (solid organic fertiliser) and PFC 3(A) (organic soil improver) is not without ambiguities. This is illustrated in the following table:

Table: Definitions for solid organic fertilisers (PFC 1(A)(1)) and organic soil improvers (PFC 3(A)) according to Annex I of Regulation (EC) No 2019/1009

	Solid organic fertiliser (PFC 1(A)(1))	Organic soil improver (PFC 3(A))
General definition of product function	Fertiliser: To provide nutrients to plants.	Soil improver: to maintain, improve or protect the physical or chemical properties, the structure or the biological activity of the soil to which it is added.
Composition	Organic carbon (C_{org}) and nutrients, solely of biological origin.	Material 95% of which is of solely biological origin.
Dry matter content	In solid form	At least 20%
Nutrient content	Where it contains only one declared primary nutrient, at least: 2.5% total N, or 2% total P_2O_5 , or 2% total K_2O . Where it contains more than one declared primary nutrient at least 1% of either N, P_2O_5 or K_2O and a sum of those nutrient contents of at least 4% by mass.	Not defined
Organic carbon content (C_{org})	At least 15% by mass	At least 7.5% by mass

It is therefore proposed by ECN (see Veecken et al., 2016) to use stabilised (effective) organic matter (EOM) as a criterion instead of total organic matter (C_{org}) in order to emphasize the contribution of the product to the enrichment of soil organic matter and improvement of physical and biological soil quality. In addition, to make a clear distinction between nutrient supply (i.e. fertiliser) and improvement of soil quality, the ratios EOM/mineral N and EOM/total P are suggested by ECN.

There are further critical points mentioned in the position paper by ECN, regarding the sanitation requirement (pathogen control with limit values for *Escherichia coli* /*Enterococcaceae*), and the proposed time-temperature profiles for composting which according to ECN are not in line with the state of the art for composting.

While it is not likely that the definitions of this Regulation will be amended in the near future, it is desirable that ambiguities are clarified.

Table: Limit values for inorganic and organic contaminants and pathogens in the Product Function Categories (PFCs) as defined Annex I of Regulation (EU) No 2019/1009

	PFC 1(A)	PFC 1(B)	PFC 1(C)(I)	PFC 1(C)(II)	PFC 2	PFC 3(A)	PFC 3(B)	PFC 4	PFC 6
Contaminant	Organic fertiliser	Organo-mineral fertiliser	Inorganic macronutrient fertiliser	Inorganic micronutrient fertiliser	Liming material	Organic soil improver	Inorganic soil improver	Growing medium	Plant biostimulants
Cd (mg/kg DM)	1.5	3	3	200***	2	2	1.5	1.5	1.5
Cd (mg/kgP ₂ O ₅) Where total P ≥5% by mass		60	60						
Cr VI (mg/kg DM)	2	2	2		2	2	2	2	2
Hg (mg/kg DM)	1	1	1	100***	1	1	1	1	1
Ni (mg/kg DM)	50	50	100	2000***	90	50	100	50	50
Pb (mg/kg DM)	120	120	120	600***	120	120	120	120	120
As (mg/kg DM)	40 (inorganic)	40 (inorganic)	40	1000***	40	40 (inorganic)	40 (inorganic)	40 (inorganic)	40 (inorganic)
Biuret (C ₂ H ₅ N ₃ O ₂) (g/kg DM)	Must not be present	12	12						
Perchlorate (ClO ₄ ⁻) (mg/kg DM)			50						
Cu (mg/kg DM)	300	600*	600*		300	300	300	200	600
Zn (mg/kg DM)	800	1500*	1500*		800	800	800	500	1500
Salmonella ssp.	Absence in 25g or 25ml	Absence in 25g or 25ml	Absence in 25g or 25ml**			Absence in 25g or 25ml		Absence in 25g or 25ml	Absence in 25g or 25ml****
Escherichia coli or Enterococcaceae	1000 CFU in 1g or 1ml	1000 CFU in 1g or 1ml	1000 CFU in 1g or 1ml**			1000 CFU in 1g or 1ml		1000 CFU in 1g or 1ml	1000 CFU in 1g or 1ml*****
<p>* Does not apply if Cu or Zn has been intentionally added as a micronutrient and is declared in accordance with Annex III</p> <p>** Only applies if the fertiliser contains more than 1% by mass of inorganic carbon (C_{org}) other than from chelating or complexing agents, nitrification/denitrification/urease inhibitors, coating agents, urea or calcium cyanamide</p> <p>*** in mg/kg of total micronutrient content, which means boron (B), cobalt (Co), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo) and zinc (Zn)</p> <p>**** for microbial plant biostimulants (PFC 6(A)), this limit is also applicable for <i>Listeria monocytogenes</i>, <i>Vibrio</i> ssp., <i>Shigella</i> ssp. and <i>Staphylococcus aureus</i>.</p> <p>***** for microbial plant biostimulants, this limit only applies for <i>Escherichia coli</i>. The limit for Enterococcaceae is 10 CFU/g. Additional limits for PFC 6(A): Anaerobic plate count (unless the microbial plant biostimulant is an aerobic bacterium) 10⁵ CFU/g or ml. Yeast and mould count (unless the microbial plant biostimulant is a fungus) 1000 CFU/g or ml.</p>									

Annex II designates the **component material categories (CMCs)** allowed to produce an EU fertilising product as follows:

CMC 1: Virgin materials and substances

CMC 2: Plants, plant parts or plant extracts

CMC 3: Compost

CMC 4: Fresh crop digestate

CMC 5: Digestate other than fresh crop digestate

CMC 6: Food industry by-products

CMC 7: Micro-organisms

CMC 8: Nutrient polymers

CMC 9: Polymers other than nutrient polymers

CMC 10: Derived products within the meaning of Regulation (EC) No. 1069/2009 (Animal By-products Regulation)

CMC 11: By-products within the meaning of Directive 2008/98/EC (Waste Framework Directive)

In accordance with its aim to aid the development of circular economy, the new Regulation defines an **end point in the manufacturing chain** for **component materials derived from animal-by products** within the meaning of **Regulation (EC) No 1069/2009**. To this end, **Art. 5(2)** of Regulation (EC) No 1069/2009 is modified accordingly (see **Art. 46** of Regulation (EC) No 2019/1009). **CMC 10** is designated to contain a table listing and specifying such derived materials having reached the end point in the manufacturing chain. A footnote to CMC 10 states that this table will be established by delegated acts referred to in Art. 42(5) of this Regulation. At the time of this writing (November 2020), no such delegated act has been released. However, a working group lead by DG Santé has started activities and submitted a first proposal with candidate materials to EFSA for a general assessment.

Similarly, an **end-of-waste status** is defined for certain **recovered wastes (such as struvite, biochar and ash-based products)** as of the moment of compliance with the requirements of Regulation 2019/1009, i.e. **products containing these materials will cease to be regarded as waste** within the meaning of **Directive 2008/98/EC** from the moment that the EU declaration of conformity was drawn up (recital 19 and **Art. 19 of Regulation (EC) No 2019/1009**). Specific recovery requirements for such materials have been proposed since the publication of 2019/1009/EC by JRC (see chapter on JRC Technical Proposals) and will probably be adopted as criteria for the respective **additional CMCs 12-14** into the Regulation until the middle of 2020 (see proposal of the Commission of Nov 7, 2019). At this point it must be emphasized, however, that, as Huygens et al. (2019) explain in the JRC Technical Proposals (pages 28-29): 'The **CE product status shall only apply to those materials that meet all the requirements for relevant PFCs**, in particular the conformity assessment requirements applicable to fertilising products. This implies that materials that meet the requirements of the CMC, but not those of the PFC, shall still have the same status as the input material from which they have been manufactured (e.g. waste status for CMCs derived from waste input materials; unless these have achieved end-of-waste status at Member State level). CMC materials that are waste are thus still subject to waste legislation, including possible restrictions on, for example, transport and permit requirements for processing such materials. Therefore, the **recovery rules** proposed in this document

CANNOT be interpreted as possible end-of-waste criteria, as they do not go as far as attributing PFC status, **but stop at providing CMC material status.**

For each CMC, **eligible input materials** are listed in **Annex II of 2019/1009/EC** (see Table 1). In addition, further **specific process and quality requirements** are defined for each CMC in this Annex.

Table 1: Eligible input materials for the component material categories (CMCs) according to Regulation (EU) 2019/1009, Annex II

CMC	Eligible input materials
1 Virgin material substances and mixtures	Substances and mixtures (with REACH registration according to Regulation (EC) 1907/2006), <u>except</u> <ul style="list-style-type: none"> (a) Waste within the meaning of Directive 2008/98/EC (b) Substances or mixtures with end-of-waste status (c) Substances formed from precursors with end-of-waste status (d) By-products within the meaning of Directive 2008/98/EC (e) Animal by-products or derived products within the meaning of Regulation (EC) No. 1069/2009 (f) Polymers (g) Compost (h) Digestate.
2. Plants, plant parts or plant extracts	Plants (including mushrooms and algae, but excluding cyanobacteria), plant parts or plant parts having undergone no other processing than cutting, grinding, milling, sieving, sifting, centrifugation, pressing, drying, frost treatment, freeze drying or extraction with water or supercritical CO ₂ extraction.
3. Compost	Compost obtained through aerobic composting of exclusively one or more of the following input materials: <ul style="list-style-type: none"> (a) Biowaste within the meaning of directive 2008/98/EC resulting from separate biowaste collection at source (b) Derived products referred to in Art. 32 of Regulation (EC) No 1069/2009 for which the end point in the manufacturing chain has been determined (c) Living or dead organisms or parts thereof, which are unprocessed or processed only by manual, mechanical or gravitational means, by dissolution in water, flotation, extraction with water, steam distillation or heating solely to remove water, or extracted from air, except: <ul style="list-style-type: none"> - the organic fraction of mixed municipal household waste - sewage sludge, industrial sludge or dredging sludge, and - animal by-products or derived products for which no end point in the manufacturing chain has been determined (d) Composting additives which are necessary to improve the process performance or environmental performance of the composting process (with specific requirements and restrictions, including REACH registration) (e) Any material listed in points a-c which has previously been composted or digested and contains no more than 6 mg/kg DM of PAH₁₆.

