IWAMA 4th International Capacity Development Workshop:
Smart Sludge Management

End-of-Waste for sewage sludge compost in Estonia – startup of the certification system

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IWAMA Interactive Water Management

Interreg Baltic Sea Region

EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION

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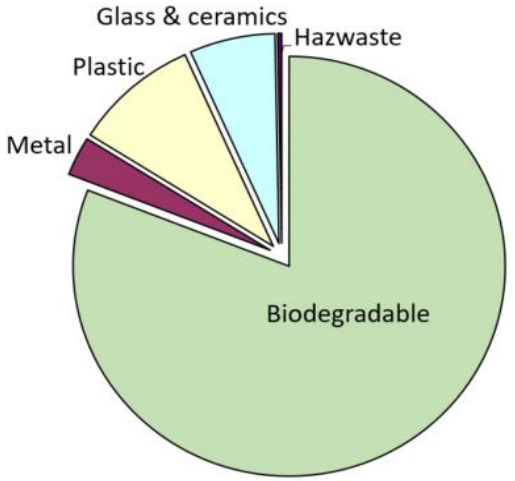
Estonian University of Life Sciences

Circular Economy

- End-of-waste law in Estonia:
  - EoW for biowaste compost
    https://www.riigiteataja.ee/akt/119122015010?leiaKehtiv
  - EoW for biowaste digestate
    https://www.riigiteataja.ee/akt/119052016009
  - EoW for sludge compost
    https://www.riigiteataja.ee/akt/128072017004

Driver: EoW for biowaste compost

- EU target is to recycle 65 % of municipal waste by 2035 (ec.europe.eu);
- Currently there is 240,000,000 t/y municipal waste in EU27 (Eurostat); out of which 150,000,000 t/y (65 %) is organic.



- **Conclusion**: we can not ignore biowaste

Circular Economy

- Let us recycle nutrients from sewage sludge back to fields!
  - Good for environment, but tricky from legal point of view.
- Sludge compost is still waste by definition!
- How to sell and buy waste?
  - Easy with some materials (glass, paper)
  - Difficult with many material types (C&D, biowaste, sludge)

- **Conclusion**: we need end-of-waste regulation for biowaste (but also to digestate, sludge, biofuels, and many other things)

End-of-waste criteria for biowaste

Waste Framework Directive (EU) 2008/98/EC & Waste Act (EST): RT I, 25.11.2016, 6

Waste (compost or sludge compost) shall cease to be waste when it has undergone a recovery operation and complies with the following criteria:

1. Compost is commonly used for specific purposes;
2. There is an existing market or demand for compost;
3. The use of compost is lawful (it fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products);
4. The use of compost will not lead to overall adverse impact on environmental or human health.

- **Conclusion**: Minister of Environment has to apply such criteria

Estonian Recycling Cluster (2010–2015)

OBJECTIVES

- To increase waste recycling rate
- To produce quality products from waste
- To increase the production capacity and volumes, joint marketing
- To increase the sales of the products & services.

ACTIVITIES

- Research
- Marketing and product development
- Image building
- Trainings and know-how

Waste to Products

Production of compost (incl sewage sludge)

Green areas, agriculture

Production of solid recovered fuels (SRF)

Cement industry

Production of recycled aggregates (incl ashes)

Road construction

Law-making

- No EU directives on quality requirements for biowaste compost.
- National standards exist, for example:
  - Swedish Waste Management's requirements, RVF report 99:2 (AFR report 257) "Sjösättning av certifieringssystem för kompost och rötrest".
  - British Standard, The Publicly Available Specification 100 (BSI PAS 100) for composted materials. WRAP (Waste and Resources Action Programme) & AFOR (Association for Organics Recycling).
  - German Bundesgütegemeinschaft Kompost e.V. (BGK) & RAL quality assurance
- European Compost Network **ECN** http://www.compostnetwork.info/

ECN

ECN QAS

(European Compost Network, Quality Assurance Scheme)

Suitable input material	**Positive-list**	What kind of waste is accepted to the compost plant?
Operation quality (plant)	**Check-list**	How compost is made & what technology is used?
Product quality (compost/digestate)	**Product control**	Quality and risk issues: Is it safe? Is it nutrient rich?
Product use (good practice)	**Application recommendation**	Where does it fit? How many tons per hectare?

ECN QAS (biowaste compost)

Quality parameters:
consumer has to know it!

