Development of Estonian legislation and certification system, basis for End of Waste for sewage sludge

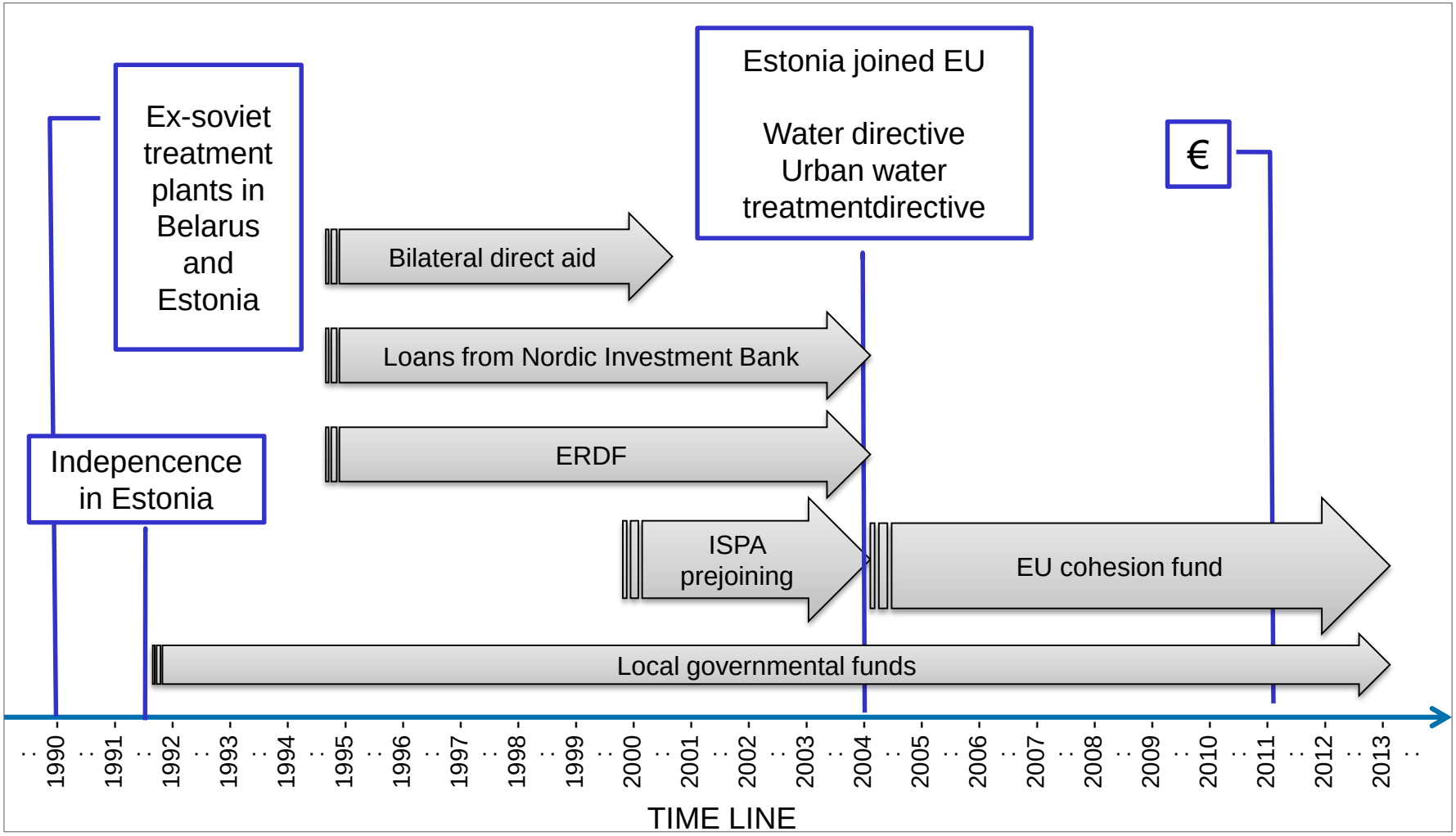
Vallo Lemmiksoo

Aqua consult Baltic