CMC	Eligible input materials
4. Fresh crop digestate	<p>Digestate obtained through anaerobic digestion of exclusively one or more of the following input materials:</p> <ul style="list-style-type: none"> (a) Plants or plant parts grown for the production of biogas (including algae, excluding cyanobacteria) (b) Digestion additives which are necessary to improve the process performance or environmental performance of the digestion process (with specific requirements and restrictions, including REACH registration) (c) Any material referred to in point (a) that has previously been digested.
5. Digestate other than fresh crop digestate	<p>Digestate obtained through anaerobic digestion of exclusively one or more of the following input materials:</p> <ul style="list-style-type: none"> (a) Biowaste within the meaning of Directive 2008/98/EC resulting from separate biowaste collection at source (b) Derived products referred to in Art. 32 of Regulation (EC) No 1069/2009 for which the end point in the manufacturing chain has been determined (c) Living or dead organisms or parts thereof, which are unprocessed or processed only by manual, mechanical or gravitational means, by dissolution in water, flotation, extraction with water, steam distillation or heating solely to remove water, or extracted from air, except: <ul style="list-style-type: none"> - the organic fraction of mixed municipal household waste - sewage sludge, industrial sludge or dredging sludge and - animal by-products or derived products for which no end point in the manufacturing chain has been determined (d) Digestion additives which are necessary to improve the process performance or environmental performance of the digestion process (with specific requirements and restrictions, including REACH registration) (e) Any material listed in points a-c which has previously been composted or digested and contains no more than 6 mg/kg DM of PAH₁₆
6. Food industry by-products	<p>Consisting of one of the following substances (with REACH registration according to Regulation (EC) 1907/2006) :</p> <ul style="list-style-type: none"> (a) Food industry factory lime (obtained by carbonation of organic matter, using exclusively burnt lime from natural sources) (b) Molasses (viscous by-product of the refining of sugarcane or sugar beets into sugar) (c) Vinasse (viscous by-product of the fermentation process of molasses into ethanol, ascorbic acid or other products) (d) Distillers grains (by products resulting from the production of alcoholic beverages) (e) Plants, plant parts or plant extracts having undergone only heat treatment or heat treatment in addition to processing methods referred to in CMC2 (f) Lime from drinking water production, i.e. residue which is released by production of drinking water from

CMC	Eligible input materials
	groundwater or surface water and consists, mainly, of calcium carbonate
7. Micro-organisms	Only applicable to PFC 6(A) Microbial biostimulants Micro-organisms, including dead or empty-cell micro-organisms and non-harmful residual elements of the media on which they were produced, which have undergone no other processing than drying or freeze-drying and are listed in the added table (currently, this table only contains the following 4 groups: Azotobacter ssp., Mycorrhizal fungi, Rhizobium ssp., Azospirillum ssp.)
8. Nutrient polymers	Polymers exclusively made up of monomer substances complying with the criteria set out in points 1 and 2 of CMC 1, where the purpose of the polymerisation is to control the release of nutrients from one or more of the monomer substances.
9. Polymers other than nutrient polymers	Polymers with the purpose <ul style="list-style-type: none"> (a) To control the water penetration into nutrient particles and thus the release of nutrients ('coating agent') (b) To increase the water retention capacity or wettability of the EU fertilising product (c) To bind material in an EU fertilising product belonging to PFC 4. Polymers of this category must comply with biodegradability criteria established by delegated acts (after transition period of 7 years).
10. Derived products within the meaning of Regulation (EC) No 1069/2009 (on animal by-products)	Derived products within the meaning of 1069/2009/EC having reached the end point in the manufacturing chain as determined in accordance with that Regulation: A list specifying such products will be established by delegated acts referred to in Art. 42(5)
11. By-products within the meaning of Directive 2008/98/EC (on waste)	By-products within the meaning of Directive 2008/98/EC (with REACH registration according to Regulation (EC) No 1907/2006) <u>except</u> : <ul style="list-style-type: none"> (a) Animal by-products or derived products within the meaning of Regulation (EC) 1069/2009 (b) Polymers (c) Compost (d) Digestate

Regarding **CMC 11, by-products within the meaning of Directive 2008/98/EC** (Waste Framework Directive), Art. 42(7) of Regulation (EC) 2019//1009 defines an **obligation to set criteria on agronomic efficiency and safety of use** for adoption into the Regulation as a delegated act. The timeline for this is 3 years after the entry of this Regulation into force, i.e. July 2022. On April 24, 2020, JRC has published a first version of a background document on Technical proposals for by-products as component materials for EU Fertilising products (Huygens and Saveyn, 2020, https://phosphorusplatform.eu/images/download/JRC-CMC11-ByProducts-1st-report-27_4_20.pdf), which was open to comment via members of the EU Fertilisers Expert Group until June 1, 2020. In this document the directional framework of the project is outlined and a positive list for CMC 11 is proposed, grouping candidate by-product materials into 4 main groups:

- 1) Residues from chemical industry

- 2) Residues from food, feed and beverage industry and biorefineries
- 3) Residues from smelting industry
- 4) Residues from air cleaning systems.

The document contains a preliminary list of candidate by-product materials as a basis for further detailed assessment which is now being carried out after stakeholder feedback has been given.

JRC Technical proposals for selected new fertilising materials under the Fertilising Products Regulation 2019/1009

This document published by JRC is known as "STRUBIAS" report due to its original scope which was limited to **struvites**, **biochars** and **ash-based** materials. However, its scope has been expanded since the beginning of the STRUBIAS project and now includes the following (renamed) candidate materials:

- Precipitated phosphate salts and derivatives (i.e. materials of a different chemical composition derived from them)
- Thermal oxidation materials and derivatives
- Pyrolysis and gasification materials (i.e. organic materials that were thermally degraded in the total or partial absence of oxygen)

The final report was presented by Huygens et al. in September 2019. It explores a possible legal framework for the three categories of fertilising materials named here. The report contains technical proposals on eligible input materials (see Table 2), process conditions, quality requirements and quality management requirements. Based on this report, the European Commission presented a proposal in November 2019 to adopt these materials as additional component material categories (CMCs) into the EU regulation 2019/1009.

Table 2: Eligible input materials for STRUBIAS-related component material categories (CMCs) 12-14 proposed the Commission (Nov 7, 2019) based on the final STRUBIAS report by Huygens et al. (2019)

CMC	Eligible input materials
12. Precipitated phosphate salts and derivatives	<p>Exclusively obtained through precipitation from one or more of the following input materials:</p> <ol style="list-style-type: none"> (a) Wastewaters and sewage sludge from municipal wastewater treatment plants (b) Derived products referred to in Art. 32 of Regulation (EC) No 1069/2009 for which the end point in the manufacturing chain has been determined (c) Animal by-products, the products derived from which are referred to in Art. 32 of Regulation (EC) No 1069/2009 and have an end point in the manufacturing chain determined (d) Wastewaters from food processing, pet food, feed, milk and drink industries, unless the processing steps involved contact with biocides (e) Residues from the production of bioethanol and biodiesel (f) Biowaste within the meaning of Directive 2008/98/EC resulting from separate biowaste collection at source, other than those materials included in points (b) and (c)

CMC	Eligible input materials
	<p>(g) Living or dead organisms or parts thereof, which are unprocessed or processed only by manual, mechanical or gravitational means, by dissolution in water, flotation, extraction with water, steam distillation or heating solely to remove water, or extracted from air, except:</p> <ul style="list-style-type: none"> - materials originating from mixed municipal waste - sewage sludge, industrial sludge or dredging sludge and - animal by-products or derived products for which no end point in the manufacturing chain has been determined - materials mentioned in points a-f <p>(h) Substances and mixtures, other than:</p> <ul style="list-style-type: none"> - those listed under point a-g - waste within the meaning of Directive 2008/98/EC - substances or mixtures which have ceased to be waste in one or more Member States - substances formed from precursors which have ceased to be waste in one or more Member States - non-biodegradable polymers, and - animal by-products or derived products within the scope of Regulation (EC) No 1069/2009 <p>In addition, salts obtained from the above listed materials processed by manual, mechanical or gravitational means, by solid-liquid fractionation using biodegradable polymers, by dissolution in water, flotation, extraction with water, steam distillation or by heating solely to remove water, by thermal hydrolysis, anaerobic digestion or composting. The temperature of such processes shall not be raised above 275°C.</p> <p>Derivates, i.e. materials that have been modified in their chemical composition through chemical manufacturing that reacts precipitated phosphate salts with materials listed under point (h) that are consumed in or used for chemical processing, are also included.</p> <p>Additional requirements:</p> <ul style="list-style-type: none"> • Minimum P₂O₅ content: 16% of dry matter content • Maximum C_{org} content: 3% of dry matter content • Macroscopic impurities > 2mm in the form of organic matter, glass, stones, metal and plastics: max. 3g/kg dry matter each, • max. 5g/kg dry matter for the sum of macroscopic impurities • sum of aluminum (Al) and iron (Fe): max. 10% of dry matter • Limit values for pathogens (if the respective PFC containing or consisting of CMC 12 materials does not define them): <i>Salmonella</i> ssp.: Absence in 25g or 25 ml <i>Escherichia coli</i> or <i>Enterococcaceae</i>: 1000 CFU in 1g or 1ml

CMC	Eligible input materials
	<p>Additional limit values for CMC12 materials obtained from wastewaters and sewage sludge from municipal WWTPs: <i>Clostridium perfringens</i>: 100 CFU in 1g or 1ml <i>Ascaris</i> sp. eggs: Absence in 25g or 25ml PAH₁₆: 6 mg/kg dry matter</p> <p>Materials must have obtained REACH registration according to Regulation (EC) No 1907/2006.</p>
13. Thermal oxidation materials and derivates	<p>Exclusively obtained through thermal conversion under non-oxygen-limiting conditions from one or more of the following input materials:</p> <ul style="list-style-type: none"> (a) Living or dead organisms or parts thereof, which are unprocessed or processed only by manual, mechanical or gravitational means, by dissolution in water, flotation, extraction with water, steam distillation or heating solely to remove water, or extracted from air, except: <ul style="list-style-type: none"> - materials originating from mixed municipal waste - sewage sludge, industrial sludge or dredged sludge - animal by-products or derived products within the scope of Regulation (EC) No 1069/2009 - materials separately listed under points e)-h) (b) Vegetable waste from the food processing industry and fibrous vegetable waste from virgin pulp production and from production of paper from virgin pulp (c) Derived products referred to in Art. 32 of Regulation (EC) No 1069/2009 for which the end point in the manufacturing chain has been determined (d) Animal by-products, the products derived from which are referred to in Art. 32 of Regulation (EC) No 1069/2009 and have an end point in the manufacturing chain determined (e) Bio-waste within the meaning of Directive 2008/98/EC resulting from separate bio-waste collection at source (f) Materials resulting from a controlled microbial or thermochemical conversion process using exclusively those input materials listed under points a)-e) and i) (g) Sewage sludge from municipal wastewater treatment plants (h) Waste within the meaning of directive 2008/98/EC with the exception of: <ul style="list-style-type: none"> - those listed under points a)-j) - materials which display one or more of the hazardous properties listed in Annex III to Directive 2008/98/EC - materials originating from mixed municipal waste - bio-waste within the meaning of Directive 2008/98/EC resulting from separate bio-waste collection at source - animal by-products or derived products within the scope of Regulation (EC) No 1069/2009 (i) Auxiliary fuels (natural gas, liquefied petroleum gas, natural gas condensate, process gases and components

CMC	Eligible input materials
	<p>thereof, crude oil, coal, coke as well as their derived materials), when used in incineration, co-incineration or biomass combustion plants to process input materials listed under points a)-h)</p> <p>(j) Substances which are used in production processes of the iron and steel industry</p> <p>(k) Substances and mixtures, with the exception of:</p> <ul style="list-style-type: none"> - those listed under points a)-j) - waste within the meaning of Directive 2008/98/EC - substances or mixtures which have ceased to be waste in one or more Member States - substances formed from precursors which have ceased to be waste in one or more Member States - non-biodegradable polymers - animal by-products or derived products within the scope of Regulation (EC) No 1069/2009 <p>Derivates from thermal oxidation materials, i.e. materials that have been modified in their chemical composition by chemical or thermochemical manufacturing, are also included here.</p> <p>Additional requirements:</p> <ul style="list-style-type: none"> • C_{org} content <3% • Max. PAH₁₆ content: 6 mg/kg dry matter • Max. PCDD/F content: 20 ng WHO toxicity equivalents/kg dry matter • Limit value for total chromium (Cr) for products containing or consisting of CMC13 materials listed under points g), h) or j): 400 mg/kg dry matter • Limit value for thallium (Tl) for products containing or consisting of CMC13 materials listed under points g), h) or j): 2 mg/kg dry matter • Limit value for vanadium (V) for products containing or consisting of CMC13 materials listed under points h) or j): 600 mg/kg dry matter • Max. chlorine (Cl⁻) content if chlorine was not intentionally added in the manufacturing process to produce alkali melt salt or alkaline earth metal salts: 30 g/kg dry matter <p>Materials must have obtained REACH registration according to Regulation (EC) No 1907/2006.</p>
14. Pyrolysis and gasification materials	<p>Exclusively obtained through the thermochemical conversion under oxygen-limiting conditions of one or more of the following input materials:</p> <p>(a) Derived products referred to in Art. 32 of Regulation (EC) No 1069/2009 for which the end point in the manufacturing chain has been determined</p> <p>(b) Animal by-products, the products derived from which are referred to in Art. 32 of Regulation (EC) No 1069/2009</p>