Quality criteria	Parameter	Dimension	Appraisal
Soil improvement	Organic matter	[% DM]	≥ 15 %, declaration
	Liming value (CaO)	[% DM]	declaration
Fertilizing properties	Nitrogen (N) total	[% DM]	declaration
	Phosphorus (P) total	[% DM]	declaration
	Potassium (K) total	[% DM]	declaration
	Magnesium (Mg) total	[% DM]	declaration
Material properties	Maximum particle size	[mm]	declaration
	Bulk density	[g/l FM]	declaration
	Dry matter	[% FM]	declaration
	Salinity / El. conductivity	[mS/m]	declaration
	pH value		declaration
Biological parameters	Aerobic biological activity		declaration
	Plant response[1)]		declaration

Risk parameters:
producer has to avoid higher values

Precautionary quality criteria	Parameter	Limit value
Hygiene	Salmonellae	Absent in 25 g dry matter
Undesired ingredients and properties	Impurities (content)	≤ 0,5 % dry matter
	Weed seeds	≤ 2 seeds per liter
Inorganic pollutants	Lead (Pb)	130 mg kg^{-1} dry matter
	Cadmium (Cd)	1.3 mg kg^{-1} dry matter
	Chromium (Cr)	60 mg kg^{-1} dry matter
	Copper (Cu)[1)]	300 mg kg^{-1} dry matter[2)]
	Nickel (Ni)	40 mg kg^{-1} dry matter
	Mercury (Hg)	0.45 mg kg^{-1} dry matter
	Zinc (Zn)[1)]	600 mg kg^{-1} dry matter[2)]

Role of EMU

- EMU was asked to help drafting the criteria
  - We adopted ECN QAS
- EMU did large-scale study about safe use of compost in agriculture
  - Lab tests of composts, lab and field tests of crops on compost-amended soils, stability tests
- EMU participated in developing a ceritification system which is currently in operation

End-of-waste criteria

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4. The use of compost will not lead to overall adverse impact on environmental or human health.

Minister of environment applied such criteria: Requirements for producing compost from Biodegradable waste: RT I, 19.12.2015, 10

How does it work?

Is it waste or product?

YOU decide!

Waste Framework Directive 2008/98/EC gives us criteria (4 tk)

National regulation for biowaste **or** National Fertilizer directive **or** EU Fertilizer Directive **or** National regulation for sludge **or** National regulation for digestate **or** similar gives us values

But Who decides that the procedure is lawful?

It is a **Certification body!** ECN or National (in Estonia it is *Foundation 'Certification Centre of Recycled Materials'*)

But Who decides that national certification body is acting lawful?

It is National Accreditation Center!

Certification body

- SA Taaskasutatavate Materjalide Sertifitseerimiskeskus
- Peterburi tee 46, Tallinn 11415 Tallinn
- +372 6181 61
- www.recycling.ee; info@recycling.ee
- margit@recycling.ee & marit@recycling.ee

Timeline for biowaste compost certification system

2011	2012	13.04.2013	2013 sept	2014-2015	2015 June	2015 Dec	17.02.2016	16.03.2016
Compost quality research	Demo certification	Biowaste compost ordinance	Estonian Recycling Competence Center	Developing certification documents	Certification Centre of Recycled Materials	Biowaste Case 1: certification **start**.	Accreditation Centre issued certificate	Biowaste Case 1: **certificate issued**.


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ACCREDITATION CERTIFICATE

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The Estonian Accreditation Centre hereby confirms that

SA Taaskasutatavate Materjalide Sertifitseerimiskeskus
Certification Centre of Recycled Materials

vastab EVS-EN ISO/IEC 17065:2012 nõuetele kui sertifitseerimisasutus
conforms to the requirements of EVS-EN ISO/IEC 17065:2012 as a certification body

komposti sertifitseerimise valdkonnas
in the field of compost certification

Akrediteerimisulatus on esitatud tunnistuse lisas
The scope of accreditation is specified in the annex

Registreerimisnumber: PC026
Registration number:

Akrediteering kehtib kuni: 16.02.2021
Accreditation is valid until

Tallinnas, 17.02.2016

Kristina Saarmil
Juhataja Director


SIHTASUTUS
TAASKASUTATAVATE MATERJALIDE
SERTIFITSEERIMISKESKUS

TOOTE SERTIFIKAAT
Nr 0000

Turule tooja / Tootja
ETTEVÕTTE NIMI
Registrikood 000000000
Aadress..

täidab biolagunevatest jäätmetest [toote (nt komposti)] tootmisel Keskkonnaministri 8. aprilli 2013. a määrusega nr 7 „Biolagunevatest jäätmetest komposti tootmise nõuded" sätestatud nõudeid.

