European Compost Network ECN e.V.

Biowaste Management in Europe - Quality and Market Perspectives for Compost and Digestate

Dr. Stefanie Siebert

Canadian Composting Council Conference

Canada - Niagara Falls, 3 October 2024

Outline

ECN
Compost and Digestate for a Circular Bioeconomy

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02 Biowaste & Circular Bioeconomy

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Outline

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EUROPEAN COMPOST NETWORK - ECN

ECN
Compost and Digestate for a Circular Bioeconomy

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

67 Members from 28 European Countries

≈ 48 M tpa Treatment Capacity

> 4.500 Composting & Anaerobic Digestion Plants

BIOWASTE & CIRCULAR BIOECONOMY

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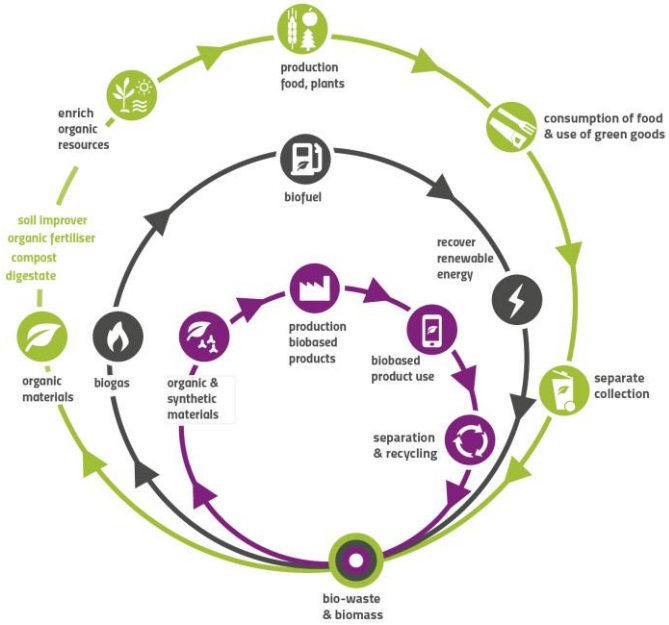
BIOWASTE

A Cross-Cutting Resource

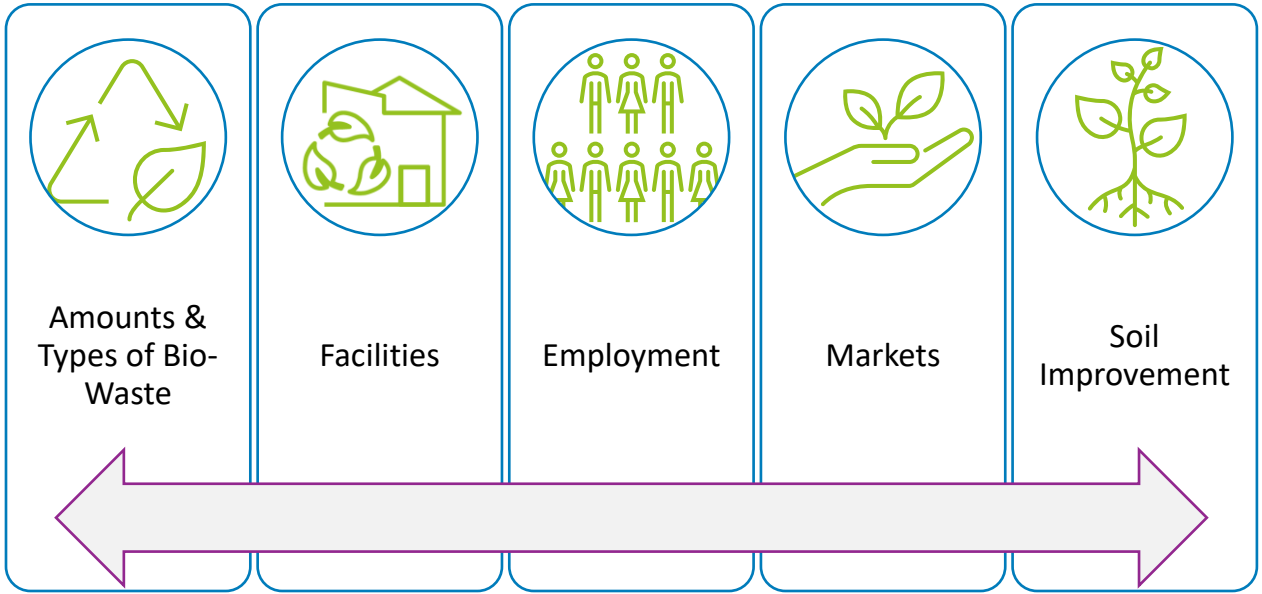
- European Green Deal
- Bioeconomy Strategy
- Biodiversity Strategy
- Farm to Fork Strategy
- Soil Strategy
- Waste Framework Directive
- Zero Pollution Action plan

BIOWASTE in the Circular Bioeconomy



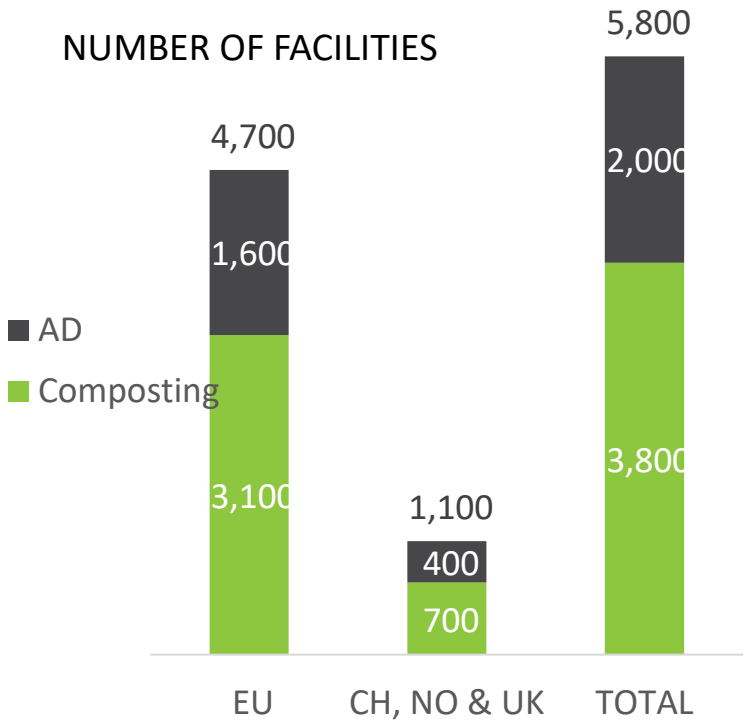
Overview on Biowaste Management in Europe

