

European Quality Assurance for Compost and Digestate

ECN-QAS and BioBest Guidelines



Dr. Stefanie Siebert

fer▶play Seminar:

Circular Fertilisers for Healthy Soils: Drivers and Challenges

Brussels, 18 April 2024

Outline

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Biowaste & Circular Bioeconomy

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Outline

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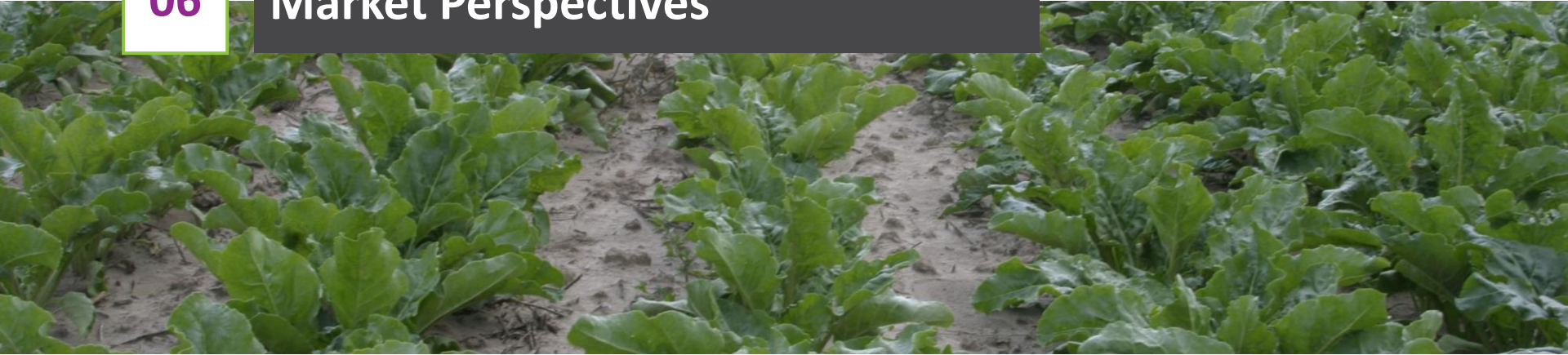
ECN-QAS for Compost & Digestate

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BioBest Guidelines

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Market Perspectives



EUROPEAN COMPOST NETWORK - ECN



Vision

Living well within the limited resources of the planet and respecting the organic cycle



Mission

Leading the organic recycling industry through our focus on separate collection of biowaste, quality assurance for compost and digestate and to keep our soils healthy