Toodetud [toote (nt komposti)] ohutus- ja kvaliteedinäitajad on Keskkonnaministri 8. aprilli 2013. a määruse nr 7 „Biolagunevatest jäätmetest komposti tootmise nõuded" Lisas 2 toodud komposti ohutus- ja kvaliteedinäitajate piirväärtuste piires.
[Kui vase arvnäitaja ületas 110 mg kg-1kuivaines ja/või tsingi arvnäitaja ületas 400 mg kg-1 kuivaines, siis märkida need näitajad sertifikaadile]

Sertifikaat hakkab kehtima __.__.____ ja kehtib kuni ei ole oluliselt muudetud [toote (nt komposti)]tootmisprotsessi ja kontrollmõõtmiste tulemusel ei ilmne probleeme [toote (nt komposti)]ohutus- ja kvaliteedinõuete täitmisel, kuid mitte kauem kui __.__.____

Sertifikaat väljastati __.__.____

KVALITEETNE KOMPOST

Allan Pohlak
Juhataja

SA Taaskasutatavate Materjalide Sertifitseerimiskeskus
Peterburi tee 46, Tallinn 11415
Reg.nr 90013124

Producer of compost (self-control is mandatory)

Assessment of documents

Yes

Application for a certificate

Suggestions for improvements!

No

Certificate is granted!

Yes

Decision

Estonian Certification Centre of Recycled Materials

- prepares the plan of asses
- contracts the experts and
- decides to issue or not to i

Contract

Report

Accredited laboratory

Analyses

Expert

1. inspects the production site
2. performs sampling
3. evaluates the quality of compost

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The Estonian Accreditation Centre hereby confirms that

OÜ Eesti Keskkonnauuringute Keskus
Marja 4d, Tallinn

Estonian Environmental Research Centre LLC

vastab EVS-EN ISO/IEC 17025:2006 nõuetele kui katselabor
conforms to the requirements of EVS-EN ISO/IEC 17025:2006 as testing laboratory

keskkonna, toiduainete, alkoholi, gaaside, naftasaaduste ja vedelkütuste proovivõtu ja analüüside, koguste mõõtmise, iseloomu parameetrite mõõtmise ning pinnase geotehniliste katsete valdkonnas
in the field of environment, foodstuff, alcohol, gases, petroleum products and liquid fuels sampling and analyses, measurements of the quantity, measurements of indoor climate parameters and soil geotechnical tests

Akrediteerimise ulatus ja tingimused on esitatud tunnistuse 10 lisas
The scope and conditions of accreditation are specified in the 10 annexes

Registreerimisnumber: L008
Registration Number:

Akrediteeritus kehtib kuni: 09.06.2018
Accreditation is valid until:

Tallinnas, 10.06.2013

Ülikooli Kivilaht
Juhataja Director

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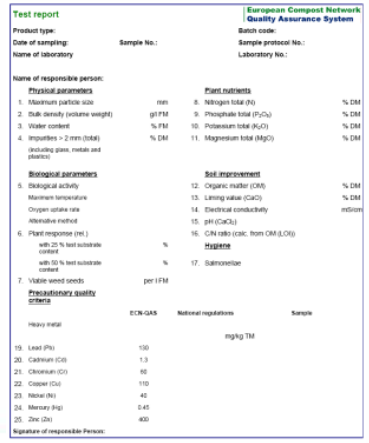
Juhataja Director



Test report
European Compost Network Quality Assurance System

Product type:
Batch code:
Date of sampling:
Sample No.:
Sample protocol No.:
Name of laboratory
Laboratory No.:

Name of responsible person:

Physical parameters			**Plant nutrients**		
1.	Maximum particle size	mm	8.	Nitrogen total (N)	% DM
2.	Bulk density (volume weight)	g/l FM	9.	Phosphate total (P_2O_5)	% DM
3.	Water content	% FM	10.	Potassium total (K_2O)	% DM
4.	Impurities > 2 mm (total) (including glass, metals and plastics)	% DM	11.	Magnesium total (MgO)	% DM
Biological parameters			**Soil improvement**		
5.	Biological activity		12.	Organic matter (OM)	% DM
	Maximum temperature		13.	Liming value ($CaCO_3$)	% DM
	Oxygen uptake rate		14.	Electrical conductivity	mS/cm
	Alternative method		15.	pH ($CaCl_2$)	
6.	Plant response (rel.)		16.	C/N ratio (calc. from OM (LOI))	
	with 25 % test substrate content	%	**Hygiene**		
	with 50 % test substrate content	%	17.	Salmonellae	
7.	Viable weed seeds	per l FM			
Precautionary quality criteria					

	Heavy metal	ECN-QAS	National regulations	Sample
			mg/kg TM	
19.	Lead (Pb)	150		
20.	Cadmium (Cd)	1.5		
21.	Chromium (Cr)	80		
22.	Copper (Cu)	110		
23.	Nickel (Ni)	40		
24.	Mercury (Hg)	0.45		
25.	Zinc (Zn)	400		

Signature of responsible Person:

DM = dry matter; FM = fresh matter

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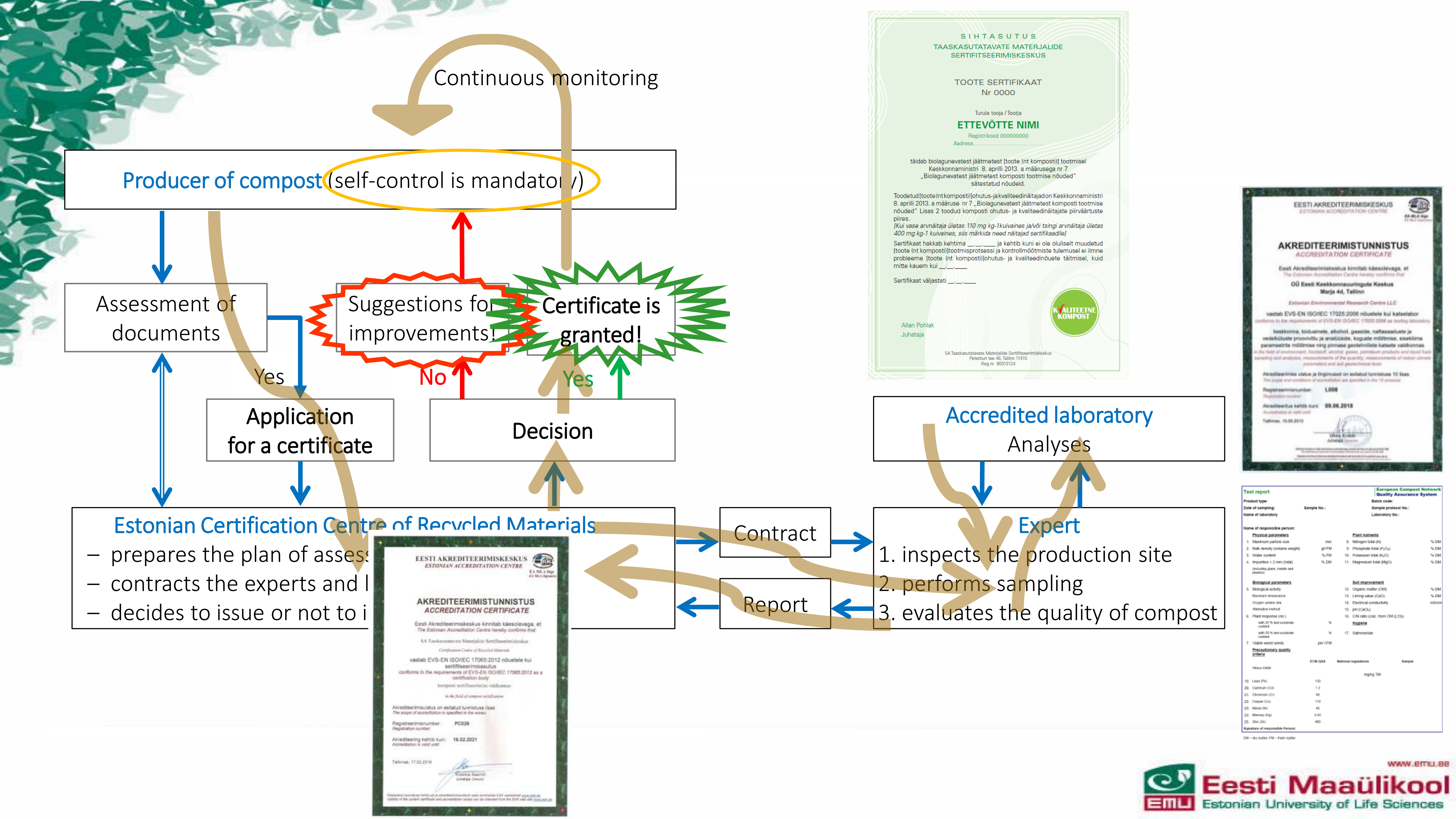

