

# **Impact of EU regulations on waste and fertilizers on the use of digestate as bio-fertilizer**

**Fredrik Svensson** (The Swedish Gas Association)  
**Ola Palm** (JTI)

# The Swedish Gas Association

- **Promoting greater use of gas**

The Swedish Gas Association is a member-funded, industry association that acts as a voice for all gases where safety, technical matters, marketing and advocacy are key elements.

- **Green Gas 2050 – our vision**

The vision describes how Sweden with the help of an increased gas market can reach a carbon neutral industrial sector, fossil-free road transports, sustainable heat & electricity production, as well as a cleaner maritime sector.

- **National Biogas Strategy**

Collaboration to reach 15 TWh biogas by 2030.  
12 TWh in transport sector and 3 TWh in the industry

# Use of digestate in agriculture today

- **No specific EU-regulation for use of digestate**
- **Specific regulations in place for sewage sludge and manure**
- **Digestate is regarded as an organic fertilizer**
- **Use of digestate has to follow general rules for application of plants nutrients – details differs between countries (maximum amounts of N and P per hectare and times for application)**
- **Voluntary certification systems:**
  - Sweden (Certified re-use – SPCR 120)
  - ECN-QAS (European Compost Network - European Quality Assurance Scheme for compost and Digestate)



# Waste - EU-definition

## Waste directive 2008/98/EC

- **‘Waste’ means any substance or object which the holder discards, intends to or is required to discard**
- **‘Bio-waste’ means biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants**
- **End-of-waste criteria's can be set up to specify when certain waste ceases to be waste and obtains a status of a product**
  - iron, steel and aluminum scrap
  - glass cullet
  - copper scrap



# EC-formulae to turn bio-waste into a product

## Circular economy Package (launched mid 2015)

Includes revised legislative proposals on waste to stimulate Europe's transition towards a circular economy which will boost global competitiveness, foster sustainable economic growth and generate new jobs

A programme of action, with measures covering the whole cycle: from production and consumption to waste management and the market for secondary raw materials

One part in the package:

- New suggestion to Regulation to boost the use of organic and waste-based fertilizers



# Regulation of CE-marked fertilizing products

**Definition: ‘fertilizing product’ means a substance, mixture, micro-organism or any other material, applied or intended to be applied, either on its own or mixed with another material, on plants or their rhizosphere for the purpose of providing plants with nutrient or improving their nutrition efficiency.**

- Includes all fertilizers – mineral- as well as organic fertilizers and mixtures of them
- Lime products
- Manufactured soil products

**COM (2016)157 final , 17.03.2016**



# End-of-waste status

**“A CE marked fertilizing product that has undergone a recovery operation and complies with the requirements laid down in the suggestion to “CE-marked fertilizing products Regulation” shall be considered to comply with the conditions laid down in Article 6(1) of Directive 2008/98/EC and shall, therefore, be considered as having ceased to be waste.”  
(Article 18)**



# Basics – fertilizer regulation

- **As this is a regulation it will be the same in all member counties**
- **The CE-label enable a free movement of products between member countries**
- **It is not possible for a member country to deny the selling of a CE-labeled product**
- **It is voluntary to CE-label a fertilizer product**
- **The CE-rules will most probably set the standard even for products that not are CE-labeled!**





**Component Material Categories (CMC)**

(Annex II = INPUT MATERIAL)

Requirements

- CMC 1 - Virgin Material substances and mixtures
- CMC 2 - Non-processed or mechanically processed plants, plants part or plant extracts
- CMC 3 - Compost**
- CMC 4 - Energy Crop Digestates
- CMC 5 - Other Digestates than green crop digestates**
- CMC 6 - Food industry by-products (lime, vinasse, molasses)
- CMC 7 - Micro-Organismen (Azotobacter, Mycorrhizal, Rhizobium, Azospirillum)
- CMC 8 - Agronomic additives
- CMC 9 - Nutrient polymer
- CMC 10 - Other Polymer than nutrient polymers
- CMC 11 - Certain animal by-products - ref. EG 1069/2009 having reached endpoint of manufacturing chain