Comprehensive survey in 2021



https://cutt.ly/D1ceQ2u

Biowaste Treatment – FOR PEOPLE – JOB CREATION



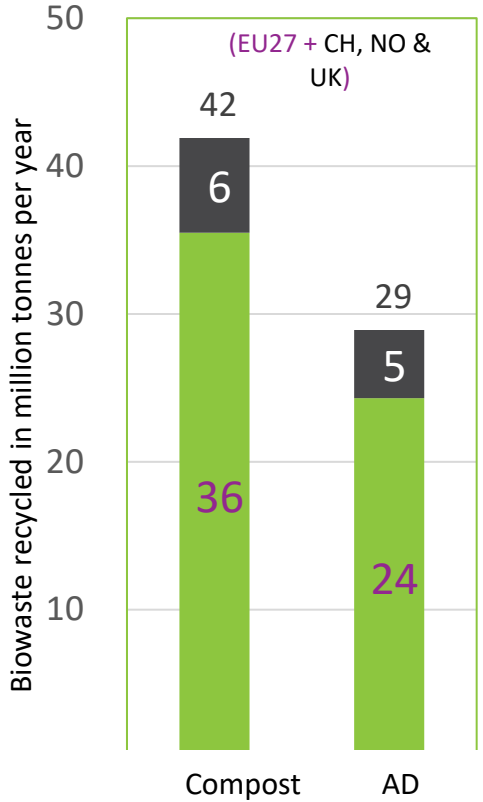
	FTEs PER FACILITY	TONNES PER FTE
COMPOSTING	4.7	4,200
ANAEROBIC DIGESTION	4.9	5,300

