

# **SUMMARY OF THE GREEN PAPER STAKEHOLDER CONSULTATION**

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# RESULTS OF THE GREEN PAPER STAKEHOLDER CONSULTATION

## 1 Introduction

The green paper on the management of bio-waste in the European Union defines green waste as “biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises, and comparable waste from food processing plants”. It does not include “forestry or agricultural residues, manure, sewage sludge, or other biodegradable waste such as natural textiles, paper or processed wood. It also excludes those by-products of food production that never become waste”<sup>1</sup>.

Waste management options for bio-waste include, in addition to prevention at source, collection (separately or with mixed waste), anaerobic digestion and composting, incineration, and landfilling. The environmental and economic benefits of different treatment methods depend significantly on local conditions such as population density, infrastructure and climate as well as on markets for associated products (energy and composts).

Very different national policies apply to bio-waste management, ranging from little action in some Member States to ambitious policies in others. This can lead to increased environmental impacts and can hamper or delay full utilisation of advanced bio-waste management techniques. It should be investigated whether action on national level would be sufficient to ensure proper bio-waste management in the EU, or whether Community action is needed. The Green Paper aims to discuss these questions and prepare grounds for the upcoming impact assessment which will also address the subsidiary issue.

A stakeholder consultation on the green paper has been organised between December 2008 and March 2009 and aimed to invite stakeholders to contribute their knowledge and views towards current policies on bio-waste management and new research findings in the field. The consultation has been organised through a number of discussion themes and related questions. An overview of these themes and questions is given in Table 1.

Table 1: Discussion themes and questions on the Green Paper

Discussion theme	Question
Waste prevention	Question 1: Waste prevention is at the top of the EU's waste treatment hierarchy. From your experience, what could be specific bio-waste prevention action at EU level?
Limiting landfilling	Question 2: Do you see benefits or disadvantages of further restricting the amount of biodegradable waste that is allowed on landfills beyond the targets already set in the EU Landfill Directive? If yes, should this be done on EU level or left to decide by Member States?
Treatment options for	Question 3: Which options for the treatment of bio-waste

<sup>1</sup> Green Paper on the management of bio-waste in the European Union

biowaste diverted from landfill	diverted from landfills would you prefer to see strengthened and what would you see as their main benefits? Do you think that the choice of the treatment of bio-waste diverted from landfills should benefit from a wider and more consistent use of life-cycle assessment studies?
Improving energy recovery	Question 4: Do you think that energy recovery from bio-waste can make a valuable contribution to sustainable resource and waste management in the EU and meeting the EU's renewable energy targets in a sustainable way and, if so, under which conditions?
Increasing recycling	Question 5: Do you see a need for promoting bio-waste recycling (i.e. compost production or use on land of composted material) and, if so, how ? How can synergies be achieved between bio-waste recycling and energy recovery?
Contribution to Soil Improvement	Question 6: In order to strengthen the use of compost/digestate: <ul style="list-style-type: none"> <li>– Should quality standards be set for compost as a product only or also for compost of lower quality still covered by the waste regime (e.g. for applications not linked to food production)?</li> <li>– Should rules for the use of compost/digestate (e.g. limits on pollutant concentration in compost/digestate and land on which compost/digestate is applied) be set ?</li> <li>– Which pollutants and concentrations should these standards be based on?</li> <li>– What are the arguments for/against the use of compost (digestate) from mixed waste?</li> </ul>
Operational (treatment) standards for small plants	Question 7: Is there any evidence of gaps in the existing regulatory framework concerning the operational standard for plants which do not fall under the IPPC scope and if so how should this be addressed?
Other uses of bio-waste	Question 8: What are the advantages and disadvantages of the abovementioned bio-waste management techniques? Do you see regulatory obstacles preventing the further developments and introduction of these techniques?

As a result of the consultation, approximately 115 comments from 22 Member States and other stakeholders have been collected. These stakeholders have been subdivided in the following categories:

- 1:** MS: Member State  
**2:** NGO-EU: Non-governmental organisation at EU level  
**3:** NGO-Nat.: Non-governmental organisation at national level  
**4:** ARL: Authorities at regional and local level  
**5:** ATT: Academics and think tanks  
**6:** IC: Individual Companies  
**7:** I: Individuals

On one hand, the current paper aims to give an overview of the stakeholder consultation and on the other hand, it aims to prepare a debate on the possible need for future policy action, seeking views on how to improve bio-waste management in line with the waste

hierarchy, possible economic, social and environmental gains, as well as the most efficient policy instruments to reach this objective.

The paper is structured according to the above mentioned themes and questions. Furthermore, there is one chapter added on general comments on the Green Paper (chapter 10).

Chapter 12 includes a list of stakeholders whose comments are included in this paper.

## 2 Waste prevention

The Green Paper states that “the amount of bio-waste, although stabilized in recent years, has the potential to increase. This may necessitate the strengthening of waste prevention policies. There are no easy administrative solutions however, as possible actions are generally linked to changing consumer behaviour and retail policies.”

The first question of the stakeholder consultation relates to this theme of waste prevention:

**Question 1: Waste prevention is at the top of the EU's waste treatment hierarchy. From your experience, what could be specific bio-waste prevention action at EU level?**

The following specific types of bio-waste prevention actions are suggested:

- Stimulation of home composting (in rural areas / areas where it is reasonable and realistically achievable), including educational programmes and composting advisors (1: AEGDL, AF, APA, CR, OVAM, PRD; 2: GAIA, EEB, ACR+, EWA, CEMR, FEAD, ISWA, MWE, ECN, Rreuse; 3: ResSources, ATF, KGVO, YYL, AD, FNE, ARGE, AOR, Cré, VHE, SORP, BDE, FNADE, CNR; 4: MWDA, LARAC, GMWDA, SEPA, ACBC, MEC, SWaMP, Vorarlberg, MEPLF; 5: DCE, IFEU; 6: VE, SE, Mil-tek, Novamont, VLACO, CM). This should go together with the obligation of using insulated home composters and a course in composting, as to limit uncontrolled anaerobic reactions and odour problems (3: AN). Households which manage their own compostable organic waste should have their charges for collection of waste reduced or eliminated (3: ATE). There is one remark that indicates that home composting is in fact not a prevention measure, but a method for treatment (5: Cemagref).

*Summary*

1: MS: 6	3: NGO-Nat.: 16	5: ATT: 3
2: NGO-EU: 10	4: ARL: 9	6: IC: 6

- Sensibilisation campaigns (information and awareness rising) targeting food waste prevention among producers, retailers, caterers and consumers. Campaigns should focus on careful shopping behaviour, stock control, well chosen size of portions for smaller households and proper offers of extra's such as milk and sugar, take away bags for surplus food, discourage of 'by one get one free actions'/'three for the price of two', etc. An example is the UK 'love food hate waste' campaign<sup>2</sup> (1: OVAM, APA, LA, A, CR, GP, MES, UK, ACA; 2: GAIA, EEB, ACR+, EWA, COPA-COGECA, EURO COOP, FEAD, ISWA, MWE, ELCA, ECN, EUREAU, Rreuse, EPF; 3: ResSources, SORP, NABU, ATF, EBA, KGVO, ESA, YYL, FANC, FNE, ARGE, AOR, Cré, Dakofa, CNR; 4: MWDA, COSLA, ACBC, BW, SKL, MEPLF; 5: IGME, Cemagref; 6: SE, Novamont, CM, NFU)

*Summary*

1: MS: 9	3: NGO-Nat.: 15	5: ATT: 2
2: NGO-EU: 14	4: ARL: 6	6: IC: 4

<sup>2</sup> [www.lovefoodhatewaste.com](http://www.lovefoodhatewaste.com)

- Improved industrial processes, improved logistics (e.g. promoting regional cycles) as well as better and more intelligent packaging (design in order to preserve its content or design in order to be biodegradable/eco-design) are the keys to further prevent bio-waste (1: GF, APA, MES; 2: MWE, Bellona; 3: FBA, VNU, FH, CNR; 4: VNG, GMWDA,). Also an update and improved food labelling legislation is welcome. A distinction between the different types of date marking should be minimized (1: UK). Material flow bookkeeping for companies could also lead to the reduction of bio-waste (1: EME; 3: FANC; 6: RCP).

<i>Summary</i>		
1: MS: 5	3: NGO-Nat.: 5	6: IC: 1
2: NGO-EU: 2	4: ARL: 2	

- Programmes for the distribution of products that are nearly expired or which cannot be sold in regular markets, to the poorest sectors of the population (1: ACA; 2: COPA-COGECA; 3: KGVO, CCN, ARGE; 4: LARAC, ACBC, GFA, SKL; 4: A).

<i>Summary</i>		
1: MS: 5	3: NGO-Nat.: 5	6: IC: 1
2: NGO-EU: 2	4: ARL: 2	

- Smart gardening: e.g. use of a rotor mulcher (cut grass is small enough to be left between resting grass); slow growing grass varieties; proper choice of plants, related to location and space; correct timing for trimming-out, re-use of trimming-out rests in decorative walls or wicker, etc. (1: OVAM; 2: ACR+, MWE; 3: CNR; 5: Cemagref; 6: SE, VLACO).

<i>Summary</i>		
1: MS: 1	3: NGO-Nat.: 1	6: IC: 2
2: NGO-EU: 2	5: ATT: 1	

- Reorganise European funds in such a way that more money is allocated to composting plants and recycling (2: GAIA). Include home and community composting and other bio-waste prevention programmes in the projects eligible for EU funding (3: FNE). The European Commission can stimulate Member States to install national programmes which tackle food waste (1: KDN).

<i>Summary</i>		
1: MS: 1	2: NGO-EU: 1	3: NGO-Nat.: 1

- Full utilisation of agricultural raw materials, including food processing by-products, which finds markets in animal feed, fertilisers, cosmetics, pharmaceuticals, bio-plastics and bio-fuels (2: EU-CIAA, COPA-COGECA; 3: EBA). A review of the use of waste food for animal consumption with a view to maximise such use whilst keeping in place sufficient safeguards for animal and human health, may prevent food waste (4: LARAC). Legal certainty must ensure the legal status of by-products as non-waste (3: EU-CIAA). On the other hand, reduction of pesticides allows using peelings of fruits and vegetables, and thus reduces food left overs (VNU). Furthermore, relaxation of standards for fruit and vegetable allowing a wider variety of shapes and sizes to be sold will reduce waste as well (4: COSLA, LARAC, GFA).

<i>Summary</i>		
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2: NGO-EU: 3	3: NGO-Nat.: 2	4: ARL: 3
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- Source separation of food waste (in households) is a waste prevention measure in itself, as the waste created becomes more evident and visual (2: Rreuse; 3: ResSources, NABU, CCN; 4: ANMP). On the other hand, door to door collection mobilises materials which were until then managed domestically and increases the total quantity of waste (3:FNE; 6: Alpheco, Insinkerator). Bring-in collections have a less harmful effect (3: FNE).

<i>Summary</i>			
2: NGO-EU: 1	3: NGO-Nat.: 4	4: ARL: 1	6: IC: 2

- Some stakeholders prefer to have no source separation of waste fluxes that can easily be treated on the production site (both for bio-waste coming from households as for bio-waste coming from producers of large quantities of bio-waste) (1: AF). At the other hand, there are voices that request to have selective collection at big producers (restaurants, food industry, etc.).

<i>Summary</i>
1: MS: 1

- Introduction of a qualitative and quantitative reporting scheme by Member States on home composting and other prevention activities. These data would allow better understanding of the data that would enable the EU to measure the effect of targets or incentives related to waste arisings (3: ARGE; 4: COSLA, GMWDA; 6 Novamont).

<i>Summary</i>		
3: NGO-Nat.: 1	4: ARL: 2	6: IC: 1

- Commercial chickens, being 'retired' (less intensive egg production) could be distributed among households for the disposal of kitchen waste (2: Rreuse, 3: ResSources, 6: VLACO). Also feeding to other domestic animals is an option (3: FNE, ARGE). Similarly, animals (e.g. sheep) could be used for mowing lawn, instead of doing this mechanically (3: VNU).

