

Deliverable D5.1:

Report on digestate and by-products

<i>Work Package:</i>	<i>WP5 - Overcoming regulatory and administrative barriers</i>
<i>Task:</i>	<i>WP5.3 - Analysis of European regulation on digestate (definition and use) and proposals for improvements</i>
<i>Responsible Partner:</i>	<i>CVB</i>

Document history

Version	Date	Authors	Reviewers
V1	29/07/2016	S. Mannelli, M. Monni (CVB)	S. Drigo, E. G. Facci, C. Rossi (AzzeroCO ₂)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 691875

Table of contents

Premise.....	4
Part A – BY-PRODUCTS.....	6
1. Analysis of the EU Regulation.....	6
1.1 European Regulation in course of implementation.....	9
1.2 National Legislation	11
1.2.1 Italian Legislation in the course of implementation.....	15
Part B – DIGESTATE	17
2. Analysis of the EU Regulation.....	17
2.1 Introduction	17
2.2 EU Directive 91/676/EC.....	18
2.3 Green Papers: Management of biodegradable organic waste in the EU – COM 811 of 3 December 2008.....	19
2.4 Communication from the Commission to the Council and the European Parliament – COM 235 (2010).....	20
2.5 Commission Implementing Regulation (EU) No 354/2014 of 8 April 2014 amending and correcting Regulation EC No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control.	21
2.6 Circular Economy Package – Legislative Proposal of the Council and the European Parliament establishing rules related to the placing on market of fertilising products with CE Marking and modifying EU Regulations No. 1069/2009 and No 110/2009/EC – COM 157 (2016).....	22
2.7 European Commission Joint Research Institute for Prospective Technological Studies, JRC – Report EUR 26425 EN 2014 Hans Saveyn & Peter Eder End-of-Waste criteria for biodegradable waste subjected to biological treatment (compost & digestate): Technical Proposals.....	23
2.7.1 Legislative aspects for digestate use in some Member States	26
3. Analysis of the Italian legislation	34
3.1 Introduction	34
3.2 Ministerial Decree of 7 April 2006: “Criteria and general technical standards for the regional regulation on the agronomic use of livestock effluents, in accordance with art. 38 of Legislative Decree No 152 of 11 May 1999 (Italian OJ No 109 of 12 May 2006 – supplement No 120).....	34
3.3 Decree No 134 of 7 August 2012. Conversion into law, with changes, of the Decree-Law No 83 of 22 June 2012, on urgent measures for the country's growth.....	35
3.4 Decree of 26 May 2015 entitled “Changes and Additions to the Annexes 1, 7 and 13 of the Legislative Decree No 75, of 29 April 2010 on the reorganization and revision of fertilisers regulation, in accordance with art. 13 of law No 88 of 7 July 2009”. (MiPAAF)	36

3.5	MiPAAF Decree 5046 “Criteria and general technical standards for the regional regulations on the agronomic use of livestock effluents and wastewaters pursuant art. 113 of Legislative Decree No 152 of 3 April 2006, as well as production and use of digestate pursuant art. 52, para 2-bis of Law Decree No 83 of 22 June 2012, converted into law No 134 of 7 August 2012.	37
3.6	Digestate from BOFSUW in Italy	41
3.6.1	National figures	41
3.6.2	A virtuous example	43
4.	Analysis of the Regional Legislation.....	45
4.1	Introduction	45
4.2	Umbria Region	46
4.2.1	Regional Regulation No 4 of 4 May 2011	46
4.2.2	Resolution of the Regional Council No 880, 14 July 2014	47
4.3	Piedmont Region	48
4.3.1	Resolution of the Regional Council No 23-2193 of 5 October 2015 - “Guidelines for the classification of digestate as a by-product in compliance with art. 184-bis, para 1 of the Legislative Decree No 152 of 3 April 2006, concerning norms on the environment and the agronomic use of digestate”	48
4.3.2	Regional Regulation No 2/R of 2 March 2016	50
4.4	Emilia Romagna Region	50
4.4.1	DGR No 1255 of 28 July 2008, entitled “Aspects of the environmental law on biogas plants of small or micro CHP: local government regulations for standardization of procedures”	51
4.4.2	Regional regulation No 1 of 4 January 2016 – “Regional Regulation on the agronomic use of livestock effluents and wastewaters resulting from farms and small-sized businesses of the agro-industrial sector”	51
4.5	Lombardy Region	52
4.5.1	D.G.R. No IX/2208 of 14 September 2011	52
4.5.2	Resolution of the Regional Council No X/5171 of 16 May 2016	53
4.6	Veneto Region	53
4.6.1	Resolution of the Regional Council No 2495 of 7 August 2006	53
4.6.2	Resolution of the Regional Council No 2439 of 7 August 2007	54
4.7	Marche Region	54
4.7.1	Resolution of the Regional Council No 92 of 3 February 2014	54
4.8	Campania Region	55
4.9	Sardinia Region	55
	Bibliography	57
	Web sites	63

Premise

In order to exhaustively address the issue of digestate, it is necessary to focus the attention on a broader horizon, i.e. the strategic framework in which it is included: Green Economy and Circular Economy.

The United Nations Environment Programme (UNEP) defined Green Economy as “a system of economic activities related to production, distribution and consumption of goods and services that result in improved human well-being over the long term, while not exposing future generations to significant environmental risks and ecological scarcities”. Circular economy is instead a completely new model of production and consumption, defined by the Mac Arthur Foundation as “restorative and regenerative by design, where there are two types of material flows: biological, able to be reintegrated in the biosphere, and technical, to be recycled without entering into the biosphere”.

The most recent development guidelines indicate that it is possible and necessary to use the limited resources we have in an increasingly efficient and sustainable way, containing wastage as much as possible and optimizing the economic, environmental and social benefits.

In a perspective of optimal use of resources, the valorisation of waste from production cycles is a crucial aspect, in terms of culture, in order to move from a linear consumerist paradigm to another one, that is respectful towards circular economy.

Biogas production cycles, based on anaerobic digestion of residual organic materials, both from agriculture and urban origin (BOFSUW), fit perfectly in this new economic strategy. In both cases, material flows are intercepted – before they become waste – in order to be reused for energy production and finally be reintegrated in the biosphere.

According to the European Commission, at the present time, only a limited amount of waste produced in the EU is being recycled (43%), while the rest goes to landfills (31%) or is being incinerated (26%). It was estimated that it would be possible to recycle or reuse 600 million more tons of waste. The Directive No 2008/98/EC establishes that by 2020, 50% of biodegradable organic waste collected from households should be differentiated and treated in order to be reused in other ways. Moreover, the new proposal of the Waste Directive of December 2015 sets even more ambitious objectives, moving to 65% by 2030 the recovery target (reuse and recycling) of urban waste.

In order to better understand how digestate, especially in Italy, could be used in a proper manner, it is necessary to analyse the current regulation, considering in particular the distinction between waste and by-

product. In fact, in the broad category of biodegradable wastes, including organic waste, often risk to enter huge amounts of agricultural and forestry residues, as well as residues from the agro-industry, that should be treated to all effects as by-products, i.e. excellent resources to be valorised in a simplified way compared to waste. Therefore, it is strategic to contain the flow of such materials that, due to the lack of a clear regulation on this matter, are being reduced to the rank of waste. As a paradox, rivers of resources are flowing into a sea of landfills – anachronistic and impacting structures – that we should be able to reduce up to their total elimination (target set by the Landfill Directive 1999/31/EC).

Part A – BY-PRODUCTS

1. Analysis of the EU Regulation

The Communitarian framework regulation is Directive No 2008/98/EC of 19 November 2008, that sets the regulatory framework concerning waste management in the EU. This Directive defines some basic concepts, such as the definitions of waste, recycling and recovery and lays down some basic waste management principles. The Directive also specifies which “*substances and objects resulting from a production process, not primarily aimed at producing, are considered by-products and not waste*”, on the basis of certain requirements included in Art. 5, reported here below.

Article 5: By-products

A substance or object, resulting from a production process, the primary aim of which is not the production of that item, may be regarded as not being waste referred to in point (1) of Article 3 but as being a by-product only if the following conditions are met:

(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 impact.

On the basis of the conditions laid down in paragraph 2 of article 5, Member States may adopt the relevant measures to improve the criteria necessary to evaluate if a substance or object shall be regarded as being a by-product and not as a waste. This opportunity is extremely important in order to solve some interpretative problems of the mandatory criteria. The Italian Ministry for the Environment, Land and Sea is working in this direction, as will be described in the following paragraphs.

The first drafts of the Directive on waste did not define the category of by-product, which was introduced only later in the Communitarian Regulation by the European Court in 2008, at the end of a process started in 2002 (European Court of Justice – Third Section – 18 December 2007, Case C-263/5).

However, in 2007, a year before the approval of the Directive on waste, the requirements were already partially found in Communitarian Legislation and partially transposed into national laws. According to the European Court (18 April 2002), by-product could be “subtracted” from waste regulation if it had been: “an undesired residue of production, reusable without changes during the production cycle”.

Italy, even before the 2008 Directive, had transposed in the Legislative Decree No 152/02 (art. 183, letter p) the legal concept of “by-product”.

For the improvement of by-product definition, a milestone was the judgement by the European Court of Justice of 18 December 2007 (C-263/5), which established that: *“in certain situations, goods, materials or raw materials resulting from an extraction or manufacturing process, which is not primarily intended to produce that item may be regarded not as a residue but as a by-product, which the holder does not seek to “discard” in accordance with art. 1, letter a) of the directive, but that it intends to exploit or market – possibly also for the need of economic operators other than the manufacturer – provided the condition that its reuse is certain, without prior processing and intervenes in the course of the process of production or use”.*

In addition to the criterion of whether or not a substance constitutes a production residue, a second relevant criterion for determining whether or not that substance is waste for the purposes of Directive 75/442 is, therefore, the degree of likelihood that that substance will be reused without any prior processing. If, in addition to the mere possibility of reusing the substance, there is also a financial advantage for the holder in so doing, the likelihood of such reuse is high. In such circumstances, the substance in question must no longer be regarded as a burden which its holder seeks to ‘discard’, but as a genuine product (see judgments Palin Granit, paragraph 37 and Niselli, paragraph 46).

In most cases, potentially long-term storage operations constitute a burden to the holder and are also potentially the cause of precisely the environmental pollution which Directive 75/442 seeks to reduce. The reuse is therefore not certain and is only foreseeable in the longer term, with the result that the substance in question can only be regarded as extraction residue which its holder ‘intends or is required to discard’ (judgments Palin Granit, paragraph 38 and Avesta Polarit Chrome, paragraph 39).

In conclusion, goods, materials or raw materials resulting from a manufacturing process which is not designed to produce them may be regarded as by-products which the holder does not seek to discard, only if the reuse of the item, included the one for the need of economic operators other than the manufacturer, is not merely a probability but a certainty, does not require any prior processing and intervenes during the process of production and use.

Gianfranco Amendola, a leading Italian expert on the matter, affirms that the aforementioned judgment has considerable uncertainty margins, especially concerning the exact meaning of “preliminary transformations”

and of “process of production or use” during which shall occur the reuse (which, however, may involve economic operators other than the manufacturer). In fact, in an attempt to give a clear interpretation of this case law, the European Commission, in the “interpretative communication on waste and by-products of 21 February 2007 (namely before the 2008 directive, which at that time was still in progress) stated that: *“if the preparation of the material for its reuse takes place during the process of production and the material is subsequently transferred in order to be reused, the result will be a by-product, in accordance with the criteria established by the Court. In this case, the relevant competent authority will have to determine whether or not the aforementioned operations are an integral part of the production process. If the material, in order to be further processed shall be moved from the site or factory where it has been produced, it is likely that the operations required for its transformation no longer are a part of the production process itself”.*

The following figure attached to the Interpretative Communication on waste and by-products presented by the Commission on 21 February 2007, during the preparatory work for Directive No 98/2008, still remains one of the best way to simplify the entire system.

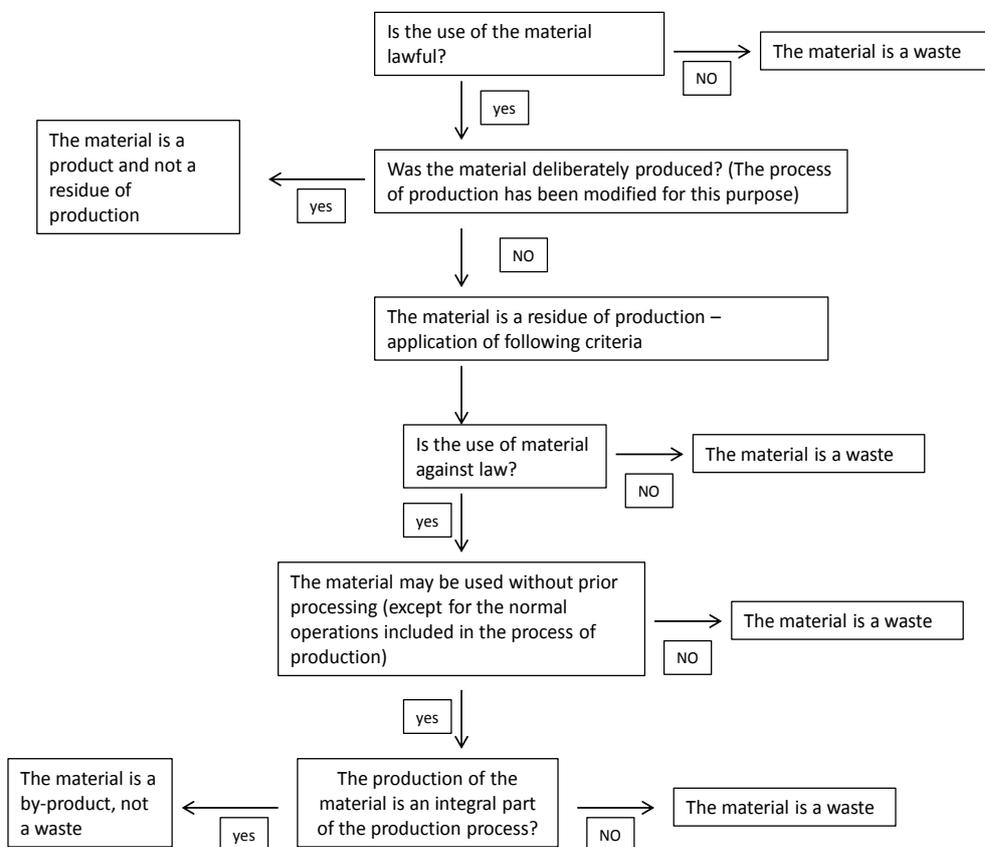


Figure 1 Decision tree for determining whether a material is a waste or a by-product

1.1 European Regulation in course of implementation

The residues of the agricultural and agro-industrial production play a key role in the new European economic strategy linked to Bioeconomy.