CMC	Eligible input materials
	<p>and have an end point in the manufacturing chain determined</p> <p>(c) Living or dead organisms or parts thereof, which are unprocessed or processed only by manual, mechanical or gravitational means, by dissolution in water, flotation, extraction with water, steam distillation or heating solely to remove water, or extracted from air, except:</p> <ul style="list-style-type: none"> - materials originating from mixed municipal waste - sewage sludge, industrial sludge or dredged sludge - animal by-products or derived products falling within the scope of Regulation (EC) No 1069/2009 - materials separately listed under points d) - f) <p>(d) Vegetable waste from the food processing industry and fibrous vegetable waste from virgin pulp production and from production of paper from virgin pulp</p> <p>(e) Bio-waste within the meaning of Directive 2008/98/EC resulting from separate bio-waste collection at source, other than those included above</p> <p>(f) Processing residues from the production of bioethanol and biodiesel</p> <p>(g) Pyrolysis/gasification additives which are necessary to improve the process performance or environmental performance of the pyrolysis/gasification process, provided that the additives classify as intermediates within the meaning of Regulation (EC) 1907/2006 and with the exception of:</p> <ul style="list-style-type: none"> - those listed under points c)-f) - waste within the meaning of Directive 2008/98/EC - substances or mixtures which have ceased to be waste in one or more Member States - substances formed from precursors which have ceased to be waste in one or more Member States - non-biodegradable polymers - animal by-products or derived products within the scope of Regulation (EC) No 1069/2009 <p>Maximum total concentration of all additives: 25% of the fresh matter of the total input material.</p> <p>In addition, processing of pyrolysis and gasification materials by manual, mechanical or gravitational means, by solid-liquid fractionation using biodegradable polymers, by dissolution in water, flotation, extraction with water, steam distillation or by heating solely to remove water, by composting or anaerobic digestion is included.</p> <p>Additional requirements:</p> <ul style="list-style-type: none"> • Molar ratio hydrogen (H)/organic carbon (C_{org}) <0.7 with testing to be performed in the dry and ash-free fraction for materials that have a C_{org} content <50% • Max. PAH₁₆ content: 6 mg/kg dry matter

CMC	Eligible input materials
	<ul style="list-style-type: none"> • Max. PCDD/F content: 20 ng WHO toxicity equivalents/kg dry matter • Max. dl-PCB content: 0.8 mg/kg dry matter • Max. chlorine (Cl) content: 30 g/kg dry matter • Max. thallium (Tl) content: 2 mg/kg dry matter, in case more than 5% of pyrolysis or gasification additives relative to the fresh weight of total input material have been applied. <p>Materials must have obtained REACH registration according to Regulation (EC) No 1907/2006.</p>

All CMCs proposed here must obtain REACH registration according to Regulation (EC) 1907/2006, unless they are covered by one of its exemptions listed in Annexes IV and V.

Furthermore, JRC proposes a **list of materials** which could be considered as having reached an **endpoint in the manufacturing chain** in accordance with the third subparagraph of Art. 5(2) of **Regulation (EC) No 1069/2009 (on animal by-products)**, for further consideration and evaluation by the Commission and other bodies, and defines further criteria for them, including the following materials:

1. Precipitated phosphate salts and derivatives that have been derived from manure, non-mineralised guano, and digestive tract content pursuant to Regulation (EC) No 1069/2009
2. Precipitated phosphate salts and derivatives that have been derived from animal by-products and derived materials from cat. 2 or cat. 3 material as defined by 1069/2009
3. Thermal oxidation materials and derivatives that have been derived from animal by-products and derived materials from cat. 2 or cat.3 materials as defined by 1069/2009
4. Pyrolysis and gasification materials that have been derived from manure, non-mineralised guano and digestive tract content pursuant to 1069/2009
5. Pyrolysis and gasification materials that have been derived from animal by-products and derived materials from cat. 2 or cat. 3 material as defined by 1069/2009.

[REACH Regulation 1907/2006/EC, last amended on June 11, 2019](#)

Regulation (EC) No 1907/2006 concerns the **registration, evaluation, authorisation and restriction of chemicals (REACH)**.

The purpose of this Regulation is to ensure a high level of **protection of human health and the environment**, including the promotion of alternative methods for assessment of hazards of substances, as well as the free circulation of substances on the internal market (Art. 1 No 1).

It lays down **provisions on substances and preparations** applying to the manufacture, placing on the market or use of such substances on their own, in preparations or in articles (Art. 1 No 2). According to Art. 3 No 1, 'Substance' means a chemical element and its compounds in the natural state or obtained by any manufacturing process. No 2 defines 'preparation' as a mixture or solution composed of two or more substances.

The Regulation is based on the principle that it is for the manufactures, importers and downstream users to ensure that the manufacture, placing on the market or use of such substances do not adversely affect human health or the environment (Art. 1 No 3). In line with this, manufacturers and

importers are required to collect and provide information on the properties of their chemical substances which will allow their safe handling when registering their substances according to the **general obligation to register** before placing them on the market (Art. 5-14).

The Regulation further establishes a **European Chemicals Agency** responsible to register and manage the information supplied on the chemicals in a central database, coordinate the evaluation of suspicious chemicals and build up a public database in which consumers and professionals can find hazard information.

Waste is not a substance, preparation or article within the meaning of this Regulation (Art. 2 No 2). However, chemical products manufactured from waste are subject to the REACH Regulation if the end-of-waste status is achieved and substances or preparations are placed on the market, e.g. as a fertilising product under the new Fertilising Products Regulation.

Art. 2(7) (a) and (b) grant exemptions from the obligation to register for substances covered by Annexes IV and V of this Regulation, as (a) sufficient information is known about these substances that they are considered to cause minimum risk because of their intrinsic properties, or (b) registration is deemed inappropriate or unnecessary for these substances and their exemption does not prejudice the objectives of this Regulation. According to Annex V Nr. 12, **biowaste compost** is explicitly excluded from REACH registration. An extension of the derogation to **digestates** was published on Oct 10, 2019 as amendment to Annex V Nr. 12 in Commission Regulation (EU) 2019/1691.

[Regulation \(EC\) No 834/2007 \(old\) and Regulation \(EU\) No 2018/848 \(new\) on Organic Production and Labelling of Organic Products, and Regulation \(EC\) No 889/2008 laying down detailed rules for the implementation](#)

The Regulation (EC) No 834/2007 on organic production and labelling of products defines **specific objectives and principles for organic farming**, including all stages of production, preparation and distribution of organic products and their control (Art. 1).

In the new Regulation (EU) No 2018/848, repealing Regulation (EC) No 834/2007 and applying from January 1, 2021 (Art. 61 new), aim and scope are described in more detail in Art. 1 and 2, in order to make clear to which products this Regulation applies (see recital 10).

Art. 3 (old) describes the general objectives of organic production:

- (a) Establish a sustainable management system for agriculture (including respect for nature's systems and cycles, biodiversity, responsible use of energy and natural resources such as water, soil, organic matter and air, and respect for high animal welfare standards)
- (b) Aim at producing products of high quality
- (c) Aim at producing a wide variety of environmentally friendly foods and other agricultural products.

Art. 4 (new) rephrases and extends the list of general objectives. For example, protection of the climate, maintaining the long-term fertility of soils and contributing to a non-toxic environment are now explicitly listed as individual objectives.

Among the overall principles described in Art. 4 (old) / Art. 5(new), the **restriction of the use of external inputs** is listed. Where necessary, such external inputs shall be limited to

- Inputs from organic production

- Naturally or naturally-derived substances
- Low solubility mineral fertilisers

The old version (Art. 4 old) limits chemically synthesised inputs to exceptional cases being:

- Where the appropriate management practices do not exist and
- The external inputs referred to above are not available on the market or
- Where the use of external inputs as specified above contributes to unacceptable environmental impacts.

This list of exceptional cases is not part of Art. 5 (new), however, **Art. 24 No 5 (new)** stipulates an even stricter limitation, granting only the third exceptional case listed above.

Art. 5 (old)/ Art. 6 (new) lists **specific principles** applicable to organic farming, among them

- The **minimisation of the use of non-renewable resources** and off-farm/external inputs
- The **recycling of wastes and by-products of plant and animal origin** as input in plant and livestock production.

Art. 12 (old and new) defines **plant production rules**. In the new Regulation, this Article refers to Annex II of the Regulation, where plant production rules are described in more detail (adopting some of the specific rules already defined in Art. 3 of Regulation (EC) 889/2008). As specified in No 1 letter (b) (old) / Annex II Part 1 No 1.9.2 (new), the fertility of the soil shall be maintained and increased mainly by multiannual crop rotation and the application of – preferably composted – **livestock manure and organic material from organic production**. Art. 12 letter (d) (old) / Annex II Part 1 No 1.9.3 (new) requires that **additional fertiliser and soil conditioners may only be used if they have been authorised for use in organic production** under Art. 16 (old) / Art. 24 (new) (stipulating a restricted list of the products and substances authorised by the European Commission). Art. 12 letter (c) (old) / Annex II Part 1 No 1.9.8 (new) **prohibits the use of mineral nitrogen fertilisers**.

Art. 3 of Regulation (EC) No 889/2008 and Annex II Part 1 No 1.9.4 of Regulation (EU) No 2018/848 explicitly mention that the **total amount of livestock manure**, as defined in **Directive 91/676/EEC**, used in the in-conversion and organic production units **shall not exceed 170 kg N/ha and year of agricultural area used**. That limit shall only apply to the use of farmyard manure (fresh and dried), dehydrated poultry manure, composted animal excrement (including poultry manure), composted farmyard manure and liquid animal excrement.

Art. 3 of Regulation (EC) No 889/2008 and Annex II Part 1 No 1.9.6 and 1.9.7 of Regulation (EU) No 2018/848 allow the use of **preparations of micro-organisms** to improve the overall condition of the soil or the availability of nutrients in the soil or in the crops, and for compost activation.

Art. 16 No 2 (old) / Art. 24 No 3 (new) defines the following general and specific criteria that must be met by a product to be eligible for placement onto the **list of permitted substances** after approval by the Commission:

- They are essential for sustained production and for the use for which they are intended
- All products and substances shall be of plant, algal, animal, microbial or mineral origin except where products or substances from such sources are not available in sufficient quantities or qualities or if alternatives are not available
- Their use is essential for obtaining or maintaining the fertility of the soil or to fulfil specific nutritional requirements of crops, or specific soil-conditioning purposes

The list of permitted fertilisers and soil conditioners can be found as **Annex I to Regulation (EC) No 889/2008** laying down detailed rules for the implementation of Regulation (EC) No 834/2007 (last amended by Regulation (EU) 2016/673). Pursuant to Art. 16 No 3 (old)/Art. 24 No 7 (new) of the Regulation on Organic Production, this list can be amended as necessary upon request by Member States. According to Art. 24 No 8 (new) of Regulation (EU) 2018/848, the Commission shall regularly review all lists of permitted products of substances.

An expert group (EGTOP) has reviewed several fertilising products proposed for use in organic farming (Final Report on Fertilisers I (2011), II (2016) and III (2018) (https://ec.europa.eu/info/food-farming-fisheries/farming/organic-farming/co-operation-and-expert-advice/egtop-reports_en), last accessed January 7, 2020) and, for instance, recommended struvite and calcined phosphates from sewage sludge ash to be included and ammonium sulfate to be excluded, among others for solubility criteria.