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

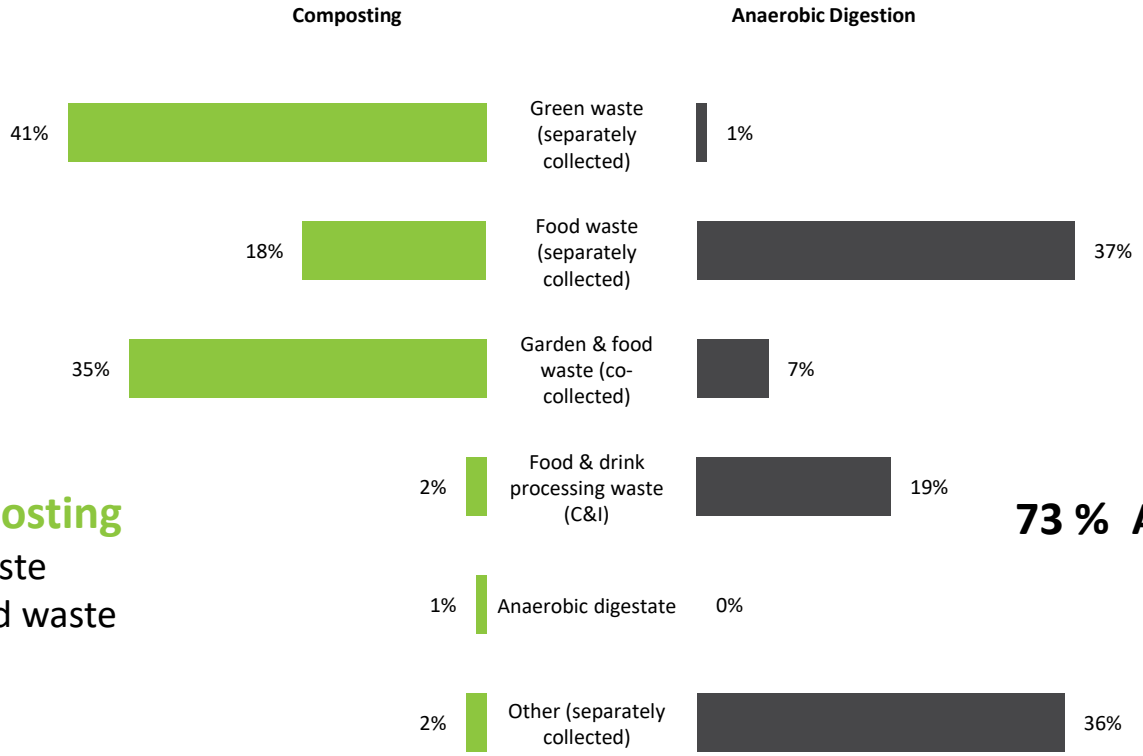
COMPOST PRODUCED

Biowaste – SOURCES FOR COMPOST & DIGESTATE PRODUCTION

76 % Composting

Green waste

Garden & food waste

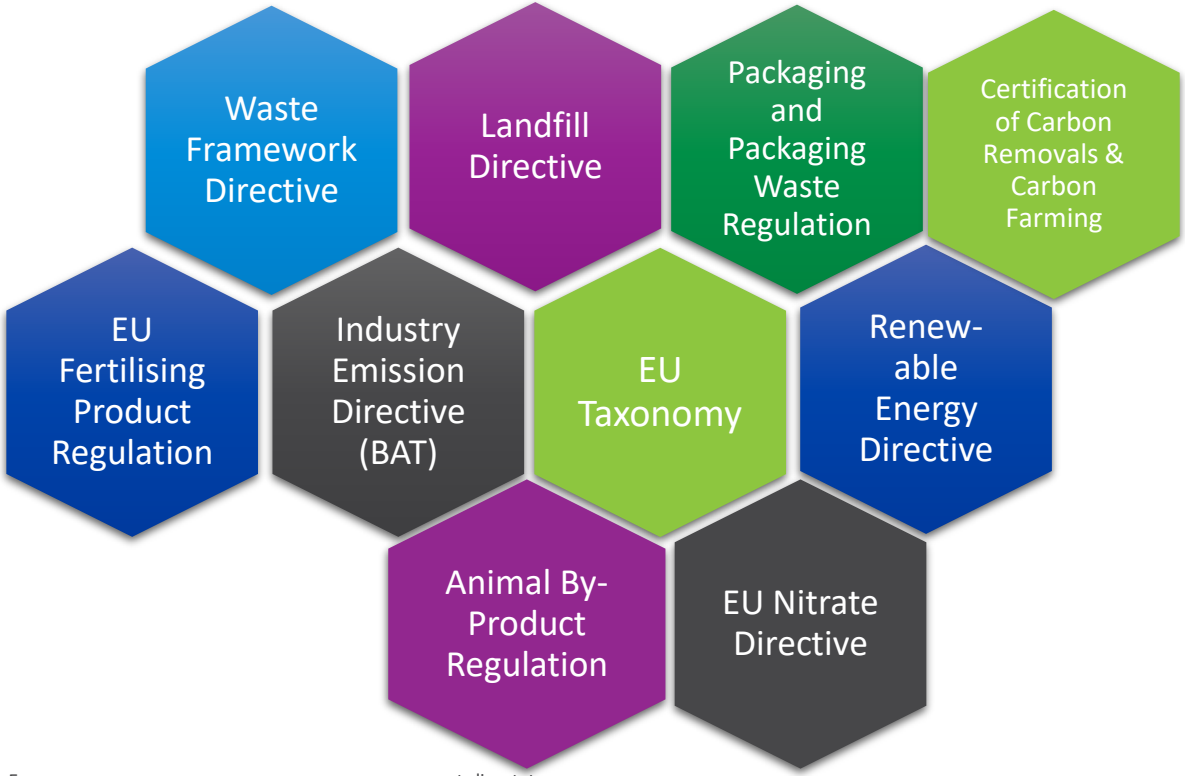


73 % Anaerobic Digestion

Food waste

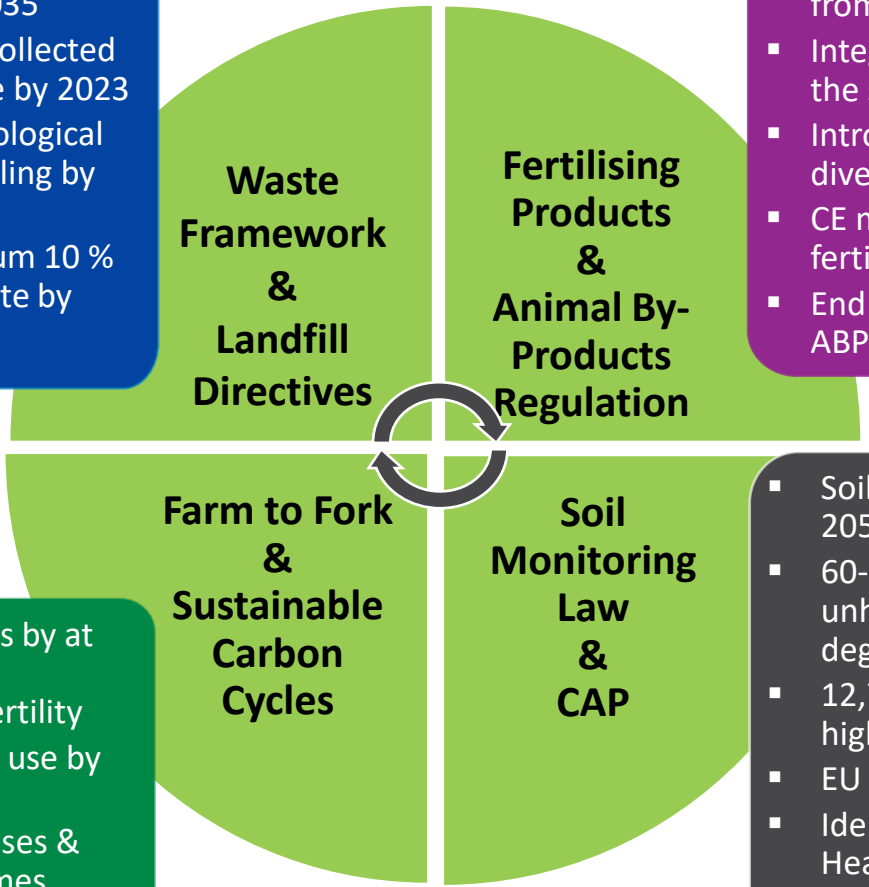
Other

EU POLICY


Waste Framework Directive
Landfill Directive
Packaging and Packaging Waste Regulation
Certification of Carbon Removals & Carbon Farming
EU Fertilising Product Regulation
Industry Emission Directive (BAT)
EU Taxonomy
Renew-able Energy Directive
Animal By-Product Regulation
EU Nitrate Directive