As mentioned in the introduction, on December 2, 2015 the European Commission adopted a new package of measures to promote the transition of Europe towards a circular economy that, according to the Commission, would increase global competitiveness, support economic growth and generate new jobs.

The new package of measures includes some reviewed legislative proposals concerning waste, landfills and packaging. The proposals on waste have a clear and ambitious vision over the long-term, aims at increasing recycling and reducing landfilling, while proposing a string of tangible measures to break down barriers to the improvement of waste management, with regard to the respective circumstances of Member States.

The package changes some directives already in force for years (Waste, Landfills and Packaging), while including only communications concerning other issues (WEEE and End of Life Vehicles), and only a simple report about the Batteries and Accumulators Directive.

1. *Framework Directive 2008/98/EC as amended by the new Directive on the basis of a new proposal on December 2, 2015*
2. *Landfills Directive 1999/31/EC as amended by the new Directive proposed on December 2, 2015*
3. *WEEE Directive 2012/19/EU as amended by the new Directive proposed on December 2, 2015*
4. *End of Life Vehicles Directive 2000/53/EC as amended by the new Directive proposed on December 2, 2015*
5. *Packaging Directive 94/62/EC as amended by the new Directive proposed on December 2, 2015*
6. *Batteries and Accumulators Directive 2006/66/EC as amended by the new Directive proposed on December 2, 2015*

According to the Commission, *“the transition to a more circular economy, in which the value of products, materials and resources is kept as long as possible and the production of waste is minimised is an indispensable component of the efforts put in place by the European Union to develop an economy that is sustainable, releases few emissions of carbon dioxide, uses resources efficiently and remains competitive”*.

Therefore, according to this proposal *“it is important to promote the innovation of industrial processes, as the industrial synergy, thanks to which wastes and by-products of a factory become raw material for another one. The Commission, in its proposals for the revision of waste legislation, presents some elements aiming*

at facilitating this practice and intends to launch a dialogue with Member States to ensure a common interpretation of the laws on by-products”.

According to the Commission, the Proposal of Amendment of the Waste Directive should, among other things, aim at clarifying the regulations on by-products, in order to promote their optimal use. Unfortunately, the amendment of article 5 does not enter into the merits of the mandatory requirements, some of which represent an enigmatic issue and remodels the authority of Member States that will no longer be allowed to *adopt measures in order to establish criteria to be met, so that a substance or object is regarded as being a by-product and not as waste*. As a consequence, the Commission becomes the only responsible for all the relevant measures on the issue and limits the self-determination of Member States with the purpose of promoting uniformity of interpretation. Here follows the Proposal of Amendment of the article on by-products:

Article 5

By-products

1. Member States ensure that a substance or object resulting from a production process, the primary aim of which is not the production of that item, may be regarded as not being waste, but as being a by-product only if the following conditions are met:

- (a) further use of 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.

2. The Commission shall set detailed rules in accordance with article 38a with the aim of establishing the implementation criteria as of paragraph 1 for specific substances and objects.

3. Member States shall communicate to the Commission the technical rules adopted in compliance with paragraph 1 of Directive No 2015/1535/EC of the Parliament and the European Council as per Directive requirement.

1.2 National Legislation

As previously mentioned, the positive position in respect of by-products appeared for the first time in art. 5 of European Directive 2008/EC. Italy, even before the 2008 Directive, had transposed in Legislative Decree No 152/06 of 3 April 2006, art.183, lett. p (“Environmental Laws” - published in OJ n. 88 of 14 April 2006 – Supplement n. 96) the jurisprudential notion of “by-product”.

Regarding the current definition of “by-product”, the national regulation, with Legislative Decree No 205 of 3 December 2010, transposing the aforementioned EU Directive on waste, defined unambiguously the characteristics that a material shall have in order to be classified as such (Legislative Decree No 205/10, art.12, transposed in Legislative Decree No 152/06 at art. 184-bis, para 1) with the following statement:

“It is a by-product and not a waste in compliance with article 183, para 1, letter a), any substance or object that fulfils the following requirements:

- a) the substance or object is produced as an integral part of a production process, the primary purpose of which is not the production of that item;*
- b) it is certain that the substance or object will be used, during the same or a subsequent production process, by the manufacturer or a third party;*
- c) the substance or object may be used directly without any further treatment other than normal industrial practice;*
- 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”.*

Here follows the analysis of these requirements with a specific reference to the agronomic use of digestate.

a) the substance or object is produced as an integral part of a production process, the primary purpose of which is not the production of that item.

The Regulation regards as being a by-product any substance that the holder intends to reuse, is produced as an integral part of the production cycle, without being its main product and is not regarded as a waste to discard. The “substance” originates from the normal production process, of which shall not be the primary product, but at this point it is not clear if by-products shall be distinguished from primary products according to quantity or economic value. The relevant criteria have not been disclosed and, therefore, the possibility of producing a “co-product” has not been recognised yet. Digestate for instance is a residue of the anaerobic fermentation process of organic input materials (from agriculture or differentiated waste collection) used for biogas and biomethane production. Therefore, digestate results from the agricultural or industrial processing

of these substrates for energy production. Digestate is not the primary result of a production cycle but a “by-product”, or rather a secondary product, which is an integral part of the same process.

b) it is certain that the substance or object will be used, during the same or a subsequent production process, by the manufacturer or a third party.

In the perspective of resources best use and as a key factor of the desired development of circular economy, a “by-product” corresponds to “a raw material for future use” that does not require “full-recovery operations” (that might be confused with operations included in waste disposal regulation). The certainty of use shall be proved by clear and incontrovertible evidence (upon request), by certifying the destination of that item. There are two different orientations concerning the definition of certainty:

- it is not necessary that, at the time of by-product production is already present a commercial negotiation for its subsequent use. The use must be certain and provable, but not necessarily simultaneous with production.
- A contractual procedure should be activated since the start of production, in order to ensure that the substance is regarded as a by-product and is subtracted from waste disposal regulation. Regarding contractual procedures, it would be necessary to take into account market structure dynamics in order to avoid the production of further useless administrative procedures. A certainty of use may be strengthened by the durability of specific purchase agreements between the parties concerned.

At the juridical and practical levels, the producer will transfer the item to other businesses (users and intermediaries) without reintroducing it in its own production process. This operation is obviously permitted but might result impossible or too expensive. (P. Giampietro)¹.

c) the substance or object may be used directly without any further treatment other than normal industrial practice.

The indication of a direct use or a use following a treatment included in the normal industry practice (NIP), gives rise to uncertainty of interpretation, due to the lack of a clear definition of NIP itself, which is the most discussed issue for the qualification of by-product. In fact, there are several opposing interpretations providing different views on the proper classification of substances. There is a need for a univocal interpretation, in order to avoid all the industry practices that are outside the normal production process, such as turning waste into by-product. According to the majority of jurists, NIP treatments may be defined as the

¹ Pasquale Giampietro, well-known environmental jurist, was involved in the drafting of the most important laws on environmental matters. He dealt with environmental issues first as a Judge of Italian Supreme Court of Cassation and then as a Scholar. Therefore, he was a member of the Ministerial Commissions for the drafting of legal texts and editor of several publications, such as essays, textbooks, magazines and encyclopedic entries.

set of operations or production stages characterising specific production cycles of goods. These operations shall not affect by-product identity and qualities which subsist from the very first stage of production.

The current debate has not solved yet the issue of the proper definition of the treatments required in order to regard a substance as being a by-product (as noted by Gianfranco Amendola)². According to Amendola, it is necessary to focus the attention on which NIP treatments are carried out regularly – in relation to specific types of process – i.e. when these operations are an integral part of a correct production process. In this context, all processing operations of input materials used in the same plant, may be also allowed to by-products, without reducing them to the level of waste. It seems reasonable to state that NIP is the set of operations or processing stages that involve both product and by-products and that characterise specific production cycles of goods.

The Judgment of the Supreme Court No 17353/12 of 17 April 2012 seems to have excluded from NIP *all operations with a minor impact on residue, such as sorting, screening, crushing or grinding, even when leading to a modification of the original consistency of residue and that, therefore, re-enter in the concept of treatment*. It highlights that, from time to time, *it shall be evaluated whether or not a treatment may be considered as a part of NIP*. The Court specifies that shall be *excluded from NIP all the operations of residue manipulation other than those normally carried out in production process and identifies as NIP compliant the operations normally carried out by the business on raw material, that by-product is going to replace*.

In the case of digestate NIP may be for instance solid/liquid fraction separation, ammonia stripping, nitrification/denitrification, phytodepuration, etc. Despite being relevant to a correct digestate management, these practices might be regarded as an attempt to fraud, because of the uncertainty of interpretation of the aforementioned criteria.

In case of doubt should be included in NIP each procedure carried out on substance or object prior to its use that, in the industrial sector of reference, is also being carried out on raw materials, intermediate or final products, without resulting in risks of environmental impact due to the use of by-products.

On the contrary, treatments of by-products with a high environmental impact (i.e. with a radical transformation of item), are likely to be outside NIP and regarded as recovery operations.

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.

² Gianfranco Amendola, former Magistrate, expert in Environmental Legislation. He was Law Magistrate of Rome where, from 1970, dealt with crimes against the environment, and conducted trial preparations for over 15,000 cases.

This requirement clarifies that, the placing on the market and trading of by-products shall not occur in violation of civil, administrative and penal law that regulate their production and circulation. On this issue there is a certainty of interpretation.

European Legislation requires, in the name of a “state of general legality”, to comply with all “relevant requirements”, i.e. present and future regulatory requirements regarding a) “products” b) “health and environment protection”, in relation to the “specific use of by-product”.

To both European and national legislation belongs a special category of by-products, i.e. Animal by-products (ABPs), in accordance with Reg. 1069/2009.

According to the European harmonisation of law, ABPs are biodegradable residues including: entire bodies or parts of animals, animal-origin products and derived products which, by law, may not be used for human consumption, animal-origin products which may be used for human consumption but are instead used for other purposes, raw materials to manufacture animal origin products. ABPs, in addition to the traditional uses (such as the transformation of animal fats into soap, shoes made of leather), are used on an industrial scale in several manufacturing sectors: pharmaceutical, cosmetic, textile and chemical industries. After the crisis due to the “mad cow disease”, the European Union has developed a specific regulation for the handling of animal-origin by-products, entrusting health authorities with the control of compliance with regulations.

Animal by-products

Animal by-products (ABPs) are materials of animal origin that people do not consume. ABPs include among others:

- Animal feed - e.g. based on fishmeal and processed animal protein
- Organic fertilisers and soil improvers - e.g. manure, guano, processed OF/SI on the base of processed animal protein
- Technical products - e.g. pet food, hides and skins for leather, wool, blood for producing diagnostic tools

In the EU, over 20 million tons of ABPs emerge annually from slaughterhouses, plants producing food for human consumption, dairies and as fallen stock from farms.

ABPs can spread animal diseases (e.g. BSE) or chemical contaminants (e.g. dioxins) and can be dangerous to animal and human health if not properly disposed of. EU rules regulate their movement, processing and disposal.

ABPs are categorised according to their risk using the basic principles in Regulation (EC) 1069/2009.

- Measures that apply to them depend on the ABP's category which is based on their handling: Production

- Collection
- Transport
- Storage
- Use
- Disposal

EU national authorities make official controls on ABP imports from non-EU countries.

EU Rules on ABP

Regulation (EC) 1069/2009 and Commission Regulation (EU) 142/2011 replaced the old one (Regulation (EC) 1774/2002) consolidating several related acts into one. " The current legislation allows for:

- Clear requirements based on ABPs' technical standards
- Enforcement measures for the new risk-proportionate approach
- End point in the manufacturing chain for processed and packaged pet food, biodiesel, tanned hides and skins and other products
- Less red tape for producers of medicines and diagnostics from ABPs
- Smoother official controls of laboratories of processing and biogas plants handling ABPs
- Better traceability from food production
- Risk-proportionate solutions for transport, processing, use and imports

In Italy, ABPs, as well as products obtained from their processing (such as meat and bone meal) – on the basis of current regulations (Art. 185 para 2 lett.b, of Legislative Decree 152/2006 of the Environment Code) do not fall within the field of application of Part IV of the Environment Code (waste disposal regulations), because regulated by other requirements, with regard to Communitarian Directives.

1.2.1 Italian Legislation in the course of implementation

In recent years, the Italian Ministry of the Environment, Land and Sea has proposed two laws in order to facilitate many sectors of industry in the use of by-products. The main problem still remains the demonstration of compliance with the requirements for the qualification of production residues as by-products and not as waste.

In 2013, the Technical Secretariat of the Ministry of the Environment set up a task-force of technical experts to develop the Legislative Decree No 152/06 (art. 184-bis, para 2 of the Environment Code). To the work group were invited the primary stakeholders of the agro-energy sector, who had been mainly damaged by the uncertainty of interpretation of art. 184-bis. The objective was to outline a draft of the Regulation with criteria to determine when production residues usable for energy purposes were to be regarded as being by-products. After years of debate, was reached an agreement on a draft decree, that clarified the correct regulatory interpretation only of those by-products intended for biogas production and energy from biomass combustion. The analysis of the technological equipment necessary for biomass use of other sectors such as Green Chemistry was postponed. This decree has not been published yet and the sector suffers from the absence of a highly useful and enlightening document concerning the Italian regulations.

Part B – DIGESTATE

At European level, digestate, although often regarded as a waste, may be used in agriculture provided that some quality conditions are being met. In any case, the use of digestate for agriculture is normally permitted by national regulations, even in certified organic cultivations.

In Italy the issue is much more complicated, due to the fact that both legislation and jurisprudence emanated ambiguous measures, according to which digestate may alternatively be included in the categories of by-product or waste.

2. Analysis of the EU Regulation

2.1 Introduction

The first European regulation of reference that treated the issue of digestate was the 1991 Waste Directive, in the broader field of interest related to surface water and groundwater protection from pathogens that, over a certain threshold, compromise the quality of water. Since then, European authorities have approved other laws.