<i>Summary</i>		
2: NGO-EU: 1	3: NGO-Nat.: 4	6: IC: 1

- Promoting households to grow their own food can act as an incentive, as the effort involved growing it is much more appreciated and therefore it is less likely to be wasted (1: CCN).

<i>Summary</i>
3: NGO-Nat.: 1

- Price policy for food so as to prevent surplus purchases (3: FH).

According to one NGO, home composting does not present a good waste prevention strategy, as industrial processes are improving both the energy efficiency and the resource efficiency of the processes. When bio-waste is treated in industrial facilities, methane can be collected and made use of (2: Bellona).

And one remark also indicates that in fact, it is desirable to increase the amount of bio-waste instead of bio-waste prevention. This is the case when other wastes are prevented/replaced by biodegradable waste. Bio-plastics could be an example of this (5: Baldé).

### 3 Limiting landfilling

Landfilling of bio-waste is in general the least desirable waste management solution and should be minimized. Still, in many Member States, increased implementation efforts and additional enforcement measures may be necessary for many years to fully implement the Landfill Directive. The second question of the stakeholder consultation relates to this theme of limiting landfilling:

**Question 2: Do you see benefits or disadvantages of further restricting the amount of biodegradable waste that is allowed on landfills beyond the targets already set in the EU Landfill Directive?**

***If yes, should this be done on EU level or left to decide by Member States?***

The answers on this question are organised in a) the ones that see benefits (PRO) and b) the ones that see disadvantages related to further landfill restrictions (CONTRA).

#### 3.1 PRO further landfill restrictions

<i>Summary PRO</i>		
1: MS: 10	3: NGO-Nat.: 17	5: ATT: 3
2: NGO-EU: 13	4: ARL: 7	6: IC: 11

Among the reactions that express pro further landfill restrictions, there are still many differences:

Some countries and organisations do favour a (near) zero landfill limit for (household) bio-waste (1: OVAM, ACA, 3: NABU, EBA, VHE, 5: IFEU, 6: Denovo). Even if landfill gas is collected and used, there remains a significant portion of methane being released into the air (minimum 40% of the produced methane) and therefore, a landfill ban should be installed all over Europe (5: IFEU). There is one remark that indicates that an EU wide prohibition of the disposal of waste containing over 5% organic carbon is wishful (1: A).

Some do specify that this can be achieved by separate collection of bio-waste (3: EBA, 4: ACBC) and according to part of them, a legal framework (a *separate Directive*, besides the new framework directive on waste) relating to selective collection of bio-waste and sustainable treatment is necessary to stimulate the appropriate investment climate (3: ARGE, 6: VLACO). This new framework should contain *ambitious quantitative targets on selective collection of bio-waste* (3: NABU, Cré, BDE) and maximal percentages of bio-waste in residual waste (recycling targets) (1: OVAM, 2: EEB, ACR+, EB, ECN, 3: ATF, 6: RCP). Some also do require to include requirements for the treatment of bio-waste and quality criteria for the produced composts and digestate (3: BGK). According to others, separate collection should never become a waste policy goal in itself (3: AD).

Some also prefer a (complete) ban (achieved by source separation as well) but only in the long run (after 2016/2020), because the evaluation of the Landfill Directive is foreseen for 2014, see also heading 3.2 (2: ISWA, 3: KGVO, ARGE, 4: CG, 6: Novamont).

Other countries and organisations do favour the further strengthening of bio-waste going to landfills, however, they do not intend to install a zero landfill limit (1: APA, GFEO, AF, PRD; 2: ESWET, Bellona, 3: FANC, FBA, BDE, VNU, 4: SEPA, EURE; 5: Baldé, IGME; 6: Ecocleaner, Ekokem). Further strengthening of the restrictions is necessary in the frame of the climate change warnings (1: GFEO, MES; 3: Dakofa, CNR; 6: Alpheco, Insinkerator).

It is also indicated that certain Member States do have more stringent requirements than the ones of the Landfill Directive. This could give the path to other Member States to be more ambitious (2: FEAD).

It is further indicated that targets for the amounts of bio-waste that may be landfilled only apply to municipal waste and that these targets should also apply to all biodegradable waste (3:AD).

Other opinions state that minimization of bio-waste going to landfills is important, but should go together with an obligation to progressively get biodegradable out of incineration (2: GAIA, 3: FANC) or should go together with an acceleration of transition from landfill to other more sustainable methods for bio-waste treatment (1: AEGDL, 2: MWE, ELCA, 3: Dakofa, 4: ANMP, SKL) and support for investment in infrastructure (3: FNADE, 4: SKL).

It is furthermore indicated that a differentiation among countries and regions is necessary, as some (e.g. nordic) countries have a smaller need for organic materials and some (e.g. southern) countries do have a bigger need for organic materials to improve their soil (1: OVAM) and there are differences between highly populated areas and rural areas as well (3: ACR+, 4: ANMP). Furthermore, there are a number of Member States that are having problems in achieving the current obligations (see also 3.2). Some opinions therefore state that further restrictions should be taken at Member State/Community level (2: EWA, EURO COOP, 3: SORP, AD, 4: SH, EURE, 6: CSRA, Veolia, NFU).

## 3.2

### CONTRA further landfill restrictions

<i>Summary CONTRA</i>		
1: MS: 9	3: NGO-Nat.: 11	5: ATT: 2
2: NGO-EU: 10	4: ARL: 7	6: IC: 3

The following reasons are given to argue the fact that further landfill restrictions are not required or not wishful:

- Many efforts and investments still need to be done, with regard to the current EU Landfill Directive, in particular in new Member States. Member States who are lagging behind should be assisted first. Also, strengthening the targets would undermine the long-term approach and could have costly and unnecessary impacts on existing investments and contractual arrangements. Thus, already strengthening current provisions of the Directive may be difficult or unrealistic (1: EME, CR, MEL, KDN; 2: CEMR, CEWEP, ESWET, FEAD, ISWA, ECN, Rreuse, 3: ResSources, ESA, AN, CCN, YYL, AOR, Cré; 4: LGA, VNG, LARAC, GMWDA, SWaMP, 5: PIVC; 6: Novamont, CM). The decision to implement further restrictions should be let to decide by the individual Member State. The majority of problems in meeting current Landfill Directive requirements are

caused by gaps the regulatory framework, which does not contain provisions of how bio-waste diverted from landfills should be treated (3: DWMA). Furthermore, the existing requirements in the Landfill Directive need greater clarity. For example, the Directive prohibits 'landfilling of untreated waste', but 'treatment' is a broad concept that is not clearly defined (1: EME).

- Article 5 of the Landfill Directive foresees that the European Commission should report by 2014 on the pursuance of the diversion targets, therefore, strengthening of the current targets only needs to be considered after the evaluation of the Commission in 2014. It should become a long term action, for the period 2016/2020 (1: LA, MES; 2: CEMR, ECN, EUREAU, Rreuse, 3: ResSources, AN, CCN, AD, 4: LGA, GMWDA, MEPLF).
- Diversion of bio-waste from landfills is reflected in the waste hierarchy of the WFD and the Landfill Directive. The EU climate change and energy package also include the promotion of renewable energy sources, providing additional policy incentives for a resource-efficient management of bio-waste. As such, the existing legislation does already create a situation in which it will not be possible to continue disposing bio-waste in landfills in the future (2: EU-CIAA, ESWET).
- Many Member States have already banned biodegradable waste from landfills, as to achieve the Landfill Directive. Furthermore, the Animal By-Products Regulation review is proposing to ban former foodstuff from landfill. In those countries where currently not all bio-waste is banned from landfill, this review will change practices (3: CIWM, 6: SRA).
- Other opinions indicate that the Landfill Directive does indeed set limits for organic waste landfilled, however, these limits tend to push bio-waste towards incineration or other 'bad' solutions. Therefore, it is not wishful to further push the landfill targets, in absence of positive targets for prevention and separate collection (3: FNE). Instead of adopting a diversion-from-landfill approach, a positive recovery approach could be explored (6: SE). It is required to create infrastructures for bio-waste recovery and it is fundamental to promote these infrastructures from an economic standpoint (landfill should never be cheaper than recovery) (2: EPF).
- Further restrictions of the amount of bio-waste on landfills should be taken on national/local level, considering the differences between Member States and regions (1: GP, KDN; 2: CEMR; 4: Vorarlberg). Local circumstances may dictate that the best option may be the use of landfill for certain bio-waste (2: EUREAU, 5: Cemagref).
- Further restrictions are not feasible because technologies such as composting and MB approach do not have good performance (1: GF).
- It would be interesting to understand the costs and benefits (financial and environmental) of further restricting the amount of biodegradable waste allowed to landfill, beyond the restrictions already in place. If it could be demonstrated that further restrictions brought net overall benefits, then such action at the EU level could be supported (1: UK, 3: ESA). This could be achieved in a recast of the Landfill Directive or in legislation specifically for bio-waste (3: ESA).
- Instead of installing further restrictions, it could be interesting to implement economical instruments, such as a landfill tax (1: KDN).



## 4 Treatment options for bio-waste diverted from landfill

Once diverted from landfills, bio-waste can go through several treatment options. It is difficult to decide on the one single environmentally most beneficial bio-waste management option under all circumstances due to a large number of variables and local considerations that need to be taken into account. Management of diverted bio-waste should be addressed by additional measures supporting a move from simple pre-treatment for landfill and incineration with little or no energy recovery into incineration with high energy recovery, anaerobic digestion with biogas production and recycling of bio-waste. In addition to assessments to highlight the benefits, it could be further strengthened with targets for the maximum allowed amount of residual waste for disposal (landfilling or incineration without energy recovery) or other measures in order to direct more bio-waste towards material and energy recovery.

The third question of the stakeholder consultation relates to this theme of diverting bio-waste from landfills:

**Question 3: *Which options for the treatment of bio-waste diverted from landfills would you prefer to see strengthened and what would you see as their main benefits?***

According to the needs and specific conditions in Member States and regions, a number of options for treatment of bio-waste diverted from landfills are listed. The different options and their benefits are described in the paragraphs beneath.

### 4.1 Options and benefits for the treatment of bio-waste diverted from landfills

For some stakeholders, the specific treatment method should be left open to the needs of the regions in question, as local /regional/national circumstances, such as collection systems, waste composition and quality, local heat demand (climate conditions), access to gas/electricity grid, market for compost, etc. may vary (1: APA, EME, KDN, MES, ACA; 2: CEMR, MWE, EPF; 3: NABU, CIWM, AD, SNH, SWM, Dakofa, FH, CNR, 4: LGA, VNG, GMWDA, MEC, SWaMP, SKL, MEPLF; 5: IFEU; 6: CSRA, NFU). Some stakeholders indicate that a more thorough scientific research and analysis of costs and

benefits of each waste treatment technology has to be carried out and more data on externalities have to be collected before any option can be chosen (1: GP; 2: ESWET, 4: COSLA). Similarly, it is indicated that legislation and policy should remain ‘technology blind’ and support current and further processes meeting wider objectives such as carbon reduction and increased sustainability (3: ESA). Others do indicate which treatment option they prefer. The different treatment options and their benefits are discussed below. For these different methods, it is also indicated that the preferred option depends upon the kind of bio-waste. For example, more wet wastes go preferably to digestion, while dry or woody materials should be burned. Some types of bio-waste can be directly used on agricultural land.

#### 4.1.1

#### Anaerobic digestion

<i>Summary</i>		
1: MS: 5	3: NGO-Nat.: 12	5: ATT: 1
2: NGO-EU: 8	4: ARL: 4	6: IC: 2

Anaerobic digestion (AD) is preferred by many stakeholders (1: OVAM, CR, AF, AEGDL, MEL, 2: GAIA, EEB, ACR+, COPA-COGECA, ISWA, ELCA, Rreuse, Bellona, 3: ResSources, NABU, CIWM, ATF, FANC, FBA, BGK, VHE, VNU, FNADE, 4: LARAC, SEPA, CG, EURE, 5: Baldé, 6: SE, CM).