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



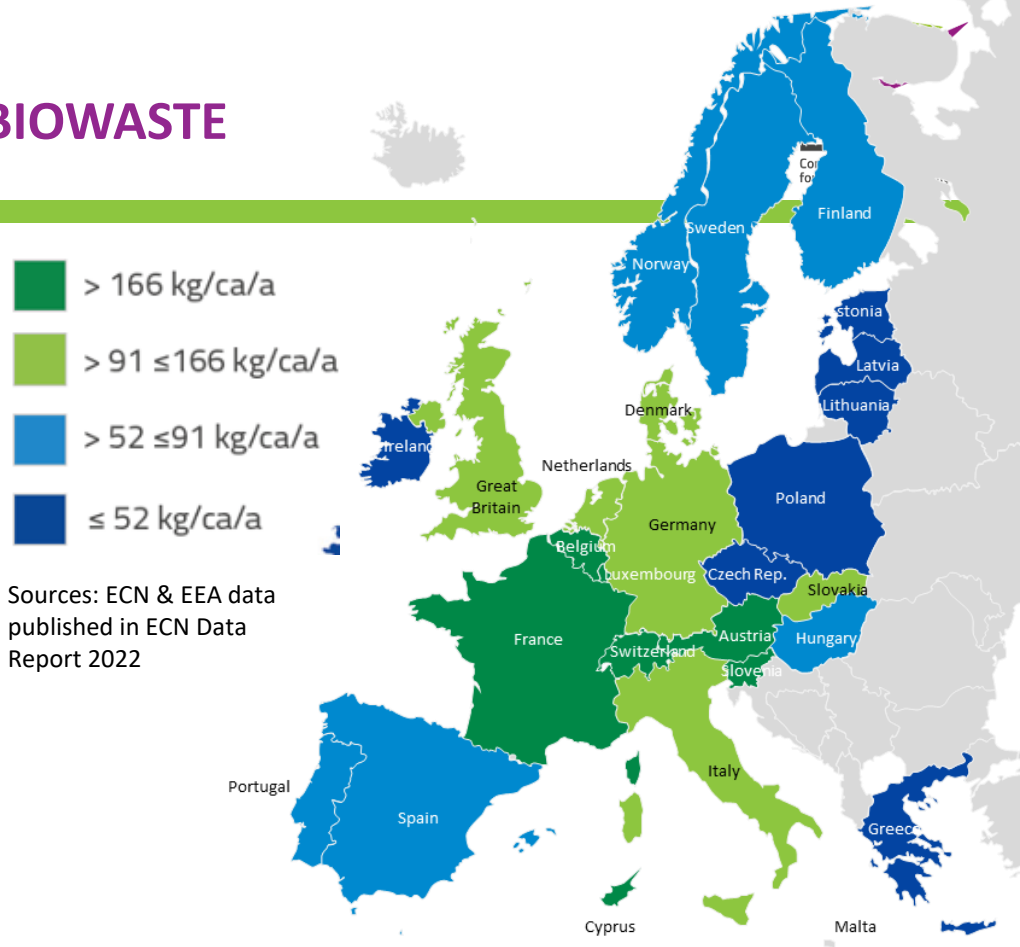
- Boosting organic matter (biowaste) recycling from biowaste
- Integration of organic fertilising products into the scope of the new Regulation
- Introducing harmonised EU rules for products diverting from organic waste materials
- CE marking and free trade for organic fertilising products across EU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

- 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)

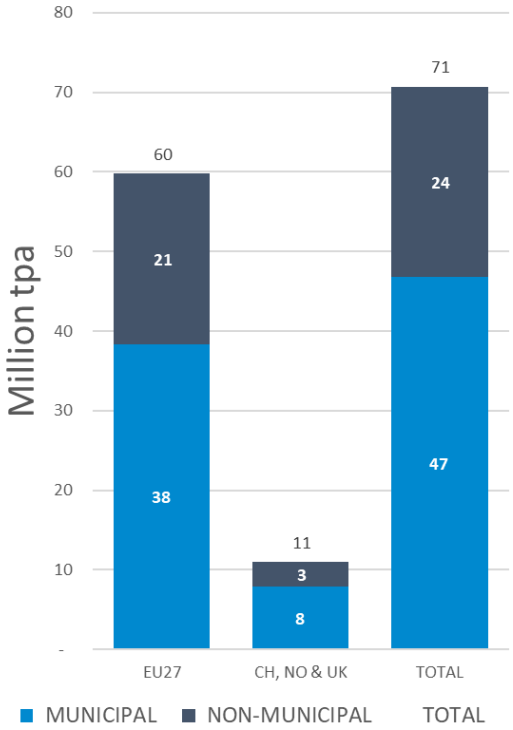
Europe - SEPARATE COLLECTION OF BIOWASTE

- 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)
- Separate collection schemes in member states **often focus only on garden waste**



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

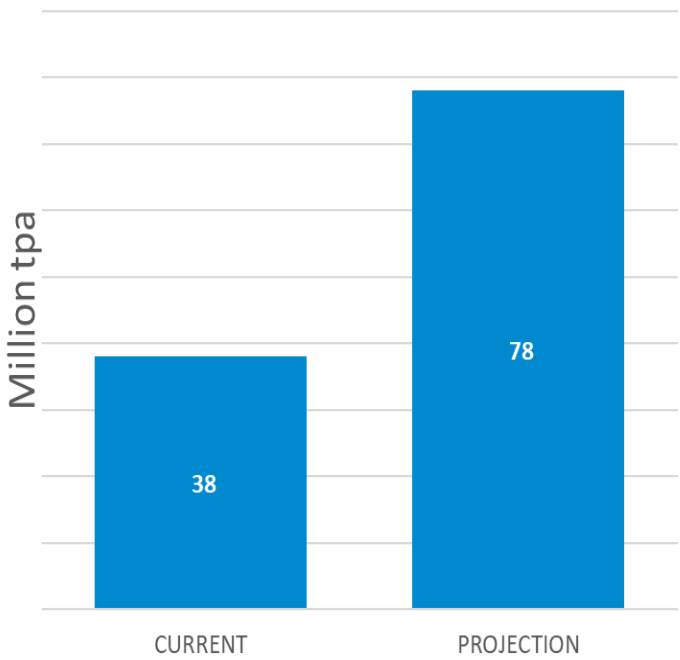
Municipal Biowaste – RECYCLING POTENTIAL



EU TARGET TO RECYCLE 65% MSW BY 2035

17% to 35% needed through bio-waste

Extra 40 M tpa <u>MUNICIPAL BIOWASTE</u> has to be separately collected



Fertilising Products – FROM WASTE TO PRODUCT

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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