According to the Framework Directive on Waste (2008/98/EC), Member States shall take the necessary measures *“to ensure that waste management is carried out without endangering human health and harming the environment, able to ensure a sustainable use of natural resources”*. The initiatives outlined are designed to promote best possible use of existing legislation, leaving Member States a wide margin of discretion in choosing the avenues of action that are best suited for their respective circumstances. In any case, for all members the univocal point of reference is given by the “waste hierarchy” through which are established the principles of prevention followed by reuse and recycling, to end up with energy recovery.

As already mentioned, digestate, regarded by many Member States as being a waste, is the subject of a new strategy of use, that takes into account all relevant requirements of health and environment protection.

In 2010 the European Commission, with the Communication COM 235 (2010) *“on future steps in bio-waste management in the European Union”*, highlighted the excessive production of waste due in particular to common practices and inadequate waste management systems. This situation, that has a high impact on economy and environment, must be solved quickly and efficiently. In relation to the issue of organic waste, the Commission established that *“compost and digestate”* obtained from bio-waste are under-used materials. This happens because *“Member States demand suffers from a lack of end-user confidence”*. To address this issue, the use of these materials should be regulated in such a way that no adverse effects are generated on soil. This problem might be solved by proper regulations that allow the free circulation in market of these

materials, their use without further monitoring and control of soils on which they are spread. From 2014, thanks to the Implementing Regulation (n. 354/2014 of 8 April 2014), has been recognised the possibility of using digestate from biogas resulting from the treatment of by-products of animal origin mixed with materials of plant origin and, upon authorization in accordance with Legislative Decree No 75/2010, of placing it on the market as a fertiliser. In wait for the approval of the Regulation on fertilisers from organic waste (proposed on 17 March 2016), digestate might be regarded as a marketable organic fertiliser. At the present time there is not a univocal regulation on digestate in EU Member States. In the absence of bilateral agreements among States, some products are not allowed to cross borders. The target of the Regulation on organic fertilisers, within the package of measures on circular economy, also consists of facilitating EU market access to fertilisers from organic waste, creating equal conditions for concurrence between organic and chemical fertilisers. Here follows the summary of the aforementioned regulations up to May 2016.

2.2 EU Directive 91/676/EC

Known as the Nitrates Directive, it is the first Regulation that has addressed the issue of digestate at European level. The Directive, approved in 1991, was intended to protecting water quality, preventing pollution of surface waters and groundwaters caused by chemical compounds (in particular nitrates) released in soil by agricultural activities, and to encouraging good agricultural practices. The law, in setting standard criteria for water protection, compares digestate to livestock effluents.

After the transposition of the law, all Member States and delegates (the Regions in Italy), set up the “Action Programmes for Nitrate Vulnerable Zones”. In the 27 EU Member States the 39.6% of territory is subjected to the implementation of over 300 action programmes. The measures provided by the Directive define all requirements for the spreading of fertilisers, the rules on capacity and construction of storage vessels for livestock manures and the conditions for land application of fertilisers near water courses. To summarize, this Directive provides:

1. Nitrate Vulnerable Zones (NVZ) where is prohibited the spreading of livestock effluents (and waste from small businesses of the agro-food sector) over 170 kg of nitrate of animal origin per hectare and per year. Rules about the agronomic use of livestock effluents from farms and industry, through the adoption of specific Action Programmes;
2. Equalisation between digestate – as an input material of the biogas plant – and livestock manure

This Directive was transposed at national level in all Member States. This happened in Italy with the first Legislative Decree No 152 of 11 May 1999 and the subsequent Legislative Decree No 152 of 3 April 2006 (of

the Environment Code)³, at the present moment replaced and updated by the recent Interministerial Decree No 5046 of 25 February 2016 entitled “Criteria and general technical standards for the regional regulation on the agronomic use of livestock effluents and wastewaters pursuant art. 113 of Legislative Decree No 152 of 3 April 2006, as well as digestate production and agronomic use pursuant art. 52, para 2-bis of the Decree Law No 83 of aa June 2012, converted into law No 134 of 7 August 2012”.

Limits of heavy metals and pathogens in digestate

Many Member States lack a proper legislation concerning limit values of heavy metals and control of pathogens in digestate. The European law, that mostly addresses this concern is Directive 86/278/EC of 12 June 1986, concerning protection of the environment and in particular of soil, from the use of sewage sludge in agriculture (OJ L 181 of 4 July 1986). The Directive has the purpose of preventing harmful effects on soil, vegetation, animals and man and encouraging the correct use of sewage sludge. The restrictions on the use of sewage sludge are currently limited to seven heavy metals: cadmium, copper, nickel, lead, zinc, mercury and chromium. At the same time, in order to prevent the spread of pathogens in the environment and the subsequent contamination of animals and plants, the Directive establishes periods, during which land application of sewage sludge is prohibited, as well as plants on which it may be applied.

In Italy this Directive was transposed into Legislative Decree No 99 of 27 January 1992, published in OJ No 38 of 15 February 1992, Ordinary Supplement No 28 entitled “Implementation of the Directive 86/278/EC concerning the protection of the environment and in particular of soil, for the use of sewage sludge in agriculture”.

With regard to the Legislation on control of pathogens in relation to the use of digestate as a fertiliser, the first Member State to have legislated in this sense has been Denmark, then followed by other countries.

In countries such as Germany, Austria and Sweden, where the legislation is relatively new, the experience of Denmark has been an example to follow in order to establish proper regulations.

2.3 Green Papers: Management of biodegradable organic waste in the EU – COM 811 of 3 December 2008

Green Papers are documents published by the European Commission to stimulate discussion on given topics at European level. They invite the relevant parties (bodies or individuals) to participate in a consultation process and debate on the basis of the proposals they put forward.

³ Source: Ecoscienza n. 2 anno 2015 “Effluenti zootecnici, cambiare le norme europee” by G.Cacopardi e D. Quarato (“Livestock effluents, changing European rules” N.d.T.)

Green Papers may give rise to legislative developments that are then outlined in *White Papers*, even if this target has not been achieved yet concerning biodegradable waste. At the present moment, the reference document in matter of waste still remains Directive 98/2008, while the reference for an only partial classification of organic waste is the 2010 Communication from the Commission to the Council and the European Parliament.

In the Green Paper, **digestate** is still regarded as being a “waste”, as it was taken into account only the one resulting from the treatment of materials from differentiated waste collection. At page 3 is stated that *“among the available options for organic waste management are, in addition to prevention, waste collection (whether differentiated or not), anaerobic digestion and composting, incineration and landfilling. Economical and environmental benefits of the different treatments remarkably depend on local conditions, such as population density, infrastructures and climate, as well as markets and related products (energy and compost)”*.

Digestate is also regarded as being a waste, in fact: *“the residue of a process, called digestate, may undergo composting treatment and be used for similar purposes as compost, with the consequence of improving the overall recovery of resources from waste”*.

2.4 Communication from the Commission to the Council and the European Parliament – COM 235 (2010)

This Communication concerns further measures in matter of organic waste disposal in the EU, is open to a wider possibility of use of digestate and clarifies that:

a) optimization of recycling operations and organic waste recovery would bring to a series of benefits and synergies. For instance, if in soil is spread digestate resulting from biogas plants, anaerobic digestion might contribute to the achievement of target for reduced CO₂ emissions both through the development of bioenergy and biofuels, as well as good practices for soil organic carbon stock and soil fertility.

b) *“Standards for compost and digestate should be established to enable their free circulation on the internal market and to allow using them without further monitoring and control of the soils on which they are used. The procedure defining when a material ceases to be a waste, provided by the regulatory framework in matter of waste, might be the most efficient way to define these rules. The Commission shall soon give start to the works intended for evaluating the technical requirements for a possible proposal. It is not difficult to assume that not all organic wastes which undergo an organic treatment meet the standards of “product”, even if those items, when properly used, could give a precious contribution to carbon-poor lands. An entire*

harmonisation among EU Member States would not be possible due to the respective circumstances (such as quality and soil requirements). However, minimum standards should be adopted at European level, in order to create a “security network” against any harmful use”.

c) *Research and Innovation may result in new technologies and practices for organic wastes (advanced applications in matter of fertilisation and bioenergy, applications of biochemicals and biomaterials). The seventh EU regulatory framework for the technological research and development (2007 – 2013) practically contributes to this type of development. Several parts of EU cooperation programmes promote activities in support of organic waste prevention and/or economic values optimization.*

2.5 Commission Implementing Regulation (EU) No 354/2014 of 8 April 2014 amending and correcting Regulation EC No 889/2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control.

In the Premises of the Regulation is stated that: “Based on the recommendations of the EGTOP⁴, which concluded as regards fertilisers and soil conditioners that the substances biogas digestate, hydrolysed proteins from animal by-product origin, leonardite, chitin and sapropel comply with the organic objectives and principles, those substances should be included in Annex I to Regulation (EC) No 889/2008 for use under certain specific conditions”. In particular, with this regulation is amended Annex I of the previous Regulation with the list of fertilisers that are usable in organic production, in case the basic rules (crops rotation, green manure, organic fertilisation activities and other activities) are not sufficient for meeting crops nutritional requirements. This list has been integrated with “digestate resulting from biogas containing by-products of animal origin with materials of plant or animal origin”. In this way, was approved the use in organic agriculture of digestate to which shall be applied the same rules of livestock effluents.

⁴ Final report: http://ec.europa.eu/agriculture/organic/files/eu-policy/expert_recommendations/expert_group/final_report_on_fertilizers_to_be_published_en.pdf

b) after the row relating to 'Composted or fermented mixture of vegetable matter', the following row is inserted:

"B	Digestate from biogas containing animal by-products co-digested with material of plant or animal origin as listed in this Annex	Animal by-products (including by-products of wild animals) of category 3 and digestive tract content of category 2 (categories 2 and 3 as defined in Regulation (EC) No 1069/2009 of the European Parliament and of the Council*) must not be from factory farming origin. The Processes have to be in accordance with Commission Regulation (EU) No 142/2011. Not to be applied to edible parts of the crop
-----------	---	--

*Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009, p. 1).

2.6 Circular Economy Package – Legislative Proposal of the Council and the European Parliament establishing rules related to the placing on market of fertilising products with CE Marking and modifying EU Regulations No. 1069/2009 and No 110/2009/EC – COM 157 (2016).

The main strategic purpose of the initiative, already mentioned and anticipated by this section, consists in encouraging EU large-scale production of fertilisers obtained from national raw materials, organic or secondary, compliant with the model of circular economy, through the processing of wastes in nutrients for crops, after the analysis of the current Regulation.

This Proposal of Regulation is an essential tool to solve some critical circumstances due to a difference in regulations of Member States which have not been harmonised yet, with a consequent problem in the circulation of goods. It will be possible to overcome this situation, only if Member States shall achieve a memorandum of understanding. In fact, according to premises *"First, innovative fertilising products, often containing nutrients or organic matter recycled from biowaste or other secondary raw materials in line with the circular economy model, have difficulties accessing the internal market due to the existence of diverging national rules and standards"*.

Around 50% of the fertilisers currently on the market, however, are left out of the scope of the Regulation No 2003/2003 (EC). Incidentally, the current regulation on fertilisers concerns almost exclusively those fertilisers produced from inorganic materials resulting from mining or synthetically. From the Regulation are excluded some inorganic fertilisers and almost all fertilisers produced from inorganic sources, as by-products of animal or agricultural origin, or those resulting from recycling of organic waste from food chain. This aspect, colliding with the recent perspectives of circular economy, is due to the fact that the Regulation was conceived at the

time for inorganic fertilisers having specific characteristics and resulting from raw materials. Today, scientific research and large investments in innovation activities, led to the production of the so-called “*Innovative Fertilisers*” obtained from organic or secondary raw materials. The use of these fertilisers if, on the one hand represents a great opportunity in a sustainable development, on the other hand prefigures a challenge due to the strict control that should be provided to ensure a proper use of raw materials.

This Proposal is intended to govern the sector of fertilisers, extending the scope to innovative fertilisers with high environmental requirements, improving approval procedures (type approval procedure is still lengthy) and harmonising new and traditional fertilisers.

To summarize, this initiative, according to the European Commission, “*will boost investment and innovation in the circular economy (...) and will create a level playing field for all fertilising products and facilitate recourse to domestic, secondary raw materials. (...) Furthermore, the initiative supports the aim to create a deeper and fairer internal market with a strengthened industrial base, by removing existing barriers to free movement of certain innovative fertilisers and facilitating the market surveillance by Member States.*”

The approach of this report to the aforementioned Proposal is due to the fact that the new Regulation will also involve both private and public stakeholders (such as operators of plants for wastewater treatment or waste management plants that produce compost or digestate), who will be able to promote their products and thus facilitate investments in their facilities.

Here follows the definition of fertiliser according to the new Proposal that, when approved, might solve the many litigations taking place in our country. In fact, this definition may also include digestate, that at certain conditions shall be marketed as a fertiliser on domestic market.

Article 2 Definitions – para 1. “*Fertilising product*”: *a substance, a mixture, a microorganism or any other material, applied or intended for application, alone or in combination with other materials, to the plants or their rhizosphere, with the purpose of providing nutrients for plants and improving nutritional efficiency*”.

2.7 European Commission Joint Research Institute for Prospective Technological Studies, JRC – Report EUR 26425 EN 2014 Hans Saveyn & Peter Eder End-of-Waste criteria for biodegradable waste subjected to biological treatment (compost & digestate): Technical Proposals

The management of digestate is finally being treated at European level with an important document published by JRC (Joint Research Centre). In this document, after a long time, it is recognized also at European level that: “*(...) In some circumstances, biogas yields may be relatively low but the process of*

anaerobic digestion offers other advantages. This is especially true for manure. Apart from lower greenhouse gas emissions, other increasingly environmental advantages are linked to the use of digestate as a bio-fertiliser instead of the untreated manure, with a consequent reduction of odour emissions, increased animal health safety, reduction of pathogens and weed seeds (Lukehurst et al., 2010).

From the process of anaerobic digestion is obtained a digestate that may be applied to field surfaces as an organic liquid fertiliser. In some plants, digestate is divided into solid and semisolid shovelable fraction.

As an alternative, digestate may undergo the aerobic composting. The liquid is being recycled to a large extent in the composting process and the part exceeding is used as a fertilising liquid, if quality is good. Anaerobic digestion is performed using biodegradable fractions from urban waste collection, agricultural waste (manure, wastes, straw, beet and potato leaves), wastes of food industry (residues of beer production, grape crushing, sugar production, slaughtering, by-products and residues resulting from meat processing and wastewaters from milk processing) and sewage sludge”.