The advantage of AD is related to the fact that energy recuperation (biogas production) is combined with material recycling. The production of biogas allows substitution of fossil fuels and biogas can be used in CHP<sup>3</sup> installations or can be further treated to produce biodiesel. Biogas has an octane value of over 140, i.e. the highest quality traffic engine fuel. The gas has inherently higher combustion efficiency and lower emissions than liquid or solid fuels. As a light gas, it has very few combustion pollutant components, and heavy toxic components such as PAHs are virtually inexistent.

The generated compost and digestate enhances many agro-environmental functions of soils (resilience, buffer power, biodiversity, productivity, etc.), it contributes to better overall reduction of greenhouse gases, thanks to improved workability of soils, sequestration of C in soils, reduced use of mineral fertilizers and pesticides, reduced emissions of N<sub>2</sub>O and dust, etc..

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<sup>3</sup> Combined heat and power

Anaerobic digesters are flexible, quick to build, less capital intensive, cheaper and with the green electricity and heat produced can pay back investment in 5 years<sup>4</sup> -this is not taking into account the value of the remaining digestate in terms of GHG and fertilisers savings. The quantity of pollutants emitted into the air is smaller and easier to monitor than in aerobic composting.

Anaerobic digestion should also be strengthened at smaller scale, in localised facilities, to cut down in transport and to encourage gas use for heating in local buildings (2: Rreuse, 3: ResSources, CCN).

Limitations on AD are the higher invest costs when compared to composting, possible GHG emissions if not properly processed and surplus waste water in wet fermentation systems. AD loses optimum output of biogas when more woody material is included and it is more difficult to set up on a small scale. Separate collection is necessary.

#### 4.1.2

#### Composting

<i>Summary</i>		
1: MS: 7	3: NGO-Nat.: 12	5: ATT: 2
2: NGO-EU: 7	4: ARL: 4	6: IC: 3

Composting is another treatment method, also preferred by many stakeholders (1: OVAM, A, CR, MEL, GFEO, AF, AEGDL, 2: GAIA, EEB, CEWEP, COPA-COGECA, ESWET, 3: EBA, NABU, ATF, ARGE, VNU, CAS, FNADE, 4: ACBC, 5: Baldé, 6: SE, Novamont).

Composting is most appropriate for green waste coming from separate collection.

The advantage of composting is related to the fact that compost and the digested material can be used as a soil improver (1: OVAM) because the majority of nutrients, contained in the source materials, are preserved. As such, it can be used as a substitute for mineral fertilisers. The use of compost has a positive effect on soil microbial activity and soil transformation processes. Water retention and infiltration are increased resulting in less susceptibility for erosion and drought. Furthermore, the technical demand is low and there is nearly no waste water (3: KGVO).

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<sup>4</sup> CADDET, Centre for Renewable Energy, ETSU, Harwell Oxfordshire OX11 0RA, UK - Anaerobic Digestion of Farm Waste in the UK

Limitations of composting are losses of energy content of the waste and the requirement of energy for mixing and oxygenating. Composting also releases greenhouse gases (3: FBA).

### ***Municipal composting***

Benefits: Reduces the amount of waste sent to disposal and eases sorting of residuals. It has low capital intensity, it creates jobs and it involves the community (2:GAIA). Composting at local level allows implementing the proximity principle (2: Rreuse, 3: ResSources, CCN). Composting can treat a larger amount of woody material as compared to AD. Suitable for biodegradable and garden waste, generally more cost-effective than burning, recycling of nutrients, option for monitor and remove pollutants (4: BW)

Limitations are the lower benefit on capturing gas emissions (3: CIWM), separate collection of bio-waste is necessary and there is no energy recovery (4: BW).

### ***Home composting***

According to a number of stakeholders, home composting should be seen as a first option in treatment of bio-waste (2: Rreuse, 3: ResSources, NABU, CCN, FNE, 4: BW, EURE, 5: Cemagref,).

Benefits: home composting is inexpensive and it reduces waste collection, transport and treatment costs (2: GAIA, 3: Quercus, 6: Mil-tek). It does not require any energy.

Disadvantages: Often inadequate levels of hygiene, frequently inadequate airing leads to methane emissions, only suitable for certain types of dwellings, not suitable for bio-waste of animal origin, no pollutant inspection, no energy recovery.

### ***Vermicomposting***

Vermicomposting brings in the possibility to get quality compost when organics are separated or get compost out of mixed waste and hence make it easier to recycle the residuals (2: GAIA, 4: AMAVE).

### 4.1.3

#### Incineation

*Summary*

1: MS: 6

2: NGO-EU: 2

3: NGO-Nat.: 3

4: ARL: 1

Incineration is preferred for a number of reasons:

- In countries where agricultural land erosion is not a problem, there is no big need for compost and therefore, the best option for treatment of bio-waste is burning the bio-waste fraction along with household waste. The bio-waste is needed for technical reasons to control the burning and avoid overheating of the oven of the municipal waste incinerators (1: GF).
- For others, burning of bio-waste is seen as another option for the production of renewable energy (1: OVAM).
- Furthermore, incineration is seen as an option for the treatment of the remaining waste (which can not be treated by recycling or other methods) (1: CR, 2: CEWEP, Rreuse, 3: ResSources, CCN) or for waste which is not collected separately and remains in residual waste (1: GFEO).
- Incineration is a forward-looking method a) in cases of dedicated plants, that only incinerate bio-waste, so that the phosphor in the ash can be used (Dakofa) b) in cases where renewable resources which are used for heat and steam production are used (1: A).
- Incineration is most appropriate for woody waste (1: A).

Advantages of incineration are the absence of GHG during treatment, no separate collection is required, effective hygienisation through mineralisation and removal of pollutants.

Limitations are the low energy efficiency due to water content. Organic matter as humus resource is destroyed, plant nutrients are lost for fertilisation and increased transport costs and environmental burden occurs, as compared to decentralised solutions for biological treatment. Treatment costs are generally higher than in bio-waste treatment plants (4: BW).

### 4.1.4

#### Mechanical Biological Treatment (MBT)

*Summary*

4: ARL: 1	5: ATT: 1	6: IC: 2
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MBT plants dealing with mixed municipal solid waste are quite likely to incorporate both anaerobic and aerobic processes in order to not only maximise revenue from biogas, but also achieve maximum stabilisation if designed either as a pre-treatment for landfill OR as a suitable “compost like” material for use on land with non-food crops (6: CSRA).

MBT must be recommended for the valorisation of bio-waste not permitted in landfills at relative low costs, because the source separation collection at large scale will be virtually impossible if the cost of diesel reaches values like those observed in the middle of the year 2008 (5: PIVC).

MBT should be re-appraised because of the big possibility of recycling carbon (6: Ecocleaner).

MBT units result in a compost of a superior quality and encourage the return of organic matter to the soil in a safe manner with obvious advantages, thus creating a value chain (4: AMAVE).

#### 4.1.5

#### Food Waste Disposer

<i>Summary</i>		
4: ARL: 1		6: IC: 1

Food waste disposers (FWD) offer an addition mean of diverting organic matter away from landfills, whilst presenting numerous environmental benefits.

Benefits: In terms of global warming, several studies reported that the carbon footprint associated with FWD's, where sludge is digested, is less than landfill, incineration or centralised composting. Another benefit of using FWD's is the resulting increase in biogas production where the sewage sludge is digested. This is due to the additional organic matter content of the sewage. As for the residue of anaerobic digestion, the bio solids can be recycled to land as bio fertiliser. The digestate does not need to be composted before it is suitable to be used on land (6: Insinkerator).

Disadvantages: sewerage operation problems, overflow of nutrients and organic matter into waterways and difficulties with the disposal into agricultural production of sludge from treatment plants (4: CG).

#### 4.1.6 Aerobic digestion

*Summary*  
6: IC: 1

Autogenous thermophilic aerobic digestion (ATAD) is a process with tremendous benefits and advantages, which should be considered when determining a treatment option for bio-waste.

These benefits include: relatively low capital costs to alternative solutions, relatively low site footprint to alternative plants, faster process reducing the time scale for holding bio-waste in a waste form, scalable plants to cater for changing processing capacities, absence of methane gas generation, absence of malodours, greater choice of urban site locations as a result of process acceptability, production of heat for local use; and the capability to transform bio-waste into a marketable end-product which offers agronomic benefits as a soil improver and fertiliser (6: Denovo).

#### 4.1.7 Production of biofuels

*Summary*  
3: NGO-Nat.: 2                      4: ARL: 1                      6: IC: 1

The production of biofuels also has to be seen as an option for the treatment of bio-waste diverted from landfills, especially biofuel production from bio-waste from sources like bakeries. This method has been proven to be quite efficient in Finland (3: YYL, 6: Ekokem).

In Sweden, there is good experience with the use of biogas in the transport sector (4: SKL).

It is remarked that only bio-waste of low quality should be used for biodiesel production. Bio-waste should be of such quality that recovering the nutrient content would lead to environmental and health problems (3: Dakofa).

#### 4.1.8 Combination of methods

*Summary*  
1: MS: 1                      3: NGO-Nat.: 7                      5: ATT: 12

2: NGO-EU: 5

6: IC: 4

Many stakeholders do prefer the combination of composting with anaerobic digestion (1: OVAM, 2: EEB, EWA, EU-CIAA, FEAD, 3: KGVO, AN, ATF, YYL, SORP, DWMA, BGK, 5: PIVC, 6: VE, Novamont). As such, advantages of both technologies are combined and in addition, GHG are lowered due to aerobic stabilisation during composting, there is reduced danger of nutrient leaching in soils, and surplus waste water can be used for watering during the composting process.

For others, the preference for straight composting or AD or the combination of both treatment methods, should be left for decision at local level, since benefits depends on local conditions (2: EEB, 3: ATF, 6: RCP).

Besides composting and anaerobic digestion, also co-digestion should be taken into account (2: EUREAU).

Another combination of methodologies is 'combined heat and aerobic composting' (CHAC) (6: Alpheco).

MBT-Vermicomposting should be a solution for small municipalities that are located far away from centralized waste treatment units. In these cases it is recommendable to do co-composting for organics from MSW and other bio-waste streams like sewage sludge, agricultural waste and biomass from forestry cleanness (5: PIVC).

#### 4.1.9

#### Separate collection of bio-waste

*Summary*

1: MS: 2

3: NGO-Nat.: 11

5: ATT: 1

2: NGO-EU: 3

4: ARL: 4

6: IC: 1

For some countries and organisations, the specific treatment method should be left open. More important for them is to establish separate collection schemes (2: ECN, 3: NABU, Cré, ATE, BDE, 4: SH, 5: IGME).

Other countries do prefer one of the above mentioned techniques, but also add that separate collection is crucial for an appropriate treatment of bio-waste (1: A, MEL, 2: GAIA, Rreuse, 3: EBA, ResSources, KGVO, DWMA, FANC, FNE, ARGE, 4: ACBC, CG, EURE, Novamont).

The main benefits from source separate collection are that this system is best fit to suit variable local conditions, the system has been proven in both rural and urban areas, on various scales, for all types of housing and all social classes and the compost can be successfully marketed as it leads to high quality compost (3: DWMA).

## 4.2 Life cycle assessment (LCA)

***Do you think that the choice of the treatment of bio-waste diverted from landfills should benefit from a wider and more consistent use of life-cycle assessment studies?***

With regard to LCA, there are stakeholders who do favour the technique (PRO) and others who see limitations to the use of LCA (LIMITATIONS).

