

Global Methane Forum

30 March 2016, Washington DC



Compost and digestate application in Europe – quality assurance & standards

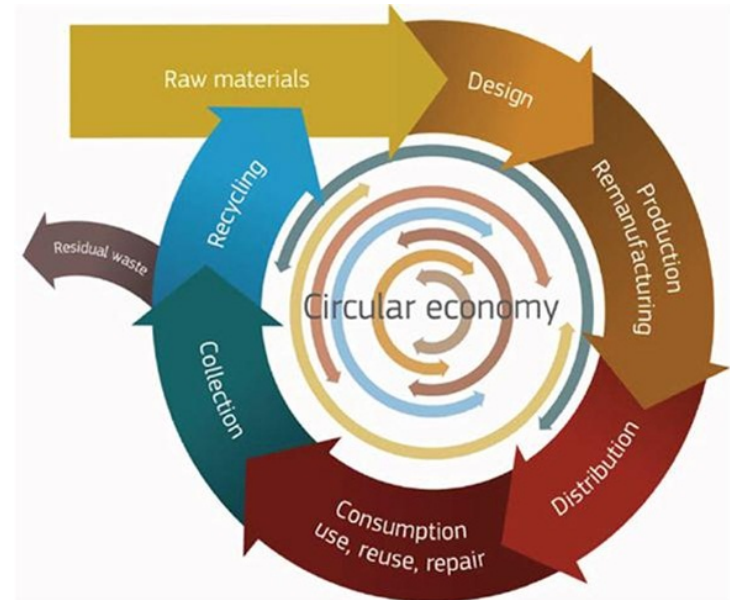
Grigor Stoyanov

‘100 - First Zero Waste & Organic Cycle Organisation’

EU Legislative Approaches



Circular Economy Package - new legislative proposal:



- **65% recycling of municipal waste in 2030 ;**
- **30% food waste reduction in 2025;**
- **Mandatory separate collection of biowaste;**
- **10% landfilling of municipal waste in 2030;**

EU Legislative Approaches



Future Perspectives

- Regulation on **End-of-waste criteria** for compost and digestate:
 - **JRC-IPTS report published in January 2014;**
 - **Decision on comitology process is stopped;**
- **Revision of the EU Fertiliser Regulation** including organic fertilisers, soil improvers and growing media:
 - **Impact assessment internal revision of EC;**
 - **Draft proposal launched March 2016.**