It is, therefore, explicitly recognized the important role of digestate. In Annex 1 is given an overview of biodegradable waste management in 25 EU State Members, as reported here below:

Table 1 Overview of the management of biodegradable waste in EU Member States

	Bio and green waste composting	Anaerobic digestion	Mixed municipal solid waste composting	Other mechan. biological treatment	Landfilling	Incineration
Country	B/GWC	AD	MSWC	MBT	LAND	INCIN
AT	X	X	-	X	-	X
BE	X	-	-	-	-	X
CY	-	-	-	-	X	-
CZ	X	-	-	-	X	X
DE	X	X	-	X	-	X
DK	X	-	-	-	-	X
EE	X	-	-	-	-	-
ES	X	X	X	-	X	X
FI	X	X	-	X	X	-
FR	X	-	X	X	X	X
GR	-	-	-	X	X	-
HU	X	-	-	X	X	-
IE	X	X	-	X	X	-
IT	X	-	-	X	-	X
LT	X	X	-	X	X	-
LU	X	X	-	-	X	-
LV	X	-	-	-	X	X
MT	-	-	-	-	X	-
NL	X	-	-	-	-	X
PL	X	-	X	X	X	-
PT	X	X	X	X	X	X
SE	X	X	-	-	-	X
SI	X	X	-	-	X	-
SK	X	-	-	-	X	-
UK	X	X	-	-	X	-

Source: - "End-of-Waste criteria for biodegradable waste subjected to biological treatment (compost & digestate): Technical Proposals (2010)"

2.7.1 Legislative aspects for digestate use in some Member States

As highlighted by JRC report but also by research studies carried out by other European work groups, such as that of Åke Nordberg⁵ on which this paragraph is concerned, the regulatory framework is extremely heterogeneous at European level, without any harmonisation between Member States.

Each country has its own criteria of digestate use, based on the origin of input materials (waste and agricultural residues) with different rules and parameters concerning the content of nutrients, heavy metals, dry matter, admissible extraneous materials, pH indicator and pathogens such as Salmonella and coliforms.

Germany

Digestate is mainly used as a fertiliser, without any prior treatment; only 10% of the plants of waste digestion use the process of composting. The 6% of digestate has a “seal of quality”, that is mandatory for compost (BGK – Bundesgütegemeinschaft Kompost), products from digestate and composting of sewage sludge. The Federal Kompost (BGK) is a professional association located in Cologne, the statutory purpose of which is the monitoring of compliance with quality standards for organic waste treatment from households, gardens and parks. It is an independent organization that follows only the criteria set by the Institute of Quality and Control, RAL Deutsche. The BGK association distinguishes several types of quality standards:

- (e) **Compost products (RAL-GZ 251): fresh compost, manure compost, compost for potting soil**
- (f) **Digestate products from biowaste (RAL-GZ 245): solid and liquid digestates**
- (g) **Digestate products from renewable energy crops (RAL-GZ 246): solid and liquid digestates**
- (h) **Composted sludge products (RAL-GZ 258): sludge-based mature compost, sludge-based fresh compost**

Netherlands

Digestate obtained from anaerobic fermentation of substrates from municipal waste collection undergoes an aerobic post-treatment (composting) and the result is marketed as a fertiliser or substrate. Digestate resulting from undifferentiated waste collection does not achieve a good quality for agriculture, not even after composting, so is incinerated and sometimes sent to landfills, even if this alternative is strongly discouraged by authorities.

⁵ Åke Nordberg. Swedish Institute of Agricultural Engineering, PO Box 7033, SE-750 07 Uppsala, SWEDEN, ake.nordberg@jti.slu.se

Sweden

The 97% of digestate resulting from plants using waste anaerobic treatment (from municipal waste collection, sewage sludge or their mixture) is used in agriculture, without any specific treatment. Only 20% of the plants separate solid and liquid fractions and only 2% carries out the composting of solid fraction. Digestate, regardless of the type of input material, can be used in agriculture only if subjected to quality standards control according to Sprc 120 rules – (Certification rules for digestate from biowaste by the quality assurance system of Swedish waste management). Digestate of lower quality, non-compliant with best quality parameters, may be used in floriculture, golf courses, non-food crops. Poor quality digestate has a limited field of application and when it contains too many pollutants is dried and sent to incinerators.

Belgium

Only farms are authorized to use the liquid fraction of digestate, while its private use is not permitted. The reason is due to Belgian legislation, which considers digestate as not sufficiently stable to allow its packaging and retail distribution and requires to professional users a specific equipment for soil application of the liquid fraction. In Belgium, digestate, in order to be considered as stable and dry, shall contain a percentage of dry matter equal or over 80%: from that, it is obtainable an easy to use granular product. The final product is called “partially dried fertiliser”. In the future, Belgian authorities might give the relevant authorizations for the use of these products to private consumers under strict conditions, as the compliance with specific input materials, process control and quality standards of final product.

Slovenia

At the time of JRS report (2014) there were 11 anaerobic digestion plants, of which only seven fed with agricultural biomass. Digestate is used in agricultural soils, with restrictions on nitrogen compounds in accordance with the national transposition of the Nitrates Directive (OJ of the Republic of Slovenia No 113/09).

England

According to the UK Organics Recycling Group, all types of digestate may be used as fertilisers, soil improvers and, in case of low content of dry matter, as foliar fertilisers. Liquid fraction may be used as biofertiliser, while solid fraction can be used as biofertiliser, organic soil amendment and manure. The UK has developed an AD Quality Protocol defining the status of “end-of-waste product” for digestate, i.e. those wastes that undergo a process of anaerobic digestion and are turned into digestate. Quality standards are included in British standard Bs-Pas 110.

Regulations and rules for the use of compost vary remarkably from country to country. For some of them, the use of compost is subjected to a complex series of national and regional regulations (Germany, Netherlands and Austria), while for others, compost may be used without any law prescription (Greece, Portugal, Slovenia). It is worth to mention that the main restrictions usually regard: quantity of compost (tons of dry matter), maximum levels of heavy metals (quality compost) that may be spread within a period of 2-5 years. The chart gives an overview of the current restrictions.

Application rules to be followed:

- e)* limitation of direct load (grams of substance per hectare and per year), in most cases assessed within a period of 2-10 years;
- f)* dose restrictions on admissible dry matter in compost per hectare per year;
- g)* limits of mineral nutrients (phosphorus and/or nitrogen) to farmland.

The following chart summarizes the regulation concerning the use of compost in the EU.

DE	Bio-waste Ordinance (BioAbfV 1998) Soil Protection Ordinance (BbodSchV 1999) Fertiliser Ordinance (DÜMV, 2003)	<input type="checkbox"/> The Bio-waste Ordinance regulates agricultural use with compost Class I 20 t d.m. in 3 years, Class II 30 t d.m. in 3 years. <input type="checkbox"/> Soil Protection Ordinance for non agricultural areas between 10 and 65 t d.m. compost depending on use. <input type="checkbox"/> Fertilising with compost according to good practice
DK	Stat. Order 1650 of 13.12.06 of the use of waste (and sludge) in agriculture	<input type="checkbox"/> 7 t d.m. /ha*y on a 10 year basis <input type="checkbox"/> Restriction of nitrogen to 170 kg /ha*y <input type="checkbox"/> Restriction of phosphorus to 30 kg /ha*y average over 3 years <input type="checkbox"/> The levels for heavy metals and organic compounds are restricted in the INPUT material for the composting process
EE	No compost restrictions	Only restrictions for the use of stabilized sludge "sludge compost"
ES	Real Decree 506/2013 on Fertiliser Products	<input type="checkbox"/> Class C compost (mixed waste compost) 5t d.m./ha*y
FI	Decree of the Ministry of Agriculture and Forestry on Fertiliser Products 12/07	<input type="checkbox"/> Maximum Cd load/ha 6 g during 4 years (crop growing area), 15 g during 10 years (landscape gardening), 60 g during 40 years (forestry); <input type="checkbox"/> Soluble phosphorus load per 5 years 400 kg (farming), 600 (horticulture) and 750 (landscape gardening); soluble nitrogen load during 5 years in landscape gardening max. 1250 kg.
FR	Organic soil improvers - Organic amendments and supports of culture NF U44-051	From the moment a compost meets the standard NF U44-051 there is no rule for the use. In the standard, flows in heavy metals, and elements are restricted to the maximum loading limits: <input type="checkbox"/> <u>Per year g/ha:</u> As 270, Cd 45, Cr 1,800, Cu 3,000, Hg 30, Ni 900, Pb 2,700, Se 180, Zn 6,000 <input type="checkbox"/> <u>Over 10 years g/ha:</u> As 900, Cd 150, Cr 6,000, Cu 10,000, Hg 100, Ni 3,000, Pb 9,000, Se 600, Zn 30,000 <input type="checkbox"/> Application should follow good agrarian practices, and agronomical needs which are taken into account for the use of composts.
GR	Common National Ministerial Decision 114218/1997 Hellenic Ministerial Decision	Upper limits for amounts of heavy metals disposed of annually in agricultural land Cd 0,15, Cu 12, Ni 3, Pb 15, Zn 30, Cr 5, Hg 0,1, kg/ha/y

HU	49/2001 Statutory Rule about the protection of the waters and groundwaters being affected by agricultural activities 10/2000. (VI. 2.) KöM- EüM-FVM-KHVM - Water protection rule	<input type="checkbox"/> Compost application on agricultural land is limited by the amount of nutrient with 170 kg/ha Nitrogen. <input type="checkbox"/> Dosage levels depending on background contamination and nutrient content level in the soil laid down in the National Statutory Rule about the threshold values for the protection of the ground- and subsurface waters and soils.
IE	Statutory Instruments SI No. 378/2006 Good agricultural practice for protection of waters: Statutory instrument 253 of 2008	<input type="checkbox"/> IE Nitrate regulation: Compost has to be included in the Nutrient Management Plan. Availability of nutrients calculated like cattle manure. <input type="checkbox"/> There are specific waiting periods to consider for animal access to land fertilised with bio-waste compost based on the Animal-By-Product Regulations. <ul style="list-style-type: none"> o Catering waste: 21 d for ruminant animals; 60 d for pigs; o Former foodstuff & fish waste compost: 3 years (under revision)
IT	National law on fertilisers L. 748/84 (revised in 2006 with the new law on fertilisers, D.lgs. 217/06) Regional provisions	<input type="checkbox"/> Compost has to be considered a product to be used according only to Good Agricultural Practice as long as it meets the standards. No restriction is set on loads for unit area <input type="checkbox"/> Some regions have codified approaches for low grade materials applications and landfill reclamation, building on the old regulation on "mixed MSW compost" (DCI 27/7/84)
LT	Environmental Requirements for Composting of bio-waste, approved by the Ministry of the Environment on 25 January 2007, No. D1-57 Standards for sewage sludge use for fertilising and redevelopment LAND 20-2005 (Gaz., 2005, No. 142-5135)	<input type="checkbox"/> When compost used for improve the quality of the soil, the annual quantity of the heavy metals can not exceed norms according LAND 20-2005. <input type="checkbox"/> Compost application in agriculture and or soil reclamation purposes, is restricted by contamination with pathogenic microorganisms, organic micropollutants and heavy metals (according to LAND 20-2005) <input type="checkbox"/> Compost application on agricultural land is limited by the amount of nutrient with 170 kg/ha Nitrogen and 40 kg/ha Phosphorous per year
LU	EU Nitrate Directive	<input type="checkbox"/> No specific regulations; advise (voluntary): 15 t d.m. /ha *y <input type="checkbox"/> Only record keeping about the compost use and send to the Ministry
LV	No regulations	only for sewage sludge compost
MT	No data available	

NL	Fertiliser Act (2008)	<input type="checkbox"/> Compost has to meet the national standard (heavy metals) <input type="checkbox"/> In the new fertiliser legislation limitations for application are only based on the nutrient content for agriculture, so called standard values of max. 80 kg P ₂ O ₅ /ha*y, 100 kg N /ha*y, 150 K ₂ O /ha*y, 400 kg neutralizing value /ha*y or 3000 kg organic matter /ha*y <input type="checkbox"/> For some crops which grow in the soil (e.g. potatoes) compost needs certification and a low glass content < 0.2 %
PL	The Act of 10 July 2007 on fertilisers and fertilisation (Journals of Laws No. 147, item 1033, as amended)	<input type="checkbox"/> Organic fertilisers and plant conditioners containing compost can be marketed and used on the Polish territory on the basis of a license from the Agricultural Ministry; <input type="checkbox"/> Products containing compost are used exactly as given in the instructions for using and storing the product, which is an integral part of the license; <input type="checkbox"/> A limit for nitrogen use of 170 kg of nitrogen (N) in the pure ingredient per ha and per year only applies to natural fertilizers
PT	No regulations available	---
RO	No data available	n.d.
SE	The Swedish Board of Agriculture: SJV 1998:915 (sewage sludge regulation)	<input type="checkbox"/> Fixed maximum heavy metal load Maximum heavy metal load (g/ha*y): Pb 25; Cd 0.75; Cu 300; Cr 40; Hg 1.5; Ni 25; Zn 600
	Nitrate directive	Agriculture: nitrogen: 150 kg/ha*y and phosphorus: 22 – 35 kg/ha*y
SI	Decree on the treatment of biodegradable waste (Official Gazette of the Republic of Slovenia, no. 62/08)	<input type="checkbox"/> Class I can be used without any restrictions. <input type="checkbox"/> Class II can be spread with a special permission with a limited application rate considering the heavy metal content and load after an evaluation and risk assessment performed by a lab (but not more than 10 t d.m./ha /year).
	Decree concerning the protection of waters against pollution caused by nitrates from agricultural sources (Official Gazette of the Republic of Slovenia, no. 113/09)	<input type="checkbox"/> Application of organic fertilizer on agricultural land is limited by the amount of nutrient with 250 kg/ha Nitrogen.
SK	Act No. 220/2004 Col. on protection and using of agricultural soils	<input type="checkbox"/> Lays down limit concentrations of risk elements in agricultural soils

	<p>Ministry of Agriculture Decree No. 26/2000, on fertilisers.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Lays down fertiliser types, max. concentration of risk elements in organic fertilisers, substrates and commercial fertilisers, storage and take-off conditions, and methods of fertiliser testing
<p>UK</p>	<p>Each country of the UK has different requirements</p> <p>Here is an example of parts of the regulations applicable for England and Wales</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Use in agriculture and applications to soil other than land restoration: A Waste Management Licence Exemption, Paragraph 7A, must be obtained by the land owner/manager before accepting and storing then spreading compost. The compost must be made from source segregated bio-waste. Per Paragraph 7A exemption: <ul style="list-style-type: none"> <input type="checkbox"/> 'Benefit to agriculture' or 'ecological improvement' must be demonstrated, which is done by spreading compost as per Nitrate Vulnerable Zone regulations if within a NVZ, and following the Codes of Good Agricultural Practice for the Protection of Soils and Water. Given the typical total nitrogen content of 'Green compost', the application rate would be approximately; <ul style="list-style-type: none"> <input type="checkbox"/> 30 - 35 fresh tonnes per hectare per year where a field NVZ limit of 250 kg total nitrogen per hectare applies, <input type="checkbox"/> 30 fresh tonnes per hectare per year if 'Not NVZ' but as per good agricultural practice, or <input type="checkbox"/> 60 – 70 fresh tonnes per hectare once per two years if 'Not NVZ' but as per good agricultural practice. <input type="checkbox"/> If the compost is classed as a waste, the Environmental Permitting Regulations apply (paragraph 7 exemption, U10 exemption or Standard Rules Permit) and a permit or exemption will be required by the land owner/manager before storing or spreading the compost. If the compost has ceased to be waste <input type="checkbox"/> Voluntary Code of Good Agricultural Practice for the Protection: limitation of nitrogen of 250 kg /ha/y (for all types of 'organic manure' used, including composts); compost can also be applied at a rate of 500 kg/ha once per two years

3. Analysis of the Italian legislation

3.1 Introduction

In order to achieve the desired levels of use of digestate in agriculture, the real problems to solve are linked to the complexity of the regulatory framework. Complexity has to be interpreted not only as abundance of legal material on which to draw but also as technical languages, references, delays, gaps and lack of linearity and harmonisation between texts published at various levels of policy and public administration. If we think that, starting from this tangle of rules, farmers should be directed to the adequate management of their own lands, we realize how much the situation has got out of rationality and wisdom.