### 4.2.1 PRO LCA

<i>Summary</i>		
1: MS: 3	3: NGO-Nat.: 5	5: ATT: 2
2: NGO-EU: 10	4: ARL: 3	6: IC: 1

For many countries and organisations, LCA seems to be very useful and important for decision making and for the identification of the best option for the diversion of bio-waste from landfills (1: APA, MEL, KDN, 2: CEMBUREAU, ACR+, EFMA, EWA, CEMR, CEWEP, FEAD, EUREAU, 3: ESA, SORP, CIWM, FANC, SNH, 4: COSLA, SEPA, 5: PIVC, 6: Denovo). Some opinions specify that LCA is a useful method, however, local conditions have to be taken into account (CIAA, EUREAU, IGME, MWDA). Others do request an EU-wide methodology for LCA (COPA-COGECA).

### 4.2.2 LIMITATIONS IN LCA

<i>Summary</i>		
1: MS: 3	3: NGO-Nat.: 17	5: ATT: 3
2: NGO-EU: 9	4: ARL: 3	6: IC: 5

The following limitations, uncertainties, and shortcomings are listed with regard to LCA:

- The positive impact of compost is not completely included in LCA (1: OVAM, CR, 2: GAIA, EEB, ACR+, ELCA, Bellona, 3: AN, NABU, CCN, BDE, ATF,YYL, DWMA, FNE, AOR, BGK, Cré, VHE, 4: GMWDA, GFA, MEPLF, 5: Baldé, CDE, Cemagref, 6: CM, RCP, VE, Ekokem, Novamont). The result of LCA strongly depends on the parameters considered. Carbon sinks, minerals and high molecular cycles and their effects on soil properties are not considered in LCA (3: EBA). Also the value of organic fertilisers (nutrient recovery) and substitution of peat/carbon sequestration and improved erosion behaviour in soil must be taken into consideration (2: FEAD). Furthermore, reduced pesticide consumption, substitution of mineral fertilisers, improved workability and water holding capacity and reduced irrigation needs, need to be taken into account (2: ISWA, ECN, Reuse, 3: ResSources, KGVO, ARGE).
- Social and economic impact is not evaluated, although quite important (1: OVAM, 3: NABU).
- The function of waste treatment facilities is not always comparable: for example an incinerator (first goal is to treat waste) and a cement oven or an electricity plant (for the latter two, waste treatment only comes at the second place) (1: OVAM, 3: NABU).
- It is already proved in several studies that AD and the use of compost for agriculture supports the efficient use of renewable energy and is assuring long lasting natural sequestration of carbon in soils (3: NABU).
- LCA is very cost intensive (2: ELCA) and also time intensive. Obligatory LCA could endanger the cost effectiveness of new and innovative technologies (3: SWM).
- LCA is no longer necessary to furnish proof of the advantages of well known treatment options (such as composting and incineration) (1: A).

According to the above, further research is needed to improve LCA methodologies for compost application and currently, LCA results should be interpreted with caution. Approaches would need to be standardised at EU level, to support decision making in a coherent way.

According to VHE, it must be checked whether decisions for treatment options can be made more appropriate and more transparent on the basis of indirect and direct CO<sub>2</sub> saving potentials rather than by LCA (3: VHE).

## 5 Improving energy recovery

To help reach renewable energy targets, energy recovery could be significantly enhanced by developments in the area of anaerobic digestion for production of biogas and by improving the efficiency of waste incineration, for example by using cogeneration of electricity and heat.

Every tonne of bio-waste sent to biological treatment can deliver between 100-200 m<sup>3</sup> of biogas which could be upgraded to natural gas standards using 3-6% of its energy. Anaerobic digestion of mixed waste brings similar energy gains but makes further use of residues on land difficult.

Most of the energy gained via incineration of MSW results from burning highly calorific fractions such as paper, plastics, tyres, and synthetic textiles while the "wet fraction" of biodegradable waste reduces overall energy efficiency. However, the biodegradable fraction of municipal waste (but including paper) still delivers about 50% of energy coming from an incineration plant and increased recycling of bio-waste could limit the amount of bio-waste available for incineration.

The fourth question of the stakeholder consultation relates to this theme of diverting bio-waste from landfills:

**Question 4: *Do you think that energy recovery from bio-waste can make a valuable contribution to sustainable resource and waste management in the EU and meeting the EU's renewable energy targets in a sustainable way and, if so, under which conditions?***

For most stakeholders, energy recovery from bio-waste is seen as an interesting solution for sustainable resource and waste management and as a solution to reduce CO<sub>2</sub> emissions (1: APA, EME, LA, 2: CEMBUREAU, CEMR, ESWET, ISWA, ELCA, 3: AN, VHE, 4: MEC, SWaMP, Vorarlberg, EURE, 5: IFEU, 6: Insinkerator, Ekokem,). Some do remark that in fact recycling is above energy recovery in the waste hierarchy (3: FNE, 4: CG, 5: PIVC) and furthermore, it is remarked that an EU strategy should focus both on recycling and energy recovery (3: BGK, 6: Ekokem). When only focussing on energy recovery, the benefits of compost (organic matter and nutrients) get lost (3: BGK).

The preference in technical solution for energy recovery does differ among Member States and organisations and can be categorised in a) the ones who prefer anaerobic digestion, b) the ones who prefer incineration, c) the ones who prefer other technologies as a method for energy recovery and d) the ones who indicate that economic efficiency of energy production has to be evaluated more before making a choice (6: Ecocleaner). According to some, this decision should be left to the local level, because local circumstances such as the differentiation in input materials, waste feedstock, the availability of destinations, etc. may favour one or another energy recovery measure (2: MWE, 3: CCN, CIWM, 4: LGA, ACBC, 5: Cemagref, 6: RCP).

## 5.1

### Anaerobic digestion

*Summary*

1: MS: 5	3: NGO-Nat.: 18	6: IC: 6
2: NGO-EU: 8	4: ARL: 6	

Many stakeholders do prefer anaerobic digestion as a method for energy recovery from bio-waste (1: GFEO, AF, AEGDL, GP, MEL, 2: EU-CIAA, FEAD, Bellona, EPF, 3: EBA, KGVO, NABU, FANC, FBA, ARGE, VNU, BDE, CNR, 4: GMWDA, SEPA, GFA, 6: CSRA, Denovo, NFU, SE). Some prefer its use in combination with composting as an ultimate step to produce high quality compost (1: A, OVAM, 2: EEB, Rreuse, GAIA, 3: ATF, ResSources, YYL, DWMA, AOR, Cré, 4: BW, 6: Novamont). Separate collection of bio-waste is a necessity for many (1: A, 3: NABU, DWMA, FANC, FBA, FNE, Cré, 4: GMWDA, 6: Novamont).

In this chapter, it should be remarked that biogas production depends on the kind of input material: kitchen and canteen waste, oil and fat have biogas generation rates of up to 200 m<sup>3</sup> per ton, whereas bio-waste from separate collection ranges around 100 m<sup>3</sup> per ton (3: YYL).

In Southern European countries, the produced compost is needed as to add on eroded lands (2: ACR+, EWA, 3: SORP).

There is one remark that indicates that the juridical state of biogas (generated by AD) needs to be cleared out. Further actions for valorisation can only be taken when biogas is accepted as renewable energy source (4: MEPLF).

## 5.2 Combined Heat and Aerobic Composting

Combined heat and aerobic composting (CHAD) yields heat that is over 4-times more than the net electricity from AD with CHP (6: Alpheco).

## 5.3 Incineration

### *Summary*

1: MS: 7

2: NGO-EU: 4

3: NGO-Nat.: 2

Some countries and organisation (Nordic countries for example) do have less need for organic materials (as soil erosion is not a big issue in these countries and there is no big need for compost as a soil improver), but they do have a bigger need for renewable energy. Finland therefore prefers to burn unsorted household waste and plans to build a large municipal waste incinerator, which will replace coal as the primary source of energy (1: GF).

Others do accept incineration, for example for large conurbations or situations where there are limited markets for the compost/digestate output (2: EWA, COPA-COGECA, 3: SORP, 6: NFU) or for waste that remains after source separation (1: OVAM, AF, GP, 3: EBA).

Furthermore, incineration is seen as a good option to treat dense waste from gardening and bulky waste (1: GFEO).

Incineration (with recovery of phosphorus) is also seen as a good treatment option for sewage sludges and slaughtering wastes. Thermal treatment is desirable for those fractions that are not suited for biological methods of recovery and have a high caloric value as well as for those with a low nutrient content and/or poor quality in biomass thermal power plants (1: A).

And of course, the CEWEP<sup>5</sup> and ESWET<sup>6</sup> do favour Waste-to-Energy plants (incineration with energy recovery) (2: CEWEP, ESWET).

If the waste is incinerated at efficient facilities, which produce both electricity and heat, it can contribute to meet the EU's renewable energy targets (1: PRD).

<sup>5</sup> Confederation of European Waste to energy plants

<sup>6</sup> European Suppliers of Waste to Energy Technology

*Summary*

1: MS: 2

2: NGO-EU: 6

3: NGO-Nat.: 10

6: IC: 1

Some opinions explicitly express against incineration, because the wet fraction of bio-waste serves to lower caloric values of mixed waste, thereby reducing the energy efficiency of the waste incineration (1: MEL 2: GAIA, EEB, FEAD, Rreuse, 3: ATF, ResSources, CCN, DWMA, FNE, VNU) and because the nutrients and organic matter are completely lost (1: AEGDL, 2: ECN, 3: KGVO, ARGE, AOR, CAS). Others do indicate that incineration can only be seen as a last resort (2: CR).

There are thoughts that indicate that the RES-Directive may promote exclusively the thermal use of biomass, which cannot be in congruency with sustainable economies on the long term (6: VE).

## 5.4

### Other technologies

*Summary*

1: MS: 1

2: NGO-EU: 6

3: NGO-Nat.: 6

4: ARL: 2

6: IC: 1

Besides combustion and anaerobic digestion, the potential for co-digestion should be encouraged (2: EUREAU).

The importance of Combined Heat and Power plants (CHP) should also be investigated (1: OVAM, 3: AOR, 4: LARAC). CHP is increasingly used by the water sector as a valuable renewable energy source (2: EUREAU, 4: LGA).

Furthermore, it is stressed that material recovery should be promoted as a first way to save energy (2: EEB, EWA, 3: ATF, SORP).

Biogas production should also be promoted and technology for enabling biogas feeding into current natural gas pipelines should be actively upgraded (3: FBA, 4: LARAC).

Furthermore, the production of biofuel (by gasification techniques) should be considered in the frame of energy recovery (6: VE).

Some do request that policy and legislation do not show preference towards specific technologies as this may result in unintended outcomes (3: ESA). Others do indicate that more extensive legislation is required concerning the arrangement of bio-waste in the EU.

It is also indicated that the bio-waste concept has to be extended to all bio-material available (also food waste), as to be able to treat more bio-material in the same plant, which would make the process more efficient and economically achievable (2: EURO COOP, ELCA, Rreuse, 3: ResSources).

## 6 Increasing recycling

The recycling of bio-waste (e.g. compost being used on soil and for the production of growing media) can result in some environmental benefits, notably with regards to the improvement of carbon-depleted soils. In addition to assessments, new action to strengthen the recycling of bio-waste could therefore comprise three inter-related issues: recycling targets, rules for the quality and use of compost and supporting action in the shape of separate collection.