These recommendations may be legally adopted by enacting the new Regulation (EU) 2018/848 in January 2021 and publishing a reviewed Annex I (currently to Regulation (EC) 889/2008).

2. Waste management

Waste Framework Directive 2008/98/EC

last amended by Directive (EU) 2018/851

This Directive lays down measures to protect the environment and human health by **preventing or reducing the generation of waste**, the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use, which are crucial for the transition to a **circular economy** and for guaranteeing the Union's long-term competitiveness (Art. 1). It sets the **basic concepts related to waste management**, which must be transposed into national law by the Member States.

Waste waters and animal by-products (except those which are destined for incineration, landfilling or use in a biogas or composting plant) **are explicitly excluded from its scope** to the extent that they are covered by other Community legislation (Art. 2).

According to Art. 3 No 1, **waste** means any substance or object which the holder discards or intends or is required to discard. Art. 3 No 2b defines **municipal waste** as mixed waste and separately collected waste from households, [...], and other sources where such waste is similar in nature and composition to wastes from households. Municipal waste excludes waste from production, agriculture, forestry, fishing, septic tanks and sewage network and treatment, including sewage sludge. Art. 3 No. 4 and 4a include **biowaste** and **food waste** into the scope of the Directive.

Art. 4 establishes a **waste hierarchy** that shall apply as a priority order in waste prevention and management, legislation and policy:

- (a) Prevention
- (b) Preparing for re-use
- (c) Recycling
- (d) Other recovery, e.g. energy recovery; and
- (e) Disposal.

According to the definitions in Art. 3, **'re-use'** means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived. **'Recovery'** is any operation the principal result of which is waste serving a useful purpose by replacing other materials necessary to fulfil a particular function or by preparing the waste in way to fulfil that function. **'Recycling'** means any recovery operation by which waste materials are reprocessed into products, materials or substances either for their original or for other purposes; it includes the reprocessing of organic materials, but does not include energetic recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations. **'Disposal'** means any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy.

Annexes I and II set out **non-exhaustive lists of disposal and recovery operations**.

The **list of recovery operations in Annex II** explicitly mentions **direct land application for agricultural use or ecological improvement** (R10). Other options relevant with regard to the production of biobased fertilisers from nutrient-rich sidestreams (wastes) are **recycling and recovery of organic substances (including composting and other biological transformation processes** (R3) and **recycling and recovery of inorganic substances** (R5). Another option is R1 Use principally as a fuel or other means to generate energy combined with R11: Use of waste obtained from any of the

operations numbered R1 to R10) when the monoincineration ash of sewage sludge is subsequently used for the production of fertilisers. R1 may also cover the digestion of organic residues in biogas plants and subsequent use of the digestate for fertilisation.

In contrast to waste, Art. 5 No 1 defines a **by product** as a substance or object resulting from a production process the primary aim of which is not the production of that substance or object, and which meets the following conditions:

- (a) Further use of the substance or object is certain;
- (b) The substance or object can be used directly without any further processing other than normal industrial practice;
- (c) The substance or object is produced as an integral part of a production process; and
- (d) Further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

Art. 6 No 1 stipulates that Member States shall take appropriate measures to ensure that waste which has undergone a recycling or other recovery operation is considered to have ceased to be waste (i.e. is granted **end-of-waste status**) if it complies with the following conditions:

- (a) The substance or object is to be used for specific purposes;
- (b) A market or demand exists for such a substance or object;
- (c) The substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and
- (d) The use of the substance or object will not lead to overall adverse environmental or human health impacts.

In order to facilitate the prudent and rational utilisation of natural resources and ensure a high level of protection of the environment and human health at the same time, the Commission shall **monitor the development of national end-of-waste criteria** and is entitled to **develop Union-wide criteria** for certain types of waste if needed (Art. 6 No 2).

For example, **union-wide end-of-waste (EoW) criteria** were **proposed** by JRC (2014) for **biodegradable waste**. With the new **Fertilising Products Regulation, union-wide end-of-waste criteria** were defined for **fertilisers (Art. 19 of Regulation 2019/1009/EU**, see chapter on that Regulation for details). This is the first time the European Commission made use of the entitlement given in Art. 6 of Directive 2008/98/EC.

After reviewing its waste policy in 2014 (see chapter on Landfill Directive), the Commission adopted a proposal for a revised Directive on waste amending Directive 2008/98/EC in 2015 (COM/2015/0595 final), setting new targets for the reduction of waste and establishing a long-term path for waste management and recycling. So far, no final decision has been made on this matter.

As part of the European Green Deal, a **new Circular Economy Action Plan** was adopted by the European Commission on **March 11, 2020**. This plan **announces another review of the Waste Framework Directive 2008/98/EC**. In this context, a broader set of measures on waste prevention shall be developed, including the definition of waste reduction targets for specific waste streams and a proposal to harmonise separate waste collection systems. Planned activities of the Commission within the frame of the new Circular Economy Action Plan also include

- Assessment of the scope to develop further EU-wide end-of-waste criteria for certain waste streams based on

- Monitoring Member States' application of the revised rules on end-of-waste status and by-products and
- Support cross-border initiatives for cooperation to harmonise national end-of waste and by-product criteria.

See https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf for details.

Waste Shipment Regulation 1013/2006/EC

As long as a NRSS or BBF has not reached end-of-waste status, i.e. is not compliant with the new Fertilising Products Regulation and not 'CE' marked) it has to comply with the Waste Shipment Regulation when transported across borders between Member States, i.e. mutual notification between departing and receiving state is required. This may cause considerable delays in transportation (Hermann et al., 2019).

Landfill Directive 1999/31/EC of April 26, 1999

As specified in the waste prevention and management hierarchy described in the Waste Framework Directive, disposal of waste by landfilling is the least desirable of the available options.

According to its Art. 1, the aim of this Directive is to provide stringent operational and technical requirements on landfilling of waste in order to prevent or reduce as far as possible negative effects on the environment. Member States were obliged to transpose this Directive into national law until July 16, 2001 (Art. 18).

Art. 5 of this Directive required Member States to set up a **national strategy for the reduction of biodegradable waste going into landfills**. This strategy should include measures to achieve this target by means of in particular recycling, composting, biogas production or materials/energy recovery. **According to Art. 5(2)(a-c), biodegradable municipal waste going to landfills must be reduced to 75, 50 and 35% of the total amount (by weight) produced in 1995 not later than 7, 10 and 17 years after the entry into force of this Directive.** Art. 5(2) also obliged the Commission to report on the practical experience gained by Member States in the pursuance of these targets 15 years after entry into force of this Directive (i.e. in 2014) and, if appropriate, to present a proposal with a view to confirming or amending these targets in order to ensure a high level of environmental protection.

Accordingly, on **July 2, 2014**, the EC presented a **legislative proposal to review waste-related targets in the Landfill Directive as well as recycling and other waste-related targets in Directive 2008/98/EC** on waste and Directive 94/62/EC on packaging and packaging waste. This proposal aimed at phasing out landfilling by 2025 for recyclable waste in non-hazardous waste landfills, including among others biowaste. It was withdrawn in **December 2014** and replaced in 2015 by a **revised legislative proposal including new Directives on waste, packaging waste and landfill of waste**, and setting clear targets for the reduction of waste and establishing an ambitious long-term path for waste management and recycling, including the following key elements (see https://ec.europa.eu/environment/waste/target_review.htm, last access Dec 5, 2019, for further information):

- A common **EU target for recycling 65% of municipal waste** and 75% of packaging waste by 2030

- A **binding landfill target to reduce landfill to maximum of 10% of municipal waste** by 2030
- A **ban on landfilling of separately collected waste**
- Promotion of economic instruments to discourage landfilling
- Simplified and improved definitions and harmonised calculation methods for recycling rates throughout the EU
- Concrete measures to promote re-use and stimulate industrial symbiosis – turning one industry's by-product into another industry's raw material
- Economic incentives for producers to put greener products on the market and support recovery and recycling schemes

[Animal By-Products Regulation 1069/2009/EC and related Regulation 142/2011 for its implementation](#)
(repealing 1774/2002/EC)

This Regulation lays down **public health and animal health rules for animal by-products and derived products**, in order to prevent and minimise risks to public and animal health arising from those products, and in particular to protect the safety of the food and feed chain (Art. 1). According to Art. 2, it applies to

- (a) Animal by-products and derived products which are excluded from human consumption under Community legislation; and
- (b) The following products which, pursuant to an irreversible decision by an operator, are destined for purposes other than human consumption:
 - (i) products of animal origin which may be destined for human consumption under Community legislation;
 - (ii) raw materials for the production of products of animal origin.

According to the **definitions** in Art. 3, **'animal by-products'** means entire bodies or parts of animals, products of animal origin or other products obtained from animals, which are not intended for human consumption, including oocytes, embryos and semen. **'Derived products'** means products obtained from one or more treatments, transformations or steps of processing of animal by-products.

Art. 5 defines an **end point in the manufacturing chain for derived products**, beyond which they are **no longer subject to the requirements of this Regulation**, implying that those derived products may subsequently be placed on the market without restrictions under this Regulation and shall no longer be subject to official controls in accordance with this Regulation. **Art. 5(2) states that such an end point may be determined for derived products which no longer pose any significant risk to public or animal health**, and that such determinations will be adopted as supplements to Regulation (EC) 1069/2009. **Regulation (EU) 142/2011** for the implementation of 1069/2009/EC lists derived products for which an end point in the manufacturing chain has been determined, among them

- Processed pet food
- Hides and skins of ungulates
- Wool and hair
- Feathers and down

given that they fulfil the specific requirements defined for them in Annex XIII of that Regulation.

In Section 1 (Art. 7-10) of 1069/2009/EC, a **categorisation of animal by-products and derived products** is established. The three defined categories reflect the **level of risk to public and animal health** arising from the respective products (Art. 7). Section 2 (Art. 11-15) contains provisions for the **disposal and use of materials according to their category**. Table 3 shows materials belonging to the respective categories and options for their disposal and use according to the Regulation:

Table 3: Options for disposal and use of animal-by products (ABP) according to the categories defined in Regulation (EC) No 1069/2009

Material / category	Options for disposal and use
<p>Category 1 (Art. 8):</p> <ul style="list-style-type: none"> • Entire bodies and all body parts, including hides and skins, of <ul style="list-style-type: none"> (i+ii) farmed animals killed in the context of transmissible spongiform encephalopathy (TSE) (iii) pet, zoo and circus animals (iv) animals used for experiments (v) wild animals when suspected of being infected with diseases communicable to humans or animals • Specified risk material and animal bodies or parts containing specific risk material at the time of disposal • ABP derived from animals which have been submitted to illegal treatment • ABP containing residues of other substances and environmental contaminants • ABP collected during the treatment of waste water from plants treating Cat. 1 material • Catering wastes from means of transport operating internationally • Mixtures of Cat. 1 material with Cat. 2 and/or Cat. 2 material 	<ul style="list-style-type: none"> (a) Disposal of waste by incineration (in some cases only after prior processing) (b) Recovery or disposal by co-incineration, if the Cat. 1 material is waste (in some cases only after prior processing) (c) Disposal by burial in an authorised landfill (in some cases only after prior processing) (d) Use as a fuel for combustion (e) Use for manufacture of derived products* (Art. 33, 34 and 36) <p>*Derived products that may be placed on the market are listed in Art. 33 (cosmetic products, several medical devices, veterinary medicinal products and medicinal products). Art. 34 regulates the import, collection and movement of ABP used for the manufacture of derived products. Art. 36 defines safety criteria that other derived products must meet if they shall be placed on the market.</p>
<p>Category 2 (Art. 9):</p> <ul style="list-style-type: none"> • Manure, non-mineralised guano and digestive tract content • ABP collected during treatment of waste water from plants processing Cat. 2 material • ABP containing residues of authorised substances or contaminants exceeding the permitted levels • Products of animal origin unfit for human consumption due to the presence of foreign bodies in them • Products of animal origin (other than Cat. 1 material) imported from or dispatched to a member state and failing to comply with Community veterinary legislation • Foetuses, oocytes, embryos, semen or dead-in shell poultry not belonging to Cat. 1 or Cat. 3 	<ul style="list-style-type: none"> (a) Disposal as waste by incineration (in some cases only after prior processing) (b) Recovery or disposal by co-incineration, if the cat. 2 material is waste (in some cases only after prior processing) (c) Disposal in authorised landfill (in some cases only after prior processing) (d) Use for manufacturing of organic fertiliser or soil improvers (e) Composting or transformation into biogas (f) Application to land without processing, in the case of manure, digestive tract content separated from the digestive tract, milk, milk-based products and colostrum which the competent authority does not consider to present a risk for the spread of any serious transmissible disease