Values



Care



Internet & Networking



Simplicity



Pillars



Quality Assurance



Advocacy



Market



Innovation



Circularity &
Sustainability
is at the heart
of everything
we do

64 Members from 28
European Countries

≈ 48 M tpa
Treatment Capacity

> 4.500
Composting &
Anaerobic Digestion
Plants

BIOWASTE & CIRCULAR BIOECONOMY

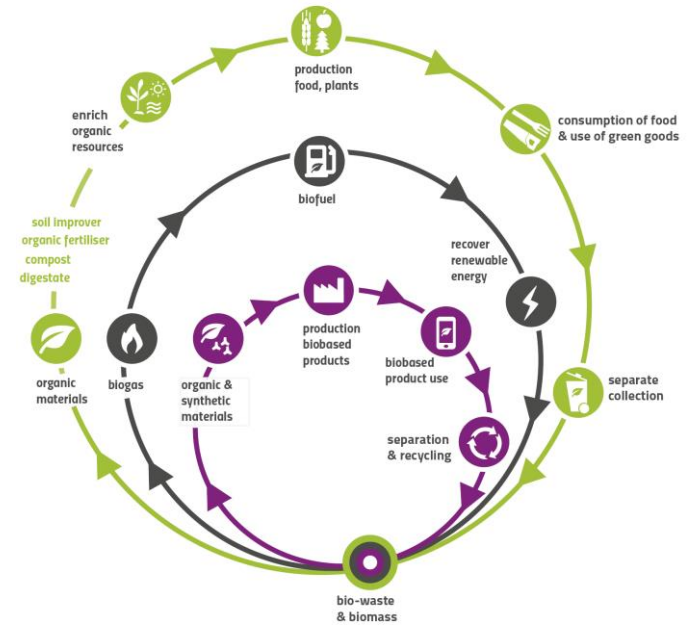
BIOWASTE



A Cross-Cutting Resource

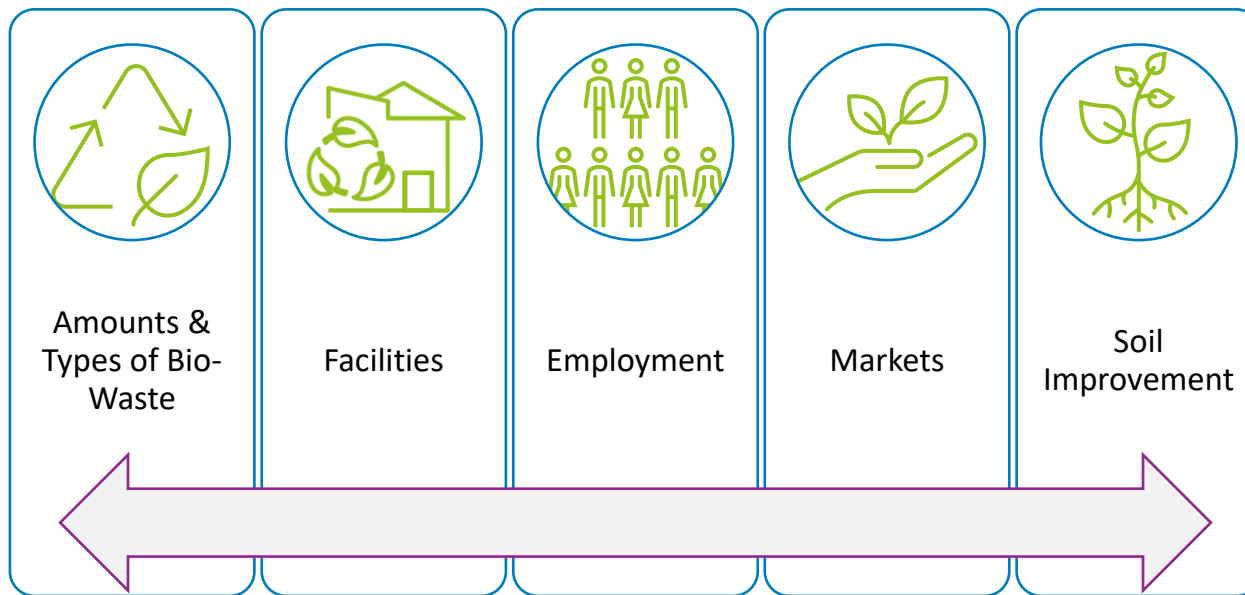


BIOWASTE in the Circular Bioeconomy



Overview on Biowaste Management in Europe

Comprehensive survey in 2021



ECN DATA REPORT 2022

COMPOST AND DIGESTATE FOR
A CIRCULAR BIOECONOMY

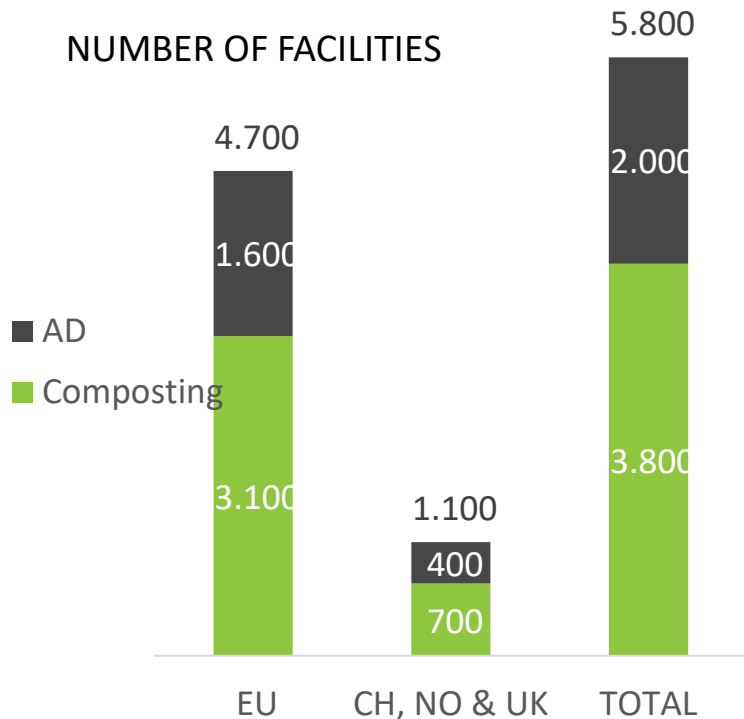
Overview of Bio-Waste Collection,
Treatment & Markets Across Europe



<https://cutt.ly/D1ceQ2u>

Biowaste Treatment – FOR PEOPLE – JOB CREATION

NUMBER OF FACILITIES



	FTEs PER FACILITY	TONNES PER FTE
COMPOSTING	4.7	4,200
ANAEROBIC DIGESTION	4.9	5,300



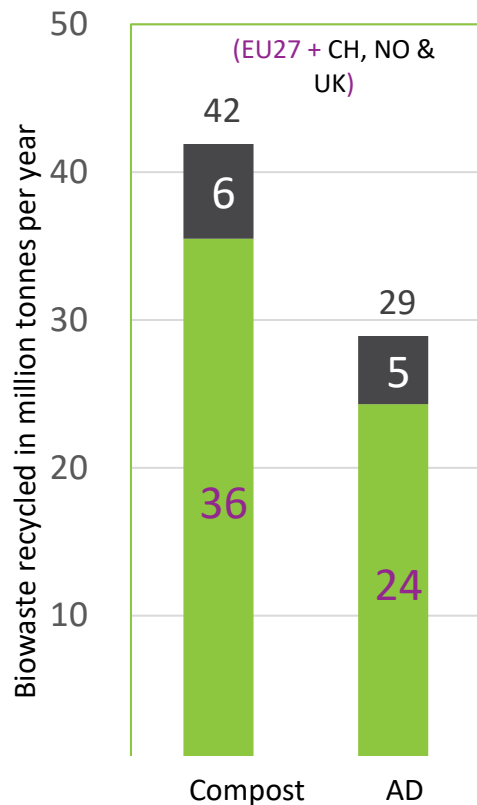
11,000 - 18,000 FTEs
COMPOSTING



2,000 - 5,500 FTEs
ANAEROBIC DIGESTION

FTE – Full Time Equivalent Employees

Biowaste Collection – COMPOST & DIGESTATE PRODUCTION



71 M tpa
BIO-WASTE RECYCLED

21 M tpa
COMPOST PRODUCED

Surface area (million ha)	Fraction of Arable Land	Fraction of Mod./ Severely Eroded Land
2.1	2%	16%