The fifth question of the stakeholder consultation relates to this theme of increasing recycling:

**Question 5: Do you see a need for promoting bio-waste recycling (i.e. compost production or use on land of composted material) and, if so, how?**

### 6.1 Need for promoting bio-waste recycling

#### 6.1.1 PRO promoting bio-waste recycling

*Summary PRO*

1: MS: 7	3: NGO-Nat.: 20	5: ATT : 4
2: NGO-EU: 15	4: ARL: 7	6: IC: 7

Many stakeholders do favour the promotion of bio-waste recycling (1: EME, AF, 2: EURO COOP, FEAD, MWE, ELCA, EUREAU, 3: CIWM, BDE, CAS, NABU, 4: Vorarlberg, ANMP, SH, 5: PIVC, Cemagref, 6: VE, Denovo). For most of them, the promotion is preferred, particularly speaking of selectively collected bio-waste (1: GFEO, A, CR, 2: ESWET, ECN, EPF, 3:NABU, FNE, Dakofa, 4: CG, 6: CSRA, Novamont, RCP). Quantitative (and qualitative) targets have to be set, in combination with separate collection (2: GAIA, EEB, ACR+, Rreuse, 3: ATF, EBA, ResSources, KGVO, ARGE, ESA, CCN, DWMA, AOR, Cré, VHE, CNR, 6: SE). Also maximum amounts of bio-waste in residual waste, prior to further treatment, are required (2: EEB, 3: ATF, FNE). On the contrary, it is indicated that separate collection should remain a local decision, as local authorities should retain the flexibility to decide which collection method is most appropriate based on local conditions and needs (1: AF, ACA, 4: LGA, LARAC, 6: Insinkerator). Some opinions state that, the framework for collection and recycling

objectives has to be set at EU level, with each Member State being able to specify national objectives based on local, regional and national conditions and needs (4: SKL).

With regard to the increase in recycling targets, as included in the new framework directive on waste, it is stated that these targets are not specific with regard to bio-waste and therefore, a **separate directive on selective collection of bio-waste** and sustainable treatment is necessary (1: OVAM, 3: DWMA, AOR, Cré, 5: IGME, IFEU).

On the other hand, binding targets for bio-waste recycling could also be set along the lines of the Landfill Directive, including targets for the treatment of bio-waste (2: Bellona). Targets are also included in the Waste Framework Directive (recycling targets and targets with regard to separate collection (article 22)) and the Sevilla process (end-of waste criteria) (3: ESA). Also the forthcoming EU Water Framework Directive is worthwhile mentioning. According to the some, the existing legislative and policy framework, in combination with the proposed quality standards, is sufficient to promote bio-waste recycling (4: LGA, 6: NFU).

On the other hand, there are opinions who favour separate collection, but meanwhile indicate that an EU-wide obligation to separate collection is almost impossible to implement (2: COPA-COGECA).

It is furthermore mentioned that it is necessary to provide a perspective and investment security and set drivers for the recycling of bio-waste, offering the possibility that a recycling industry is developed. Waste management policies must therefore have a long-term perspective. This can only be achieved through clear legislative guidelines at European level (1: EME, 2: GAIA, EEB, ACR+, Rreuse, 3: ResSources, NABU, ATF, AN, CCN, YYL, ATE). This can also be done by forcing a quality output material, which can at its turn be achieved by a quality input material that is obtained by selectively collection (2: GAIA, 3: NABU). This makes clear that the development of a separate Bio-Waste Directive (2: ISWA, 3: NABU,) or separate long-term legislation (2: FEAD), which sets clear targets and standards for input materials, process requirements and output materials, is a necessity.

Taking into account all types of bio-materials also favours better economic synergies. To obtain this, a legislative framework needs to be developed (2: EURO COOP).

The quality and standard assurance of compost products is of special importance when promoting bio-waste recycling (2: ELCA).

Other ideas to promote the recycling of bio-waste are the introduction of an obligation for each Member State, to use a fixed amount of ‘renewable fertilisers’ (fertilisers coming from bio-waste). Also the introduction of fiscal rules could favour recycling (3: FNADE).

### 6.1.2 **CONTRA promoting bio-waste recycling**

*Summary PRO*

1: MS: 3

2: NGO-EU: 2

4: ARL: 4

6: IC: 1

The following reasons are given to argue the fact that further promotion of bio-waste recycling is not wishful or not needed:

- The set up of separate collection schemes for bio-waste should be left open to local authorities, allowing them to carry out an assessment based on the local conditions and needs (1: PRD, 2: CEMR, 4: LGA, VNG, MEPLF, 6: CM).
- Increasing the recycling target of bio-waste discriminates anaerobic digestion. There should be no policy preference for composting over bio-gas production. This should be based on local conditions (2: EU-CIAA).
- There seems not to be a need to promote compost production or the use of composted materials on land (4: BW). An LCA study, carried out in the Netherlands, did indicate that there is no single treatment option for bio-waste that is better than another method. Therefore, composting of bio-waste should not be promoted more (1: KDN).
- Finland prefers the burning of bio-waste together with unsorted or lightly sorted household waste. The use of composted material on land is not often required (1: GF).

## 6.2 **Synergies between bio-waste recycling and energy recovery**

***How can synergies be achieved between bio-waste recycling and energy recovery?***

With regard to the synergy between energy recuperation and material recycling, part of the respondents indicate that anaerobic digestion combined with composting is a good

solution (1: OVAM, GP, MEL; 2: GAIA, EEB, ACR+, ELCA, Rreuse, 3: ResSources, ATF, NABU, DWMA, AOR, VHE, 4: GMWDA, 5: PIVC, Baldé). For others, either composting is favoured, with or without a preceding anaerobic digestion (AD) step or anaerobic digestion (without composting) is preferred (3: FBA, 4: CG). Other opinions are that the decision about the suitability of AD should be dependent upon local circumstances (3: ECN) or that the synergy between energy recovery and land use of compost depends upon the location (4: SEPA).

Furth3: EWA, 2: SORP).

The CEWEP indicates that source separation of waste is preferred and respect has to be given to recycling (incl. composting). However, for the remaining waste (after source separation), Waste-to-Energy (incineration with energy recovery) is the preferred option (2: CEWEP).

One remark indicates that recycling must be a first priority and can not be seen in 'synergy' with energy recovery (3: FNE).

## 7 Contribution to Soil Improvement

Bio-waste management could improve EU soils by delivering safe compost, although the overall potential is limited (even a maximum increase of recycling of bio-waste across the EU could supply no more than 3,2% of agricultural land). Nevertheless, to avoid the risk of soil pollution and strengthen user confidence, it could be necessary to introduce common standards on bio-waste treatment and compost quality.

The sixth question of the stakeholder consultation relates to this theme of soil improvement:

**Question 6: *In order to strengthen the use of compost/digestate:***

**– *Should quality standards be set for compost as a product only or also for compost of lower quality still covered by the waste regime (e.g. for applications not linked to food production)?***

For some stakeholders, strict hygienic and microbiological standards should be set for all types of compost and digestate as to guarantee quality assurance (1: GFEO, AF, GF, APA, 2: EURO COOP, MWE, Bellona, 3: YYL, AD, BDE, FH, 4: MEC, BWSH, 5: PIVC, 6: Ecocleaner). It is required to have a range of standards for different markets/applications. Some of these do not need to be too expensive to achieve and test for, as not to disadvantage smaller scale operators (6: NFU). Furthermore, the use (dose, frequency) differs among countries and regions (6: SE).

Other opinions require two quality levels: one for compost coming from the 'product' regime and originating from separate collection and one for the 'waste' regime and thus coming from mixed waste. It is required that the word 'compost' ought to be limited to products resulting from the treatment of source separated waste, in order to avoid confusion and increase consumer confidence. Other materials could be referred to as 'stabilised waste', 'MBT output' or others (1: LA, CR, KDN, MES, 2: ACR+, GAIA, FEAD, ISWA, ECN, EUREAU, 3: KGVO AN, CIWM, ARGE, Dakofa, FNADE NABU, AD, FANC, FBA, BGK, Cré, VHE, 4: LGA, VNG, LARAC, ANMP, GFA, 5: IFEU, 6: VE, Novamont). This would allow 'quality compost' to become a product marketable on a European level, without limitation. A Bio-waste Directive could specify the requirements for separate collection; list permitted input materials, product standard and quality assurance requirements (2: ECN, 6: Novamont). Another way to distinguish between two compost

classes is a) compost destined to be used as a commercial product on small scale and b) that provided as part of a bulk service to agriculture (2: EWA, 3: SORP). Furthermore, two compost classes can be distinguished as follows: a) fertilisers that can be used to land for food production/agriculture and b) fertilisers that can be applied to parks, green areas, forests and land used for energy crops (4: SKL, 5: Cemagref).

For some, analysis of the end product is only needed for the larger units, while separate collection and managing the composting process well should be sufficient to the smaller production units (3: FNE).

Furthermore, there are voices that only request one quality standard, either for higher quality compost (1: GP, 2: Rreuse, CEMR, 3: ResSources, CCN, EBA, DWMA, 4: SEPA, 6: Alpheco) or for compost from non-source separated collection systems covered by the waste regime (3: ESA).

A division between 3 quality standards could be made as follows: 1) an EU quality compost, formed from fully recovered material and described as 'product' 2) class II compost from source segregated inputs: this material would not meet the stringent standards from the first class, and would be classified as 'waste'. Limitations could be set either at national or European level, as there would be potential differences between Member States. 3) An EU non source-segregated compost class, including compost manufactured from mixed waste (3: AOR).

Besides compost standards, also a standard for digestate is requested for, because digestate can be utilised on farmland directly from the digestion tank (1: MES 3: AN).

Several organisations indicate that separate collection is a prerequisite to have consistent quality of composted products (1: A, KDN, 2: EEB, ACR+, 3: ATF, NABU, DWMA, BDE, 4: GFA).

Furthermore, an integrated approach in setting quality standards for compost to be used as a product, as well as compost of lower quality is preferred. End-of-waste criteria are not sufficiently and only a combination of factors (selective collection, control of input, high quality treatment, decent quality control system and standards for output streams) will lead to good quality compost (1: OVAM, 2: CEWEP, 3: DWMA, NABU, 6: VLACO).

For the moment, Germany regards compost as 'waste', until its application on soil. Only when introducing high quality standards for separately collected bio-waste, Germany

could accept the 'product status' for compost. With regard to compost of lower quality, Germany prefers to establish a second waste class for compost, with limit values and certification on national level (3: NABU).

**– Should rules for the use of compost/digestate (e.g. limits on pollutant concentration in compost/digestate and land on which compost/digestate is applied) be set?**

A number of countries and organisations do support EU wide standards for quality of compost. Distinction can be made between the ones who prefer standards for compost and/or digestate (2: GAIA, EEB, EUREAU, 3: ATF, DWMA, VHE, 6: NFU, EIM) and the ones who prefer standards for the use of compost/digestate. Examples of standards according to the use are standards for soil improvement in agriculture, for landscaping, food production or others. These limits should be related to the absolute load applied per hectare and per year and not to the relative concentration in compost/digestate, as to guarantee the most effective protection of soil and groundwater (1: GP, MEL, 2: ESWET, EU-CIAA, ISWA, Rreuse, 3: EBA, BDE, NABU, FANC, ResSources, CCN, CIWM, AD, FBA, VNU, 4: SEPA, 5: IGME, PIVC, 6: Alpheco, CSRA, Ecocleaner,). According to few, standards have to be set both for the compost/digestate and the use of it, to prevent unacceptable pollutant concentration from large amounts (1: LA, AF, AEGDL, 3: FNADE, 4: BW, SH, MEPLF, 6: VE). There is one opinion that indicates that this combined standard (both for compost/digestate and the use of it) should apply only to use on agricultural land, otherwise this would be too expensive, in terms of both time and finances (1: CR).

On the other hand, there are opinions which prefer to leave the detailed rules on the use to the Member States, due to the difference in soil needs, climate and customers needs across Europe (1: KDN, 2: FEAD, ISWA, ECN, 3: KGVO, ARGE, AN, Cré, 4: CG). Furthermore it is asked to set only minimum requirements for compost and its use in the EU, so that Member States can decide to set up more stringent requirements according to national considerations where it is deemed necessary (1: PRD, MES, UK).

One organisation indicates that rules for the application of compost and digestate do already exist. According to them, they are administered under the waste permitting system which is established under EU Directives (3: ESA).