Estonian University of Life Sciences

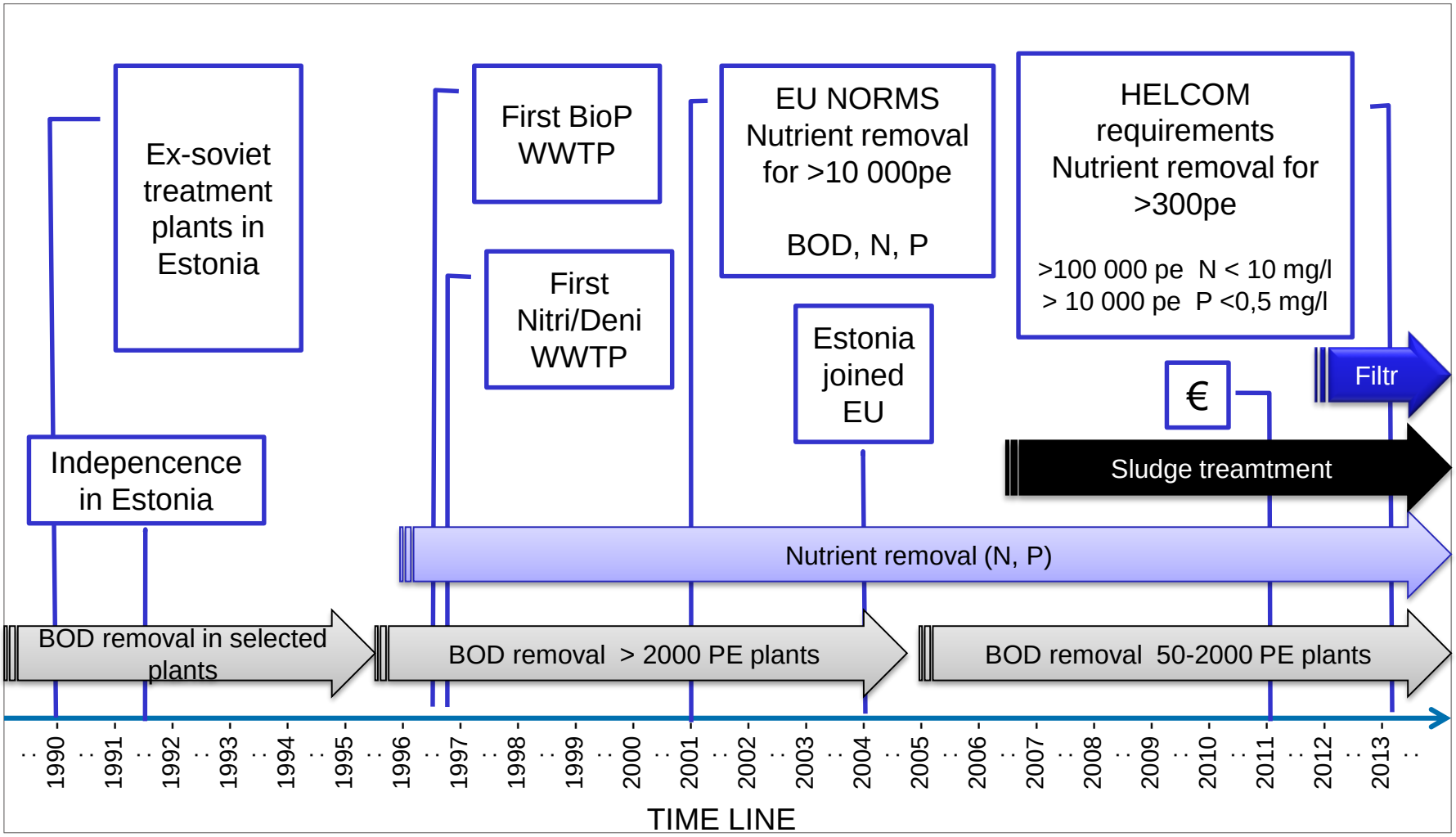
Tartu 08.02.2018

Estonia- overview

Milestones- financing WSS infra



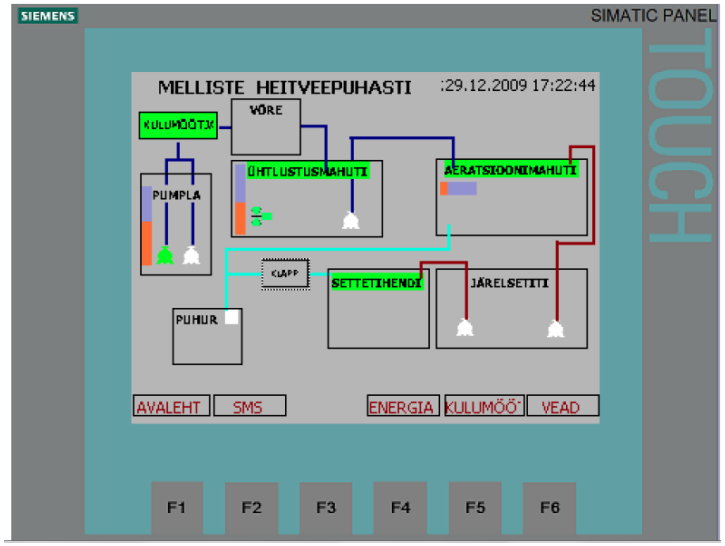