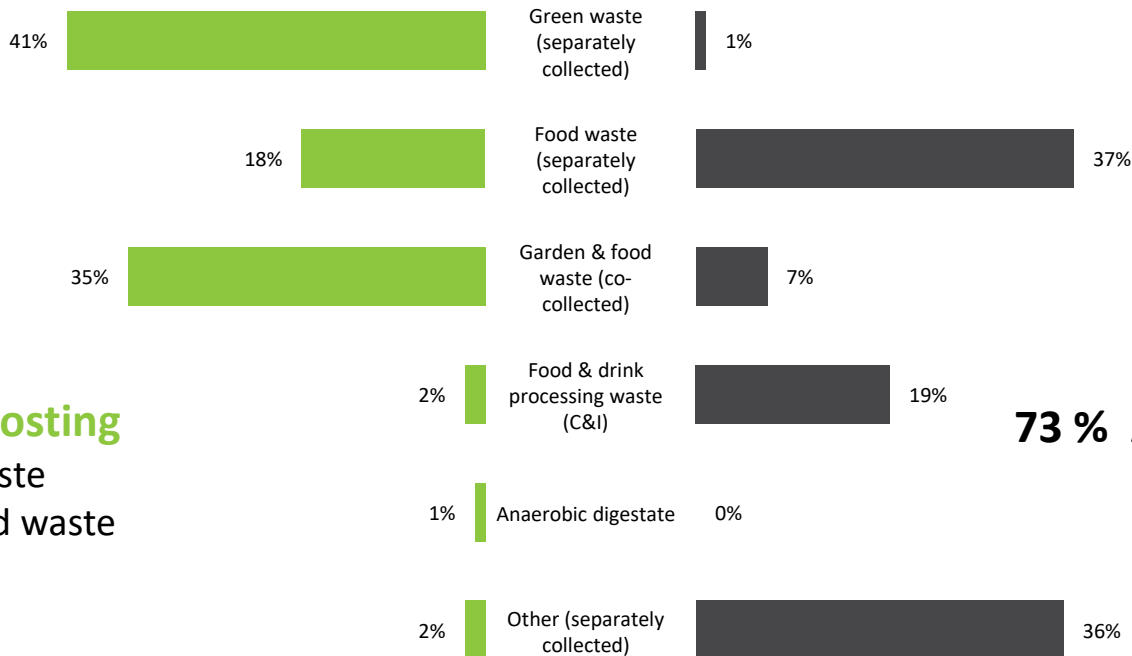
ESTIMATION FOR 2035

46 M tpa
COMPOST PRODUCED

Biowaste – SOURCES FOR COMPOST & DIGESTATE PRODUCTION

Composting

Anaerobic Digestion



76 % Composting

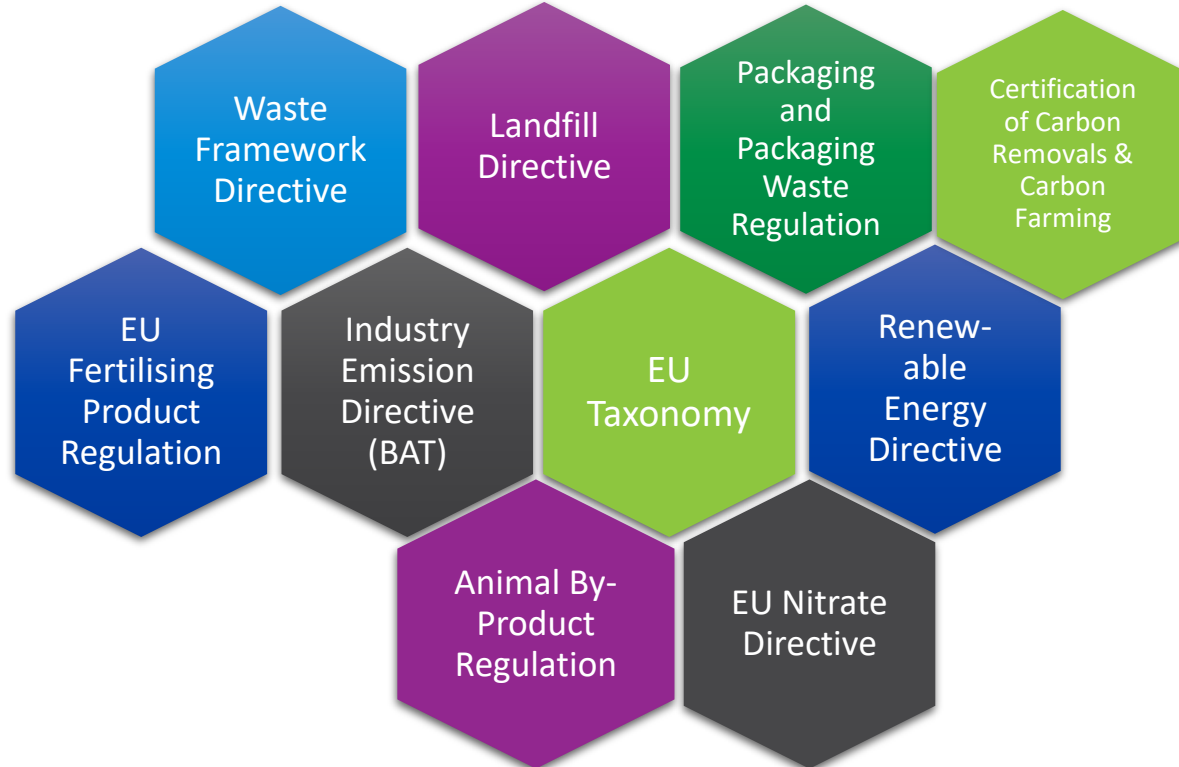
Green waste
Garden & food waste



73 % Anaerobic Digestion

Food waste
Other

EU POLICY



EU GREEN DEAL & CE

- 65 % recycling target for municipal waste by 2035
- Mandatory separate collected or separated at source by 2023
- Ban on Mechanical biological Treatment from Recycling by 2027
- Landfill target Maximum 10 % of municipal solid waste by 2035