**– Which pollutants and concentrations should these standards be based on?**

According to stakeholders, quality standards should be set for the following pollutants and measurable matter:

- Heavy metals (1: OVAM, APA, GFEO, AF, MES, 2: GAIA, EEB, CEWEP, ESWET, ISWA, 3: ATF, DWMA, AOR, FH, 4: GMWDA, ACBC, MEC, SH, 5: IGME) / Pb, Cd, Cr, Cu, Ni, Hg and Zn (1: MEL, KDN, 3: NABU, BGK, 4: SEPA, BW) / As, Cd, Cr, Cu, Pb, Hg, Ni, Se and Pb (3: CAS) / Cd, Hg (1: GF).
- Organic matter (1: OVAM, GFEO, MES, 2: GAIA, EEB, ACR+, EU-CIAA, 3: ATF, NABU, BGK, 4: SEPA, BW, SH, 5: IGME) / organic components (including dioxins and furans) (1: APA) / Dioxins, Furans (1: GF) / Persistent organic substances (2: ESWET, 4: ACBC).
- Potentially toxic elements (1: GP, 3: ACR+)
- Total dry extract (1: OVAM) / readily available moisture content (2: ACR+)
- Pathogens (1: OVAM, APA, 2: GAIA, ACR+, 3: NABU, DWMA, FNADE, CNR, 4: MEC, 5: IGME) / Salmonella (3: BGK) / Micro organismen (1: AF) Weed seeds (1: OVAM, 2: ACR+, 3: NABU, DWMA, BGK).
- Impurities (1: OVAM, 2: CEWEP, 3: NABU, DWMA, BGK, FNADE, CNR)
- Inert materials (1: APA, 3: CNR, 4: GMWDA,) / plastics (2: GAIA) / physical contaminants and stones (2: ACR+) / glass and plastics (1: AF)
- Nutrient content (1: OVAM, 2 : ACR+, 3 : NABU, BGK).
- Stability (1: OVAM).
- Electrical conductivity (3: NABU, BGK).
- pH (3: NABU, BGK).
- Maturation parameters (1: APA) / maturity (2: ACR+)
- Conductivity (2: ACR+)
- Plant response (2: ACR+)
- Residual pesticides (4: SEPA)
- Antibiotics (4: SEPA)

On the one hand, it is indicated that further assessments need to be made (using a risk-based approach) as to set limits for pollutants (2: FEAD, Rreuse, 3: ResSources, CCN, FNADE, 6: VE, Ecocleaner). On the other hand, several remarks indicate that work towards setting standards has already been initiated at EU level and within the ECN [a) Study 'Heavy metals and organic compounds from wastes used as organic fertiliser', b) JRS/IPTS report 'End of waste criteria for compost', 2008 and c) second draft of the working paper of the EU Commission 'The biological treatment of biowastes', 2001]. These remarks indicate that this work could be the basis of further elaboration of the standards (1: GFEO, MES, 3: AN, CIWM, FNE, BDE, 4: Vorarlberg). A comparison could be done across Europe (benchmark) resulting in the most rational and safest standard (1: CR, 3: CCN, 6: CSRA). Other opinions on the other hand do request to differentiate standards among Member States (6:NFU).

Furthermore, the limit values have to be discussed in connection with sampling methods and analytical threshold values and should be based on environmental requirements (1: EME, 3: NABU, 4: SH).

**– What are the arguments for/against the use of compost (digestate) from mixed waste?**

**PRO**

Summary PRO			
1: MS: 4	2: NGO-EU: 2	3: NGO-Nat.: 4	6: IC: 4

A number of arguments are given, which favour the use of mixed waste:

- The use of mixed waste allows the recovery and recycling of organic materials and nutrients, respecting the waste hierarchy (1: APA, 2: Rreuse, 3: ResSources, CCN, 6: Ecocleaner). Less waste needs to be dumped when using compost coming from mixed waste (1: A).
- The use of mixed waste favours carbon capture (2: Rreuse, 3: ResSources, CCN).
- Some opinions indicate that low quality compost too can be a significant alternative in the organisation and landscaping of many landfills, quarries, etc. as part of the covering and growth layer (1: EME). Compost/digestate from mixed

waste can be used for renovating land/soil to a level to be used productively, e.g for biomass production (6: CSRA).

- Other opinions indicate that the quality of the compost that comes from mixed waste is good enough, because the treatment equipment has good performance (AF). Since there is a ban on different compounds like cadmium, mercury, etc., in manufactured goods, there is a slow decrease of those compounds in the entering wastes. This will continue in the future. Some new processing plants have improved the sorting step and have shown the possibility to produce composts with good quality composition, used in agriculture without problems for acceptance and environmental risk (6: VE).

Remarks concerning the use of mixed waste are the following:

- In principle there is nothing wrong about the use of mixed waste, but the criteria used to control the recycling practices should always reflect the risks presented but the origins of the waste (2: EWA, 3: SORP).
- Because confidence of users is a key point, it is recommended to install quality assurance schemes, specifically designed for mixed collection (6: VE).
- Pure source separated organic material is the key to high quality compost, although, Member States who prefer producing compost out of mixed municipal solid waste, should be able to continue with this practice (3: YYL, 6: NFU). In that case, the treatment plants should be specifically designed and operated to achieve good results (3: YYL).

## CONTRA

### *Summary PRO*

1: MS: 10	3: NGO-Nat.: 14	5: ATT: 2
2: NGO-EU: 6	4: ARL: 6	6: IC: 1

Arguments against the use of compost from mixed waste are mainly related to the potential for contamination and limited applications associated. Research indicates that the use of mixed waste results in higher heavy metal concentrations and other pollutants and impurities. Not all pollutants can be envisaged or tested for. Even if the compost quality criteria would be met, repeated and regular application over time results in

pollutant accumulation in soil. This requires a more stringent quality control and application measures (1: APA, EME, LA, AEGDL, A, CR, PRD, GP, MES, 2 GAIA, EEB, ACR+, ECN, Rreuse, 3: NABU, ResSources, KGVO, ARGE, AN, CCN, DWMA, ATF, EBA, FANC, BGK, Cré, VHE, BDE, 4: VNG, GMWDA, SEPA, MEC, BW, SH, 5: IGME, IFEU, 6: VLACO).

On the other hand, it is indicated that new mixed waste treatment plants can produce material of a high enough quality, which could meet some national standards (e.g. in France). However, this composted mixed waste material could have the potential to endanger the compost's imago and could lead to a loss of confidence (because of the above mentioned reasons) and even the market for high quality compost products. This needs further investigation (2: ISWA).

Finland has strong arguments against the use of compost from mixed waste, as it sees more benefits from mixed burning (see also question 3) (1: GF).

## 8 Operational (treatment) standards for small plants

Plants treating over 50 tonnes of bio-waste per day (most composting and digestion capacity) would be covered by the revised IPPC Directive. Covering plants treating below 50 tonnes was found disproportionate. The relevant BAT Reference Document covers anaerobic digestion and mechanical biological treatment, but not composting.

It will have to be decided whether composting plants which do not fall under the Animal By-Products Regulation should have to meet certain sanitation and monitoring requirements as a benchmark for licensing and to guarantee that compost used on land is safe. The seventh question of the stakeholder consultation relates to this theme of standards for small plants:

**Question 7: *Is there any evidence of gaps in the existing regulatory framework concerning the operational standards for plants which do not fall under the IPPC scope and if so, how should this be addressed?***

The revision of the IPPC Directive foresees the inclusion of plants treating over 50 tons of bio-waste per day. The number of plants falling out of the scope is quite important in some Member States.

### 8.1 Need for further regulation

*Summary PRO*

1: MS: 2	3: NGO-Nat.: 12	5: ATT: 2
2: NGO-EU: 8	4: ARL: 3	6: IC: 6

Among stakeholders, different opinions exist with regard to the need for further regulation:

- All (new) plants should meet IPPC standards (1: GF, 3 :FH).
- There might be a further need for applying equivalent measures for plants not falling under the IPPC scope (3: NABU, 4: ACBC, SH, 5: IGME, 6: CSRA, SE, CM). Operational standards should be broadened to all composting and biogas plants (3: AN).

- A simplified version of IPPC requirements could be foreseen under a legislative act on the management of bio-waste for plants treating less than 50 tons per day (2: FEAD).
- A second tier for systems between 25 and 50 tons need to be in operation for composting plants (2: Rreuse, 3: ResSources, CCN).
- A revision of the IPPC Directive is foreseen, but will only cover treatment installations treating over 50 tonnes/year. As most bio-waste treatment installations fall under this limit, it is wishful to include a specific text in the revised IPPC Directive. This text should specifically deal with bio-waste treatment installations, no matter of their size. These installations should become subject of a quality assurance system with minimal European standards (3: FNADE).
- On one hand, flexibility is necessary to allow decentralized and flexible small-scale systems. It is required to consider a threshold capacity below which IPCC does not apply (2: GAIA, EEB, 3: ATF). On the other hand, proper monitoring is necessary for big-scale composting facilities and anaerobic digesters (2: GAIA).
- If plants are exempt from the IPPC regulations, they should still be subject to parallel national regulations (1: GP, 2: EWA, ISWA, 3: SORP). Requirements should be based on local and regional conditions and needs (4: SKL). Home and small communal plants and their products may be exempt (2: EWA, 3: SORP).
- There could be a gap in the existing regulatory framework between the WFD and the RED. This gap could be reduced redefining and reclassifying bio material and their utility in the process of renewable energy production (2: EURO COOP).
- A Bio-Waste Directive could close the gap between the Animal By-Products Regulation and the IPPC/BREF (2: ISWA).
- A Bio-Waste Directive could set standards for compost plants (3: NABU, DWMA, BGK, BDE, 4: BW). This does not mean that large centralised plants with AD and composting are to be exempted from the IPCC scope (3: NABU).
- A quality assurance system can be set out in the Bio-Waste Directive (6: Vlaco).
- Sewage sludge is excluded from the current definition of bio-waste and there is a real danger of mis-alignment between the objectives of the bio-waste proposal, the Waste Framework Directive (including End of Waste Criteria), Sludge Directive (current and future), proposed Soil Framework Directive, Industrial Emissions Directive (IPPC) and any future Renewable Energy Directive. Great

care is needed to look at the overlaps and synergies in order to avoid legislative conflicts that would hamper the objectives (2: EUREAU).

- Best Available Techniques (BAT) for composting plants should be of high interest in some countries with emerging treatment plants (5: CDE). The planned revision of the BAT Reference document on Waste Treatment (BREF) could be an opportunity to make the BREF cover also all types of bio-waste treatment (composting, anaerobic treatment, MBT handling, etc.) (1: EME, 6: Insinkerator). A 'light' version of the BREF, covering small plants, could be considered (3: Dakofa).

## 8.2

### No need for further regulation

*Summary PRO*

1: MS: 10	3: NGO-Nat.: 8	6: IC: 5
2: NGO-EU: 4	4: ARL: 6	

For some countries and organisations, there is no need for further EU regulation with regard to small plants (1: OVAM). It is indicated that the current legislative provisions (waste framework directive, animal by-products regulation, sludge directive and draft directive on industrial pollution) already overlap and no gap needs to be filled (1: A, KDN, UK, 2: CEMR, 4: LGA, VNG, GMWDA, SEPA, 6: Insinkerator, NFU). Furthermore, Member States with significant organic waste treatment capacities have their national licensing regulations, including requirements for all types of emissions (1: AEGDL 6: Novamont,).

Other opinions state that this legislation should be left to Member States (1: ACA 2: COPA-COGECA, 3: EBA, 4: GMWDA). Operational/environmental standards for biological treatment (e.g. in relation to odour, water management) can best be dealt with on Member State level (3: DWMA). Local and small scale management deserves support, because it avoids long-distance transport. Medium size structures should therefore be regulated at local or nation level (3: FNE). Environmental effects of small treatment installations are mainly occurring at local level and therefore, these installations should be ruled by national legislation (1: AF). In a number of Member States, there is existing legislation regarding this matter (1: CR, PRD, MES, 6: RCP), which is in some cases stricter than the European legislation (4: MEPLF).