Continuous monitoring
Producer of compost (self-control is mandatory)
Assessment of documents
Suggestions for improvements!
Certificate is granted!
Yes
No
Yes
Application for a certificate
Decision
Estonian Certification Centre of Recycled Materials
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Content of sludge ordinance

https://www.riigiteataja.ee/akt/128072017004

- Scope of the law & definitions
- Requirements for sludge treatment
- Requirements for managing co-composted biodegradable waste
- Requirements for reception of biodegradable wastes
- Requirements for composting facility
- Requirements for sampling
- Requirements for storage of compost
- Requirements for self-control system and record-keeping
- Certification authority
- Assessment of conformity of compost with requirements
- Disclosure of information concerning utilisation of compost

Timeline for sludge compost certification system

2015	2016	19.07.2017	2017 summer	2017 summer	2017 autumn	2018
aquaConsult study on sludge	Draft law on Sludge EofW	Sludge EofW in foce!	Certification Centre, certification documents!	Case 1: start certification of sludge compost.	Accreditation Centre issued certificate	Case 1: time-out


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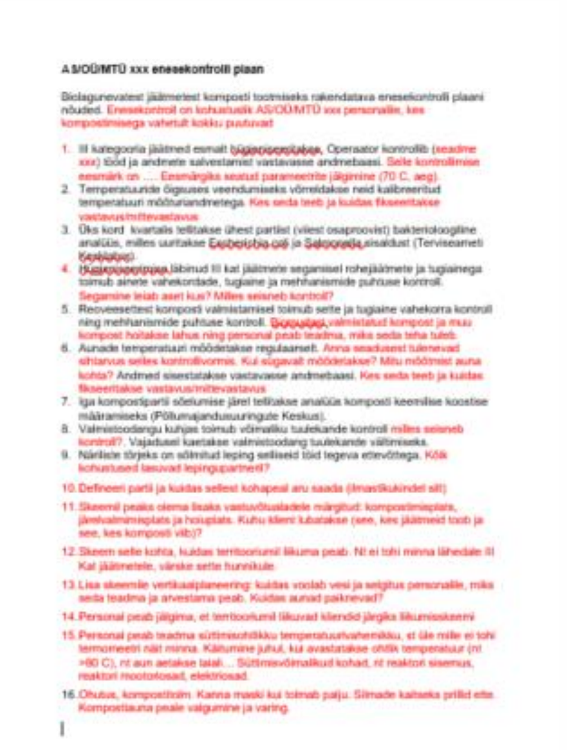
Kristina Saarniit
Juhataja Director

Conclusions

- Quality of compost can not be a result of ‘positive accident’.
- It has to be achieved **‘by producers will’**.
- I see self-control system as a key!

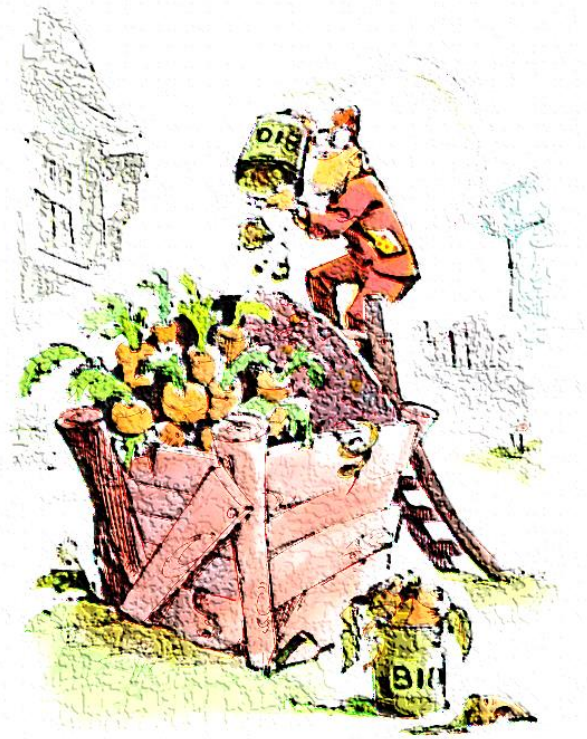
- Basic principle for EoW & Certification have to be similar for all materials.
- Certification should be recognised as help for produceres!