EU Commission's Report 2016 – on separate collection of waste

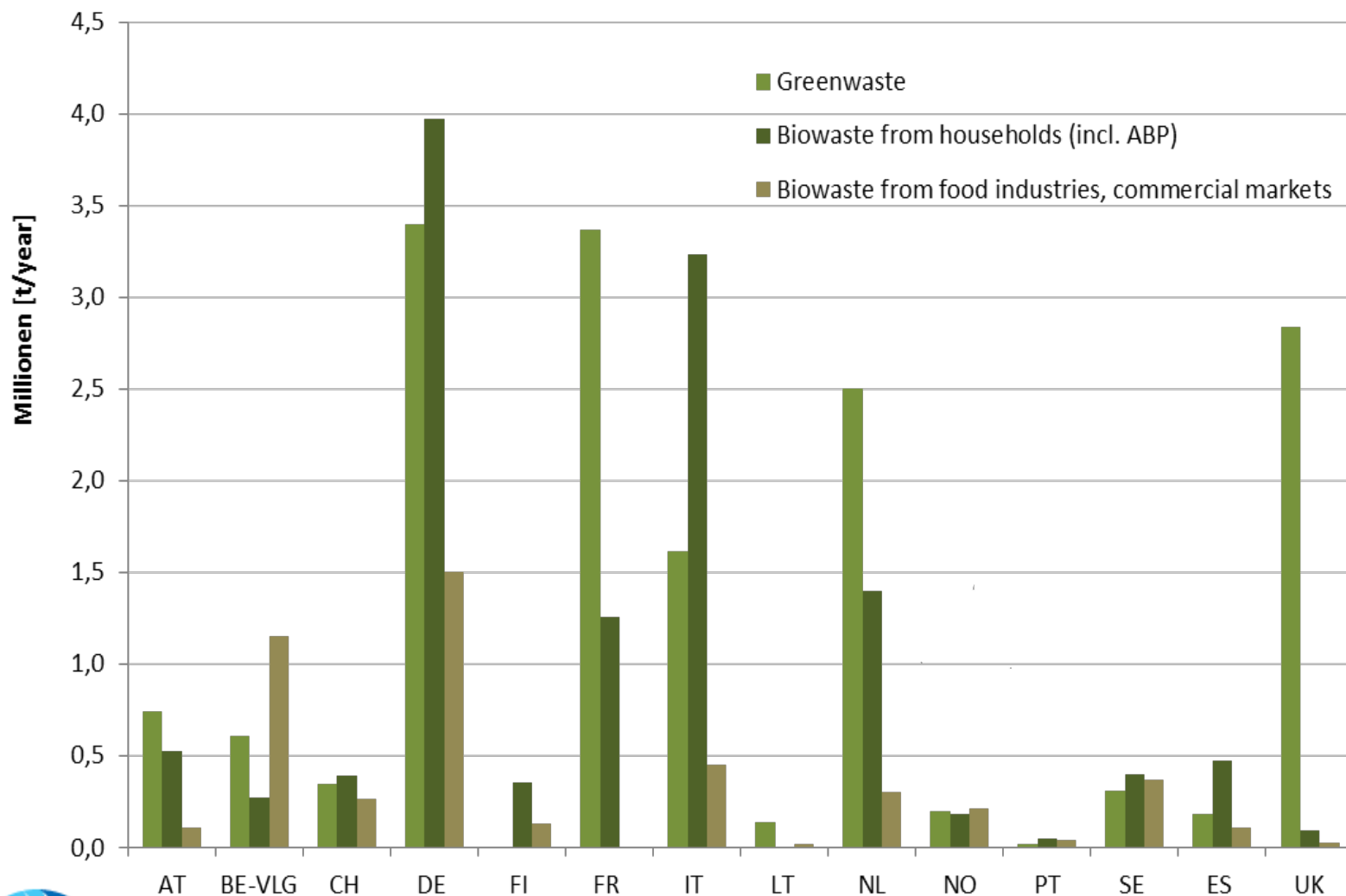


Key findings from the report 'Assessment of separate collection schemes on the 28 capitals of the EU' (EU COM 2015):