Annex II

**Product Function Categories (PFC)**

(Annex I) = PRODUCT

Safety, Quality, Labelling requirements,  
Conformity assesment

- PFC 1 - Fertilizers**
  - A. Organic Fertilizers**
    - I. solid
    - II. liquid
  - B. Organo-mineral fertilisers**
    - I. soild
    - II. liquid
  - C. Inorganic fertiliser**
    - I. Inorganic macronutrient fertil.
    - ....
    - II. Inorganic micornutrient fertil.
    - ...
- PFC 2 - Liming Material
- PFC 3 - Soil Improver**
  - A. Organic soil improver**
  - B. Inorganic soil improver**
- PFC 4 - Growing media**
- PFC 5 - Agronomic additives
  - A. Inhibitors
  - B. Chelators
  - C. Clomplexing agent
- PFC 6 - Plant stimulants
  - A. Microbial
  - B. Non-Micorbial
- PFC 7 - Fertilising product blend**

Annex I - V

# Important points in the CE-rules

- **Many similarities with SPCR 120 and ECN-QAS**
- **Source separated organic wastes can be used as substrate for a CE-labeled fertilizer**
- **Materials from the wastewater treatment sector are not allowed**
- **MBT-fractions are not allowed (mechanical, biological treatment)**
- **A notified body has to assess the conformity (valid for digestate, compost, soil products)**
- **Labelling requirements are set, including tolerance rules**



# Input materials

**Positive list (same principle as in SPCR 120 and ECN-QAS)**

- **Bio-waste according to WFD 2008/99 EC**
- **ABP Categories 2 and 3 (e.g. manure and catering waste)**
- **Plant material**
- **Additives possible – certain demands**
- **< 6 mg PAH<sub>16</sub>/kg DM - analysis could be avoided under certain conditions**



# Treatment

- **Demands (temperature and time) on thermophilic- and mesophilic digestion are listed.**
  - Thermophilic: Minimum 55 °C i during 24 h and a hydraulic retention time of 20 days, or 55 °C including a pasteurization step (70 °C – 1 h)
  - Mesophilic: 37–40 °C including a pasteurization step (70 °C – 1 h), or a composting step with set criteria's
- **Stability: Maximum biogas potential left in the digestate: 0,45 l biogas/g VS**



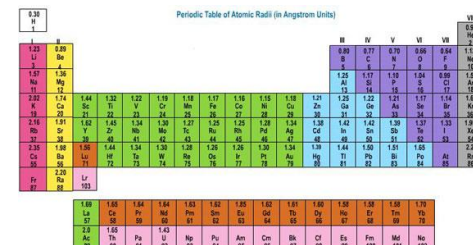
# Demands on organic fertilizers

- Only carbon and nitrogen with biological origin
- Limit values:
  - Cd 1,5 mg/kg DM
  - Cr(VI) 2 mg/kg DM
  - Hg 1 mg/kg DM
  - Ni 50 mg/kg DM
  - Pb 120 mg/kg DM
  - Biuret (C<sub>2</sub>H<sub>5</sub>N<sub>3</sub>O<sub>2</sub>) 12 mg/kg DM

Note: if it unlikely that the substance not is present, analysis is not necessary (i.e. Cr(VI) and Biuret is normally not needed to analyzed!)