Up to the present, due to the difficulty of interpreting the regulations, it is not so simple to distinguish appropriately between digestate and waste and it is hard to understand whether digestate is an innovative and effective fertiliser or rather a high environmental impact substance. The paradox is that, while policy, science, agriculture and many citizens agree on the fact that – despite some exceptions – digestate is an excellent fertiliser, this fact has not been clearly declared. As a consequence, an increasing number of skeptics – without specific knowledge in the subject – have begun to nurture and spread doubts about it. The recent Effluents Decree (Decreto Effluenti – Ministerial Decree 5046 of 25 February 2016), despite having pursued the goal of harmonisation of rules at a national level (starting from 20 different rules), has only partially solved the many problems linked to the use of digestate in the agricultural sector.

In fact, as widely described, in recent years many rules as well as judgements of all kinds have been approved on the topic of *digestate as a by-product or as a waste*, but the aforementioned Decree 5046 on digestate refers on several occasions to the Environment Code (Testo Unico Ambientale - TUA) which, as it is widely known, has often created difficulties of interpretation. This aspect should not be ignored and the status of by-product should be attributed to digestate resulting from biogas plants, so releasing the matter from the confusion created by the 4 conditions included in art.184-bis of the aforementioned TUA.

3.2 Ministerial Decree of 7 April 2006: “Criteria and general technical standards for the regional regulation on the agronomic use of livestock effluents, in accordance with art. 38 of Legislative Decree No 152 of 11 May 1999 (Italian OJ No 109 of 12 May 2006 – supplement No 120).

This Decree, a belated transposition of the European Nitrates Directive (91/676/EEC), standardized digestate, without ever defining or naming it, until 2012. Through this regulation were established roles and duties performed by the regions in the geographical designation of the so-called Nitrate Vulnerable Zones

(NVZs) and non-vulnerable zones and in the application of the spreading limits of manure in these areas. As a result, the Italian Regions have defined their Action Plans.

Art. 2 of the decree defines *livestock effluents* as “animal waste or a mixture of litter and livestock manure, even in the form of processed products, including wastewaters from fish farming activities of freshwater systems”.

Therefore, in accordance with this Directive, animal manure – even if subjected to anaerobic digestion treatment – shall be considered as livestock effluents.

The ministerial decree does not specify if the percentage of nitrogen resulting from materials other than livestock effluents can be considered as a fertiliser.

These rules immediately seemed very strict and all the professional organizations, with the scientific support of the research institutions, repeatedly invited the European Union to reconsider the Directive in favour of more flexibility, in order to allow all Member States to establish the amount of livestock effluents, sewage and digestate usable per hectare and in relation to the specific requirements of crops.

After a long procedural process, in February 2016 was finally reached an agreement with the European Commission for a change to the Ministerial Decree.

3.3 Decree No 134 of 7 August 2012. Conversion into law, with changes, of the Decree-Law No 83 of 22 June 2012, on urgent measures for the country's growth.

Art.52 of the Decree-Law 83/2012 de facto established that digestate coming from agricultural installations is a by-product, on the condition that residues destined to anaerobic digestion are delivered to the plant as by-products. The government expressed its view on a controversial topic for the relevant ministries, looking for a drastic solution which did not have the desired results. Moreover, the status of digestate as a by-product is made possible only according to TUA art.184- bis for the input sources, with consequent difficulties in interpreting the concept of digestate itself. Finally, the Ministerial Decree, as for the second paragraph, had a four year stop, creating a further misunderstanding. Here follows the aforementioned article 52.

*“According to art.184-bis of the Legislative Decree No 152 of 3 April 2006, **is considered as a by-product the digestate** obtained in industrial plants or in a network of facilities from anaerobic digestion, possibly associated to other physical and mechanical treatments of livestock effluents, vegetable residues or residues from plant processing and valorization, **delivered as by-products**, even if mixed with each other and used for agricultural purposes. By decree of the Ministry of Agricultural, Food and Forestry Policies, in cooperation*

with the Ministry for the Environment, Land and Sea, are defined the characteristics and procedures for the use of digestate that, with regard to fertilizing effects and efficiency of use, is comparable to chemical fertilisers, as well as the methods of classification of the operations of dehydration, sedimentation, clarification, centrifugation and drying.”

3.4 Decree of 26 May 2015 entitled “Changes and Additions to the Annexes 1, 7 and 13 of the Legislative Decree No 75, of 29 April 2010 on the reorganization and revision of fertilisers regulation, in accordance with art. 13 of law No 88 of 7 July 2009”. (MiPAAF)

The Ministry of Agricultural, Food and Forestry Policies authorized the use of solid digestate resulting from dried vegetable matter, provided the relevant tolerance limits and replaced the tables of the fertilisers allowed in organic agriculture. The regulatory classification of the liquid fraction is still undefined. It appeared that all the regulatory references – on the basis of which could be assessed the conformity of the liquid fraction for agricultural purposes – were not available upon the approval of this law.

Annex

Change to Annexes 1, 7 and 13 of the Legislative Decree No75 of 29 April 2010 - Annex 1, National fertilisers was changed as follows: at entry 5.2 Organic fertilisers, with the addition of product 13:

Fertiliser classification	Method of preparation	Average nutrient requirement (percentage by weight)		Forms; fertilisers solubility and average nutrient requirement, as specified in columns 8, 9 and 10. Fineness of grinding			Fertiliser identification indicator Other requirements			
		Total	For all fertilising elements	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	Other figures and notes
1	2	3	4	5	6	7	8	9	10	11
13. Digestate from dried vegetable material	Dried digestate obtained from biogas conversion of dedicated energy crops, agro-residues, vegetable by-products and by-products from the agro-industry	4% N + P ₂ O ₅	2% Organic 1% P ₂ O ₅ Organic 30% Humidity level 15% Absolute humidity level	Total nitrogen	P ₂ O ₅ TOTAL	Organic nitrogen	P ₂ O ₅ TOTAL	it is allowed to declare K ₂ O content, if over the percentage of 1%

Annex 7, Levels of tolerance changed as follows:

at entry 3.3.1. Organic nitrogen fertilisers (solid and liquid), right after “Mixture of organic nitrogen fertilisers (solid and liquid) was added the note “Digestate from dried vegetable material” with the relevant level of tolerance.

	Absolute values (percentage by weight)			
	C	N	P ₂ O ₅	K ₂ O
digestate from dried vegetable materials	1,0	0,5	0,2	0,5

3.5 MiPAAF Decree 5046 “Criteria and general technical standards for the regional regulations on the agronomic use of livestock effluents and wastewaters pursuant art. 113 of Legislative Decree No 152 of 3 April 2006, as well as production and use of digestate pursuant art. 52, para 2-bis of Law Decree No 83 of 22 June 2012, converted into law No 134 of 7 August 2012.

In February 2016, after an interminable process during the State-Regions Conference, was approved the inter-Ministerial Decree on the revision of the regulation on the management of livestock effluents (up to now governed by the Ministerial Decree of 7 April 2006) and on the agronomic use of digestate produced by anaerobic digestion plants.

After the positive opinion expressed by the State-Regions Conference and the cooperation with the Ministries of the Environment, Economic Development, Health and Transports, the Decree was finally signed by the Minister of Agricultural, Food and Forestry Policies and then sent to control bodies for its registration. The law was the result of a long and in-depth preliminary activity, in which participated the relevant competent authorities such as the Regions, the Ministries and the professional associations and was published in the Italian OJ on 18 April 2016. The law introduced a series of changes, among which in particular:

1. the possibility of using digestate from anaerobic digestion of livestock effluents, plant residues and residues from the agro-industrial sector;
2. distinction between zootechnical digestate and digestate from agro-industrial sources;
3. ban on digestate resulting from crops near disposal areas;
4. possibility for the Regions of modifying the 60 days mandatory period of ban on livestock effluents spreading, according to climate and environmental conditions;
5. introduction of a gradual restriction on crops for non-food purposes;
6. nitrogen assessment according to soil requirements.

At the national level, the Decree emerges as a standard regulation on the agronomic use of digestate and finally overcomes the differences between regions, confirming the important contribution that anaerobic

digestion can give to the Italian agricultural sector, allowing businesses to produce food, energy and biofuels and release essential fertilisers into the soil. Some articles – that according to experts have not solved yet some crucial issues – are still a matter of discussion. These controversial sections are listed below.

Article 22, concerning digestate production, defines the digestate itself, divides it into categories (agro-zootechnical digestate and digestate of agro-industrial origin according to the input sources) and makes a list of the permitted materials. According to art.184-bis, digestate is considered by law a by-product, only if produced in industrial plants or in a network of facilities exclusively fed with materials and substances included in a positive list and only if destined for agricultural use in full respect of the current legislation. The mandatory requirement for considering digestate as a by-product is the presence of the following input materials and substances (alone or in mixture):

- a) straw, harmless cuttings and trimmings; other harmless agricultural or forestry material. With the exception of some old plants, for all the other recently authorized installations the aforementioned material shall not exceed 30% of the total;
- b) livestock effluents;
- c) wastewaters;
- d) residues of the agro-food industry included in a further positive list;
- e) wastewaters from crushers and humid pomace, also without kernels; by-products of animal origin;
- f) non-food agricultural and forestry materials included in a positive list already used by the sector.

The Decree states that digestate produced from sources other than those indicated by art.22 shall not be used for agriculture and therefore is classified as a waste. This aspect is reaffirmed for digestate of agro-industrial origin in art.29, para 2.

As a consequence, businesses using sources which are not compliant with art.22, even if allowed and compatible with the regulation on the production of biogas from agriculture, cannot use digestate for agricultural use. It is undeniable that the *positive lists* included in the annexes of the decree are incomplete. In other words, there was not a preliminary evaluation of the permitted materials before the compiling of the list. For this reason, in the future some by-products, that today are still used in biogas plants, will produce a digestate that will be regarded as a waste.

Many businesses are today in big trouble because the Decree does not set up a transitory period to allow operators to adapt to the managing of stocks produced with forbidden sources.

Another surprising aspect for experts and technicians is the 30% limit of crops dedicated to biogas production. If on the one hand, this limit is partly justified in order to avoid the building of plants in conflict with agricultural productions – still an open matter of discussion – on the other hand it does not make sense

on a scientific level. In fact, this percentage creates a discrimination between by-product and waste from harmless organic materials, that have always been used by the agricultural sector for that purpose.

Article 24 (Criteria for the qualification of digestate as a by-product) is important for the purposes of this report and for having strongly influenced the interpretation of art.184-bis of Legislative Decree 152/2006 and introduced the clarifying elements listed below.

1. *In compliance with art. 184-bis of legislative decree No152 of 3 April 2006, digestate regulated by the current decree is a by-product and not a waste, in case the producer is able to prove that the following conditions have been met:*

- a) *digestate is being produced by anaerobic digestion plants authorized in compliance with the current regulation, exclusively fed with materials and substances included in art.22, para 1;*
- b) *it is indisputable that digestate will be used for agronomic purposes by its producer or a third party, according to the aforementioned law. The proper use guarantee must be certified by the producer and evidenced by contractual relations between producer and user and if from the transfer contract clearly emerges the subject of supply, the duration of the contract and contractual conditions. The existence of contractual relations between digestate producer and user does not exempt the producer from the obligation to submit a communication to the relevant competent authorities in compliance with art.4;*
- c) *digestate might be used directly without any further treatment, other than the industry standard operating procedures. In compliance with the present paragraph, treatment operations of digestate for agronomic purposes are a part of industry procedures. In particular, are included in the standard procedures the operations of dehydration, sedimentation, clarification, centrifugation, drying, filtration, liquid-solid separation, ammonia stripping, nitrification, denitrification and phytodepuration, implemented in compliance with article 33 of the Decree. In addition, are also included in standard operating procedures all the activities and operations of digestate transformation that are not intended to confer to the material the environmental and sanitary characteristics required for its agronomic use, with the exception of the operations included in the digestate production cycle. All the activities and operations aimed at improving digestate efficiency and its nutrient characteristics are considered as an essential part of the digestate production cycle.*
- d) *digestate meets the requirements included in the aforementioned Decree and in particular those defined in Annex IX, respects health and sanitary standards, and protects the environment.*

Summary of regulations

- **Ministerial Decree of 7 April 7 2006** (Criteria and general technical standards for the regional regulation on the agronomic use of livestock effluents, in accordance with art. 38 of the Legislative Decree No 152 of 11 May 1999 (Italian OJ No 109 of 12 May 2006 – supplement No 120)
- **Legislative Decree No 75 of 29 April 2015 on the reorganization and revision of fertilisers regulation** → sets definitions⁶, official control procedures for compliance evaluation of fertilisers with legislation and pecuniary penalties.
- **Ministerial Decree of 6 July 2012, art. 26** → additional premium to the plants using advanced technologies: high-performance cogeneration engine and waste recovery system for the transformation of waste into fertiliser⁷.
- **Conversion into law No 134 of 7 August 2012** of the Decree-Law No 83 of 22 June 2012 i.e. Decreto Sviluppo → digestate is a by-product when obtained from industrial plants or a network of facilities from anaerobic digestion of livestock effluents, residues of plant origin and residues from processing and valorization of vegetable materials of the agro-industry, delivered as by-products, even if in mixture and used for agricultural purposes.
- **Italian Supreme Court, Criminal Section 3, Judgment No 33588** → also digestate resulting from anaerobic processing in plants that exclusively use sources of vegetable origin is a by-product of biogas production with fertilising characteristics.
- **Ministry of Agricultural, Food and Forestry Policies, Ministerial Decree of 26 May 2015** Changes and modifications to annexes 1, 7 and 13 of legislative decree No 75 of 29 April 2010 on reorganization and revision of fertilisers regulation, in compliance with art. 13, law No 88 of 7 July 2009. Change to the national regulation for these types of products.
- **MiPAAF Decree 5046** Criteria and general technical standards for the regional regulation on the agronomic use of livestock effluents and wastewaters pursuant art. 113 of legislative decree No 152 of 3 April 2006, as well as digestate production and use pursuant art. 52, para 2-bis of Law Decree No 83 of 22 June 2012, converted into law No 134 of 7 August 2012.
- **Regulation (EC) No 2003/2003 of 31 October 2003 on fertilisers** → lays down rules relating to the

⁶ While the current Decree defines the fertiliser as a “PRODUCT, whose main function is to supply nutrients to plants (...)”, point 4 of Communitarian Regulation defines it as a “SUBSTANCE, whose main function is to supply nutrients to plants”. Therefore, the national definition of manure seems restrictive compared to that established by European Legislation.