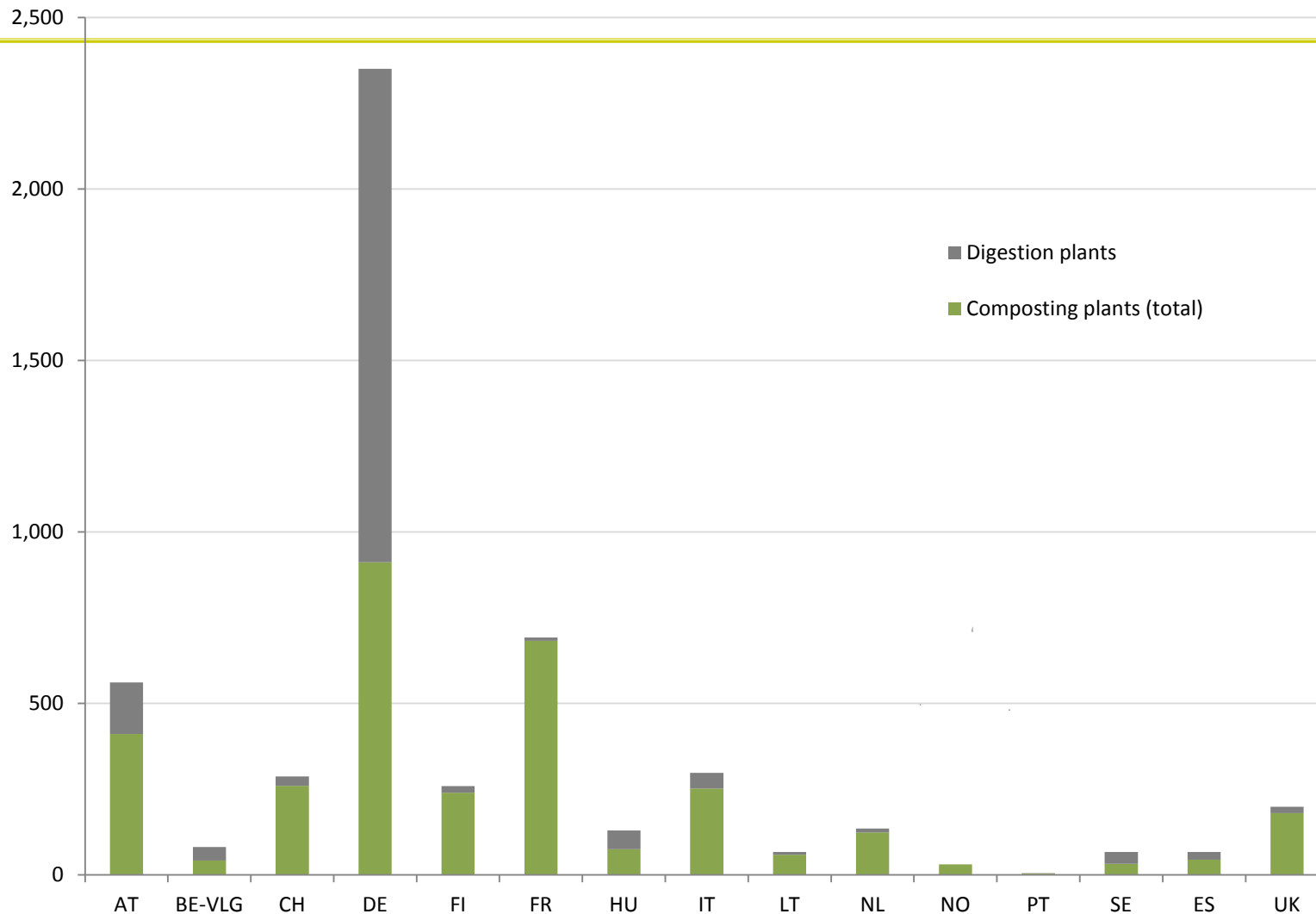
- 13 MS have implemented door-to-door for biowaste (including food waste);
- 2 MS have implemented door-to door collection only for garden waste;
- 1 MS has implemented a bring system for biowaste;
- **12 MS do not collect biowaste separately.**



Total amount of separate collected biowaste



Composting/Digestion Plants



Source: ECN Survey 2016

Compost and digestate applications



- Compost is used mainly as soil improver/fertiliser and component of growing media:
 - The total amount of compost produced in EU-27 is estimated at **11,8 Mtonne fresh matter/year**
- Digestate is mainly used as an organic fertiliser with lesser soil for its fertilizing properties, given its highly available fractions of N,P, K
 - The total amount of digestate produced in Europe is estimated at **56 Mtonne fresh matter/year**

Digestate application – data European Compost Network



- Wet fermentation of bio-waste biogas plants:
 - Central/Western Europe: the output is separated into a liquid and solid fraction whereby the solid fraction is post-composted and mostly applied to agricultural land
 - Scandinavia: the complete digestion residue is applied on agricultural land
- Dry fermentation: the solid digestion residue is generally post-composted together with bio-/green waste
- Approximately less than 3% of the digestates are further treated to specific products e.g. for pellets or as constituents for growing media or manufactured soils.

Digestate application – data

European Biogas Association



- Today, still more than 95% of the produced digestate in Europe is used directly in the agricultural sector as a liquid fertilizer.
 - new products like dried or pelletized digestates are increasingly released into the European market.
 - With full upgrading by ultrafiltration and reverse osmosis, **highly concentrated fertiliser** and a **purified aqueous stream of drinking water quality** can be produced.