Material / category	Options for disposal and use
<ul style="list-style-type: none"> • Mixtures of Cat.2 and Cat. 3 material • ABP other than Cat. 1 or Cat. 3 material 	<ul style="list-style-type: none"> (g) For material from aquatic animals: Ensilage, composting or transformation into biogas (h) Use as a fuel for combustion (i) Use for the manufacture of derived products (Art. 33, 34 and 36)
<p>Category 3 (Art. 10):</p> <ul style="list-style-type: none"> • Carcasses and parts of slaughtered/killed animals fit for human consumption but not intended for human consumption for commercial reasons • Carcasses and parts originating either from animals considered fit for slaughter for human consumption or from game killed for human consumption, including poultry heads; hides and skins, horns and feet of animals other than ruminants requiring TSE testing, or ruminants which have been tested with a negative result; pig bristles; feathers • ABP from poultry and lagomorphs slaughtered on the farm, which did not show any signs of disease communicable to humans or animals • Blood of animals which did not show any signs of disease communicable through blood to humans or animals obtained from slaughtered animals after having been considered fit for slaughter (only animals other than ruminants requiring TSE testing and ruminants which have been tested with a negative result) • ABP arising from the production of products intended for human consumption, including degreased bones, greaves and centrifuge or separator sludge from milk processing • Products of animal origin, or foodstuffs containing them, which are no longer intended for human consumption for commercial reasons or defects from which no risk to public or animal health arises • Petfood and feedingstuffs of animal origin, or feedingstuffs containing ABP or derived products, which are no longer intended for feeding for commercial reasons or due to defects from which no risk to public or animal health arises • Blood, placenta, wool, feathers, hair, horns, hoof cuts and raw milk originating from live animals that did not show any signs of 	<ul style="list-style-type: none"> (a) Disposal as waste by incineration (b) Recovery or disposal by co-incineration, if the Cat.3 material is waste (c) Disposal in an authorised landfill (d) Processing and use <ul style="list-style-type: none"> (i) for the manufacturing of feed for farmed animals other than fur animals (with some exceptions!) (ii) for the manufacturing of feed for fur animals (iii) for the manufacturing of pet food (iv) for the manufacturing of organic fertilisers or soil improvers (e) Use for the production of raw pet food (f) Composting or transformation into biogas (g) For material originating from aquatic animals: ensilage, composting or transformation into biogas (h) For shells from shellfish and egg shells: use under conditions which prevent risks arising to public and animal health (i) Use as a fuel for combustion (j) Use for manufacture of derived products (Art. 33, 34 and 36) (k) For catering waste: processing by pressure sterilisation or composting or transformation into biogas (l) Application to land without processing, in the case of raw milk, colostrum and products derived therefrom, if they do not present a risk of any disease communicable through those products to humans or animals

Material / category	Options for disposal and use
<p>disease communicable through that product to humans or animals</p> <ul style="list-style-type: none"> • Aquatic animals and parts of such animals, except sea mammals, which did not show any signs of disease communicable to humans or animals • ABP from aquatic animals originating from plants manufacturing products for human consumption • Shells from shellfish, hatchery by-products, eggs, egg by-products and day old chicks killed for commercial reasons, if these materials originate from animals not showing any signs of disease communicable through that material to humans or animals • Aquatic and terrestrial invertebrates other than species pathogenic to humans or animals • Animals and animal parts of Rodentia and Lagomorpha except Cat.1 and Cat. 2 material • Hides, skins, hooves, feathers, wool, horns, hair and fur originating from dead animals that did not show any signs of disease communicable through that product to humans or animals • Adipose tissue from slaughtered animals which did not show any signs of disease communicable through that material, which were considered fit for slaughter for human consumption • Catering waste other than as referred to in Art. 8 (cat. 1) 	

According to **Art. 32, organic fertilisers and soil improvers may be placed on the market and used provided:**

- (a) They are derived from Cat. 2 or Cat. 3 material;
- (b) They have been produced in accordance with the conditions for pressure sterilisation or with other conditions to prevent risk arising to public and animal health, in accordance with the requirements laid down pursuant to Art. 15 (laying down implementing measures for the section on disposal and use of materials);
- (c) They come from approved or registered establishments or plants, as applicable; and
- (d) In the case of meat-and-bone meal derived from Cat. 2 material and processed animal proteins intended to be used as or in organic fertilisers and soil improvers, they have been mixed with a component to exclude the subsequent use of the mixture for feeding purposes (and marked when required).

Art. 32 also explicitly allows the placing on the market and use of **digestion residues from transformation into biogas or compost** as organic fertilisers or soil improvers.

Member States are granted to adopt or maintain **national rules imposing additional conditions for or restricting the use of organic fertilisers and soil improvers** if they are justified on grounds of the protection of public and animal health.

According to Art. 32 No 3, specific measures for the implementation of this Article may be laid down and will be adopted as supplements to this Regulation. This was done in **Art. 22 of Regulation (EU) 142/2011**, which lays out **specific requirements for the placing on the market and use of organic fertilisers and soil improvers** (see **Annex XI** of that Regulation for details, including requirements for the trade of unprocessed and processed manure and derived products from processed manure, as well as conditions for the production, storage and transport of certain organic fertilisers and soil improvers other than manure).

As mentioned above, Art. 36 contains provisions for the placement on the market of derived products other than those referred to in Art. 31, 32, 33 and 35. It stipulates that operators must ensure the control of risks to public and animal health by

- Safe sourcing in accordance with Art. 37
- Safe treatment in accordance with Art. 38, where safe sourcing does not ensure sufficient control; or
- Verifying that the products are only used for safe end users in accordance with Art. 39 where safe treatment does not ensure sufficient control.

According to Art. 37 No. 1 (a), safe sourcing shall include the use of material from which no unacceptable risks to public and animal health arise.

This legal definition of safe sourcing should for example exclude the use of ashes from Cat. 1 materials as component material for fertilisers, since Cat. 1 materials pose an unacceptable risk within the meaning of this definition – at least, this is the clearly voiced position of the European Commission. Accordingly, the Fertilising Products Regulation allows the production of fertilising materials from Category 2 and 3 animal by-products, but not from Category 1 material. However, the position of European Commission is not accepted unequivocally by all Member States. For example, in the UK, a fertiliser made from Cat. 1 ash was licensed for sale based on the argument that with the incineration, it had reached an endpoint in the manufacturing chain. Similarly, Switzerland (not EU Member) allows the use of incinerated Cat. 1 material for fertiliser production.

[Sewage Sludge Directive 86/278/EEC](#)

The 'EU Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture' was **designed in the 1980s to encourage the controlled and efficient reuse of sewage sludge by land application in agriculture, while regulating it in a way that should prevent adverse effects on soil, water, vegetation and animals** (Art. 1). To this end, **limit values for heavy metal concentrations in sludges and soils** were defined (Art. 4, Annex I) and it was specified that **only treated sludge**, i.e. sludge that had undergone biological, chemical or heat treatment, long-term storage or any other appropriate process so as to significantly reduce its fermentability and the health hazards resulting from its use (Art. 2), was to be used in agriculture (Art. 6). Further restrictions for the use of sludge on agricultural lands were defined (Art. 7) and it was stipulated that the sludge should be used in such a way that account was taken of the **nutrient needs of the plants** and that the **quality of the soil and of the surface and ground water** was not impaired (Art. 8). The directive also specified **rules for the sampling and analysis of sludges and soils** (Art. 9, Annex II).

Member States were obliged to transpose this Directive into national law, which was done by national sewage sludge acts or ordinances, such as the German Waste Sewage Sludge Ordinance (Abfallklärschlammverordnung, AbfKlärV).

Some Member States implemented much stricter limit values or other restrictions on the direct use of sewage sludge as a fertiliser on agricultural land, including a total ban of that way of reuse in some countries (see reports on National legislation).

3. Ground and surface water quality, air quality and climate/renewable energy

Water Framework Directive 2000/60/EC and related legislation for the protection of water

Water Framework Directive 2000/60/EC

Last amended by Commission Directive 2014/101/EU of 30 October 2014, establishing a framework for Community action in the field of water policy.

As can be seen from its title, this Directive was created with the **aim to establish a single piece of framework legislation introducing a more global approach to water policy**, which was until then mostly focused on separate areas of interest addressed by several specific directives (e.g. protection of wetlands, drinking water, or bathing water) or individual types or sources of pollution (e.g. urban waste water, nitrates from agriculture). To this end, the **scope of water protection was expanded to all waters, surface waters and groundwater** (Art. 1), which should be protected by introducing the system of **river basin management** (Art. 3) – with the river basin being the natural geographical and hydrological unit irrespective of national borders. In Art. 4, environmental objectives were defined for surface and ground water bodies as well as for particular protected areas. A general requirement for ecological protection, and a general minimum of chemical standard, were introduced for **surface waters**. **'Good ecological status'** was defined in **Annex V** of the Directive in terms of the quality of the biological community, the hydrological characteristics - referenced to a status with minimal anthropogenic impact - and the chemical characteristics. **'Good chemical status'** was defined based on compliance with quality standards already laid down in **existing European legislation (including Annex IX of this Regulation)**. In addition, a mechanism was provided for renewing these standards and establishing new ones by establishing a **priority list of hazardous chemicals (Annex X)**, which has been updated by Directive 2008/105/EC, see chapter below). For **groundwater**, a requirement to **monitor chemical status** and to **reverse any anthropogenically induced upward pollution trend** was laid down (Art. 4), and **'good groundwater chemical status'** as well as **'good quantitative status'** were defined in Annex V.

In order to allow a co-ordination of measures, an evaluation procedure regarding the fulfilment of the objectives of the Directive for each body of water was established, including the obligation for Member States to design whatever additional measures (supplementing existing legislation) were needed to fulfil these objectives – the **river basin management plan** (Art. 13).

The European Commission published a 'Fitness Check' of the EU Water Framework Directive (with the Environmental Quality Standards, Groundwater and Floods Directives) on Dec 10, 2019 (SWD (2019) 439 and SWD (2019) 440). The Commission's conclusions maintain and confirm the Water Framework Directive's objectives, in particular the 2027 deadline, by which finally (after the previous 2015 deadline was missed) all European surface water – lakes, rivers, transitional and coastal water, and groundwater – should reach "good status". These conclusions have been welcomed by NGOs and scientists, who had feared that the WFD deadlines might be delayed, and are coherent with the ambitious objectives of the new European Commission's 'Green Deal'. The Commission underlines that no substantial progress has been made over recent years in water bodies' overall quality status, and that only half of water bodies had achieved good quality by 2015. The Commission notes that achieving quality objectives will require reducing pressures, restoration (e.g. morphological), and full implementation of the Nitrates Directive and the Urban Waste Water Treatment Directive, as well as better integration of action in agriculture and transport. Diffuse pollution of nutrients (phosphorus,

nitrogen) from agriculture are identified as a major challenge: “Around 38% of the EU’s surface water bodies are under pressure from diffuse pollution (of which agricultural production is a major source (25%))”. Failure to achieve the WFD’s objectives is considered to be due to insufficient funding, slow Member State implementation and insufficient integration of environment into other sectoral policies. Actions to address these should include working on best practices for cost-recovery, reduction of pollutants at source and green infrastructure (ESPP eNews No. 39, January 2020).