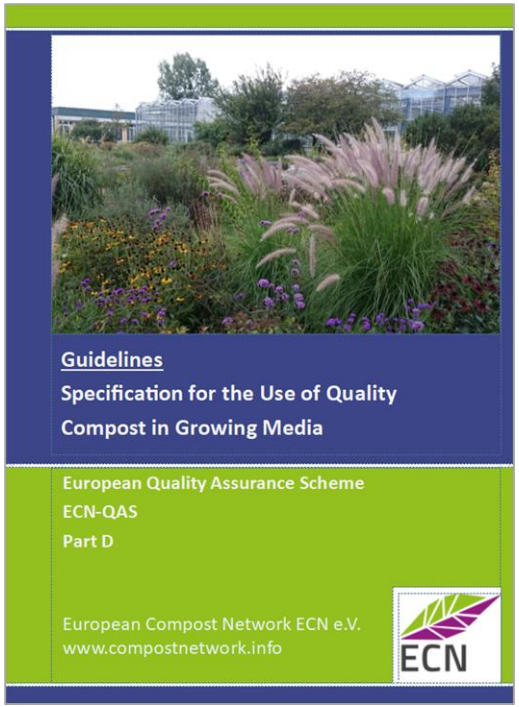
- EU Fertilising Product Regulation entered into force on 16/07/2022 Consolidated Version of EU FPR 16/03/2023
- Frequently Asked Questions - as implementation guidance
- Blue Guide on the implementation of the product rules (29/06/2022)
- Guidance document labelling EU fertilising products and Annexes 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 – QUALITY ASSURANCE FOR COMPOST & DIGESTATE

ECN-QAS –

Benchmark for Quality assurance of compost and Digestate in Europe

- ECN-QAS Manual
- Part D: Specification for the use of Quality Compost in Growing Media



ECN-QAS




- Suitable input material → Positive-list
- Operation quality (plant) → Check-list
- Product quality (compost) → Product control
- Product use (good practice) → Application recommendation

National-QAS (Quality label)
- plant certificate
- product certificate
- annual quality report