**Waste
Framework
&
Landfill
Directives**

**Fertilising
Products
&
Animal By-
Products
Regulation**

- Boosting organic matter (biowaste) recycling from biowaste
- Integration of organic fertilising products into the scope of the new Regulation
- Introducing harmonised EU rules for products diverting from organic waste materials
- CE marking and free trade for organic fertilising products across EU
- Optional harmonisation
- End point in the manufacturing chain for ABP-derived materials

**Farm to Fork
&
Sustainable
Carbon
Cycles**

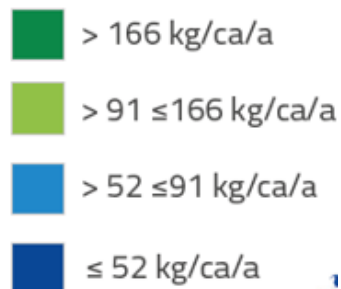
**Soil
Monitoring
Law
&
CAP**

- Reduce nutrient losses by at least 50 % without deterioration in soil fertility
- Reduction of fertiliser use by at least 20 %
- Carbon farming practises & carbon removal schemes

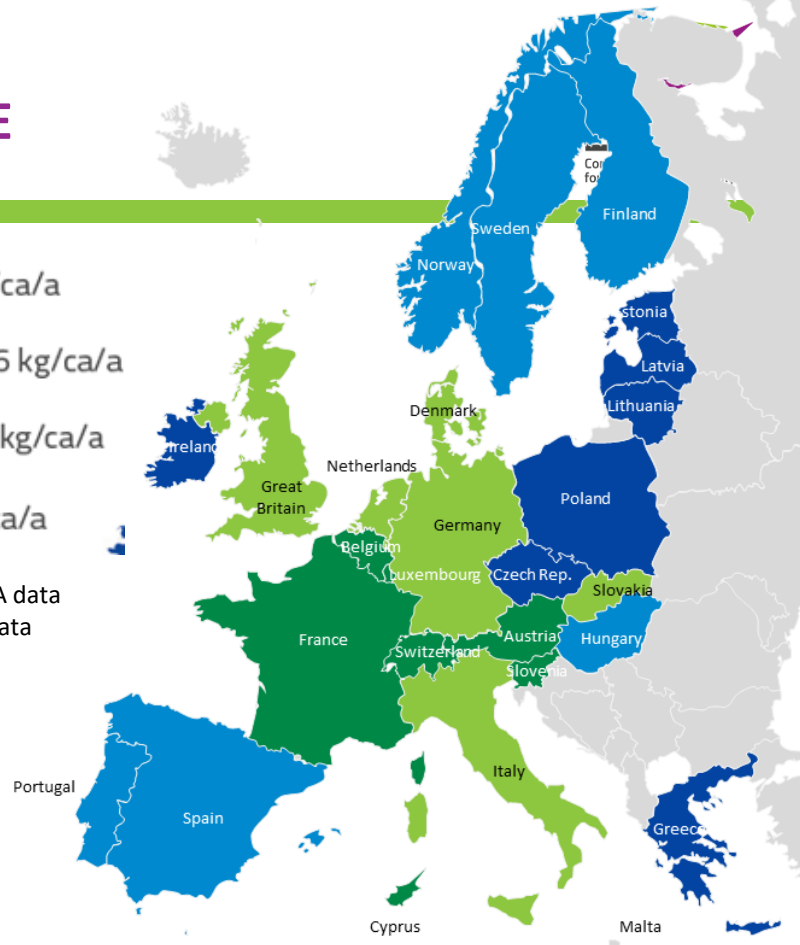
- Soils should be in a healthy condition by 2050
- 60-70 % of soil ecosystems in the EU are unhealthy and suffering from continuing degradation
- 12,7 % of Europe is effected by moderate to high erosion
- EU Soil Monitoring Law 2023
- Identifying Soil health indicators & Soil Health Certificate
- 30 % restoring land and increasing organic farming (25% organic farmland by 2030)

Europe - SEPARATE COLLECTION OF BIOWASTE

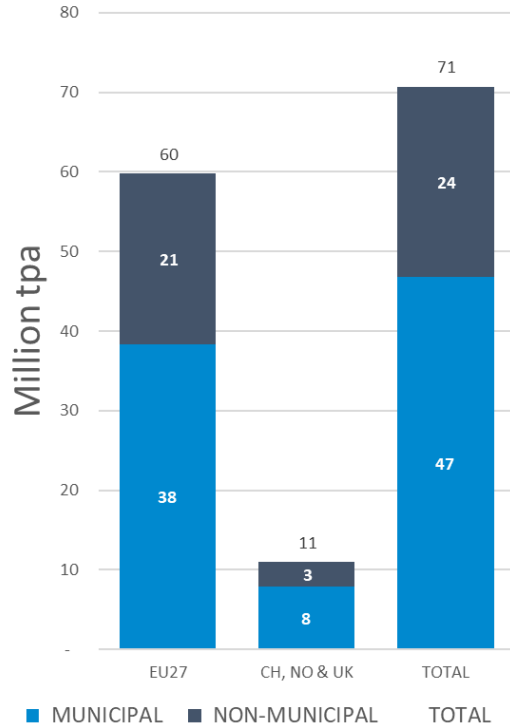
- Only **43%** of municipal biowaste was collected separately, while 57% of it ended up in mixed municipal waste (EEA), **Food waste only 16% collected separately** (BIC)
- **Residual waste still comprises 39% biowaste** (UBA, DE)
- Out of 60 Mio t a⁻¹ of food waste generated in the EU, **50 Mio t a⁻¹ are not delivered to high-quality recycling** (ECN)
- Separate collection schemes in member states **often focus only on garden waste**