- *Salmonella spp.* shall be absent in a 25 g sample
- < 1000 CFU/g fresh mass of *Escherichia coli* or Enterococcaceae

Periodic Table of Atomic Radii (in Angstrom Units)



										Periodic Table of Atomic Radii (in Angstrom Units)																																																																																																																																																																																																							
										I										II																																																																																																																																																																																													
										H										He																																																																																																																																																																																													
0.38																																																																																																																																																																																																																	
0.51	Li	0.60																					0.28	Be	0.35	B	0.48	C	0.60	N	0.71	O	0.83	F	0.92	Ne																																																																																																																																																																													
0.57	Na	0.56																					0.57	Mg	0.56	Al	0.54	Si	0.52	P	0.50	S	0.48	Cl	0.47	Ar																																																																																																																																																																													
0.63	K	0.63	Ca	0.62	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01																																																																																																																																															
0.71	Rb	0.71	Sr	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01																																																																																																																																								
0.79	Cs	0.79	Ba	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01																																																																																																																																
0.87	Fr	0.87	Ra	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01																																																																																																																								
1.68	La	1.68	Ce	1.66	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01																																									
2.07	Ac	2.07	Th	2.06	2.05	2.04	2.03	2.02	2.01	2.00	1.99	1.98	1.97	1.96	1.95	1.94	1.93	1.92	1.91	1.90	1.89	1.88	1.87	1.86	1.85	1.84	1.83	1.82	1.81	1.80	1.79	1.78	1.77	1.76	1.75	1.74	1.73	1.72	1.71	1.70	1.69	1.68	1.67	1.66	1.65	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56	1.55	1.54	1.53	1.52	1.51	1.50	1.49	1.48	1.47	1.46	1.45	1.44	1.43	1.42	1.41	1.40	1.39	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.29	1.28	1.27	1.26	1.25	1.24	1.23	1.22	1.21	1.20	1.19	1.18	1.17	1.16	1.15	1.14	1.13	1.12	1.11	1.10	1.09	1.08	1.07	1.06	1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61	0.60	0.59	0.58	0.57	0.56	0.55	0.54	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.34	0.33	0.32	0.31	0.30	0.29	0.28	0.27	0.26	0.25	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01

# Demands liquid organic fertilizer – continue

- **< 40 % of dry matter (DM)**
- **Contain at least one of the following declared nutrients in the minimum quantities stated:**
  - 2% by mass of total-N
  - 1% by mass of total phosphorus pentoxide ( $P_2O_5$ ), or
  - 2% by mass of total potassium oxide ( $K_2O$ )
  - Organic C > 5% by mass
- **Cu and Zn has to be declared if exceed:**
  - Cu 200 mg/kg DM
  - Zn 600 mg/kg DM
- **There is no demands on maximum amounts of metals that are added to an agricultural soil during use**



# Organo-mineral fertilizer

- **It is possible to mix an organic fertilizer with mineral fertilizers = organo-mineral fertilizer**
  - Other demands on Cd – related to P-content

**Note: P and K are expressed as  $P_2O_5$  and  $K_2O$ !**



# Sampling and tolerance

- **Sampling frequency depends on treated amount per year (1 – 12 times).**
  - Example 60 001- 80 000 tones = 6 times
- **Tolerance rules for the product for parameters that has to be declared:**
  - C ( $\pm 20 \%$ )
  - DM ( $\pm 5,0 \%$ -units)
  - Tot-N ( $\pm 50 \%$ )
  - Organen-N ( $\pm 50\%$ )
  - Tot  $P_2O_5$  ( $\pm 50 \%$ )
  - Tot  $K_2O$  ( $\pm 50 \%$ )
  - Total water soluble MgO, CaO,  $SO_3$  and  $Na_2O$  ( $\pm 25 \%$ )
  - Cu and Zn ( $\pm 50\%$ )
  - Amount ( $< 5 \%$ )





# Conclusions

- **The regulation is planned to be valid from 2018-01-01**
- **It is still a suggestion, but the official period for comments is passed**
- **Probably no major changes, but certain limit values and other details could be changed**
- **Although it is voluntary, it will set a new standard for organic fertilizers**
- **Open up for export/import**
- **Complicated structure but set common criteria's for all fertilizer products – positive!**
- **Difficult for digestate to apply to the minimum nutrient content requirements**
- **Metals and other parameters - OK**



# Thank you!