According to some, small bio-treatment operations need to be excluded from IPPC because they are often part of innovative initiatives, not always being able to follow the rules set in IPPC (2: MWE). Technical requirements resulting from IPPC could hinder the development of small and medium scale facilities in starting countries or in rural or semi-rural areas in Europe (4: Vorarlberg, 6: Novamont).

Other comments indicate that the IPPC scope is due to be extended under the Emissions Directive and this will bring smaller plants into the same operating regime as for larger IPPC facilities (3: CIWM, AD). Others do indicate that the current draft revision on the IPPC directive only envisages biological installations treating more than 50 tonnes/day. This makes a large number of installations falling out of the scope of the Directive, which is unacceptable. It is therefore required to add a specific text to the management of bio-waste, requiring a quality assurance system (QAS) approved by the Member States) (6: VE).

Emission problems arising from composting plants do not result from the design of the technology per se, rather, they stem from the way in which it is managed and operated. Implementation of a national Quality Management System is therefore the most efficient tool to guarantee and to maintain continuously a high level of operational and product quality (2: ECN, 3: KGVO, ARGE, Cré).

## 9

### Other uses of bio-waste

Many planned and ongoing research activities aim at developing alternative means of exploiting residual biomass and bio-waste to address the climate change issue and soil quality deterioration. Further bio-waste treatment options are being explored at research level (e.g. biochar).

**Question 8: *What are the advantages and disadvantages of the abovementioned bio-waste management techniques?***

For this question, the answers are much diversified. Some responses do summarise the advantages and disadvantages of different currently used technologies, while others do comment on new technologies and research that is going on. With regard to advantages of the currently used techniques, we do refer to chapter 4.1.

With regard to new technologies and research that is going on, the following remarks are made:

- Alternative processes (biochar, gasification and pyrolysis) are not fully developed yet and need further research, to evaluate the respective potential and suitability as regard to their environmental and economic performance (2: EEB, ECN, 3: NABU, ATF, 6: Denovo, Vlaco) and also to compare these techniques with others (1: GFEO). In The Netherlands, there is experience with gasification (1: KDN, 4: VNG). In Flanders, a project of pyrolyses has failed (6: Vlaco) and research on black carbon sequestration is going on (1: OVAM).
- Advantages and disadvantages of new techniques should be further assessed by means of appropriate studies (1: APA, RCP, CR, PRD, 2: ISWA, 3: BGK, 4: SKL, MEPLF). Research and development work in the area of bio-waste treatment has only be done at laboratory and plot scale, further studies are necessary (1: AF, 3: VHE). Evidence of successful experiences at full-scale should be presented to consider 'novel' techniques (such as virification and others).
- Two technological possibilities which should be further developed are: a) the breakdown of fibres using enzymes, which makes uses other than incineration for energy recovery possible and b) treating wet biomass under pressure, which can produce oils.

- Phosphorus recycling technologies should be prioritised (1: MES).
- There is a need for supported European and national demonstrations plants. Availability of European research funds are welcome (5: PIVC, 6: VE). Legislation and regulatory practice should always encourage innovation (1: GP, 2: EWA, 3: SORP). Financial incentives and supports should be integrated in the Eighth Framework Programme for Research and Technological Development (2: FEAD).
- LCA principles should be used to assess the environmental impact when considering new technologies (3: YYL).

***Do you see regulatory obstacle preventing the further developments and introduction of these techniques?***

Regulatory obstacles that are seen for further developments are:

- The lack of legal clarity and certainty at European level, which has a direct impact on investments (2: FEAD, ISWA, 5: IGME, 6: VE, Dakofa). There is a lack of EU targets, promoting bio-waste management activities (4: ACBC).
- Extensive technology demands on smaller plants (2: ECN).
- The implementation of the Animal By-Products Regulation is an obstacle to the development of solutions in bio-waste management and composting (1: A, 3: KGVO, ARGE, Cré, 4: Vorarlberg, 6: Dakofa).
- Possible obstacles for implementing new techniques could result from the emissions regulation from the IPPC or treatment requirements of the animal-by-products regulation, specifying that new treatment techniques for bio-waste should be approved by the EFSA (2: ACR+).
- Obligatory LCA could also endanger the cost effectiveness of new and innovative technologies. Therefore, the EU framework should stay open for innovative options for treatment (3: SWM).
- Part of bio-waste is suitable for ethanol or biodiesel production, this should be encouraged (3: FBA).
- The regulatory regime may prevent rapid expansion of the use of biochar (4: SEPA).

- Electric companies pose big administrative obstacles to energy-generating waste management facilities regarding distribution network connection (4: ACBC).
- The Swedish Supreme Court's interpretation of the Public Procurement Act is a legislative obstacle in Sweden (4: CG).

Other obstacles are the following:

- Lack of public awareness and understanding for the advantages and disadvantages of various treatment techniques (4: LARAC).

Further measures and legislation on bio-waste should allow sufficient flexibility to take into account new findings and adaptation to technological development (2: CEMR, ELCA, 3: CIWM, AD, 6: CSRA).

The key points for the introduction of bio-waste management techniques are the information to stakeholders, as well as a more appropriate definition of bio-materials (2: EURO COOP).

## 10 General comments

Besides the answers on the questions relating to the Green Paper, a number of stakeholders added some general comments. These comments can be categorised into a) comments relating to definitions (bio-waste, stability and compost) and b) other comments.

### 10.1 Definition of 'bio-waste'

According to some reactions on the Green Paper, there is a lack of definition, with regard of the term 'bio-waste'.

'Garden waste' is included in the definition, but seemingly only as part of MSW (page 1, 4th paragraph). A substantial amount of garden waste is produced by commercial gardening and grounds maintenance companies, which is not part of MSW, and therefore clarification is necessary on whether or not this is included in the definition of bio-waste.

Furthermore, paper and card is excluded. This exclusion almost implies that the paper and card fraction is now seen as a resource instead of a waste, conversely implying that the remainder of bio-waste is still a waste rather than a resource. Or, possibly, there is an implication that the best environmental treatment option is different for paper and card than it is for bio-waste as defined - but this will depend on circumstances, and indeed different treatment options may be preferable for different types of bio-waste.

The scope of the definition was perhaps set as a result of the fact that separate collections this fraction of MSW are already in place in several countries, alongside separate paper collections. However, in several regions, cardboard is collected for composting along with garden waste, which would mean that 'bio-waste' is not strictly speaking separately collected in these regions.

MSW contains both park / garden and kitchen waste; from commercial sources it is more likely that waste is either garden/park waste or food waste but not a mix. As the nature of garden/park waste is different from kitchen waste (in woody tissue and moisture content), it may worth considering these commercial wastes in particular separately from each other.

In par. 3.1, the term 'Green Waste' is used. This term is not defined in the document and should be avoided.

Furthermore, clarification is required on whether overproduction in the food industry is included in the definition, and at which point it would change from agricultural waste to bio-waste (e.g. when it leaves the farm).

Finally, clarification is requested on whether cooking oil is included in the definition of bio-waste.

All non-hazardous biodegradable material that is discarded should be counted as biowaste (4: LARAC).

NFU indicates that although 'bio-waste' is well defined in the Green Paper, different stakeholders hold different interpretations as to what constitutes bio-waste. It is therefore important that EU has a uniform definition that is well understood and recognised by all stakeholders (6: NFU).

Suez Environment (6: SE) favours the adoption of a wider definition of bio-waste, which would notably include sewage sludge. They believe that the standards for compost should be based on the product output, rather than on the input. According to them, there would thus be no reason to adopt a restrictive definition. SE would for this matter like to stress the importance of integrating sewage sludge into the scope of the end of waste status. This seems crucial as it is still highly unlikely that composted or heat-dried sludge should be granted access to product status in the upcoming revision of the sludge directive, and as the revision will only take place in 2010 or 2011 at the very earliest. The various studies conducted in view of the revision of the sludge directive could bring a significant contribution to the process of definition of the end of waste criteria (6: SE).

Neither sewage sludge from waste water treatment plants nor organic waste from agriculture is included in the new Waste Directive definition of bio-waste. These fractions are however covered by the recently published End of Waste criteria. There should be conformity between the definition of bio-waste in the new Waste Directive and the End of Waste criteria (3: Dakofa).

It is not clear whether the definition of bio-waste refers to the nature of waste products (referring to the deposition of waste) or the flux of collected wastes (referring to the waste

collection). The quantities and nature of waste fluxes rests not well understood, especially for certain waste streams, such as organic waste coming from food industry (5: Cemagref).

It is required to treat household bio-waste, animal waste and sludge from waste water treatment plants in the same way. The valorisation of these materials is comparable and even complementary (7: NJ Brehon).

The Green Paper definition of bio-waste does not include waste from forest management and from agriculture, manure, sludge from waste water treatment plants and other biologically degradable waste, such as natural textiles, paper or processed wood. It is however recommended that other types of biologically degradable waste are added to biological waste according to the definition stipulated in Directive 2008/98/EC, including e.g.: sludge from waste water treatment plants, natural textiles, paper, processed wood, etc. Separate rules could also be stipulated for these wastes (while there is a separate directive on sewage sludge, i.e. Directive 86/278/EEC, it provides only for use of sludge from waste water treatment plants in agriculture).

With respect to fulfillment of the objective of Directive 1999/31/EC on the landfill of waste (to limit landfilling of biodegradable municipal waste), it would be suitable to clearly state what catalogue numbers in category 20 of the Catalogue of Waste are considered to be biodegradable municipal waste and, by means of coefficients, specify the quantity of the biodegradable waste contained in these materials (1: CR).

It is not clear from the definition of bio-waste whether organic waste from industry, including animal waste, is covered, since the meaning of 'comparable' is unclear. The Waste Directive defines 'bio-waste' as 'biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants'). The question raises whether waste from slaughterhouses for example is covered by the definition (1: PRD).

The term bio-waste should be defined in terms of the European Waste Catalogue. In the Green Paper a distinction is made for bio-waste between green waste and kitchen waste. However there are much more extensive differences between the types of bio-waste and

it would be definitely necessary and desirable to establish methods of managing and treating these. The material properties of the 'biogenous waste' vary, which leads in practice to preferred biological treatment methods (1: ACA).

## 10.2 Definition of 'stability'

A major concern in relation to the Green Paper is the lack of definition on the term "stability". It is explained that one of the main objectives of MBT plants (and it can be also very interesting for composting and anaerobic digestion plants) is to stabilize wastes in order to minimize environmental impact of wastes. However, stability is not defined as it was in the old Directive drafts presented by the Commission. This is however crucial to improve the entire bio-waste treatment system and it should be regulated at European level.

Compost, digestate, stabilized waste from MBT and rejected materials going to landfill or incineration should be quantitatively measured in terms of stability, with threshold values and standardized methods (Scientific literature is full of methods suitable to measure stability in organic solid wastes) (CDE).

The Green Paper makes some statements regarding the quality of output of MBT, however, the paper does not provide any scientific evidence or research to support the statements. Well managed MBT operations often produce an equivalent of in some cases superior product to separately collected green waste/food waste treatment facilities (4: LCC).

## 10.3 Definition of 'compost'

The term 'compost' is ill defined in the document. In section 3.1, it is stated that compost can refer to composted digestate. Whereas this is acceptable in the case of source separated and subsequently digested biowaste, it is problematic where MBT digestate is concerned unless the MBT digestate is produced to a specification that allows it to be beneficially used on land (horticulture or agriculture) as compost. In some countries there is a positive list of materials allowable as compost feedstock (LARAC).

## 10.4 Definition of 'digestate'

The term 'digestate' should be replaced by the global term 'fermentation residues'. The terms used in Austria are 'biogas manure' and 'digestate' and are differentiated on the basis of the starting materials used in biogas installations (waste or renewable resources) (1: ACA).