Sources: ECN & EEA data published in ECN Data Report 2022



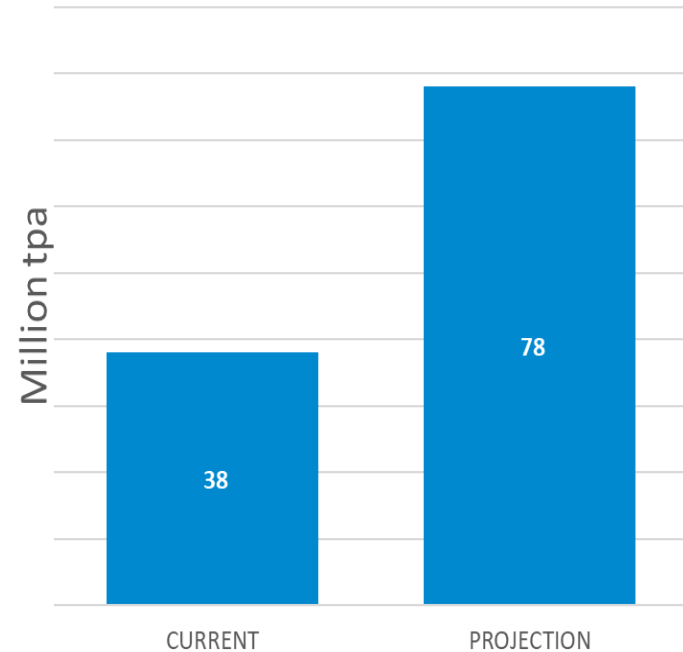
Municipal Biowaste – RECYCLING POTENTIAL



**EU TARGET TO
RECYCLE 65% MSW
BY 2035**

**17% to 35% needed
through bio-waste**

**Extra 40 M tpa
MUNICIPAL
BIOWASTE has to be
separately collected**



Fertilising Products – FROM WASTE TO PRODUCT

EU Fertilising Products Regulation

- CE marked fertilising products: free trade on the EU market
- Boost for circular economy in Europe: Waste materials => end-of-waste status included
- Limit values for biological, physical and chemical hazards
- Quality Assurance and Certification is the basis (audit, independent sampling+analysis, certificate)



EU End-of-waste criteria for compost and digestate

- EU Fertilising Product Regulation entered into force on 16/07/2022 [Consolidated Version of EU FPR 16/03/2023](#)
- [Frequently Asked Questions](#) - as implementation guidance
- [Blue Guide](#) on the implementation of the product rules (29/06/2022)
- [Guidance document labelling EU fertilising products](#) and [Annexes to Guidance document labelling EU fertilising products](#) (17/02/2021)
- [Delegated act \(COM 2023/1605\) on the End point of the manufacturing chain for animal by-product](#) derived compost and digestate (22/05/2023)

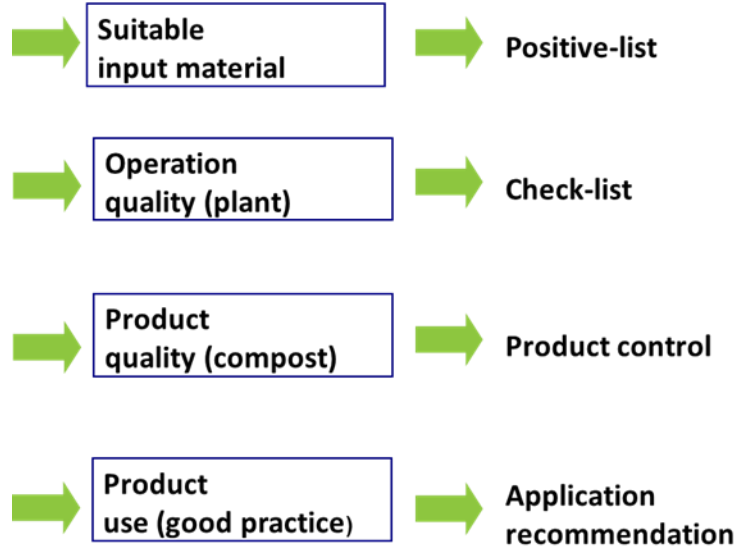
ECN-QAS - Benchmark for Quality assurance of compost and Digestate in Europe

Objectives:

- Harmonisation of the compost and digestate quality and requirements
- Harmonisation of quality assurance schemes
- Assistance to build up national quality assurance schemes
- Assurance and monitoring of high quality compost and digestate products in Europe
- **Promotion of recycling of organic waste materials ‘from waste to product’**



ECN-QAS



National-QAS (Quality label)

- plant certificate
- product certificate
- annual quality report

and

ECN-QAS

- certification of conformity
- conformity label



Limit values - COMPOST & DIGESTATE

Limit value [mg /kg]	Cd	Cr _{total}	Cu	Pb	Hg	Ni	Zn	As
EU Fertilising Products Reg.	(2) / 1.5	2 (CrVI)	300	120	1	50	800	40
EoW Criteria (EU JRC 2014)	1,2	100	100	120	1	50	400	
ECN-QAS	1,5	60	300	130	0,45	40	600	-
Values in Compost/Digestate								
Compost (green waste)	0,36	18,35	30,70	26,00	0,09	11,55	140	4,9
Compost (bio-waste)	0,38	19,80	42,80	29,00	0,08	12,00	168	6,7
Digestate Liquid	0,35	16,00	57,20	5,00	0,05	12,86	251	7,7
Digestate Solid	0,20	15,01	26,90	8,00	0,05	7,20	133	

EU LIFE Project Guiding the mainstreaming of best biowaste recycling practices in Europe