Further information on the Water Framework Directive and related EU legislation can be found under https://ec.europa.eu/environment/water/water-framework/info/intro_en.htm (last access: Nov 28, 2019).

[Directive 2008/105/EC on Environmental Quality Standards \(Priority Substances Directive\) Amending Directive 2000/60/EC by replacing its Annex X \(First list of priority substances based on Art. 16 of the Water Framework Directive\) with a new list of 33 priority substances and 8 other pollutants, for which limits on concentration were established \(Annexes I and II of Directive 2008/105/EC.](#)

This Directive introduced an obligation to review the list of priority substances by January 13, 2011. Following this obligation, a new Directive amending the Water Framework Directive and the Environmental Quality Standards Directive was proposed (COM (2011)876). As yet, no decision has been reached on this proposal.

[Groundwater Directive 2006/118/EC](#)

Another Directive directly related to the Water Framework Directive is the Groundwater Directive 2006/118/EC, which was developed in response to the requirements of Art. 17 of the Water Framework Directive. It laid down additional technical specifications to protect groundwater against pollution and deterioration, including criteria and procedures for assessing groundwater chemical status (Art. 3 and 4), identification of significant and sustained upwards trends (Art. 5) and measures to prevent or limit inputs of pollutants into groundwater (Art. 6).

[Drinking Water Directive 98/83/EC \(last amended October 6, 2015\)](#)

This Directive concerns the quality of water intended for human consumption, aiming to protect human health from the adverse effects of any contamination of water intended for human consumption by ensuring that it is wholesome and clean (Art. 1). It defines minimum requirements and quality standards for drinking water (Art. 4 and 5, Annex I), including its being free from any micro-organisms and parasites, as well as limit values for certain contaminants/pollutants. In addition, an obligation for monitoring and remedial actions and restrictions is established for the Member States (Art. 7 and 8). The Annexes must be reviewed regularly in order to account for scientific and technical progress (Art. 11).

This directive has been under revision since February 2018. A revised version that has been amended several times was approved by the EU parliaments’ ENVI Committee on February 18, 2020. The next step was accomplished on 23 October 2020 when the European Council adopted it as a first reading position, after which it will go into a second reading for announcement at the European Parliament (EP) Plenary, vote at the Environment Committee and then, as a final step, vote by the EP Plenary. In accordance with the letter of 18 February 2020 sent by the Chair of the European Parliament’s Committee on the Environment, Public Health and Food Safety to the Chair of the Committee of Permanent Representatives, the European Parliament should, at second reading, approve the Council’s position at first reading without amendment.

The main aim of the new proposal is to further improve water quality and safety by adding new and emerging substances (such as legionella and chlorate) to the list of criteria determining water safety and hygiene, and by tightening existing or introducing new maximum limits for certain pollutants (e.g. PFAS, endocrine disruptors Bisphenol A and Beta-estradiol). It also addresses the obligation for Member States to improve access to water for all people. In addition, monitoring of microplastics levels is introduced, and it is stipulated that consumption of tap water instead of bottled water shall be encouraged by improving information about the quality of drinking water, aiming to reduce plastic waste. See <https://www.europarl.europa.eu/legislative-train/theme-environment-public-health-and-food-safety-envi/file-revision-of-the-drinking-water-directive> for further information.

Bathing Water Directive 2006/7/EC (last amended December 28, 2013)

This Directive concerns the management of bathing water quality and lays down provisions for its monitoring and classification as well as for information to the public. Its purpose is to preserve, protect and improve the quality of the environment and to protect human health by complementing Directive 2000/60/EC (Art. 1). Quality criteria based on microbial pollution with pathogenic organisms are set out in Annexes I and II.

Member States are obliged to transpose these Directives into national law, which was done e.g. by setting standards for the discharge of waters into natural water bodies, including threshold / limit values for nitrates, pesticides and other contaminants. While legislation regarding the protection of waters does not relate to fertiliser production and quality in a direct way, the water quality standards set by such legislation will have an impact on fertilisation practice and its legal regulation. A good example for this is the Nitrates Directive and related legislation (see chapters on Nitrates Directive and related national legislation). The definition of priority substances and the setting of legal limit values for such substances in surface and ground water bodies may not only have an effect on the definition of good fertilising practices, but also on the introduction (or tightening) of limit values for the respective substances in fertilisers.

Urban Waste Water Treatment Directive 91/271/EEC

This Directive concerns the collection, treatment and discharge of urban waste water and the treatment and discharge of waste water from certain industrial sectors. Its objective is to protect the environment from the adverse effects of the abovementioned waste water discharges (Art. 1).

The Urban Waste Water Treatment Directive sets **cumulsory standards for the collection, treatment and discharge of waste waters** (Annex I), including requirements for primary and secondary (biological) treatment and the designation of sensitive areas according to criteria laid down in Annex II, where more stringent rules for treatment and discharge apply. These rules include maximum concentration values for (bio)chemical oxygen demand (BOD) and total suspended solids, as well as N and P concentrations of the discharges from urban waste water treatment plants.

The Directive stipulates that **treated waste water as well as sludge arising from waste water treatment shall be reused whenever appropriate** (Art. 12 and 14), while making sure that disposal routes shall **minimize the adverse effects on the environment**.

Member States were obliged to transpose this directive into national law, which they did by implementing national acts and ordinances such as German Ordinance on the Discharge of Waste Water (AbwV).

On December 13, 2019, the European Commission has published conclusions of an assessment of the Urban Waste Water Treatment Directive (UWWTD), based on an in-depth JRC and OECD study and specific public consultations (SWD (2019) 700 final). The UWWTD assessment concludes that the Directive has been effective, that benefits outweigh costs, that administrative costs are negligible compared to costs and benefits, that it is coherent with other water policy and that there is widespread recognition that the Directive is still needed and that withdrawing it would have negative impacts. The Directive is assumed to have been successful in reducing pollution, with wastewater BOD (biochemical oxygen demand), nitrogen and phosphorus reduced by 61%, 32% and 44% from 1990 to 2014. However, full compliance still has not been achieved in a number of Member States: full compliance for phosphorus would reduce current total emissions to surface waters by over 13.5%. A further 250 billion € need to be spent in the EU until 2030 to maintain and achieve full UWWTD compliance. Nonetheless, the Directive is assessed to be cost effective, with total EU annual capital and operating costs at 18 billion €/year compared to benefits of nearly 30 billion €/year. Challenges which should be assessed are identified as: improving cost-recovery (water tariffs), better collection and treatment of stormwater overflows and urban runoff, emerging contaminants (pharmaceuticals, microplastics), more coherent definition of eutrophication, the definition of 'Sensitive Areas' by Member States, Circular Economy potentials (control at source of pollutants to facilitate agricultural use of sludge and water reuse) and improving treatment of waste water from smaller agglomerations and non-connected households (these place significant pressure on over 10% of Europe's water bodies). The assessment concludes that the Directive has led to innovation so that today eight of the world's top fifteen water businesses are EU-based (ESPP eNews No. 39, January 2020).

[Nitrates Directive 91/676/EEC and the SAFEMANURE project](#)

The objective of the Nitrates Directive is to **reduce water pollution caused or induced by nitrates from agricultural sources and to prevent further such pollution** (Art. 1). Member States are obliged to **monitor nitrate concentrations** in their ground and surface waters and to designate territories draining into waters that are or could be affected by high nitrate levels as **vulnerable zones** (Art. 3). Annex I of the Directive defines criteria for the evaluation of waters according to Art. 3. Alternatively, countries can designate their whole national territory as vulnerable zone. This approach was chosen by Germany as well as by Austria, Denmark, Finland, Ireland, Lithuania, Luxembourg, Malta, the Netherlands and Slovenia. All Member States had to establish **codes of good agricultural practice** (topics defined in Annex II) and establish and apply **action programmes** (measures defined in Annex III) aiming to reduce existing and prevent future nitrate pollution from agricultural sources for their nitrate vulnerable zones (Art. 4 and 5). The Nitrates Directive was transposed into national law by the Member States by issuing national rules for fertilisation, such as the German Fertiliser Application Ordinance (DüV), see chapter on National legislation.

According to Annex III Nr. 2 of the Nitrates Directive, all National Action Programmes had to include a **limit of 170 kg nitrogen (N) per hectare and year from livestock manure**. Member States were allowed to get derogations to go beyond that limit, however, only under strict conditions laid out in this Annex. Some countries were granted such derogations, typically up to a limit of 230-250 kg N/ha and year. Germany had a derogation in the past (until 2014), but is currently not allowed to exceed the 170 kg limit (see National legislation – Fertiliser Application Ordinance).

According to the legal definition in Art.2 letter g, for the purpose of the Nitrates Directive, **'livestock manure'** means waste products excreted by livestock or a mixture of litter and waste products excreted by livestock, **even in processed form**. This implies that **fertilisers based on livestock manure remain manure and as such may only be used in accordance with the 170 kg N limit**, even if they bear no resemblance to animal manure in their physico-chemical characteristics anymore. This is seen critically by many producers and researchers nowadays, who point out that there are manure derived fertilisers that in fact bear the same characteristics like mineral fertilisers (see for example ESNI 2019 presentation by de Leeuw on fertiliser made from poultry litter ash in the Netherlands (ReNu2Farm)) – according to de Leeuw, poultry litter ash is in fact a mineral PK fertiliser, but has not been acknowledged as such by the EU authorities under Regulation (EC) No 2003/2003 on mineral fertilisers (see there) until now. A similar line of reasoning is brought forward by Hermann et al. (2019) who emphasize that 'when the Nitrates Directive was enforced in 1991, technologies for processing manure did not encompass producing products with distinctively different characteristics in terms of chemical composition, physical state and crop nutrient performance.' In the meantime, however, it has been demonstrated many times (e.g. by the EU project SYSTEMIC) that products can be produced from manure (and manure-based digestates) which fully correspond to specifications of mineral fertilisers from fossil resources, e.g. ammonium sulphate, ammonium nitrate, struvite and other mineral concentrates. Consequently, there are **efforts to develop harmonised criteria that could allow to grant N fertilisers partially or entirely derived from manure a status as 'chemical fertiliser' as defined in the Nitrates Directive** ('chemical fertiliser' according to Art. 2 letter f Nitrates Directive means any fertiliser which is manufactured by an industrial process). To this end, a proposal was worked out by the European Commission Joint Research Centre (JRC) under the title **'SAFEMANURE – Developing criteria for safe use of processed manure in Nitrates Vulnerable Zones above the threshold established by the Nitrates Directive'**. An interim report containing the first draft proposal for so-called RENURE criteria (**Recovered Nitrogen from manure**) was presented by Huygens et al. in September 2019.

Main objectives of the proposed criteria for RENURE materials were

- To ensure a similar agronomic efficiency and a similar N leaching potential like Haber-Bosch derived chemical fertilisers when applied under good management practices
- Not to exacerbate risks related to sustainability dimensions, environment and human health beyond those directly targeted in the Nitrates Directive (mainly regarding contaminants of emerging concern and metals, NH₃-losses and odour nuisances).

RENURE was defined by Huygens et al. (2019) as 'any nitrogen containing substance fully or partially derived from livestock manure through processing under controlled conditions that can be used in areas with water pollution by nitrogen following the same provisions applied to nitrogen containing chemical fertilisers as defined in the Nitrates Directive (91/676/EEC), while providing adequate agronomic benefits to enhance plant growth.'