Digestate applications in EU



- **In Germany - 36.5 Mtonne digestate produced annually**

- Liquid digestate (94% of whole digestate) is used directly as fertiliser in agriculture
- about 10% of the plants treating waste produce compost from the output of the digestion process.
- only 6% of the quality assured digestate (BGK label) is produced as solid digestate in Germany.

- **In Austria, Bulgaria**

- Mainly Liquid digestate – directly used in agriculture
- Low production of dewatered digestate – post composted and used in agriculture as a fertiliser

Digestate applications in EU



● In the Netherlands, Spain

- digestate from separately collected organic waste from households **always undergoes aerobic post-treatment** (composting) and the resulting material is sold as fertilizer or component in growing media.

● In Italy

- anaerobic digestion plants that treat agricultural biomass apply the digestate directly in agriculture.
- anaerobic digestion plants that treat organic wastes, the resulting digestate is considered a waste and the digestate can be aerobically post treated to produce compost.

Digestate applications in EU



- **In Belgium** (800 ktonne digestate was produced)
 - only professional users are allowed to apply liquid digestates, as it is assumed that these materials are not suitable for application by private users
 - **In Flanders**, in total 150 415 tonnes of products were produced from digestion in 2009. These products are mainly exported (56%). The second most important market is agriculture and horticulture (19%)
- **The UK** (124 ktonne digestate was produced in 2009)
 - developed an AD Quality Protocol, which defines end-of-waste for digestate. As of 2013, twelve plants are producing digestate certified.

Market of digestate in EU



- Dried digestate
 - Prices range from 5 - 30 € per tonne - depending on the feedstock, content of nutrients and quality
- Wet digestates
 - prices of 0 to 8 Euro/tonne, whereas composted digestates generally generate prices of 0 to 50 Euro per tonne.
- Average cost for anaerobic digestion in EU:
 - 30 – 90 EUR per tonne

Comparison of digestate quality requirements in EU



Country	AT	BE (FL)	CH	DE	SE	UK
<i>process requirements</i>	validated process		hydraulic dwell time 24 h \geq 53 °C Catering waste \geq 70 °C 1 h 12 mm	approved minimum hydraulic retention time or \geq 70°C 1h 12 mm	for different plant categories e.g. Cat. B/C: \geq 55 °C 6 h Minimum hydraulic dwell time 7 days	further requirement or national ABPR for catering wastes only: \geq 70°C 1h 60 mm or \geq 57 °C 5h 50 mm followed by storage for an average of 18 days
<i>Proof of sanitation</i>		X	X	X	X	X
<i>Salmonella</i>				Absent in 50 g fresh matter	Absent in 25 g fresh matter	Absent in 25 g fresh matter
<i>Germinable weeds and sprouting</i>		\leq 1 seed/l		\leq 2 seeds/l	\leq 2 seeds/l only for solid digestate	
<i>E. Coli</i>		Max 1000 CFU /g fresh matter	Max 1000 CFU /g fresh matter	Max 1000 CFU /g fresh matter with one exception in 5 trials of 5000 CFU/g	Max 1000 CFU /g fresh matter	Max 1000 CFU /g fresh matter
<i>Enterococci</i>		X	X	X	X	X