LIFE21-PRE-ES-LIFE BIOBEST – 101086420

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Project Partners



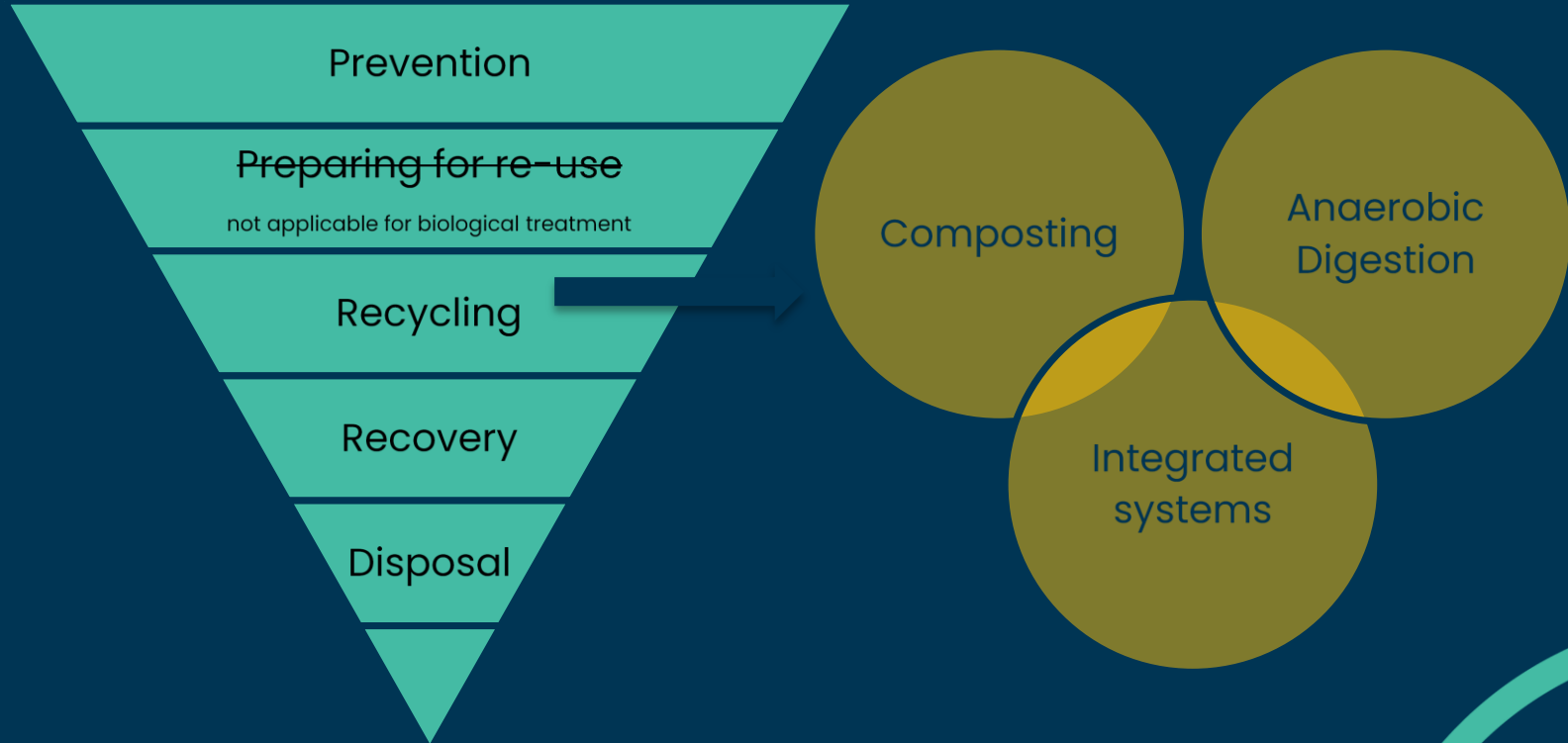
Guideline to promote quality compost and digestate

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Technical guideline

1. Definitions
2. Process options for municipal bio-waste treatment
 1. Biological treatment
 2. Mechanical pre- and post-treatment
3. Product characteristics analysis
4. Best practice examples

Process options for municipal bio-waste



Storage and Pre-treatment

Shredding, screening, mixing, conditioning,
homogenisation, leachate collection

Composting

Type of system applied

Batch management

Turning, watering, aeration

Sanitation

Temperature control

Maturation

Further stabilisation

Refining and Storage

Screening, preparation for marketing

Quality Assurance

Product analysis, product type and market
classification

Marketing

Sale of product to specific market sector

Biological treatment – Composting

- Description of composting process steps and their (technical) requirements
- Process requirements
- Existing technologies and their specifications
 - Static open systems, e.g. open windrow
 - Encapsulated systems, e.g. tunnel composting
 - Optional equipment
- Similar procedure for AD processes
- Potentials for process scaling

Product characteristics

Characteristic	Bio-waste compost	Green waste compost	Bio-waste Digestate
Nutrients	**	*	***
Nitrogen availability	**	*	***
Salt content ¹	**	*	***
Physical impurities (% DM) ²	***	*	***
Heavy metals	Depends on feedstock	Depends on feedstock	Depends on feedstock
Stability and organic matter ³	*** - **	***	* - **
Transportability	***	***	* ⁵ / ** ⁶
Odour release ⁴	**	*	***

¹Measured by electric conductivity, ²Most concerning impurity is plastics, ³For use as growing media, only very mature compost should be used, to be tested with oxygen uptake rate, ⁴Assuming equal stability degree, ⁵Liquid, ⁶Dried/Solid