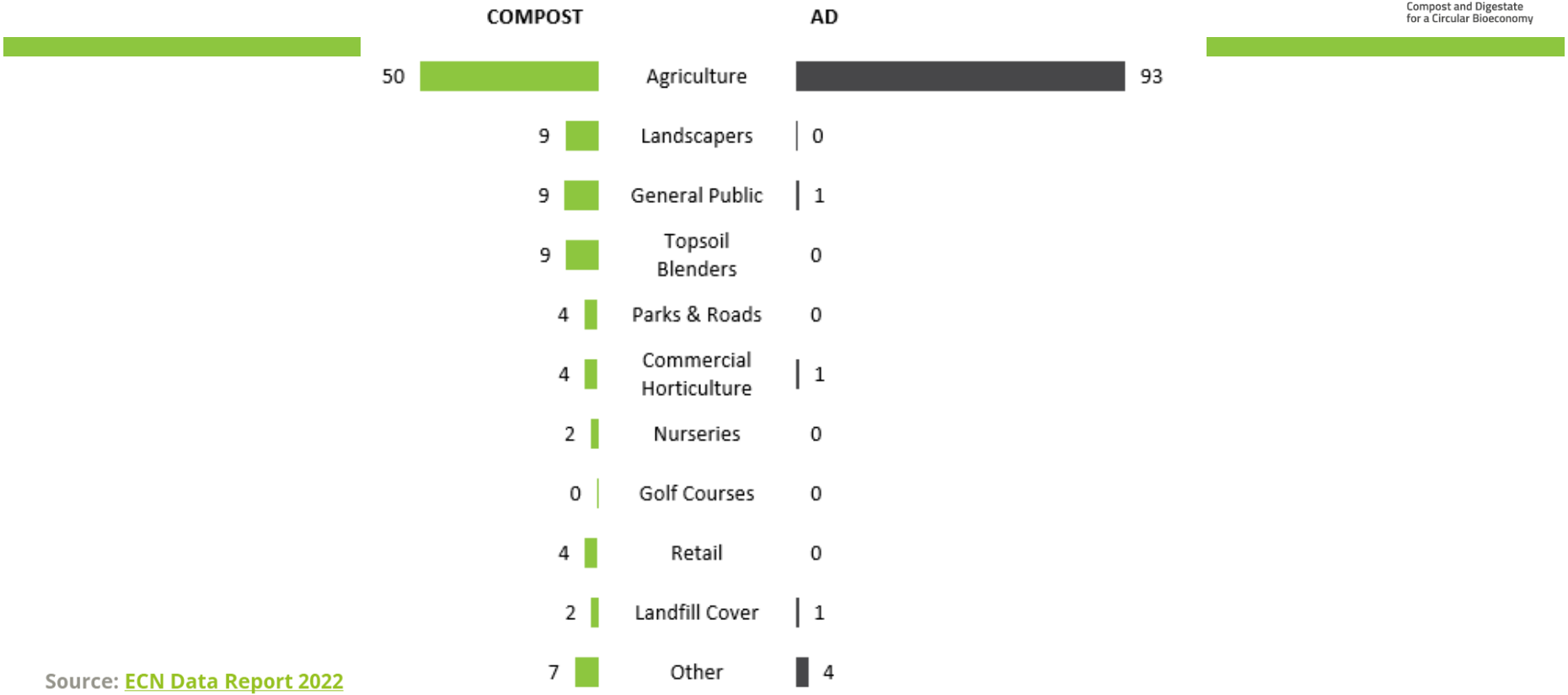
and

ECN-QAS
- certification of conformity
- conformity label

Limit values - COMPOST & DIGESTATE

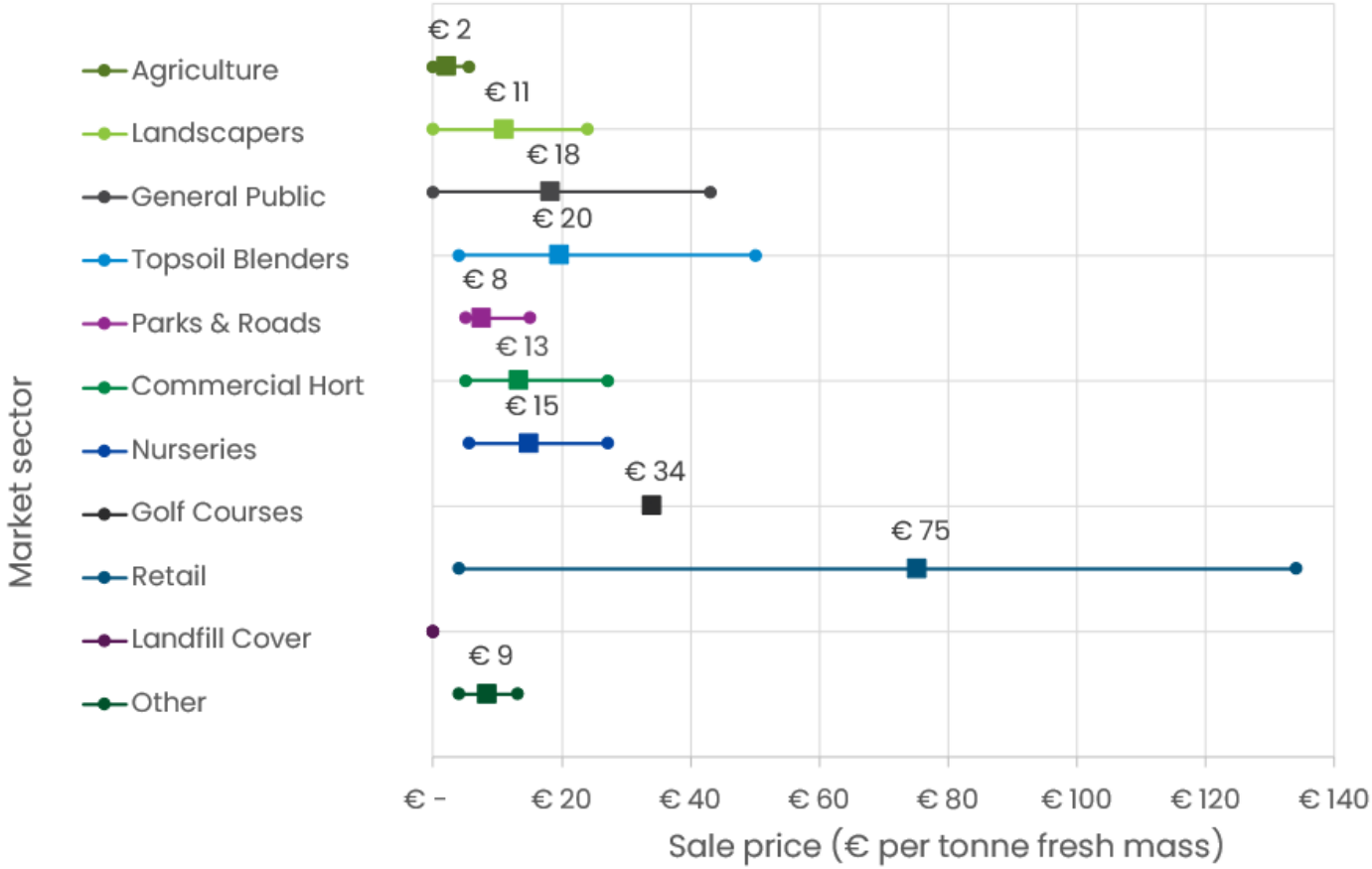
Limit value [mg /kg]	Cd	Cr $_{total}$	Cu	Pb	Hg	Ni	Zn	As
EU Fertilising Products Reg.	(2) / 1.5	2 (CrVI)	300	120	1	50	800	40
EoW Criteria (EU JRC 2014)	1,2	100	100	120	1	50	400	
ECN-QAS	1,5	60	300	130	0,45	40	600	-
Values in Compost/Digestate								
Compost (green waste)	0,36	18,35	30,70	26,00	0,09	11,55	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	

Markets of Compost & Digestate in Europe



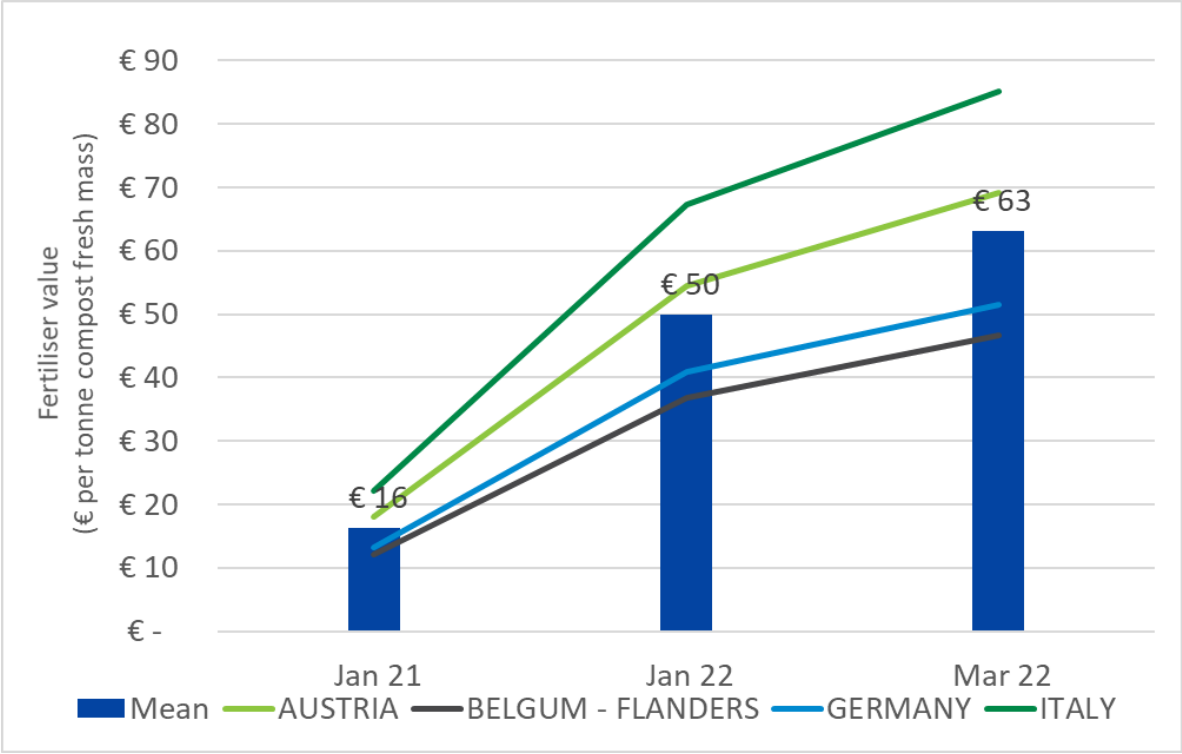
Source: ECN Data Report 2022

Market prices for compost products in Europe



Source: ECN Data Report 2022

Market Perspective – FERTILISER VALUE



Compost production	Nutrient Value in million € January 2022			
in million tonnes	N	P	K	SUM
TOTAL - EU27 **17.6**	318	97	157	572
TOTAL - NON-EU **3,4**	62	19	30	111
TOTAL EU & NON-EU **21**	380	116	187	683
Total Nutrient Value				**1.367**
Compost production	**February 2024**			
in million tonnes	N	P	K	SUM
TOTAL - EU27 **17.6**	58	27	39	124
TOTAL - NON-EU **3,4**	11	5	7	24
TOTAL EU & NON-EU **21**	70	32	46	148
Total Nutrient Value				**295**