Country	AT	BE (FL)	CH	DE	SE	UK
Physical contaminants						
<i>Impurities</i>	≤ 0.5 % d.m. (glass, plastics and metals > 2mm)	≤ 0.5 % d.m. (glass, plastics and metals > 2mm)	≤ 0,5 % d.m. (glass, plastics and metals > 2mm)	≤ 0.5 % d.m. (glass, plastics and metals > 2mm)	≤ 0.5 % d.m. (glass, plastics and metals > 2mm)	≤ 0.5 % d.m. (glass, plastics and metals > 2mm)
<i>Visible impurities</i>				>25 cm ² /l fresh matter		
<i>Stones > 5mm</i>		< 2 % d.m.		< 10 % d.m.		< 8 % d.m.
Stability/maturity/fermentation degree						
<i>Oxygen consumption</i>		≤ 50 mmol O ₂ /kg organic matter/h				
<i>Organic acids</i>				≤ 1.500 mg/l		
<i>Volatile Fatty Acids</i>						0.43 g COD/g VS
<i>Residual Biogas Potential</i>						0.25 l/g VS
Organic matter and dry matter requirements						
<i>Organic matter content</i>	≥ 50 % d.m.			≥ 30 mass-% for solid dig.	≥ 20 mass.-%	
<i>Dry matter</i>						< 15 % of its mass should be dry matter for whole and liquid



Country	AT	BE (FL)	CH	DE	SE	UK
						digestate

Heavy metal limits (mg/kg d.m.)

As		150	-	-	-	-
Cd		6	1	1.5	1	1.5
Cr		250	70	100	100	100
Cu		375	100/150 (in case >50% pig manure)	100 Exception from limit value possible if tolerated by local authority	600	200
Hg		5	1	1	1	1
Ni		50	30	50	50	50
Pb		300	120	150	100	200
Zn		900	400/600 (in case >50% pig manure)	400 Exception from limit value possible if tolerated by local authority	800	400

Declaration parameters

Product type	x	x	x	x	x	x
Weight or volume	x	x	x	x	x	x
Bulk density				x		
Organic matter	x	x	x	x	x	x
pH Value	x	x	x	x	x	x
Salt content			x	x		
Nutrients total (N, P ₂ O ₅ , K ₂ O, MgO, S)	x (S, MgO)	x (S)	x + Ca (S)	x (S)	x + Ca	x (only total N, P and K)
Soluble Nitrogen (NH ₄ -N, NO ₃ -N)			x	x		Only NH ₄ -N
Micro nutrients				(x)		
Water soluble sodium chloride						x





Compost use potential in EU

- Based on ORBIT/ECN study (2008), about 29.5 % or 23.6 million tonnes of the estimated total recoverable potential of the 80 million tonnes organic waste fractions was separated at the source and treated predominantly through composting.

Present situation in EU	Amount
Amount of collected bio and green waste	23 600 000 tonnes
Amount of compost produced in the EU-27	11 800 000 tonnes
Arable land for plant production in the EU-27	123 391 000 ha ¹³
A typical application rate of 10 tonnes compost/ha/year needs	1 180 000 ha
Portion of the total arable land needed to absorb the compost	1.5 %

(Comparison of compost production and agricultural use potentials in the EU (Source: ORBIT/ECN, 2008).



EU compost production

Table 1: Compost produced in the EU (tonnes/year). Source: ORBIT/ECN (2008) and stakeholder survey December 2010