Regulatory guideline

1. Quality assurance scheme for compost and digestate
2. Compost and digestate within EU legislation
3. Description of existing product quality standards
 1. ECN-QAS
 2. National and regional QAS in conformity with ECN-QAS

Compost & Digestate Quality



	Sample size [n]	pH [-]	Electrical conductivity ^d [dS/m]	Bulk density [g/L FM]	Dry matter [% FM]	Total impurities >2mm ^e		Nutrients	
						[% DM]	Tot. N [% DM]	P ₂ O ₅ [% DM]	K ₂ O [% DM]
Reference year: 2022									
Italy (CIC, 2024)									
Bio-waste compost	212	6.0 – 8.8	1.3 – 11.0	NA	50.6 – 94.9	<0.05 ^g – 0.5	1.30 – 3.20	0.43 – 3.50	0.66 – 3.27
Green waste compost	48	6.1 – 8.5	0.5 – 6.0	NA	50.0 – 94.5	<0.05 ^g – 0.5	1.10 – 2.60	0.39 – 1.50	0.57 – 2.10
Digestate^a	-	-	-	-	-	-	-	-	-
Reference year: 2022									
Germany^f (BGK, 2024)									
Bio-waste compost	1890	7.2 – 9.0	1.1 – 3.3	480 – 770	51.0 – 76.5	0.00 – 0.25	1.11 – 2.13	0.50 – 1.09	0.58 – 1.74
Green waste compost	1985	7.1 – 9.0	0.5 – 1.5	440 – 776	49.0 – 76.6	0.00 – 0.12	0.76 – 1.70	0.31 – 0.76	0.88 – 1.93
Digestate	1249	8.14 – 8.74	3.9 – 9.3	990 – 1,047	2.3 – 14.0	0.00 – 0.01	4.17 – 21.54	1.20 – 5.91	2.9 – 10.4
Reference year: 2021									
Flanders (VLACO, 2024)									
Bio-waste compost	53	7.8 – 9.1	1.5 – 4.2	NA	53.4 – 78.1	<0.05 ^g – 0.40	1.7 – 2.4	0.69 – 1.39	1.0 – 2.1
Green waste compost	153	6.3 – 9.1	0.5 – 1.6	NA	48.5 – 69.9	<0.05 ^g – 0.16	1.0 – 1.9	0.35 – 0.62	0.59 – 1.40
Digestate^b	106	8.3 – 8.8	4.6 – 10.0	NA	4.3 – 12.9	<0.05 ^g – 0.10	5.2 – 10.3	2.9 – 5.5	3.5 – 8.2
Reference year: 2023									
Austria (KBVÖ, 2024)									
Bio-waste compost	166	5.9 – 8.8	0.5 – 5.7	NA	40.1 – 98.2	0.00 – 0.91	0.5 – 2.7	0.01 – 8.20	0.25 – 13.2
Green waste compost^c	-	-	-	-	-	-	-	-	-
Digestate	131	7.2 – 9.0	NA	NA	0.5 – 81.0	0	0.5 – 18.4	0.1 – 7.1	0.4 – 22.9

^aNo digestate produced under CIC quality assurance, ^bIncludes manure and other sludges, ^cnot separately assessed, ^dIn Germany measured as salinity in g/L, ^eIn Germany >1 mm,

^fValues represent lower 10% and upper 90% percentiles, ^gBelow determination limit

Compost & Digestate – HIGH QUALITY PRODUCTS

Separate Collection of Biowaste & Quality Assurance are pre-conditions for placing compost- or digestate-based fertilising products on the European Market

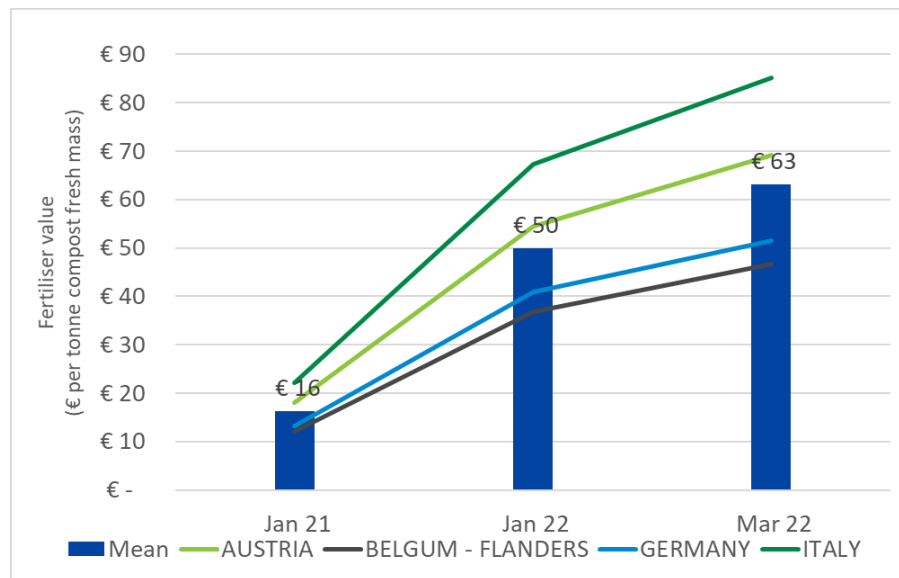
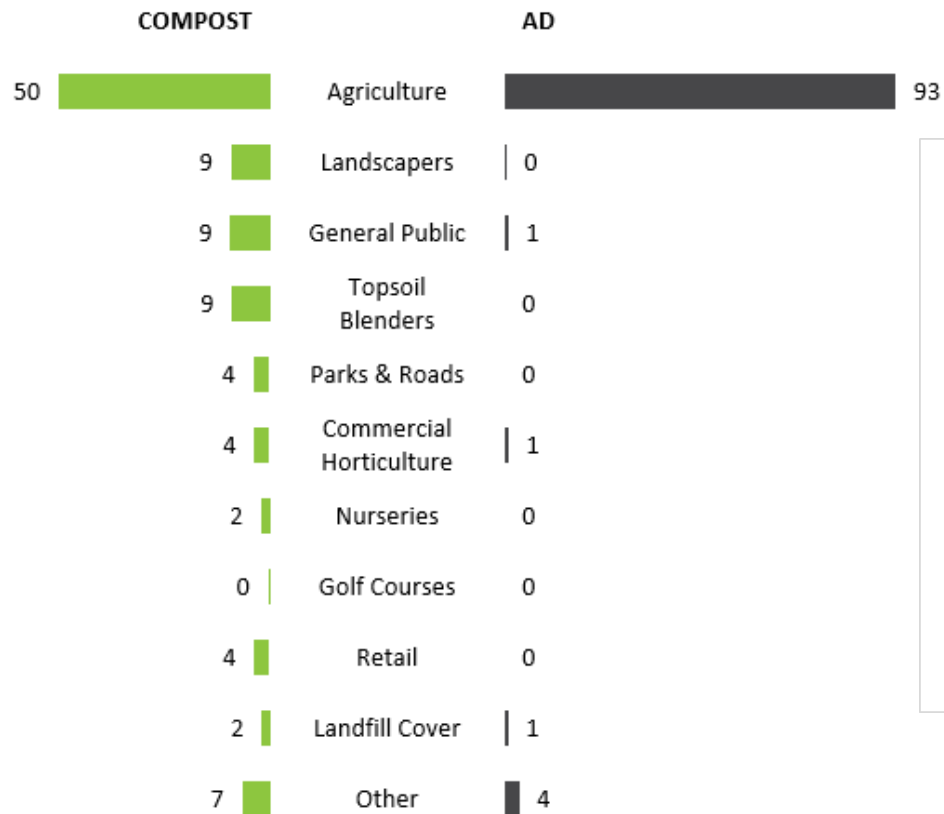
FROM WASTE TO PRODUCT