A combination of product specific and use specific parameters was proposed in the RENURE compliance scheme, comprising

- A Total Organic Carbon (TOC): Total N (TN) ratio ≤ 3 or a mineral N:TN ratio $\geq 90\%$ for RENURE materials
- Limit values for Cu (300 mg/kg DM), Hg (1 mg/kg DM) and Zn (800 mg/kg DM) (no limit values were proposed for veterinary drugs since it was concluded that more information was still needed to understand and evaluate their environmental risks)
- The provision of best management practices for timing and mode of application by Member States (application must be synchronized with plant nutrient requirements, and - when

appropriate – cover/catch crops shall be used to prevent nutrient leaching and run-off losses from RENURE application on fallow land)

- Provisions by Member States necessary to prevent and minimise NH₃-emissions during RENURE application on the field (especially if RENURE N fertilisers have <40% of their TN present as NO₃-N, or if they are applied on soils with pH>5
- Provisions by Member States necessary to prevent and minimise emissions to air resulting from storage, through enforcing appropriate storage conditions.

So far, **the proposal does NOT suggest to use RENURE criteria for defining the end point in the manufacturing chain.** As stated by Huygens et al. (2919, SAFEMANURE interim report page 2 and page 6), given the animal origin of RENURE materials, legal requirements relating to manure as an animal by-product, in particular Regulations (EC) No 1069/2009 and (EU) No 142/2011, should continue to apply until the end point in the manufacturing chain, as defined in these Regulations, is reached. Consequently, **it is NOT proposed to list the materials identified as RENURE materials under CMC 10** (Derived products within the meaning of Regulation (EC) No 1069/2009 having reached the end point in the manufacturing chain) **of the the new European Fertiliser Products Regulation No 2019/1009.** On September 19, 2020 the final report “*Technical proposals for the safe use of processed manure above the threshold established for Nitrate Vulnerable Zones by the Nitrates Directive (91/676/EEC)*” was published, essentially confirming the criteria defined in the intermediate report and discussed by the expert group in a meeting at JRC Sevilla in January 2020: processed manure characterised by a ratio of total organic carbon to total N ≤ 3 or a mineral N to total N ratio $\geq 90\%$ may have a similar N leaching potential and agronomic efficiency to Haber-Bosch derived and equivalent chemical N fertilisers. Nitrogen-rich processed manure materials, such as scrubbing salts, mineral concentrates, and liquid digestates obtained through centrifugation and/or advanced solids removal might be able to meet these requirements. To comply with the objectives of environmental protection, it is, however, necessary to combine the use of RENURE with good management practices, including the use of living plant covers or equivalent measures, low NH₃ emission application techniques and good RENURE storage conditions. Altogether, this report proposes a set of material and use requirements to enable the safe use of RENURE in areas with water pollution by nitrogen, in amounts above the threshold established by the Nitrates Directive (91/676/EEC). The RENURE criteria are expected to be adopted by the European Commission in a first step and may be enforced in the course of 2021.

The full report is accessible under <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/technical-proposals-safe-use-processed-manure-above-threshold-established-nitrate-vulnerable>

National Emissions Ceilings (NEC) Directive 2016/2284/EU

This Directive is part of the so-called **Clean Air Policy Package** adopted by the European Commission in 2013, which included a **Clean Air Programme for Europe** setting objectives for 2020 and 2030, and accompanying legislative measures (https://ec.europa.eu/environment/air/clean_air/index.htm, last access Dec 5, 2019).

It sets national emissions reduction commitments for Member States and the EU for five important air pollutants. It establishes reporting requirements for Member States, who are obliged to submit **National Air Pollution Control Programmes** including emission inventories as well as strategies and measures for their reduction at regular intervals.

One of the pollutants addressed by the Directive is NH₄, which originates from agriculture to a very large extent. The Directive stipulates a reduction of ammonia emissions by 29% in 2030 compared to the level of 2005.

Transposing this goal into national law required further action from the Member States regarding the implementation of emission reduction measures related to fertilisation practices. For example, Germany adapted its Fertiliser Application Ordinance regulating best management practices in fertilisation accordingly, specifically with regard to the application of liquid organic fertilisers such as animal manure or slurry.

Such requirements need to be kept in mind when evaluating the quality of BBFs from an environmental point of view.

Renewable Energy Directive 2018/2001/EU and related legislation

A large and growing NRSS forming the basis for a number of unprocessed as well as processed biobased fertilisers are digestates resulting from the production of biogas from biomass (energy crops and organic wastes) as a renewable energy source. In addition, organic residues that may be suitable input materials for BBFs occur from the production of other biofuels based on biomass, both liquid (e.g. bioethanol, biodiesel) and solid. Policies and legislation related to renewable energy targets may have a considerable influence on the quantitative development of these sidestreams. In particular, legislation resulting from the targets set by the **Energy Union Strategy** published in 2015 (COM/2015/80 final) is relevant in this regard. The Energy Union Strategy is currently being implemented by the so-called **Clean Energy for All Europeans Package**, consisting of a total of eight legislative acts (<https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/clean-energy-all-europeans>, last access Dec 5, 2019). With view to biomasses, the following legislative acts are most relevant:

Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (recast of Directive 2009/28/EC)

The Revised Renewable Energy Directive (RED II) entered into force in December 2018. As a recast of Directive 2009/28/EC, it updated the renewable energy targets set in that Directive for 2020 for the next decade.

As stated in Art. 1, this Directive establishes a common framework for the promotion of energy from renewable sources. It sets a **binding Union target for the overall share of energy from renewable sources in the Union's gross final consumption of energy in 2030 of at least 32%** (with the option for possible upwards revision by 2023, Art. 3 of this Directive). It also lays down **rules on**

- **financial support for electricity from renewable sources,**
- self-consumption of such electricity,
- the **use of energy from renewable sources** in the **heating and cooling sector** and in the **transport sector,**
- regional cooperation between Member States and between Member States and third countries,
- guarantees of origin,
- administrative procedures and
- information and training.

It also establishes **greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels** (see following paragraphs).

As can be seen from the definition of 'energy from renewable sources' or 'renewable energy' in Art. 2(1), biomass (energy crops) is just one out of many renewable non-fossil sources that may be used to reach the 2030 renewable energy target. This particular source, however, may be associated with a considerable drawback: As has been observed in some Member States since the introduction of support schemes for biomass energy through EU policy, so-called **indirect land use change (ILUC)** may occur as a result of pasture or agricultural land previously destined for food and feed markets being diverted to the production of energy crops. This happens because in order to keep up food and feed production, agricultural land may be extended into areas with high carbon stock, such as forests, wetlands or peatlands. This land use change may be **associated with considerable release of greenhouse gas emissions**, i.e. emission of CO₂ that was previously stored in trees and soil and is therefore **unwanted**. ILUC is therefore explicitly addressed in the recast Renewable Energy Directive in several ways:

In Art. 26, **specific rules are defined for biofuels, bioliquids and biomass fuels produced from food and feed crops**:

- As stated in Art. 26(1), for the calculation of a Member State's gross final consumption of energy from renewable sources (Art. 7) and the minimum share of renewable energy in the transport sector (Art. 25(1)), the share of biofuels and bioliquids, as well as of biomass fuels consumed in transport, where produced from food and feed crops, shall be no more than 1% point higher than the share of such fuels in the final consumption of energy in the road and rail transport sectors in 2020 in that Member State (with a maximum of 7%).
- Member States may set a lower limit and may distinguish between different biofuels, bioliquids and biomass fuels produced from food and feed crops, taking into account best available evidence on indirect land-use change impact.
- According to Art. 26(2), the share of **high-indirect land-use change risk biofuels, bioliquids or biomass fuels** produced from food and feed crops for which a significant expansion of the production area into land with high-carbon stock is observed shall not exceed the level of consumption of such fuels in that Member State in 2019, unless they are certified to be low indirect land-use change-risk fuels. From Dec 31, 2023 until Dec 31, 2030 at the latest, that limit shall gradually decrease to 0%.
- **'low indirect land-use change-risk biofuels, bioliquids and biomass fuels'** are defined in Art. 2(37) of this directive as fuels the feedstock of which was produced within schemes which avoid displacement effects of food and feed-crop based fuels through improved agricultural practices as well as through the cultivation of crops on areas which were previously not used for cultivation of crops, and which were produced in accordance with the sustainability criteria for biofuels, bioliquids and biomass fuels laid down in Art. 29.
- By Feb 1, 2019, the Commission was obliged to adopt a delegated act to supplement Directive (EU) 2018/2001, setting out criteria for certification of low indirect land-use change-risk biofuels, bioliquids and biomass fuels and for determining the high indirect land-use change-risk feedstock for which a significant expansion of the production area into land with high-carbon stock is observed. Following this obligation, the Commission adopted the Delegated Regulation on Biofuels and Indirect Land Use Change on March 13, 2019 (see below).

In Art. 29, **sustainability and greenhouse gas emissions criteria are defined for biofuels, bioliquids and biomass fuels**. According to Art. 29(1), energy from these fuels shall only be taken into account

as contributing towards the defined renewable energy targets and for the eligibility for financial support, if they fulfil the following criteria:

Type of biomass (Article/paragraph)	Sustainability/Greenhouse gas emissions criteria
Waste and residues derived not from forestry but from agricultural land (Art. 29(2))	Operators/national authorities must have monitoring or management plans in place addressing the impacts on soil quality and soil carbon
Agricultural biomass (Art. 29(3))	No raw material obtained from land with a high biodiversity value (further specified in this paragraph)
Agricultural biomass (Art. 29(4))	No raw material obtained from land with high-carbon stock (i.e. wetlands, forests or land with high trees)
Agricultural biomass (Art. 29(5))	No raw material obtained from land that was peatland in January 2008, unless evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil
Forest biomass (Art. 29(6))	National or subnational laws applicable in the area of harvest as well as monitoring and enforcement systems in place, or alternatively, management systems in place ensuring sustainable production (further specified in this paragraph)
Forest biomass (Art. 29(7))	Land-use, land-use change and forestry criteria further specified in this paragraph must be met, ensuring that carbon stocks and sinks levels in the forest are maintained or strengthened over the long term
All biomasses (Art. 29(10))	Greenhouse gas emission savings from the use of the respective fuel shall be: <ul style="list-style-type: none"> (a) At least 50% for fuels produced in installations in operation on or before Oct 5, 2015 (b) At least 60% for fuels produced in installations starting operation from Oct 6, 2015 until Dec 31, 2020 (c) At least 65% for fuels produced in installations starting operation from Jan 1, 2021 (d) At least 70% for electricity, heating and cooling production from biomass fuels used in installations starting operation from Jan 1, 2021 until Dec 31, 2025, and 80% for installations starting operation from Jan 1, 2026.

[Regulation \(EU\) No 2018/1999 on the Governance of the Energy Union and Climate Action](#)
According to **Regulation (EU) 2018/1999**, Member States had to set up **10-year National Energy & Climate Plans for 2021-2030** (NECPs) outlining how they were going to meet the 2030 targets set by the Revised Renewable Energy Directive, including a longer-term view towards 2050. The drafts submitted to the Commission in early 2019 were reviewed by the Commission and are currently being finalised by the Member States.

[Delegated Regulation on Biofuels and Indirect Land Use Change of March 13, 2019, supplementing Directive \(EU\) 2018/2001](#)

As stated in its Art. 1, this Regulation specifies criteria for **determining high indirect land-use change-risk feedstock** for which a significant expansion of the production area into land with high carbon

stock is observed, and for **certifying low indirect land-use change-risk biofuels, bioliquids and biomass fuels**.

According to Art. 3, cumulative criteria for high ILUC-risk feedstock are

- (a) The average annual expansion of the global production area of the feedstock since 2008 is higher than 1% and affects more than 100,000 hectares, and
- (b) The share of such expansion into land with high-carbon stock is higher than 10%.