	Year	Total	Bio-waste (except green waste) compost	%	Green waste compost	%	Sewage sludge compost	%	Mixed waste compost	%	Other composts	%
AT	2005	634,400	218,400	34	380,000	60	32,000	5	4,000	1		0
BE/Flanders	2009	344,856	115,150	33	229,706	67	0	0	0	0		0
BE/Wallonia	2008	152,954	11,892	8	120,129	79	20,933	14	0	0		0
BG		0	0		0		0		0			
CY		0	0		0		0		0			
CZ	2006	77,600	4,000	5	21,600	28	52,000	67	0	0		0
DE	2008	4,384,400	2,048,600	47	1,599,000	36	627,600	14	0	0	109,200	2
DK	2008	374,530	17,600	5	315,600	84	41,330	11	0	0		0
EE		0	0		0		0		0			
ES	2008	610,148	53,969	9	6,549	1		0	549,630	90		0
FI	2005	180,000	150,000	83		0	30,000	17		0		0
FR	2005	2,490,000	170,000	7	920,000	37	800,000	32	600,000	24		0
EL	2005	8,840	0	0	840	10	0	0	8,000	90		0
HU	2005	50,800	20,000	39	30,800	61	0	0	0	0		0
IE	2006	100,500	25,000	25	34,000	34	17,000	17	24,500	24		0
IT	2008	1,004,952	802,340	80	176,804	18		0		0	25,808	3
LT		0	0		0		0		0			
LU	2005	20,677	20,677	100	0	0	0	0	0	0		0
LV		0	0		0		0		0			
MT		0	0		0		0		0			
NL	2008	1,603,464	595,464	37	1,000,000	62	8,000	0	0	0		0
PL		0	0		0		0		0			
PT	2005	29,501	2,086	7	1,730	6	2,500	8	23,185	79		0
RO		0	0		0		0		0			
SE	2008	199,700	71,700	36	116,000	58	0	0	12,000	6		0
SI		0	0		0		0		0			
SK	2005	32,938	1,836	6	27,102	82	4,000	12	0	0		0
UK	2005/06	2,036,000	316,000	16	1,660,000	82	15,000	1	45,000	2		0
EU-27		14,358,104	4,651,864	32	6,654,554	46	1,650,363	11	1,266,315	9	135,008	1
Bio and green waste compost					11,306,418	79						



Compost use in EU

	AT 2003	BE/ FI 2009 (¹)	DE 2005	ES (²) 2006	FI 2005	FR (³) 2005	HU 2005	IE 2006	IT 2003	NL bio- waste 2005	NL (²) green waste 2005	PL (³) 2005	SE 2005	UK 2005	Weight ed Mean EU(⁴)
Agriculture	40.0	11	53.4	88.0	20.0	71.0	55.0	37.0	51.0	74.8	44.4	—	—	30.0	50.9
Horticulture & green house production	10.0		3.9	8.0	—	25.0	15.0	3.0	—	—	15.5	—	5.0	13.0	10.6
Landscaping	15.0	38	15.9	4.0	20.0	—	10.0	6.0	6.0	3.6	12.3	—	20.0	14.0	10.4
Blends	15.0	44	13.6	—	10.0	—	—	16.0	—	15.0	5.1	—	—	2.0	6.3
Soil mixing companies	2.0		—	—	—	—	—	—	—	—	9.4	—	10.0	—	1.6
Wholesalers	—		—	—	—	—	—	—	—	—	5.2	—	15.0	—	0.9
Hobby gardening	15.0		11.9	—	—	4.0	5.0	—	27.0	1.1	2.3	—	10.0	25.0	12.9
Land restoration and landfill cover	2.0		—	—	50.0	—	15.0	38	2.0	—	—	100.0	40.0	16.0	4.9
Export	1.0	6	—	—	—	—	—	—	—	5.5	5.0	—	—	—	1.0
Others	—	2	1.3	—	—	—	—	—	—	—	0.8	—	—	—	0.5

(1) Data for Wallonia reported in different classification: Agriculture 56.6%; Private 4.4%; Potting compost 13.1%; Green areas 2.1%; Rehabilitation 4.1%; Storage on-site 5.6%; Landfill 2.7%; Other elimination 2.6%; Exported 8.9%. (²) Green waste compost. ; (³) Mainly mixed waste compost; (⁴) Weighted by data from Table 1

Market of Compost in EU



- Average price for compost products in EU
 - Prices range from 0 - 30 € per tonne - depending on the feedstock, content of nutrients and quality
- Average cost for composting in EU:
 - 35 – 60 EUR per tone

ECN Quality Assurance Scheme (ECN-QAS) for compost and digestate



Targets of ECN-QAS

- Harmonisation of the compost and digestate quality and requirements across Europe
- Harmonisation of quality assurance schemes across Europe
- Assistance to build up national quality assurance schemes
- Assurance and monitoring of high quality compost and digestate products in Europe
- Promotion of recycling of waste «from waste to product»



Content and labels of ECN-QAS



The European Quality Assurance Scheme includes:

- Awarding the ECN-QAS Conformity Label to national quality assurance organisations (NQA0)
- Awarding quality labels for composting plants and compost products
- Awarding quality labels for digestion plants and digestate products





National QAS for digestate in EU

Country	AT	BE (FL)	CH	DE	SE	UK
General information						
<i>QA organisation</i>	ARGE	VLACO	VKS-ASIC	BGK	AVFALL Sverige	REA
<i>Applicable standard</i>	Austrian Fertiliser Ordinance BGBl. II Nr. 162/2010	General Regulations for end products of biological treatment of bio-waste	Quality guideline for compost and digestate 2010	1) RAL GZ 245 for bio-wastes 2) RAL GZ 246 for renewable energy crops	SPCR 120	PAS 110:2010
<i>Types of digestate</i>		1 type	2 types	2 types		3 types
	whole	whole			whole	whole
			liquid	liquid		separated liquor
			solid	solid		separated fibre

National QAS for compost in EU



Country	Quality Assurance Organisation /Scheme
Austria	ARGE Kompost & Biogas
Belgium	Flemish compost organisation VLACO
Germany	Compost Quality Assurance Organisation (Bundesgütegemeinschaft Kompost BGK)
Denmark	DAKOFA (Danish Association on waste management)
Italy	Italian Compost Association (CIC)
Netherlands	BVOR Dutch Association of Compost Plants and Dutch Waste Management Association DWMA/VA
Sweden	Swedish Waste Management Association (Avfall Sverige)
UK	UK Composting Association
Bulgaria	100 – First Zero Waste & Organic Cycle Organisation (100 NGO) / ARGE Kompost & Biogas