AS/OÜ/MTÜ xxx enesekontrolli plaan

Biolagunevatest jäätmetest komposti tootmiseks rakendatava enesekontrolli plaani nõuded. Enesekontroll on kohustuslik AS/OÜ/MTÜ xxx personalile, kes kompostimisega vahetult kokku puutuvad

1. III kategooria jäätmed esmalt hügieniseeritakse. Operaator kontrollib (seadme xxx) tööd ja andmete salvestamist vastavasse andmebaasi. Selle kontrollimise eesmärk on …. Eesmärgiks seatud parameetrite jälgimine (70 C, aeg).
2. Temperatuuride õigsuses veendumiseks võrreldakse neid kalibreeritud temperatuuri mõõturiandmetega. Kes seda teeb ja kuidas fikseeritakse vastavus/mittevastavus
3. Üks kord kvartalis tellitakse ühest partiist (viiest osaproovist) bakterioloogiline analüüs, milles uuritakse Escherichia coli ja Salmonella sisaldust (Terviseameti Keskalabor).
4. Hügieniseerimise läbinud III kat jäätmete segamisel rohejäätmete ja tugiainega toimub ainete vahekordade, tugiaine ja mehhanismide puhtuse kontroll. Segamine leiab aset kus? Milles seisneb kontroll?
5. Reoveesettest komposti valmistamisel toimub sette ja tugiaine vahekorra kontroll ning mehhanismide puhtuse kontroll. Biojäätmetest valmistatud kompost ja muu kompost hoitakse lahus ning personal peab teadma, miks seda teha tuleb.
6. Aunade temperatuuri mõõdetakse regulaarselt. Anna seadusest tulenevad sihtarvus selles kontrollvormis. Kui sügavalt mõõdetakse? Mitu mõõtmist auna kohta? Andmed sisestatakse vastavasse andmebaasi. Kes seda teeb ja kuidas fikseeritakse vastavus/mittevastavus
7. Iga kompostipartii sõelumise järel tellitakse analüüs komposti keemilise koostise määramiseks (Põllumajandusuuringute Keskus).
8. Valmistoodangu kuhjas toimub võimaliku taaslekande kontroll milles seisneb kontroll?. Vajadusel kaetakse valmistoodang taaslekande vältimiseks.
9. Närilise tõrjeks on sõlmitud leping selliseid töid tegeva ettevõttega. Kõik kohustused lasuvad lepingupartneril?
10. Defineeri partii ja kuidas sellest kohapeal aru saada (ilmastikukindel silt)
11. Skeemil peaks olema lisaks vastuvõtualadele märgitud: kompostimisplats, järelvalmimisplats ja hoiuplats. Kuhu klient lubatakse (see, kes jäätmeid toob ja see, kes komposti viib)?
12. Skeem selle kohta, kuidas territooriumil liikuma peab. Nt ei tohi minna lähedale III Kat jäätmetele, värske sette hunnikule
13. Lisa skeemile vertikaalplaneering: kuidas voolab vesi ja selgitus personalile, miks seda teadma ja arvestama peab. Kuidas aunad paiknevad?
14. Personal peab jälgima, et territooriumil liikuvad kliendid järgiks liikumisskeemi
15. Personal peab teadma süttimisohtlikku temperatuurivahemikku, et üle mille ei tohi termomeetri näit minna. Käitumine juhul, kui avastatakse ohtlik temperatuur (nt >60 C), nt aun aetakse laiali… Süttimisvõimalikud kohad, nt reaktori sisemus, reaktori mootoriosad, elektriosad
16. Ohutus, kompostitolm. Kanna maski kui tolmab palju. Silmade kaitseks prillid ette. Kompostiauna peale valgumine ja varing.



Thank you!

mait.kriipsalu@emu.ee