25 % Quality Compost
produced in the EU 27, CH, NO; UK
was certified to the ECN-QAS
=
**5.3 Million tpa out of 21,7 Million
tpa**

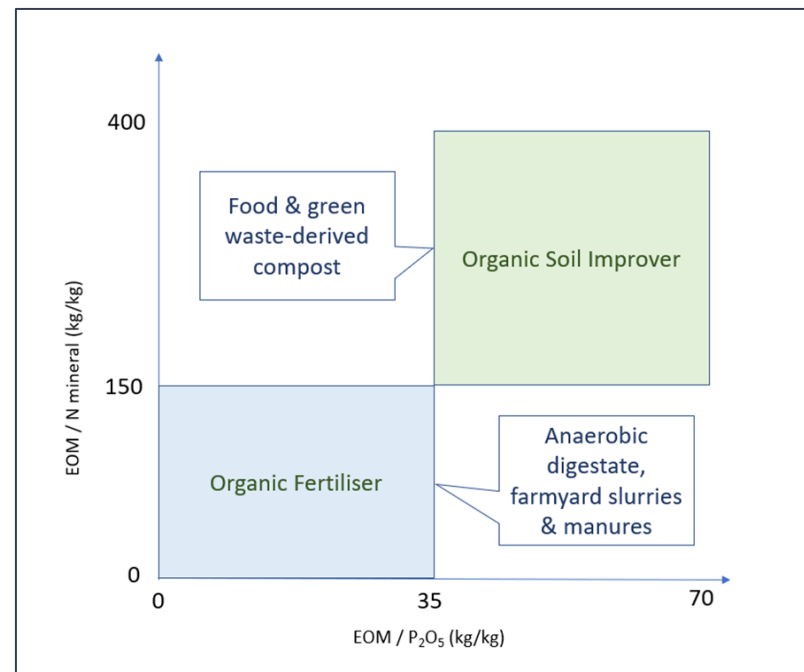
Nutrient value
**41 € per tonne compost
(FM)**

Compost & Digestate – MARKETS (%) & FERTILISER VALUE



Market Perspective – COMPOST & DIGESTATE

- More **recycling** will boost compost, biogas (biomethane) and digestate production
- Need for stable **organic matter** and **nutrients**:
 - Compost is a solution for increasing soil organic matter,
 - Digestate is a solution to provide nutrients and replace mineral fertilisers



Source: Gilbert, Ricci & Ramola, 2020

Market Perspective – COMPOST & DIGESTATE

- **Implementation of EU Policy is needed** for the promotion of recycling of biowaste resources and for the sustainable use of compost & digestate
- **Good quality compost and digestate are needed!**
- **Quality Assurance and Certification is essential to support the markets for compost and digestate (agriculture, landscaping, topsoil blending, growing media)**



Further information

[EU Interreg project CORE](#)

‘Composting in Rural Ecosystems’

Objectives

- Mainstreaming composting in rural areas
- Develop best practices
- Promoting circular bioeconomy
- Project website
<https://www.interregeurope.eu/core-0#>
- Social media: **#COREinterreg**



Interreg
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CORE



Announcement

EU Life BIOBEST Project

Guiding the
mainstreaming of best
biowaste recycling
practices in Europe'

| #LIFEBIOBEST webinar

Regulatory and technical perspectives – driving progress in bio-waste treatment

27 May 2024 | 10:30 CET





Thank you

Do you have any questions?

Contact details: European Compost Network ECN e.V.

Email: siebert@compostnetwork.info

Website: <https://www.compost-digestate.eu>

SIGN ECN MANIFESTO!



www.saveorganicsinsoil.org