Quality Assurance, Certificates and Labels for Compost and Digestion Residues



**QAS Monitoring in EU:
800 plants with capacity of
11 million tons composting
and
2.5 million tons digestion**



International QAS for compost

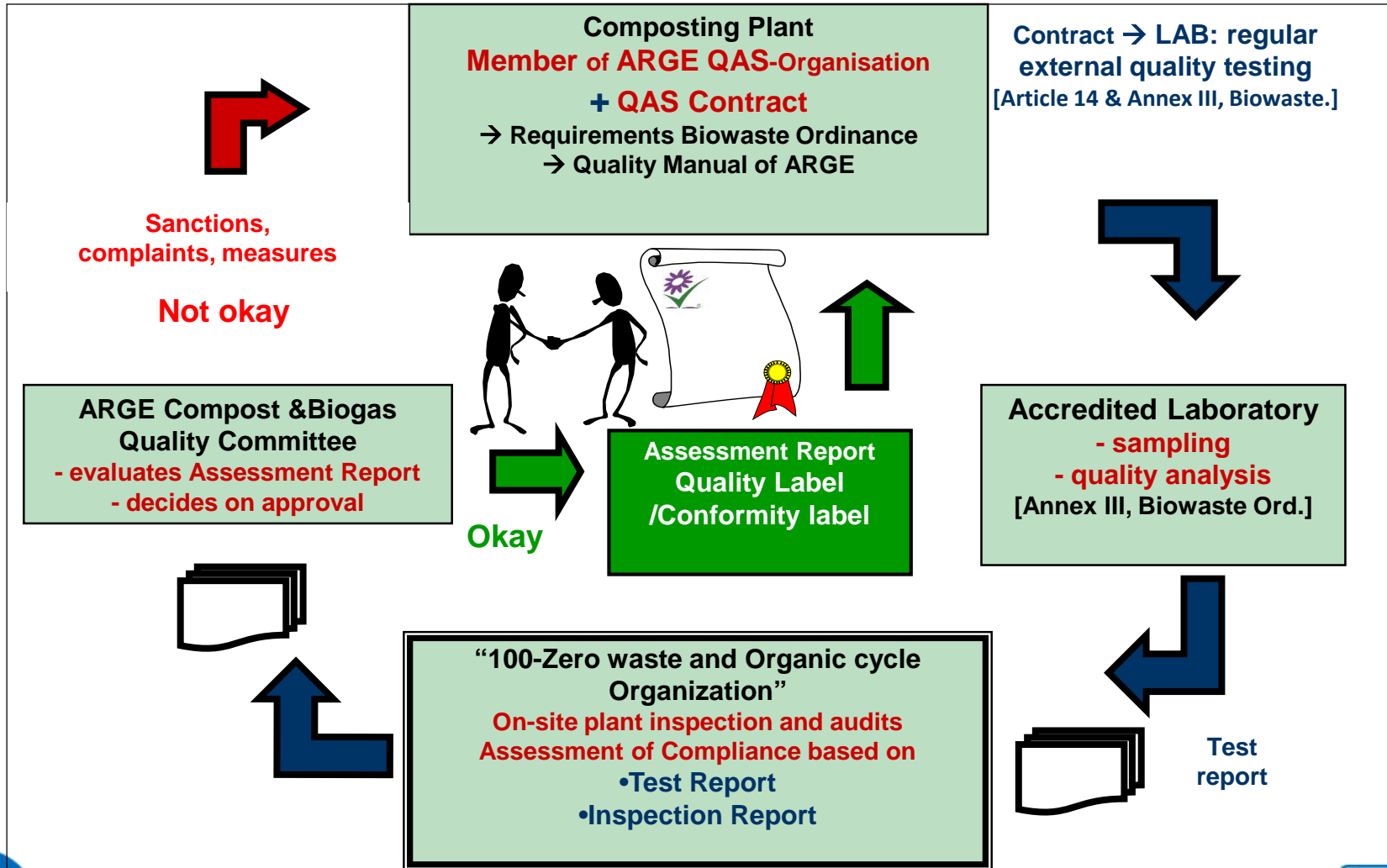


provided by:

“100 NGO” / “ARGE Kompost & Biogas Austria”



International QAS for compost



Biogas & Composting Plant Sofia, Bulgaria



- Composting plant – first quality certified plant by 100NGO/ARGE Austria
 - Capacity (24000 t/y)
 - Compost produced (2014-2016) = 9737 t. (100% sold in agriculture sector)
- Biogas plant
 - Capacity (20000 t/y)
 - Liquid Digestate produced (2015) = 16275 m³
 - Dewatered Digestate = post composted



ZERTIFIKAT
Quality Management and Control System
for Compost Austria

MUNICIPAL ENTERPRISE FOR WASTE TREATMENT - SOFIA

Compost Plant Han Bogrov
Gorni Bogrov village, Malo livade

on behalf of arge kompost & biogas has been inspected and controlled by its partner organisation

"100 – First Zero Waste & Organic Cycle Organisation"

for compliance with:

Ordinance on the Treatment of Biowaste from 15 October 2013, Technical Regulation ONR 192205 Implementation of quality assurance on composting plants; ONORM S 2206-1: Requirements for a quality assurance system for the production of composts - Part 1: Principles for quality assurance of a company and of the internal technical processes; ONORM S 2206-2: Requirements for a quality assurance system for composts - Part 2: Determination of tasks and conditions for a quality assurance organisation

The enterprise is eligible to refer to this certificate in the declaration and labelling of compost products that have been tested in compliance with the Ordinance on the Treatment of Biowaste from 15 October 2013 and to use the label „Kompost Qualitätsbetrieb“ as sign at the facilities premises and official documents issued by the composting plant in electronic and printed format.

Last inspection: 03.06.2015

Validity: until the next inspection, at maximum until 31.12.2016

Conditions of the validity of the certificate:

- Compliance with all relevant legal obligations, including the plant's permits
- Fulfilment of the requirements of arge kompost & biogas

Vienna, Sofia, 04.11.2015

Für das Qualitätssicherungs-Kollegium
Vorsitzender: Seifinger Hubert

GAS AKZO certified
by EGN-GAS



arge
kompost
& biogas

THANK YOU FOR YOUR ATTENTION!

“100 – First Zero Waste & Organic Cycle Organisation”



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