⁷ It is not clear, whether the article concerns a “product”. It is a concept which has never been properly treated by any law. It could be stated that product is “a primary item resulting from a production process” → incompatibility with the definition of by-product (art. 184-bis of Code of Environment).

placing of fertilisers on the market and the conditions to be met in order to use the title “EC FERTILISERS” provided that they belong to a specific type of fertiliser listed in Annex I (when existing). The Regulation does not specifically refer to digestate.

- **Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products** → establishes that fertilisers and organic soil amendments are essential for organic agriculture, because they preserve soil fertility and replenish the nutrients into the soil.
- **Regulation (EC) No 834/2008 of 5 September 2008 on organic production, control and labelling of organic products** → sets fertilisers and organic soil amendments that can be used in organic production:
 - Chicken manure (except for large-scale poultry farming)
 - Livestock effluents (except for industrial livestock production)
 - Fermented compost of plant origin (obtained from a mixture of materials of plant origin exposed to anaerobic composting and fermentation for biogas production).
- **Implementing Regulation of the European Commission (EU) No 354/2014 of 8 April 2014** amends and corrects Regulation (EC) No 889/2008, laying down detailed rules for the implementation of the European Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control.

3.6 Digestate from BOFSUW in Italy

3.6.1 National figures

For a future and integrated solid waste management, one of the priorities set by the European Regulation is the gradual reduction of landfill disposal of biodegradable waste. According to figures from the 2015 “Rapporto Rifiuti Urbani” (Urban Waste Report), developed by the National System for Environmental Protection (ISPRA) and referred to the 2014 situation, urban waste production corresponded to about 29.7 million tons, with 45.2% of differentiated waste collection. In other words, the 45% objective set by the 2008 Regulation was achieved with a delay of six years. In total, the differentiated waste collection corresponds to 13.4 million tons, with an increase of 900,000 tons compared to 2013 (+7.2%). According to figures on the waste collection of several types of fractions, from 2013 to 2014 there was a 9.7% increase of the organic fraction (humid fraction + green waste), following the 8.4% increase between 2012 and 2013.

In the integrated system of urban waste management, the composting of organic fractions intercepted through the differentiated waste collection and their transformation in organic soil amendments represents an essential form of recycling. In this context, anaerobic digestion itself plays a substantial role. As a consequence, there is a greater number of plants that use both anaerobic and aerobic organic waste treatments.

The sector of waste composting highlighted in 2014 a more consistent technological development of equipment in particular in the northern regions of Italy, with a consequent treatment capacity increase of the organic fractions resulting from the differentiated waste collection. There are 279 operating plants (+39 compared to 2013), of which 179 are located in the North (64.2%), 44 in the Centre (15.8%) and 56 in the South (20.1%) of Italy.

Technological evolution and best practices have confirmed over the last decade the interesting perspectives given by the application of anaerobic digestion to waste treatment, promoting it as the best technology available for organic waste treatment. In the sector of composting, the evolution of the treatment plants is aimed at integrating aerobic processes with anaerobic digestion. Under the regulatory framework, the Italian consortium biogas and gasification (CIB) and the Italian composting association (CIC) published a collection of the current regulations and made an in-depth analysis of the laws applicable to the sector. The work group, specifically formed for this purpose, found an inadequate regulatory framework and at the present moment, the following dispositions may be taken as points of reference:

1. with reference to the total duration of the integrated process of anaerobic digestion and digestate composting, the only regulation available⁸ sets to carry out the aerobic treatment (composting) after the anaerobic stage with a reduced duration of 30-45 days.
2. In case the input sources are treated as waste (see art. 183 of legislative decree No 152/2006 and further amendments) such as BOFSUW; or in case digestate is the result of waste treatment, the digestate itself must be considered waste.

It is worth to remember that a material may cease to be regarded as being a waste, provided the compliance with the conditions included in art. 184ter (Law on End-of-waste-status) of legislative decree No 152/2006 as amended, according to which: a material ceases to be waste when it has undergone a recovery operation, including recycling and preparing for reuse, and complies with specific criteria to be developed in line with certain legal conditions, in particular:

- a. the substance or object is commonly used for specific purposes;

⁸ Ordinary Supplement of OJ of 7 June 2007, Linee guida recanti criteri per l'individuazione delle migliori tecniche disponibili art. 3 c.2 D.lvo 372/99 (Guidelines including criteria for identification of best techniques available N.d.T.)

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

In the case of organic waste or digestate undergone to the composting process, a material ceases to be waste when it acquires the legal status of product (quality compost as defined by art. 183 para ee). Annex No 2 of legislative decree 75/2010 (i.e. the regulation laying down the standards for the qualification of a product) determines the characteristics of a Composted Amendment (green compost or compost mixtures), at the end of the organic treatment (composting).

As a consequence, the Composted Amendment leaves the field of application of the waste treatment regulation and joins, with regard to trade transactions and controls, the fertilisers regulation. Other types of use, such as the use of digestate in agriculture through its direct spreading on fields using the R10 procedure (included in Annex C of Legislative Decree 152/2006 as amended), are not currently supported by specific laws on technical requirements, amount of digestate and conditions of application. Some of the few authorizations available refer to the technical regulation concerning sewage sludge spreading (Legislative Decree No 99/92). However, the CIB/CIC work group believes that the equivalence between sewage sludge and digestate resulting from anaerobic process is inappropriate, because these materials have different origins. The group also believes that the entire application of the regulation concerning the spreading of sewage sludge has not a scientifically correct approach.

3.6.2 A virtuous example

A worth to mention example of technology and good management is the plant of Montello S.p.A. in Montello, Bergamo. This plant, operating from 1997, treats BOFSUW through the traditional process of aerobic digestion (i.e. with oxygen) and starting from 2008, has integrated the treatment with anaerobic digestion (without oxygen). This type of biotechnology allows to transform municipal solid waste into renewable fertiliser and generates electrical and thermal energy from biogas. The plant is totally computerized, from anaerobic digestion to composting (there is no manual control), includes the separation of undesired materials and operates continuously 24 hours per day, 7 days per week. The digestate is processed by three centrifuges, that separate wastewater from solid compost. Solid fraction is then mixed with cellulosic and ligneous substances and finally becomes a fertiliser after being insufflated in a bio-tunnel with forced-pressure oxygen. The whole BOFSUW process lasts about 90 days. During the bio-tunnel stage are carried

out controls during which bacterial load is reduced to undetectable levels, so to produce a quality composted mixed soil improver. The energy requirement of the plant is supplied from organic materials turned into energy. According to Montello S.p.A. the whole process contributes to an estimated reduction of 60,000 tons of CO₂ emissions.

4. Analysis of the Regional Legislation

4.1 Introduction

Before the approval of the MiPAAF Ministerial Decree 5046/2016, the Italian Government and its ministries – despite having already established some measures – had never legislated on a targeted and comprehensive use of digestate in agriculture, generating uncertainty and different opinions among operators of the agroenergy sector and the local authorities that were responsible for giving the relevant authorizations. Digestate, considered either as a by-product or a waste, may in any case be used for agricultural purposes. This is not a mere bureaucratic formality but a real distinction in the classification of the anaerobic digestion process as agricultural activity or waste disposal treatment, with differences in tax treatment and management expenses. This distinction represents a key factor for the evaluation of the economic feasibility of initiatives in rural areas. Italian Regions, in an attempt to compensate for the lack of “national certainties”, with regard to the regulatory framework of digestate, developed some initiatives on their own, referring to the Action Plans for vulnerable zones included in the Nitrates Directive. This attitude gave rise to different and sometimes contradictory scenarios, in particular when, classifying as a waste the digestate obtained from some types of natural products and by-products, the status of input material was denied to many useful organic sources. As a consequence, the same product was treated differently even by neighbouring regions, determining more or less favourable conditions for the development of agroenergy activities in locations that were quite close to each other. Until now, there has always been a continuing situation of confusion whenever it has been necessary to predict and prevent objections to the agronomic use of digestate.

The recently approved MiPAAF Ministerial Decree 5046 (published on 18 April 2016), establishes at art. 1 para 2 (**Purposes and general guidelines**), that the regions and the autonomous provinces shall – within 180 days from its entry into force – regulate the use of agronomic activities covered by the Decree in compliance with criteria and required technical standards.

Some regions have already begun to adjust their positions on the legal status of digestate, anticipating with **Regional Decrees** the regulations of the aforementioned Decree. As often happens in Italy, the northern regions are more determined to find both regulatory and practical solutions to the current problems, because they are supported by businesses devoted to the modernization of production systems and by local administrations inclined to grab civil society demands. At present, the new Regulation on the agronomic use of digestate has been approved only by three regions: Lombardy, Piedmont and Emilia Romagna; the others will have time until 15 October 2016. Here follows the analysis of the current Regulation for the regions that

have already acknowledged the Effluents Decree, as well as of regulations not yet compliant with the new Decree.

4.2 Umbria Region

Regulatory references

- Regional Regulation No 4 of 4 May 2011, “Implementation norms of art. 4, para 1, letter e) of the regional law No 25 of 10 December 2009, concerning the management of the plants for the treatment of livestock effluents, biomass for biogas production and agronomic use of solid and liquid fractions”.
- Resolution of the Regional Council No 880 of 14 July 2014, entitled “Agronomic use of digestate as a by-product”.
- Resolution of the Regional Council No 1031 of 4 August 2014, entitled “Agronomic use of digestate as a by-product”. Resolution of the Regional Council No 880 of 14 July 2014 (Technical characteristics of digestate and its use) – Resolutions”.

In this region the management of digestate is based on the Regional Regulation No 4 of 4 May 2011. With the recent approval of two measures, Umbria has reviewed some aspects concerning the agronomic use of digestate as a by-product.

4.2.1 Regional Regulation No 4 of 4 May 2011

This Regulation, in compliance with the requirements for the protection and conservation of water supplies establishes:

- requirements for the management of the industrial plants and the network of facilities using anaerobic digestion for the treatment of livestock effluents mixed with biomass for biogas production with an electrical output up to 1 MW.
- procedures for the agronomic use of digestate, obtained from anaerobic digestion of both solid and liquid fractions.

The Regulation also states that digestate produced from livestock effluents mixed with biomass should be treated as manure and is outside waste disposal regulation.

Art. 9

The **transport of digestion input** (livestock effluents and biomass) and digestion output, shall occur within a maximum radius of 30 Km and mainly in the region.

The capacity of the containers for the **storage of digestate** shall be proportional to the amount of the materials treated by the plant, however not lower than the volume of digestate produced in 150 days. All the necessary precautions shall be taken in order to avoid odour emissions.

Art. 10

All farms and agricultural enterprises are required to prepare a **Plan for the Agronomic Use (PUA)**, where are reported the maximum values allowed for nitrogen, phosphorus, heavy metals and pathogenic bacteria, obtained from specific tests, to be repeated whenever occurs a variation of quality and quantity of input materials. The businesses involved in the cycle of production and agronomic use of digestate shall prepare the records of material handling (loading and unloading) and provide the required notification.

Art.11

In order to improve the supply of nutrients and amendments to soil, digestate may be also subjected to a separation **treatment** of the solid component (shovelable) from the liquid one (non-shovelable). Therefore, digestate or its fractions may be subjected to anaerobic digestion, composting and reduction of nitrates to contain the environmental impact on land and atmosphere.

4.2.2 Resolution of the Regional Council No 880, 14 July 2014

This Resolution confirms the possibility of using for agricultural purposes the digestate “produced by biogas plants or a network of facilities located outside the region”. Digestate shall comply with certain requirements, among which:

- have the status of “by-product” (art. 184-bis of Legislative Decree 152/2006)
- possess specific characteristics (compliant with the Regional Resolution No 1031/2014)
- respect the plan of agronomic use (Resolution of Regional Council No 2052 of 7 December 2005).

The use of digestate will not take place beyond the radius of 30 Km from the digester – which must be located within a range of 30 Km from the regional border – and the transport shall not produce more than twelve kg of CO₂ emissions.