The Regulation is accompanied by an Annex containing the relevant information needed to apply the above criteria.

According to Art. 4 low ILUC-risk biofuels, bioliquids and biomass fuels must

- (a) comply with the sustainability and greenhouse gas emissions saving criteria set out in Art. 29 of Directive (EU) 2018/2001, and
- (b) have been produced from additional feedstock obtained through additionality measures according to Art. 5 of this Regulation. ‚Additional feedstock‘ is defined in Art. 2 as additional amount compared to the average yield, while ‚additionality measure‘ means any improvement of agricultural practices leading, in a sustainable manner, to an increase in yields; and any action that enables the cultivation of crops on unused or abandoned land.

According to Art. 26(2) of Directive (EU) 2018/2001, **this Regulation shall be reviewed by the Commission by Sept 1, 2023** and amended where appropriate. In addition, by that time, a trajectory shall be included to **gradually decrease the contribution of high ILUC biofuels, bioliquids and biomass fuels** produced from feedstock for which a significant expansion of the production into land with high-carbon stock is observed.

Most of the other elements of Directive 2018/2001/EU must be transposed into national law by Member States by June 30, 2021.

4. Common Agricultural Policy (CAP) and related legislation

The CAP provides a policy framework for European Agriculture, aiming to

- support EU farmers and improve agricultural productivity, ensuring a stable supply of affordable food
- safeguard EU farmers to make a reasonable living
- help tackle climate change and the sustainable management of natural resources
- maintain rural areas and landscapes across the EU
- keep the rural economy alive by promoting jobs in farming, agri-foods industries and associated sectors

(https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en, last access: Dec 4, 2019).

CAP is based on two pillars:

- 1) **Direct payments** (income support, remunerating farmers for environmentally friendly farming and delivering public goods not normally paid for by the markets, e.g. taking care of the countryside) and **market measures** (to deal with difficult market situations such as a sudden drop in demand or a fall in prices), financed by the European Agricultural Guarantee Fund (EAGF)
- 2) **Rural development measures** with national and regional programmes, financed by the European Agricultural Fund for Rural Development (EAFRD)

By designing their direct payments programmes and targeting their market and development measures accordingly, both pillars allow to considerably influence the use of NRSS for the production of BBFs.

The following regulations contain rules for the CAP for the period 2014-2020:

Rural Development Regulation (EU) 1305/2013

This Regulation sets rules for the financial support for rural development, defining six Union priorities to which national and regional rural development programmes (designed by Member States) must relate in order to receive funding from the EAFRD (Art. 5):

- (1) Fostering knowledge transfer and innovation in agriculture, forestry and rural areas
- (2) Enhancing farm viability and competitiveness of all types of agriculture in all regions and promoting innovative farm technologies and sustainable forest management
- (3) Promoting food chain organisation, including processing and marketing of agricultural products, animal welfare and risk management in agriculture
- (4) **Restoring, preserving and enhancing ecosystems** related to agriculture and forestry
- (5) **Promoting resource efficiency** and supporting the **shift toward a low-carbon and climate resilient economy** in the agriculture, food and forestry sectors
- (6) Promoting social inclusion, poverty reduction and economic development in rural areas

Of particular relevance with regard to NRSS/BBFs are priorities 4 and 5 which explicitly mention the option for programmes to focus on

4b) improving water management, including **fertiliser** and pesticide **management**

or on

5c) facilitating the supply and **use of renewable sources** of energy, of by-products, wastes and residues and of other non-food raw material, for the purposes of the bio-economy

5d) reducing greenhouse gas and **ammonia emissions** from agriculture

5e) fostering **carbon conservation** and sequestration in agriculture and forestry

Horizontal CAP Issues Regulation (EU) 1306/2013 on the financing, management and monitoring of the common agricultural policy

As specified in Art. 1, this Regulation lays down rules on

- (a) Financing of expenditure under the CAP
- (b) The farm advisory system
- (c) The management and control systems to be put in place by the Member States
- (d) The cross-compliance system
- (e) Clearance of accounts

The **cross-compliance (CC) system** attaches the financial support of farmers through the CAP to so-called cross-compliance rules that must be respected by farmers regarding the following areas (Art. 93 and Annex II of this Regulation):

- (a) Environment, climate change and good agricultural condition of land
- (b) Public, animal and plant health
- (c) Animal welfare.

As stated in Art. 92 of this Regulation, **CC rules apply to beneficiaries receiving direct payments** under Regulation (EU) No 1307/2012, payments under Art. 46 and 47 of Regulation (EU) No 1308/2013 **and the annual premia** under points (a) and (b) of Art. 21(1), Art. 28-31, 33 and 34 of Regulation (EU) No 1305/2013.

CC rules include **statutory management requirements** as well as **standards for good agricultural and environmental condition of land** (see Annex II), and can be established on EU as well as on national level by legal acts. **Examples listed in Annex II relating to NRSS/BBFs** are

- The **Nitrates Directive 91/676/EEC** concerning the protection of waters against pollution caused by nitrates from agricultural sources and related national legislation (see chapters on Nitrates Directive and national legislation)
- The **protection of ground water** against pollution (see Groundwater Directive)
- The **maintenance of soil organic matter level** through appropriate practices

Direct Payments to Farmers Regulation (EU) 1307/2013

As specified in Art. 1, this Regulation establishes common rules on payments granted directly to farmers under the support schemes listed in its Annex I as well as rules for specific payments. Among the list of specific payments is a payment for farmers observing agricultural practices beneficial for the climate and the environment (letter b, No iv), including crop diversification, maintaining existing permanent grassland and having ecological focus area on the agricultural area (Art. 43) as well as a number of so-called equivalent practices listed in Annex IX of this Regulation. So far, none of the listed practices is related to the use of NRSS/BBFs.

Common Market Organisation Regulation (EU) 1308/2013 establishing a common organisation of the markets in agricultural products

In addition to setting rules for market intervention and providing sector-specific aid schemes and support programmes, this Regulation contains rules concerning marketing and producer organisations, including marketing standards for agricultural products. Finally, it provides rules for trade with third countries and competition rules.

A more comprehensive description of the CAP Regulations can be found in Hermann et al. (2019).

The post 2020 CAP period

After evaluating the achievements of the first CAP period (2014-2020), the European Commission presented **legislative proposals on the future of the CAP** for the new period in June 2018.

https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en, last access Dec 4, 2019

Among other **provisions for the new CAP period (2021-2027, start postponed to 2022)**, the Commission proposed the introduction of an obligatory **nutrient management tool** (named **Farm Sustainability Tool for Nutrients, FaST**) to **improve water quality and reduce ammonia and nitrous oxide levels**. This management tool shall be part of the standards for Good Agricultural and Environmental Conditions (GAECs) defining rules for cross compliance (CC). The FaST tool includes the development of a smart phone tool, made available to farmers free of charge, which will provide information on applicable regulations and enable entry of nutrient data, field by field, as well as enabling coherent data reporting. Member States and farmers will also be able to use other existing tools to enter their nutrient balance, subject to reporting compatibility. (see https://ec.europa.eu/info/news/new-tool-increase-sustainable-use-nutrients-across-eu-2019-feb-19_en, last access Feb 25, 2020, for more information).

Another focus of the post 2020 CAP period is the **preservation of carbon-rich soils** through protection of wetlands and peatlands. Speakers at the EU Agricultural Outlook Conference, 10th-11th December 2019, including the new Commissioners for Agriculture Janusz Wojciechowski and the new Commissioner for Health and Food Safety, emphasized the pursuit of sustainability in agriculture including **carbon neutrality or even carbon sequestration by soils as well as agricultural and forestry activities** (https://ec.europa.eu/info/events/2019-eu-agricultural-outlook-conference-2019-dec-10_en, accessed January 5, 2020). In a recent study, the International Institute for Applied Systems Analysis (IIASA) outlined 'A roadmap to make the land sector carbon neutral by 2040'. If countries were to implement the roadmap, the land sector could become carbon neutral by 2040 and a net carbon sink by 2050. The land sector currently emits about 11 Gt CO₂e per year (about 25% of global emissions). With this roadmap, it will be a net carbon sink of about three Gt CO₂ per year by 2050. Together, these actions would mitigate 15 Gt CO₂ per year – about 50% from reducing emissions and 50% from additional carbon uptake by land (Roe et al., 2019).

For the post 2020 period, the European Commission proposes a **new way of working**, which shall streamline administrative processes, make environmental protection easier and simplify support to young farmers. This includes the **submission of national strategic plans by Member States**, in which the countries outline how they intend to use the CAP instruments (direct payments, rural development and sectorial strategies) to meet the 9 EU-wide objectives of the CAP:

- To ensure a fair income to farmers

- To increase competitiveness
- To rebalance the power in the food chain
- Climate change action
- Environmental care /foster sustainable development and efficient management of natural resources such as water, soil and air
- To preserve landscapes and biodiversity
- To support generational renewal
- Vibrant rural areas
- To protect food and health quality.

For further information see https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/key_policies/documents/cap-post-2020-enviro-benefits-simplification_en.pdf (last access Feb 25, 2020).

On May 20, 2020, the European Commission published the ‘**Farm to Fork Strategy**’ as part of the EU ‘Green Deal’ (COM(2020)381 final plus Annex). Aiming to achieve a more sustainable food production, this strategy explicitly addresses the **excess of nutrients** (especially nitrogen and phosphorus) as a major challenge. Two objectives are stated which should considerably influence the post 2020 CAP period with regard to nutrient recycling: The Commission will act to **reduce nutrient losses by at least 50% by 2030**, while ensuring no deterioration on soil fertility. This shall in turn **reduce the use of fertilisers by at least 20% by 2030**. To this end, the **EU “Integrated Nutrient Management Plan” (INMAP)**, which was already proposed as part of the **new Circular Economy Action Plan in March 2020**, will be developed together with Member States (a stakeholder consultation is currently running until end of June 2020). The aim of the INMAP is to ensure a more sustainable application of nutrients and to stimulate the markets for recovered nutrients. The **recycling of organic waste into renewable fertilisers** is explicitly mentioned as a **key measure to be included into Member States’ CAP Strategic Plans**.

The Draft Action Plan for the Farm to Fork Strategy contains two additional actions which may be relevant in terms of using NRSS for the production of BBFs, namely (indicative timetable in brackets)

- The EU **carbon farming initiative** (Q3, 2021)
- A proposal for **EU-level targets for food waste reduction** (2023)

On October 21, 2020, the European Council agreed its negotiating position (general approach) on the post-2020 common agricultural policy (CAP) reform package. This agreed position puts forward some strong commitments from Member States for higher environmental ambition with instruments like mandatory eco-schemes (a novelty compared to the current policy) and enhanced conditionality. At the same time, the agreed position allows Member States to have the necessary flexibility in how they would reach environmental goals. For instance, there would be a two-year pilot phase for eco-schemes and Member States would enjoy flexibility on how to allocate funds under different green practices. The European Parliament voted by a large majority its key points for the CAP reform: 10% of money available for measures enhancing biodiversity, 35% for environmental and climate related measures and direct payments for eco-schemes. Environmentalists and Green MEPs still complain that the proposal does not go far enough and indeed, the CAP proposals and the Farm2Fork Strategy do not seem to be fully coherent. The vision, mission and strategy statements related to the Green Deal, the Farm2Form Strategy and the „Caring for Soil is Caring for Life“ Mission are apparently not sufficiently reflected in the ongoing CAP discussions.

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„Berichte aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft“
erscheinen seit 1995 in zwangloser Folge

Seit 2008 werden sie unter neuem Namen weitergeführt:
„**Berichte aus dem Julius Kühn-Institut**“

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