History of Estonian WWTP from 90´s

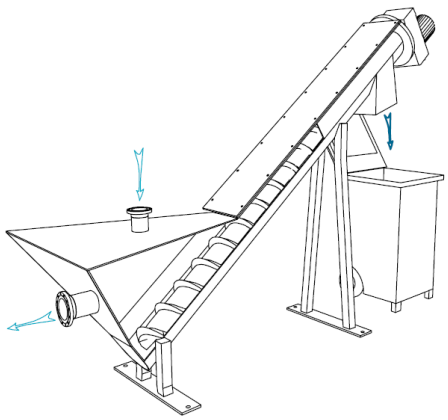


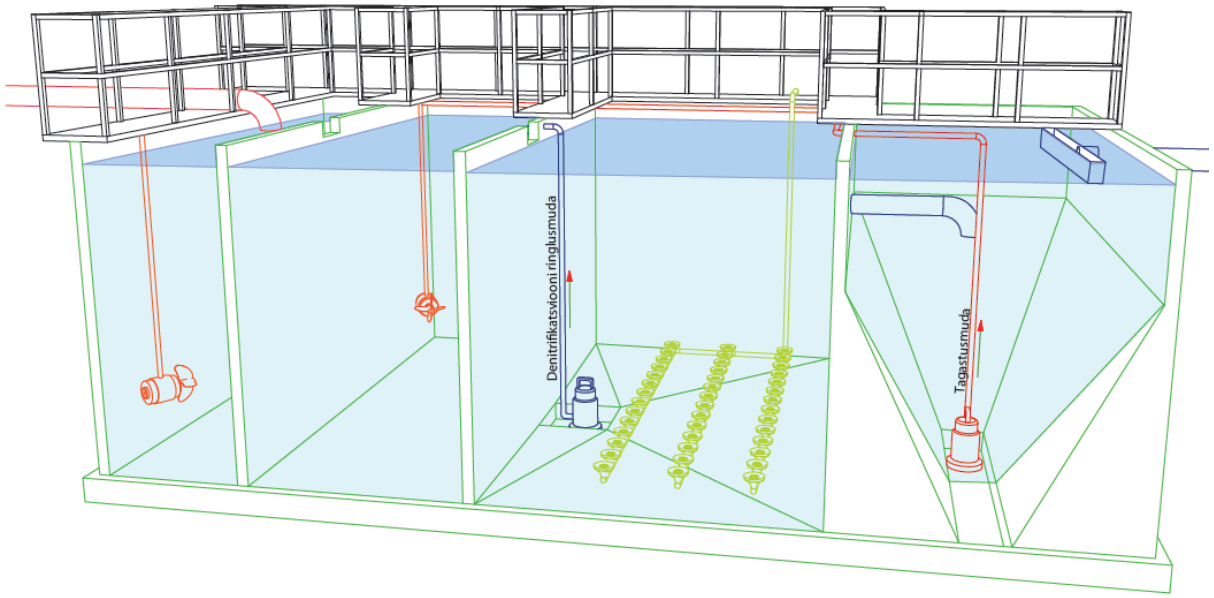
Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument)