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

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)**

LIFE BIOBEST

Co-funded by the European Union

EU LIFE Project

Guiding the mainstreaming of best biowaste recycling practices in Europe

LIFE21-PRE-ES-LIFE BIOBEST – 101086420

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the CINEA - EC. Neither the European Union nor the granting authority can be held responsible for them.

Project Partners

FUNDACIÓ ent

CONSORZIO ITALIANO COMPOSTATORI

ACR+

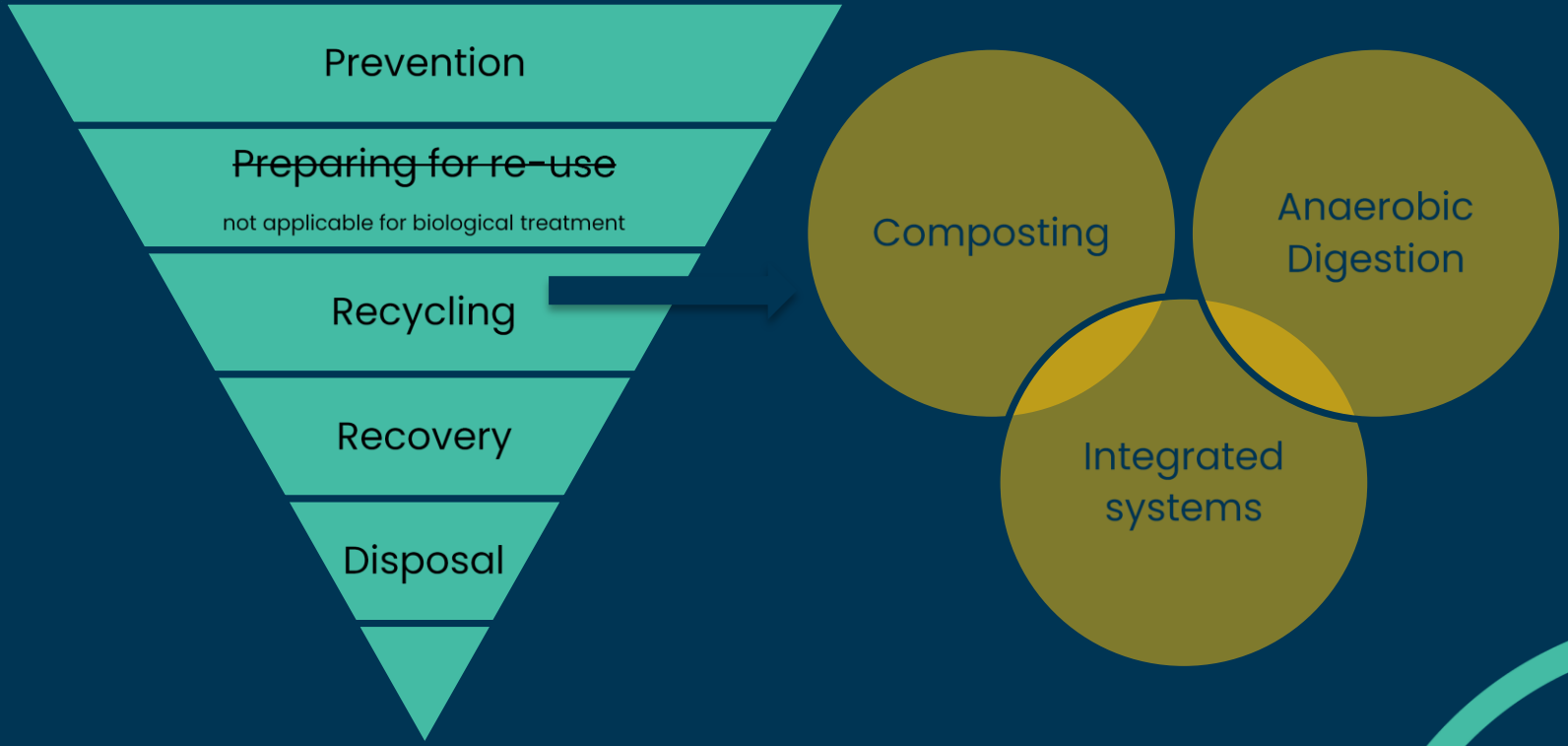
ECN

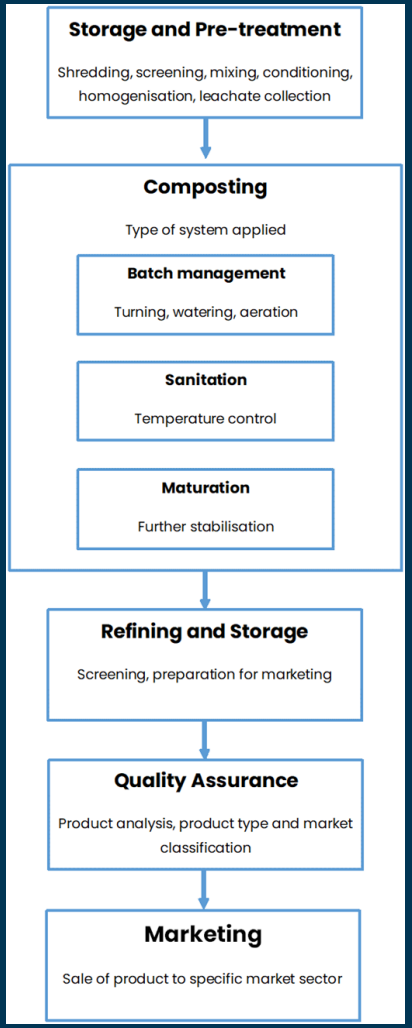
ZERO WASTE EUROPE

The guidelines can be found, following the links:

- Separate collection of bio-waste: https://zurl.co/gvhR
- Governance and economic incentives: https://zurl.co/J12K
- Promoting quality compost and digestate: https://zurl.co/FMb5
- Communication and engagement: https://zurl.co/1Ev9

Process options for municipal bio-waste





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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 (wet and dry systems)
- Potentials for process scaling

Compost & Digestate Quality

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	Sample size	pH	Electrical conductivity[d]	Bulk density	Dry matter	Total impurities >2mm[e]	Nutrients		
	[n]	[-]	[dS/m]	[g/L FM]	[% FM]	[% DM]	Tot. N [% DM]	P_2O_5 [% DM]	K_2O [% 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

[a]No digestate produced under CIC quality assurance, [b]Includes manure and other sludges, [c]not separately assessed, [d]In Germany measured as salinity in g/L, [e]In Germany >1 mm,
[f]Values represent lower 10% and upper 90% percentiles, [g]Below determination limit

Product characteristics

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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]	**	*	***

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

ECN - PROJECTS

EU Interreg project CORE

‘Composting in Rural Ecosystems’

Objectives

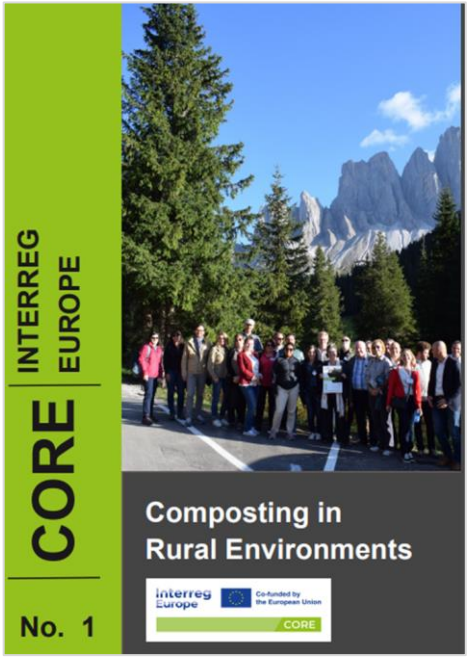
- Mainstreaming composting in rural areas
- Develop best practices
- Promoting circular bioeconomy

- Project website
  https://www.interregeurope.eu/core-0#
- Social media: **#COREinterreg**

CORE – INFORMATION

CORE Project Video

CORE E-Magazine No. 1



CORE – GOOD PRACTICES

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16 Good Practices published:

https://www.interregeurope.eu/core-0/good-practices?page=1

Good practices

Explore inspiring and tested policy solutions identified by our cooperation projetcs and beyond.

Implementing professional vegetable-fruit-garden (vfg)-waste pre-digestion and composting

The use of Master Composters to help implement Home Composting in Flanders

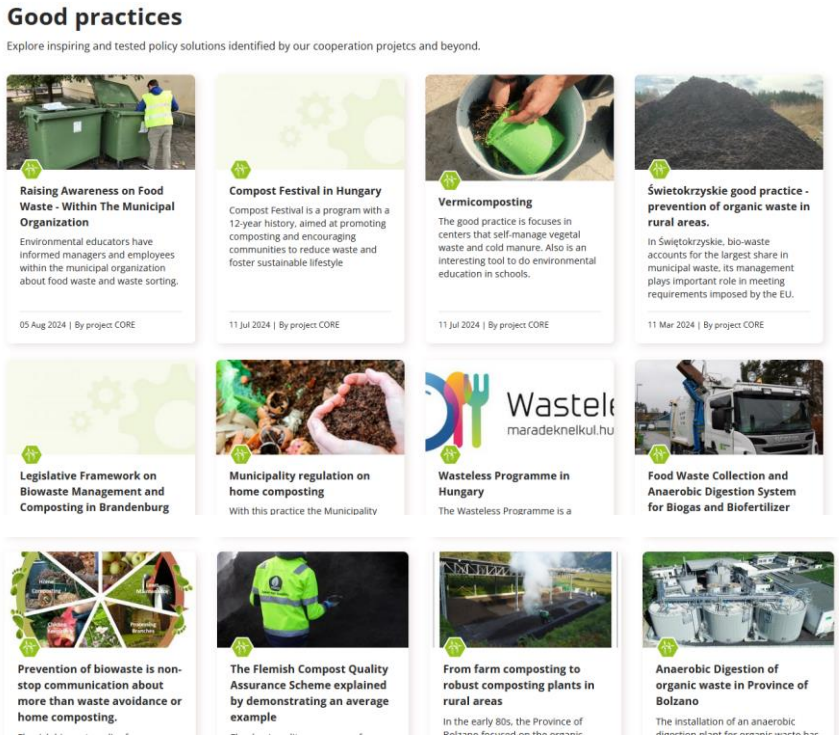
Master Composters are volunteers

Anaerobic Digestion & Composting - Bio-Energy Centre - Schwarze Elster

The introduction of bins for organic

Community composting of biowaste in occupational center

This practice has the follow



CORE – VIDEO'S

CORE on Youtube

https://www.youtube.com/@COREinterreg

- 8 videos published

Vlaco Food Truck
ECN Interview with Elfriede Anthonissen (Vlaco)

Closed Loop Gardening -
Vlaco Interview with Myriam De Munter

Quality Assurance
ECN Interview with Wim Vanden Auweele (Vlaco)

AD/Composting Plant -
ECN Interview with Peter de Leeuw, DDS Verko

Waste Composting
ECN Interview with DJ Compost Operator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SOIL
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INTERNATIONAL COMPOST AWARENESS WEEK 2021
How to recycle organics and to feed our soils?
A compost journey across Europe
Date: 5 May 2021
0:53 / 1:07:06
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Contact:
ECN e.V.
Dr. Stefanie Siebert
siebert@compostnetwork.info
www.compost-digestate.eu