With Resolution No 1031/2014, in wait for a specific Decree of the MiPAAF on the definition of the characteristics and conditions of use of digestate comparable to chemical fertilisers, the Regional Council intends to anticipate the last ministerial decree. This Resolution recalls the Annex A on “Characteristics of agro-industrial digestate and conditions for its use” as follows:

- calculation of digestate weight, volume and nitrogen content
- nitrogen efficiency use of digestate
- limit values of agro-industrial digestate

4.3 Piedmont Region

Regulatory framework

- Resolution of the Regional Council No 23.2193 of 5 October 2015, entitled “Guidelines for the classification of digestate as a by-product in compliance with art. 184-bis, para 1 of the legislative decree No 152 of 3 April 2006, concerning norms regarding the environment and the agronomic use of digestate”.
- The Regional Council, on 29 February 2016, approved with Regional Decree No 19-2971 some changes to the Regional Regulation 10/R/2007, as transposition of the recently approved national regulatory framework.
- Decree of the President of the Regional Council No 2/R of 2 March 2016, entitled “Review of the Programme of Action and changes to the Regional Regulation No 10/R of 29 October 2007 (general regulation for the agronomic use of livestock effluents and wastewaters and programme of action for nitrate vulnerable agricultural lands – regional law No 61 of 29 December 2000)”.

4.3.1 Resolution of the Regional Council No 23-2193 of 5 October 2015 - “Guidelines for the classification of digestate as a by-product in compliance with art. 184-bis, para 1 of the Legislative Decree No 152 of 3 April 2006, concerning norms on the environment and the agronomic use of digestate”.

With these guidelines Piedmont intends to define the characteristics of digestate, classified as a by-product and establishing the conditions for its agronomic use, with the aim of supporting local administrations in the evaluations included in art.184-bis, para 1 of the Legislative Decree No 152/2006. The agronomic use of digestate, that is regarded as a by-product, shall occur in compliance with nitrogen requirements of crops and at certain conditions and procedures.

Digestate, in order to be regarded as a by-product, must meet the conditions included in art. 184-bis, para 1 of the Legislative Decree No 152 of 3 April 2006.

- a. digestate is produced through anaerobic digestion from industrial plants or in a network of facilities.
- b. it will be used for agricultural purposes and should it occur in a business other than the producer, its use will be regulated by specific contractual relations between producer and user (type of supply, contract duration, mode of delivery). In any case, the correct agronomic use for the producer or a third party will be determined yearly by a simplified nitrogen assessment (including input and output parameters determining the soil nutrient balance).
- c. can be directly used without further treatment than the normal industrial practice (listed in Annex A).
- d. digestate meets the requirements set by Annex D, as well as health and sanitary regulations and norms for environmental protection.

All the aforementioned conditions shall be published in a technical report prepared by a qualified operator and signed by the digester's legal representative.

Digestate regarded as being a by-product may be of two different types: "agro-zootechnical" if obtained from cuttings, prunings, agricultural residues, livestock effluents etc. and of "agro-industrial" origin if resulting from residues of the agro-food industry, wastewater from crushers, by-products of animal origin, etc.

The obligations incumbent upon producers and users for the agronomic use of digestate in the status of by-product vary according to whether:

- producer and consumer are the same person and will provide a report including a list of agricultural lands, a description of input materials, types of digestate obtained, a register and a fertilization plan.
- producer and consumer are different persons and will provide a report on the agronomic use and a register.
- the business that uses in agriculture the digestate treated as a by-product and obtained from other manufacturers must only comply with the requirements on livestock effluents (in relation to content and percentage of nitrogen).

The agronomic use of digestate treated as a by-product must meet the requirements of crops, according to the specific operating instructions included in the regional regulation 10/R/2007.

In nitrate vulnerable zones, digestate use is limited to the amount of 170 kg of nitrogen per hectare per year. Therefore, are defined specific prohibitions, criteria and **spreading conditions**. These guidelines vary

depending on vulnerable and non-vulnerable zones and on the type of digestate (solid or liquid). Moreover, the choice of **spreading techniques** must be done in consideration of the hydrogeological and geomorphological characteristics of soils, type of digestate and crop growth stages. The **storage** must be done in variable size containers, depending on crops requirements, when for example its use is limited due to agronomic, climatic or regulatory reasons. Containers are waterproof hoppers for solid (shovelable) digestate and tanks with fixed or floating covers for liquid digestate (non-shovelable). Containers size must ensure a volume equivalent to a quantity producible in 180 days.

4.3.2 Regional Regulation No 2/R of 2 March 2016

This Regulation came into force on 19 April 2016, the following day of DM 5046 of 25 February 2016 publication on Italian OJ, and transposes the provisions on digestate.

The text of the regulation, implementing the Regional Law No 61 of 29 December 2000 (Provisions for the first implementation of the Legislative Decree No 152 of 11 May 1999 on water protection) and the plan for water protection, regulates production, quality features and agronomic use of digestate.

Art.20-bis (General criteria), para 2 establishes – **fully recalling the provisions of DM 5046** – that digestate (divided into agrozootechnical and of agro-industrial origin) “is a by-product and not a waste if it meets the conditions of para 1, Annex VI bis (Origin, adequate legal certainty, possible treatments and environmental requirements) and is intended for agronomic use according to the provisions of para 4, Annex VI bis.

4.4 Emilia Romagna Region

Regulatory framework

- Regional Law No 4 of 6 March 2007, entitled “Compliance with adjustments of the environmental legislation. Changes to Regional Laws”.
- Regional Regulation compliant with art. 8 of the Regional Law No 4 of 6 March 2007. Provisions for the agronomic use of livestock effluents and wastewaters from farms and micro-businesses of the agro-food sector.
- Resolution of the Regional Council No 1255 of 28 July 2008, entitled “Aspects of the environmental law on biogas plants of small or micro CHP: local government regulations for standardization of procedures”.

- Resolution of the Regional Council No 1495 of 24 October 2011, entitled “Technical criteria for the reduction of the environmental impact in the design and management of biogas plants”.
- The President of the Regional Council of Emilia Romagna, with decree No 243 of 31 December 2015 approved the “Regional Regulation No 1 of 4 January 2016 on the agronomic use of livestock effluents and wastewaters derived from farms and micro-businesses of the agro-industrial sector”.

4.4.1 DGR No 1255 of 28 July 2008, entitled “Aspects of the environmental law on biogas plants of small or micro CHP: local government regulations for standardization of procedures”.

Since 2008, Emilia Romagna has always attempted to shed light on this issue through a Resolution classifying as an “organic fertilizer” the digestate resulting from the treatment of five groups of common sources of both plant and animal origins and dealt with the issue of the agronomic use in relation to four types of output residues. In the case of digestate of purely vegetable origin, the Nitrates Action Programme (NAP) does not set a particularly strict limit – according to the type of crop – and allows to meet nitrogen requirements without using chemical fertilisers.

Art. 4 sets “The conditions/assessments that qualify digestate according to the input materials used for anaerobic digestion and justify their use in agriculture. With reference to legislative decree No 152/06 it is established that digestate resulting from input sources classified as “faecal matter” and “harmless organic substances” shall be considered as organic fertiliser and may be used in agriculture in both nitrate vulnerable and non-vulnerable zones.

4.4.2 Regional regulation No 1 of 4 January 2016 – “Regional Regulation on the agronomic use of livestock effluents and wastewaters resulting from farms and small-sized businesses of the agro-industrial sector”

This is for Emilia Romagna the most recent regulation on this issue. The field of application and purposes, established by art. 1, includes criteria for the agronomic use of digestate, to be treated as “the material resulting from the anaerobic digestion of livestock effluents or biomass alone or mixed with each other”. In turn, biomass is defined as “harmless materials of plant or forestry origin used in agriculture or for energy production, as well as industrial by-products in compliance with art. 184-bis of Legislative Decree No 152 of 2006”.

Although compliant with aspects of DM 5046 (supply, transport, storage and spreading), the Regulation does not define at present the same clear separation between agro-zootechnical digestate and digestate from the

agro-industrial sector. In addition, it does not set clear limits to the percentage of crops dedicated to anaerobic digestion and does not specify whether the obtained digestate can be considered or not a by-product.

4.5 Lombardy Region

Regulatory framework

- Resolution of the Regional Council No IX/2208 of 14 September 2011, entitled “Approval of the Regional Action Programme for the protection and restoration of waters from pollution caused by nitrates from agriculture for the businesses of vulnerable zones”.
- Resolution of the Regional Council No 8/5868 of 21 November 2007 entitled “Integration with changes to the Action Programme for the protection and restoration of waters from pollution caused by nitrates from agriculture for businesses of vulnerable zones”.
- Resolution of the Regional Council No X/5171 of 16 May 2016, through which Lombardy approved the “Regional Action Programme for water protection from pollution caused by nitrates from agriculture in vulnerable zones in compliance with the Nitrates Directive No 91/676/EC”.

Until 2016, the regulation of Lombardy had in some ways accepted the use of digestate, even in absence of a specific law. A prospect of this issue was included in the 2011 Regional Action Programme, without any evaluation of essential elements, such as the exact definition of admissible input materials and the management of digestion mixtures.

4.5.1 D.G.R. No IX/2208 of 14 September 2011

With this Resolution was approved the Nitrates Regional Action Programme in which – although anaerobic digestion for biogas production at the time was already well developed – the issue of the possible use of digestate was not so clear and was included in the requirements established for the shovelable components of livestock effluents.

In the definition section, it was established that to livestock effluents for agronomic use – divided into manure (shovelable) and sewage sludge (non-shovelable) – belonged treated materials, as described in Annex III, part D (with an analysis of digestate and its benefits of use).

4.5.2 Resolution of the Regional Council No X/5171 of 16 May 2016

With the approval of the Action Programme, this Resolution launches a system for the agronomic use of materials that allow nutrients and soil amendments to play a useful role in agricultural soil, provide a fertilizing effect, soil conditioning, irrigation and a corrective action, meet crops requirements and ensure the protection of soil and drainage basins. In this Programme, through the transposition of all provisions of DM 5046 of 25 February 2016, are explained some controversial aspects. At chapter 6 are given the explanations listed below:

- digestate has the status of a by-product (input sources, certainty of the agronomic use by the producer or a third party, permitted and prohibited treatments, characteristics, health and sanitary regulations).
- definition of two types of digestate (agro-zootechnical digestate and digestate from the agro-industrial sector).
- conditions for digestate storage and input sources (definition of volumes, infrastructures, process schedule, etc.).
- General criteria for the agronomic use of agro-zootechnical digestate and digestate from the agro-industrial sector.

4.6 Veneto Region

Regulatory framework

- Resolution of the Regional Council No 2495 of 7 August 2006 entitled “Criteria and technical regulations for the agronomic use of livestock and industrial effluents *in compliance with articles 110 and 112 of Legislative Decree No 152 of 3 April 2006* – Regional Action Programme for nitrates vulnerable zones, *in accordance with art. 92 of Legislative Decree No 152 of 3 April 2006*”.
- Resolution of the Regional Council No 2439 of 7 August 2007 “DGR no 2495 of 7 August 2006. Approval of technical criteria and appropriate application forms to submit the plans for use and spreading of livestock effluents”.

4.6.1 Resolution of the Regional Council No 2495 of 7 August 2006

Art. 2 of the Resolution establishes that shall be regarded as manure “*all shovelable fractions for agronomic use, resulting from aerobic treatment of zootechnical effluents, including solid fractions resulting from*

anaerobic digestion". The article also regards as being sludge "all solid fractions for agronomic use, resulting from the treatment of zootechnical effluents".

4.6.2 Resolution of the Regional Council No 2439 of 7 August 2007

In Annex A of the resolution, biomass of plant origin is admitted only in terms of addition to sludge and/or manure without establishing the limits for any of the three types of input sources. As a consequence, the regulation of Veneto and that of Piedmont, do not contemplate the possibility of agronomic use of organic residues (purely of vegetable origin). There are only two types of digestate permitted as fertilisers: pure zootechnical digestate and digestate mixed with biomass of plant origin.

Annex A of the Resolution defines the general guidelines for the organization of control programmes of effluents agronomic use and for the effects of the implementation of the Action Programme. Digestate is the result of the anaerobic digestion of livestock effluents, possibly with the addition of biomass of plant origin and can be either used directly or separated into the solid and liquid fractions.

4.7 Marche Region

Regulatory framework

- Resolution of the Regional Council No 119 of 1 August 2012, entitled "Biomass and biogas plants: adjustments of DGR No 255 of 8 March 2011 concerning authorization, regulations on digestion output and implementation of the Action Plan compliant with DACR 52/2007 on the limitation of polluting emissions in urban areas of zone A".
- Resolution of the Regional Council No 92 of 3 February 2014, entitled "Change to para 2.4.1 of Annex to DGR 1191/2012 and approval of guidelines for the agronomic use of digestate".

4.7.1 Resolution of the Regional Council No 92 of 3 February 2014

In Annex A of DGR is deleted a paragraph of DGR 1191/2012, which determines the connection between digestate and by-product, in accordance with art. 184-bis of Legislative Decree 152/2206 and is introduced the concept – now confirmed – according to which digestate may have, under certain conditions, the same characteristics of a fertiliser and can be used on agricultural land in compliance with the regulations of livestock effluents. In accordance with this view is established that "in case of anaerobic digestion of

livestock effluents and biomass – as highlighted in previous paragraphs – digestion output can be treated as a fertilizer and used in soil in compliance with the law”. For a proper use of digestate it is necessary to follow specific technical criteria compliant with regulations, requirements of agricultural land and protection of the environment.

4.8 Campania Region

Regulatory framework

- Resolution of the Regional Council No 771 of 21 December 2012, entitled “Regional Technical Regulation for the agronomic use of livestock effluents and wastewaters resulting from businesses in compliance with art. 101, para 7, letters a), b), and c) of Legislative Decree No 152/2006 and small-sized companies of the agro-food sector, implementing art. 3 of the Regional Law No 14 of 22 November 2010 on “protection of waters from the pollution caused by nitrates from agricultural sources”.

The Resolution does not expressly mention digestate, the use of which is admitted in agriculture in accordance with the regulations established for livestock effluents resulting from anaerobic digestion. The latter is intended as an operation tending to modify the characteristics of livestock effluents, with or without the addition of energy crops or residues from agricultural activities, in order to improve their agronomic use and reduce health and sanitary risks.

4.9 Sardinia Region

- Nitrates Action Programme for the vulnerable area of Arborea – Former Resolution G.R. No 1/12 of 18 January 2005.
- Resolution No 21/34 of 5 June 2013 entitled “Regional Transposition of D.M. of 7 April 2006 on “Criteria and technical regulations on the agronomic use of livestock effluents in accordance with art. 112 of Legislative Decree No 152 of 3 April 2006”.