Result:

Most small (200-1000PE) WWTP technology is activatred sludge







The sludge study

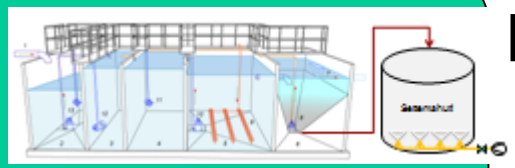
The Estonian Ministry of the Environment contract

- Investigation of the sludge management strategy in Estonia
- Development of the solutions for regional sludge treatment and elaboration of the waste discontinuation criteria for wastewater sludge

June 2014 – April 2016

- **Stage I – Overview of the sludge management**
- **Stage II – Sludge usage and clarification of the sludge potential users**
- **Stage III – Discontinuation criteria**
- **Stage IV – Financial and economic study for sludge management**

Sludge management at the end of CF 2007-2013 period



Local dewatering and transport to largerr plant

Reactor composting

Anaerobic digestion

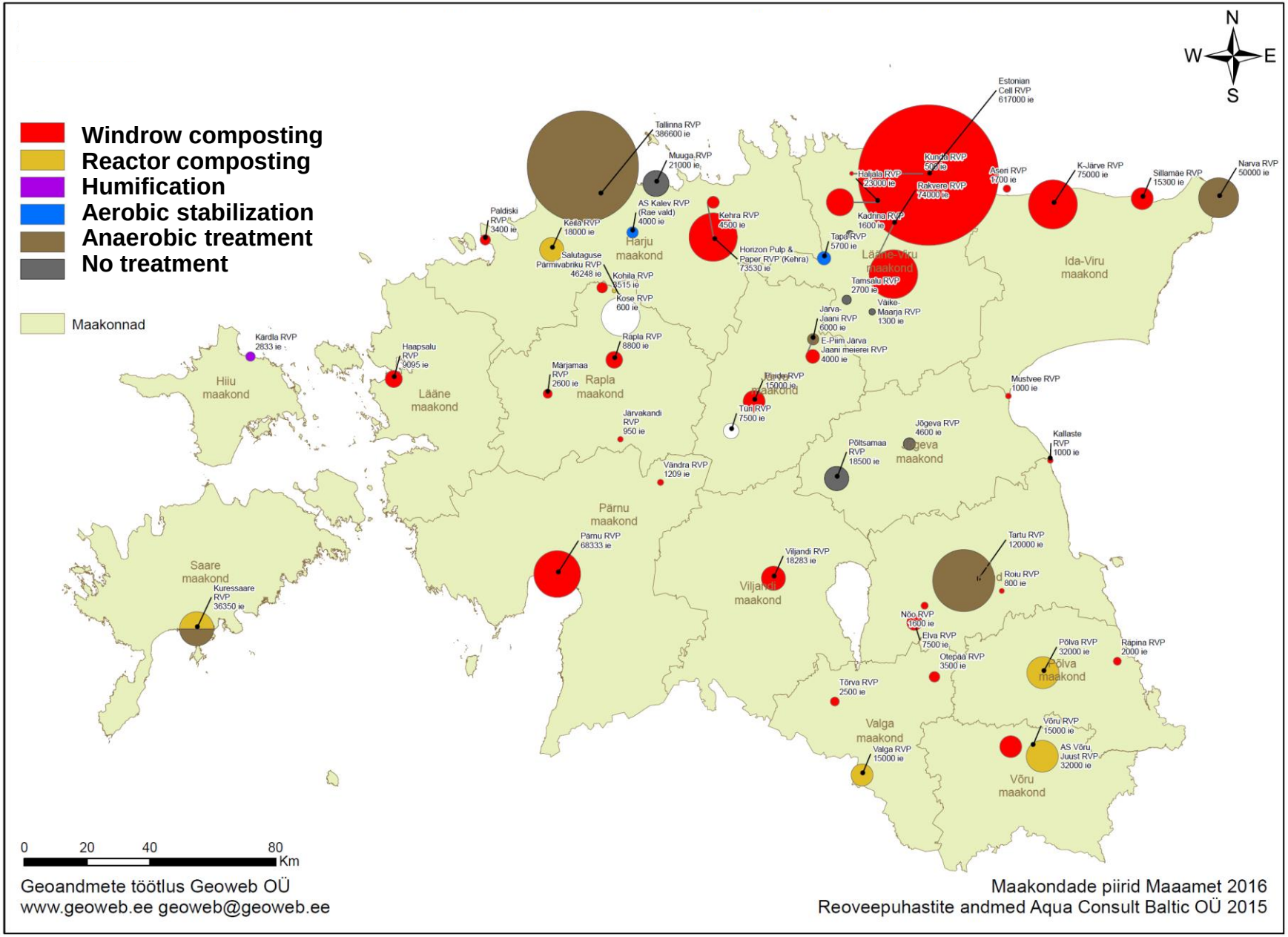
Windrow composting

Extended aerobic

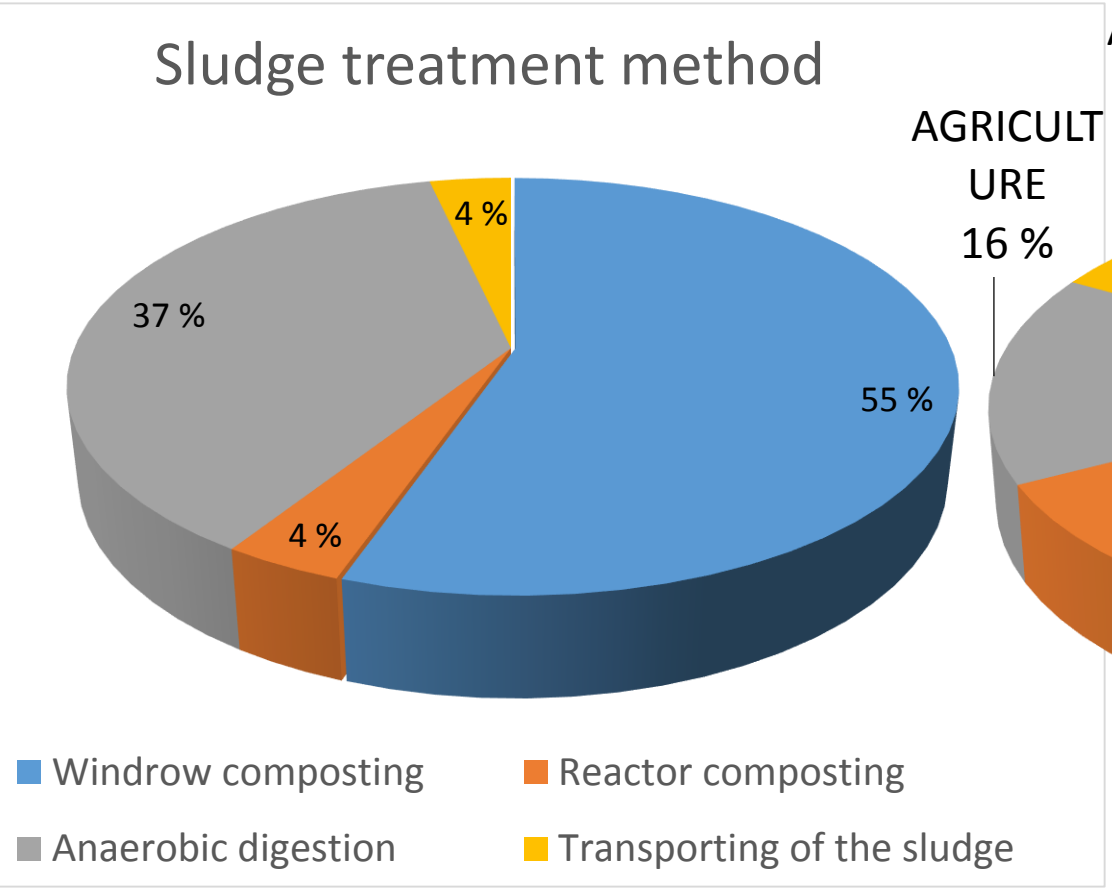
Drying/ Incineration at Future?