## 10.5 Other comments

The current scope (bio-waste only) is too narrow and should be enlarged to biodegradable waste (6: VE).

Page 4, Para 5: If biogas is to be directly injected in to the gas distribution grid, must it be scrubbed free of gases like H<sub>2</sub>S and of silicates that otherwise cause corrosion and serious cylinder glazing in a CHP engine? If so, what are the financial costs and energy losses of that gas cleansing? (6: Alpheco)

Economic impact: as far estimating financial costs of the bio-waste management, the Green Book does not account for the costs of the mixed collection followed by composting, nor for the mixed collection followed by anaerobic digestion. This makes it difficult for an economic analysis of the existing treatment solutions (6: EIM).

Page 9 and 11: The statement concerning the use of peat, damaging ecosystems, can not be accepted. Today, in Europe, only small part of the peatlands (less than 0.5% of the acreage) is used for peat extraction and about half of the extracted peat is devoted to energy production. Peat extraction is made under strict control and peatlands are restored after exploitation. So it can be not considered that the replacement of peat automatically yields environmental benefits. Moreover, the use of peat allows the use of compost in growing media, where compost on its own would not be suitable (3: CAS).

In the French version of the Green Paper, 'growing media' is translated by 'milieu de culture'. Correct translation would be 'support de culture' (3: CAS).

## 11 Abbreviations

AD	Anaerobic Digestion
ARL	Authorities at regional and local level
ATAD	Autogenous thermophilic aerobic digestion
ATT	Academics and Think Thanks
BAT	Best Available Technology
BREF	BAT reference document
CHAC	Combined heat and aerobic composting
CHAD	Combined heat and aerobic composting
CHP	Combined Heat and Power plants
FWD	Food waste disposers
GHG	Greenhouse gasses
I	individuals
IC	Individual companies
IPPC	Integrated Pollution Prevention Control

LCA	Life Cycle Analysis
MBT	Mechanical Biological Treatment
MS	Member State
MSw	Municipal Solid Waste
NGO-EU	Non governmental organisation at EU level
NGO-Nat.	Non governmental organisation at local level
PAH	Polycyclic Aromatic Hydrocarbons
RED	Renewable Energy Directive
WFD	Waste Framework Directive

## 12 Stakeholders

The table beneath gives an overview of the stakeholders who's comments on the Green Paper are included in this document. In the first column of the table, the abbreviation of the stakeholder is mentioned. The second column gives the category of stakeholder (MS: Member State, NGO-EU: non-governmental organisation at EU level, NGO-Nat.: non-governmental organisation at national level, ATT: academics and think tanks, ARL: regional and local authorities, IC: individual companies, I: individuals).

1.	A	MS	Austria
2.	ACA	MS	Austrian Chamber of Agriculture
3.	ACBC	ARL	Autonomous Community of the Basque Country
4.	ACR+	NGO-EU	ACR+: Association of Cities and Regions for Recycling and Sustainable Resource management
5.	AD	NGO-Nat.	Affald Danmark (Waste Denmark)
6.	AEGDL	MS	L'Administration de l'Environnement du Grand-Duché de Luxembourg
7.	AF	MS	Autorités Françaises
8.	Alpheco	IC	Alpheco Ltd Containerised composting systems
9.	AMAVE	ARL	Associação de municípios do ale do ave (Portugal)
10.	AN	NGO-Nat.	Avfallnorge

11.	ANMP	ARL	Portugese National Association of Municipalities
12.	AOR	NGO-Nat.	The Association for Organics Recycling
13.	APA	MS	Agencia Portuguesa do Ambiente
14.	ARGE	NGO-Nat.	Austrian Compost and Biogas Association
15.	ATE	NGO-Nat.	Amigos de la Tierra Espana (Friends of the Earth Spain)
16.	ATF	NGO-Nat.	Amis de la Terre France
17.	Baldé	ATT	Dr. C.P. Baldé from Statistics Netherlands
18.	BDE	NGO-Nat.	Bundesverband der Deutschen Entsorgungswirtschaft (Federation of the German Waste Management Industry)
19.	Bellona	NGO-EU	Bellona Foundation
20.	BUNR	MS	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
21.	BGK	NGO-Nat.	Bundesgütegemeinschaft Kompost
22.	BW	ARL	Baden-Württemberg, Ministry of the environment, Stuttgart, Germany
23.	CAS	NGO-Nat.	Chambre Syndical des Améliorants Organiques et Supports de Culture
24.	CCN	NGO-Nat.	Community Compost Network

25.	CEMAGREF	ATT	Research institute on sustainable management of water and territory
26.	CEMBUREAU	NGO-EU	European Cement Bureau
27.	CEMR	NGO-EU	Council of the European Municipalities and Regions
28.	CEWEP	NGO-EU	Confederation of European Waste-to-Energy Plants
29.	CG	ARL	Board of Sustainable Water and Waste Management on behalf of the city of Goteborg
30.	CIWM	NGO-Nat.	Chartered Institution of Wastes Management
31.	CM	IC	Cabinet Merlin (France)
32.	CNR	NGO-Nat.	Cercle National du Recyclage (Française)
33.	COPA- COGECA	NGO-EU	European farmers and European agri-cooperatives
34.	COSLA	ARL	Convention of Sottish Local Authorities
35.	CR	MS	Czech Republic
36.	Cré	NGO-Nat.	Composting Association of Ireland Teo
37.	CSRA	IC	CSRA Creating Resource From Waste
38.	Dakofa	NGO-Nat.	Dansk Komptencecenter for Affald (Danish Waste Expertise Centre)
39.	DCE	ATT	Department of Chemical Engineering, Universitat

			Autonoma de Barcelona, Spain (Antoni Sanchez Ferrer)
40.	Denovo	IC	Denovo Tech Systems Ltd
41.	DP	NGO-Nat.	Danish Parliament
42.	DWMA	NGO-Nat.	Dutch Waste Management Association / Vereniging Afvalbedrijven
43.	EB	NGO-EU	European Bioplastics
44.	EBA	NGO-EU	European Biogas Association
45.	ECN	NGO-EU	European Compost Network
46.	Ecocleaner	IC	Ecocleaner Llc, Estonia
47.	EEB	NGO-EU	European Environmental Bureau
48.	EFMA	NGO-EU	European Fertilizer Manufacturers Association
49.	EIM	IC	Resíduos do Nordeste EIM (Empresa Intermunicipal do Nordeste Transmontano)
50.	EKOKEM	IC	Ekokem Group (Finnish total service provider in the field of waste management)
51.	ELCA	NGO-EU	European Landscape Contractors Association
52.	EME	MS	Estonian Ministry of the Environment
53.	EPF	NGO-EU	European Property Federation

54.	ESA	NGO-Nat.	Environmental Services Association
55.	ESWET	NGO-EU	European Suppliers of waste to energy technology
56.	EU CIAA	NGO-EU	Confederation of the food and drink industries of the EU CIAA
57.	EURE	ARL	Departement de l'Eure, delegation du développement Durable
58.	EUREAU	NGO-EU	European Federation of National Associations of Water and Waste Water Services
59.	EURO COOP	NGO-EU	European Community of consumer co-operatives
60.	EWA	NGO-EU	European Water Association
61.	FANC	NGO-Nat.	Finnish Association for Nature Conservation
62.	FBA	NGO-Nat.	Finnisch Biogas Association
63.	FEAD	NGO-EU	European Federation of Waste Management and Environmental Services
64.	FH	NGO-Nat.	Förderverband Humus e.V. (Humus promotion association)
65.	FNADE	NGO-Nat.	Fédération Nationale des Activités de la Dépollution et de l'Environnement
66.	FNE	NGO-Nat.	France Nature Environment
67.	GAIA	NGO-EU	Global Action in the Interest of Animals

68.	GF	MS	Government of Finland: Mikko Paunio Senior Medical Officer, Ministry of social affairs and health
69.	GFA	ARL	Gipuzkoako Foru Aldundia Diputacion Foral de Gipuzkoa
70.	GFEO	MS	German Federal Environment Office
71.	GMWDA	ARL	Greater Manchester Waste Disposal Authority
72.	GP	MS	Greek Parliament
73.	IFEU	ATT	Institut für energie- und umweltforschung Heidelberg
74.	IGME	ATT	IGME
75.	Insinkerator	IC	Insinkerator
76.	ISWA	NGO-EU	International Solid Waste Association
77.	KDN	MS	Koniinkrijk Der Nederlanden (Kingdom of The Netherlands)
78.	KGVO	NGO-Nat.	Kompostgüteverband Österreich
79.	LA	MS	Latvian Authorities
80.	LARAC	ARL	LARAC
81.	LCC	ARL	Lancashire County Council
82.	LGA	ARL	Local Government Association

83.	MEC	ARL	Ministry of the Environment and Conservation, Agriculture and Consumer Protection of the State of North Rhine-Westphalia
84.	MEL	MS	Ministry of the Environment Lithuania
85.	MEPLF	ARL	Maison Européenne des Pouvoirs Locaux Français
86.	MES	MS	Ministry of the Environment Sweden
87.	Mil-tek	IC	Mil-tek Portugal Sul provides autonomous waste management & composting solutions
88.	MWDA	ARL	Merseyside Waste Disposal Authority
89.	MWE	NGO-EU	Municipal Waste Europe
90.	NABU	NGO-Nat.	German nature and Biodiversity Union
91.	NFU	IC	National Farmers Union
92.	NJ Brehon	I	Nicolas Jean Brehon
93.	Novamont	IC	Novamont S.p.A; is a producer of different biodegradable and compostable biobased plastic materials
94.	OVAM	MS	Openbare Afvalstoffenmaatschappij voor het Vlaams Gewest (Public Waste Agency of Flanders, Belgium)
95.	PIVC	ATT	Polytecnic Institue of Viana do Castelo, High school of Technology and Management, Civil and environmental engineering department, Portugal

96.	PRD	MS	Permanent Representation of Denmark
97.	Quercus	NGO-Nat.	Associação Nacional de Conservação da Natureza (Portugal)
98.	RCP	IC	Reseau Compost Plus
99.	ResSources	NGO-Nat.	Réseau des entreprises d'économie sociale actives dans la récupération et le recyclage
100.	Rreuse	NGO-EU	Rreuse
101.	SE	IC	Suez Environment
102.	SEPA	ARL	Scottish Environment Protection Agency
103.	SH	ARL	Ministry of Agriculture, the environment and rural affairs of Schleswig-Holstein, Germany
104.	SKL	ARL	Sveriges Kommuner och Landsting (Swedish Association of Local Authorities and Regions)
105.	SWM	NGO-Nat.	Stadtwerke München
106.	SNH	NGO-Nat.	Scottish Natural Heritage (SNH)
107.	SORP	NGO-Nat.	Sustainable Organic Resources Partnership UK
108.	SWaMP	ARL	Southern Waste Management Partnership
109.	UK	MS	United Kingdom
110.	VE	IC	Veolia Environment

111.	VHE	NGO-Nat.	Verband der Humus- und Erdenwirtschaft e.V. (Humus and Soil Management Association)
112.	VLACO	IC	Flemish Compostorganisation (Belgium)
113.	VNG	ARL	Association of Netherlands Municipalities
114.	VNU	NGO-Nat.	VNU
115.	Vorarlberg	ARL	Government of the Province of Vorarlberg (Austria)
116.	YYL	NGO-Nat.	Association of Environmental Enterprises

## 13 Member States of the EEA

This summary report includes opinions coming from Member States, Non-governmental organisation (at EU level and at national level), Authorities at regional and local level, Academics and think tanks, Individual Companies and Individuals, coming from the following member states of the EEA:

1. Austria
2. Belgium
3. Czech republic
4. Denmark
5. Estonia
6. Finland
7. France
8. Germany
9. Greece
10. Italy
11. Latvia
12. Lithuania
13. Luxemburg
14. Norway
15. Poland
16. Portugal
17. Scotland
18. Spain
19. Sweden

20.The Netherlands

21.United Kingdom