The Ministerial Decree of the MiPAAF of 7 April 2007 defined the regulatory framework with criteria and standard procedures for the prevention of pollution, the entire cycle of the agronomic use of livestock effluents and wastewaters with the following stages: production, collection, storage, fermentation and maturation, transport and spreading. Within this renewed regulation for water protection Sardinia designated, with Resolution G.R. No 1/12 of 18 January 2005, a Nitrate Vulnerable Zone (NVZ) in the municipality of Arborea and, with Resolution G.R. No14/17 of 4 April 2006, defined and approved the relevant Nitrates

Action Programme (NAP). With this programme, Sardinia implemented Act V of D.M. of 7 April 2006, regulating the agronomic use of nitrogenous fertilisers (livestock effluents, wastewaters, nitrogenous manure and organic soil amendments) in a nitrates vulnerable area. However, the programme, while mentioning some forms of anaerobic treatment of livestock effluents, did not treat in detail the issue of digestate. It only stated that the production of livestock effluents “may be supported by anaerobic digestion that, despite unable to determine significant reductions in the nitrogen load, allows – especially with the addition of carbon sources (such as energy crops and organic residues) – to obtain a quality digestate and a significant power generation that can be used for the treatment of livestock effluents and wastewaters”.

Bibliography

Here follow the relevant reference texts, such as official documents, regulations of sectors, (divided into EU, National and Regional Regulations), judgments, reports and articles from specialized magazines.

Åke Nordberg, Legislation in different European countries regarding implementation of anaerobic digestion, Swedish Institute of Agricultural Engineering

Åke Nordberg, Review of European policies affecting implementation of anaerobic digestion, Swedish Institute of Agricultural Engineering, art. 2016;

Adani F., D'Imporzano G., Genevini L., Scaglia B., Schievano A., Tampone F., What Is The Digestate?, Ricola Group, University of Milano, Faculty of Agricultural Sciences, Department of Crop Production

Al Seadi T., Lukehurst C., Quality management of digestate from biogas plants used as fertiliser, IEA Bioenergy, studio 2012;

ARPAT, Utilizzo Agronomico del Digestato, Arpat News, art. 2015;

Bignami D., Via libera al decreto digestato, Terra e Vita, art. n. 9-2016 4 marzo;

Bonazzi G., Norme più chiare per l'uso dell'effluente digestato, Informatore Agrario, art. N° 13-2007;

Cacopardi G., Quarato D., Effluenti Zootecnici, Cambiare Le Norme Europee, ECOSCIENZA, art. N° 2 Anno 2015;

Capponi S., Barbanti L., Utilizzo agronomico del digestato normative regionali a confronto, Terra e Vita n°25, art. 2010;

Claire Ingremeau Association technique energie environnement- Club Biogaz, Avancées réglementaires et techniques sur les digestats, Pollutec Horizons, presentazione 2013;

Coldiretti, Digestato, per la Cassazione non è un rifiuto, art. www.ambienteterritorio.coldiretti.it;

Commissione Delle Comunità Europee, Libro Verde, La gestione dei rifiuti organici biodegradabili nell'Unione europea, COM(2008) 811 definitivo, Bruxelles 2008;

Commissione Europea, Proposta di Regolamento UE che stabilisce norme relative alla messa a disposizione sul mercato di prodotti fertilizzanti recanti la marcatura CE e che modifica i regolamenti (CE) n. 1069/2009 e (CE) n. 1107/2009, Bruxelles 2016, COM(2016) 157 final 2016/0084 (COD);

Commissione Europea, Pacchetto sull'economia circolare, Proposta di Pacchetto di Norme UE, Bruxelles 2016, COM(2016) 157 final 2016/0084 (COD);

Commissione Europea, Norma UE relativa alle prossime misure in materia di gestione dei rifiuti organici nell'Unione europea SEC(2010)577, Bruxelles 2010 COM(2010)235 definitivo;

Commissione Europea, Ufficio delle pubblicazioni, La direttiva Nitrati dell'UE, 2010;

Commissione Europea, Regolamento Di Esecuzione (Ue) N. 354/2014 Della Commissione dell'8 aprile 2014 che modifica e rettifica il regolamento (CE) n. 889/2008 recante modalità di applicazione del regolamento (CE) n. 834/2007 del Consiglio relativo alla produzione biologica e all'etichettatura dei prodotti biologici, per quanto riguarda la produzione biologica, l'etichettatura e i controlli, Consorzio Monviso Agroenergia 2014;

Commissione Europea, Rettifica del regolamento (CE) n. 1907/2006 del Parlamento europeo e del Consiglio, del 18 dicembre 2006, concernente la registrazione, la valutazione, l'autorizzazione e la restrizione delle sostanze chimiche (REACH), che istituisce un'Agenzia europea per le sostanze chimiche, che modifica la direttiva 1999/45/CE che abroga il regolamento (CEE) n. 793/93 del Consiglio e il regolamento (CE) n. 1488/94 della Commissione, nonché la direttiva 76/769/CEE del Consiglio e le direttive della Commissione 91/155/CEE, 93/67/CEE, 93/105/CE e 2000/21/CE (Gazzetta ufficiale dell'Unione europea L 396 del 30 dicembre 2006);

Comune Jesi, Richiesta interpretativa sull'uso del digestato, parere 2014;

Consorzio Biogas3, Quadro normative e finanziario europeo per la realizzazione di impianti a biogas su piccola scala nelle aziende del settore agroalimentare e delle bevande, Dicembre 2014

Consorzio Italiano Compostatori, Biogas e Compost da rifiuti organici selezionati. Position Paper 2011;

Consorzio Italiano Compostatori, Dati Annuali Sintetici 2015, 2015;

Consorzio Monviso Agroenergia, Quaderno N. 6 Impianti Biogas Guida Tecnico Normativa Il Digestato Quadro Normativo Ed Interpretativo, Consorzio Monviso Agroenergia, studio 2014;

Cz. RE-Cord, Proposte Di Valorizzazione Del Digestato Da Produzione Di Biogas, Cz. RE-Cord, studio riservato.

Dossier de presse Istitut Canot IRSTEA, Des déchets pour produire de l'énergie renouvelable : la méthanisation, studio 13/01/2015;

EBA, European Biogas Association, EBA opinion on the digestate drying at biogas plants, parere 2013;

EBA, European Biogas Association, Digestate Factsheet: the value of organic fertilisers for Europe's economy, society and environment, parere 08/07/2015;

European Compost Network news, End-of-Waste Criteria for Compost and Digestate, art. n° 1-2011;

Fachverband Biogas / EBA / BiPRO, Digestate and REACH – Position Paper, November 2013;

Istituto superiore per la protezione e la ricerca ambientale, ISPRA, Rapporto Rifiuti Urbani, Edizione 2015;

Gnemmi G., Tesi Di Laurea In Diritto Agrario Energie Rinnovabili E Normativa Sui Sottoprodotti: Opportunita' E Criticita', AA 2013-2014;

lobescan, "The Business Case for the Green Economy. Sustainable Return on Investment", UNEP 2012;

Governo, LEGGE 7 agosto 2012 , n. 134 Conversione in legge, con modificazioni, del decreto-legge 22 giugno 2012, n. 83, recante misure urgenti per la crescita del Paese, norma 2012;

Governo Francese, Arrêté du 12 août 2010 relatif aux prescriptions générales applicables aux installations classées de méthanisation relevant du régime de l'enregistrement au titre de la rubrique n° 2781-1 de la nomenclature des installations classées pour la protection de l'environnement, norma 2010;

JRC, Joint Research Centre Institute for Prospective Technological Studies, End-of-waste criteria for biodegradable waste subjected to biological treatment (compost & digestate): Technical proposals, studio;

Mantovi P., Come spandere il digestato rispettando la Direttiva nitrati, supplemento a L'Informatore Agrario, art. 9/2012;

Ministero delle politiche agricole, alimentari e forestali, DM_5046_del_25_02_2016, Decreto Interministeriale Effluenti Modifica DM 7 aprile 2006, 2016;

Ministero delle politiche agricole, alimentari e forestali, Piano di Settore per le Bioenergie, Documento strategico, 01/07/2014;

Ministero delle politiche agricole, alimentari e forestali, Criteri e norme tecniche generali per la disciplina regionale dell'utilizzazione agronomica degli effluenti di allevamento, di cui all'articolo 38 del decreto legislativo 11 maggio 1999, n. 152, Gazzetta Ufficiale della Repubblica Italiana n. 109 del 12-5-2006- Suppl. Ordinario n.120;

Petralia Dario e Stefano D'Adda, Viaggio all'impianto di Montello, dove finisce tutto l'umido raccolto a Milano / VIDEO, Eco della Città, 21 giugno, 2013;

Provincia Cremona, Analisi Normativa Sui Sottoprodotti Impiegabili Negli Impianti Di Digestione Anaerobica (Biogas),

Ragazzoni Alessandro, Lucia Devenuto, Direttiva nitrati, l'Italia deve puntare alle deroghe. L'Informatore Agrario • 34/2008

Regione Campania, Guida Per La Compilazione Della Comunicazione Per L'utilizzo Agronomico Degli Effluenti Zootecnici (Ai Sensi Della Dgr 771/2012), norma Regione Campania;

Regione Emilia-Romagna, Regolamento regionale 4 gennaio 2016, n.1 Regolamento regionale in materia di utilizzazione agronomica degli effluenti di allevamento e delle acque reflue derivanti da aziende agricole e piccole aziende agro-alimentari. BURER Anno 47 4 gennaio 2016 N. 2;

Regione Lombardia, 2009_02_23_DGR_64_10874.pdf Lombardia, norma regionale Supp. n. 1 al B.U. n. 08, 23/02/2009;

Regione Lombardia, nitrati_digestato_revisione_2011_784_7966, norma

Regione Lombardia, Deliberazione X/5171 del 16/05/2016, Deliberazione di Approvazione del programma d'azione regionale per la protezione delle acque dall'inquinamento provocato dai nitrati provenienti da fonti agricole nelle zone vulnerabili ai sensi della direttiva nitrati 91/676/CEE;

Regione Lombardia, "Programma d'Azione regionale per la protezione delle acque dall'inquinamento provocato dai nitrati provenienti da fonti agricole nelle zone vulnerabili ai sensi della Direttiva nitrati 91/676/CEE", Allegato A della deliberazione della Giunta Regionale 16 maggio 2016, n. X/5171;

Regione Piemonte, Deliberazione della Giunta Regionale 5 ottobre 2015, n. 23-2193 Linee guida per la classificazione del digestato come sottoprodotto ai sensi dell'articolo 184 bis, comma 1 del decreto legislativo 3 aprile 2006 n. 152, recante norme in materia ambientale, e per la sua utilizzazione agronomica, norma regionale BU40 08/10/2015;

Regione Piemonte, Regolamento regionale 2 marzo 2016, n. 2/r – testo integrato

Rosato M., La giungla normativa europea sul digestato, agronotizie.imaginenetwork, art;

Rossi L., Mantovi P., Digestato un Utile Sottoprodotto Del Biogas, Conoscere Per Competere n° 4 CRPA, art. 01/09/2012;

Rossi L., Uso del digestato in agricoltura bio, ora tocca al Mipaaf, supplemento a L'Informatore Agrario, art. 27/2014;

Rossi L., Digestato da rifiuti e da matrici agricole, presentazione CRPA, 27/09/2012;

Rotundo D., La Ue sul digestato: non è equiparabile, Terra e Vita, n. 13-2015 28 marzo;

Solavagione D., Classificazione del digestato di origine agricola, Consorzio Monviso Agroenergia, Prot. AC_387274 1 ottobre 2012;

Terzoni, Zolezzi, Busto, Segoni, De Rosa, Daga e Mannino, Interrogazione a Risposta Scritta, Atti Parlamentari Camera dei deputati, seduta del 21 dicembre 2013;

The Environment Agency Chapter 4, The Environmental Permitting (England and Wales) Regulations, Standard rules SR2010No17 Storage of digestate from anaerobic digestion plants, norma 2010;

The Environment Agency Chapter 4, The Environmental Permitting (England and Wales) Regulations, Standard rules SR2010No17 Storage of digestate from anaerobic digestion plants, norma 2015;

The Environment Agency Chapter 4, The Environmental Permitting (England and Wales) Regulations, Standard rules SR2010No16 On-farm anaerobic digestion facility including use of the resultant biogas, norma 2010;

Zaffrani G., Il digestato alla luce del nuovo decreto, presentazione CNR, 10/11/2012;

Zanoni A., Biogas e digestato: va applicata la direttiva UE sui rifiuti, www.andreazanoni.it, comunicato stampa 2013;

Further information

Programma d'azione per la zona vulnerabile da nitrati di origine agricola di arborea, ex Delib.G.R. del 18 gennaio 2005, n. 1/12

Regione Piemonte, Regolamento regionale 29 ottobre 2007, n. 10/R

Governo, Norme in materia ambientale, decreto legislativo 3 aprile 2006, n. 152

Governo, Attuazione della direttiva 2001/77/CE relativa alla promozione dell'energia elettrica prodotta da fonti energetiche rinnovabili nel mercato interno dell'elettricità, 2003

Regione Emilia Romagna, criteri tecnici per la mitigazione degli impatti ambientali nella progettazione e gestione degli impianti a biogas, GPG/2011/1616

Regione Marche, Deliberazione della giunta regionale DM 07/04/2006 – DGR 1191/2012 – DGR 1448/07-modifica del punto 2.4.1 dell'allegato alla DGR 1191/2012 e approvazione delle linee guida per l'utilizzazione agronomica del digestato, 2014

Regione Veneto, Disposizione in materia di predisposizione del Piano Di Utilizzazione Agronomica, ai sensi della DGR n. 2495/2006 e smi, e degli articoli 8 e 10 dell'allegato A alla DGR n. 1150/2011, luglio 2012

Regione Veneto, Revisione della determinazione dei riferimenti catastali delle zone vulnerabili ai nitrati di origine agricola del Veneto, 2010

(v., , sentenze *Palin Granit*, citata, punti 34-36; 11 settembre 2003, causa C-114/01, *AvestaPolarit Chrome*, Racc. pag. I-8725, punti 33-38; *Niselli*, citata, punto 47, nonché 8 settembre 2005, causa C-416/02, Commissione/Spagna, Racc. pag. I-7487, punti 87 e 90, e causa C-121/03, Commissione/Spagna, Racc. pag. I-7569, punti 58 e 61)

GU Serie Generale n.90 del 18-4-2016 - Suppl. Ordinario n. 9

Web sites

<http://www.nextville.it/news/1836>, solo per gli abbonati ma utile per individuare le norme

https://webgate.ec.europa.eu/sanco/traces/output/eu_listsPerCountry_en.htm#

<http://www.arpat.toscana.it/notizie/arpatnews/2015/213-15/213-15-utilizzo-agronomico-del-digestato>