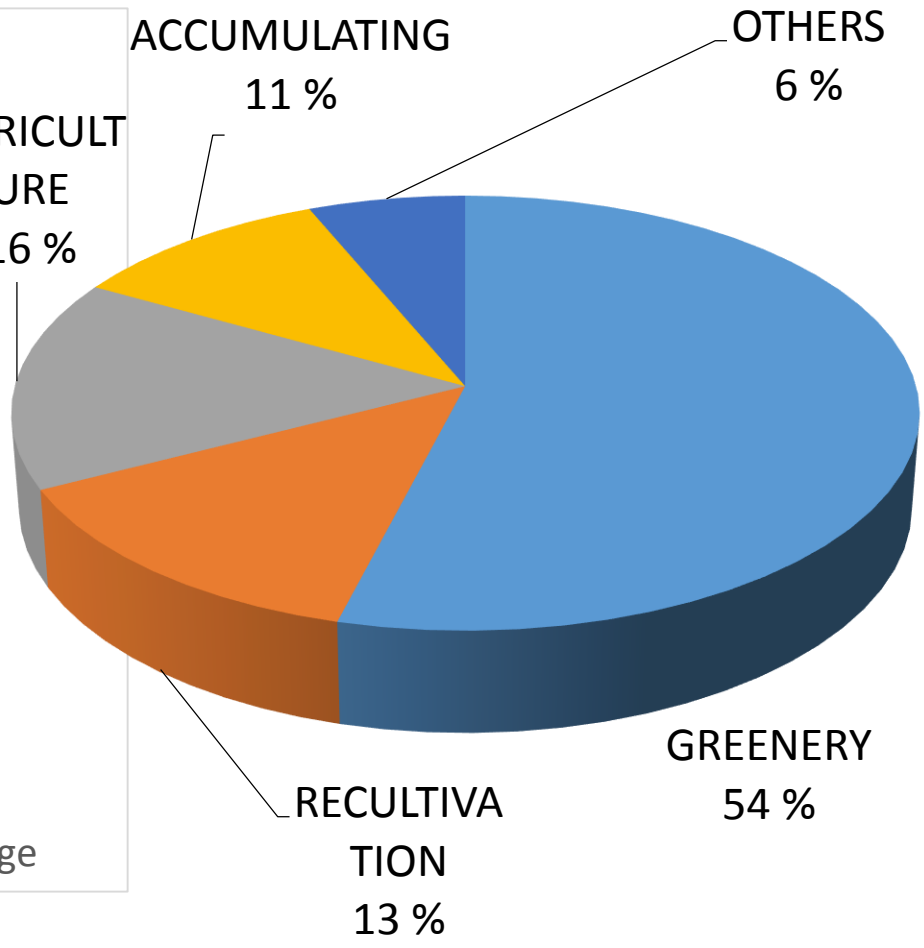
5 ... 50 … 100 … 500 …1000 …5000 …10 000… 50 000… 100 000 … 500 000 PE

Larger WWTP loadings and sludge treatment technologies

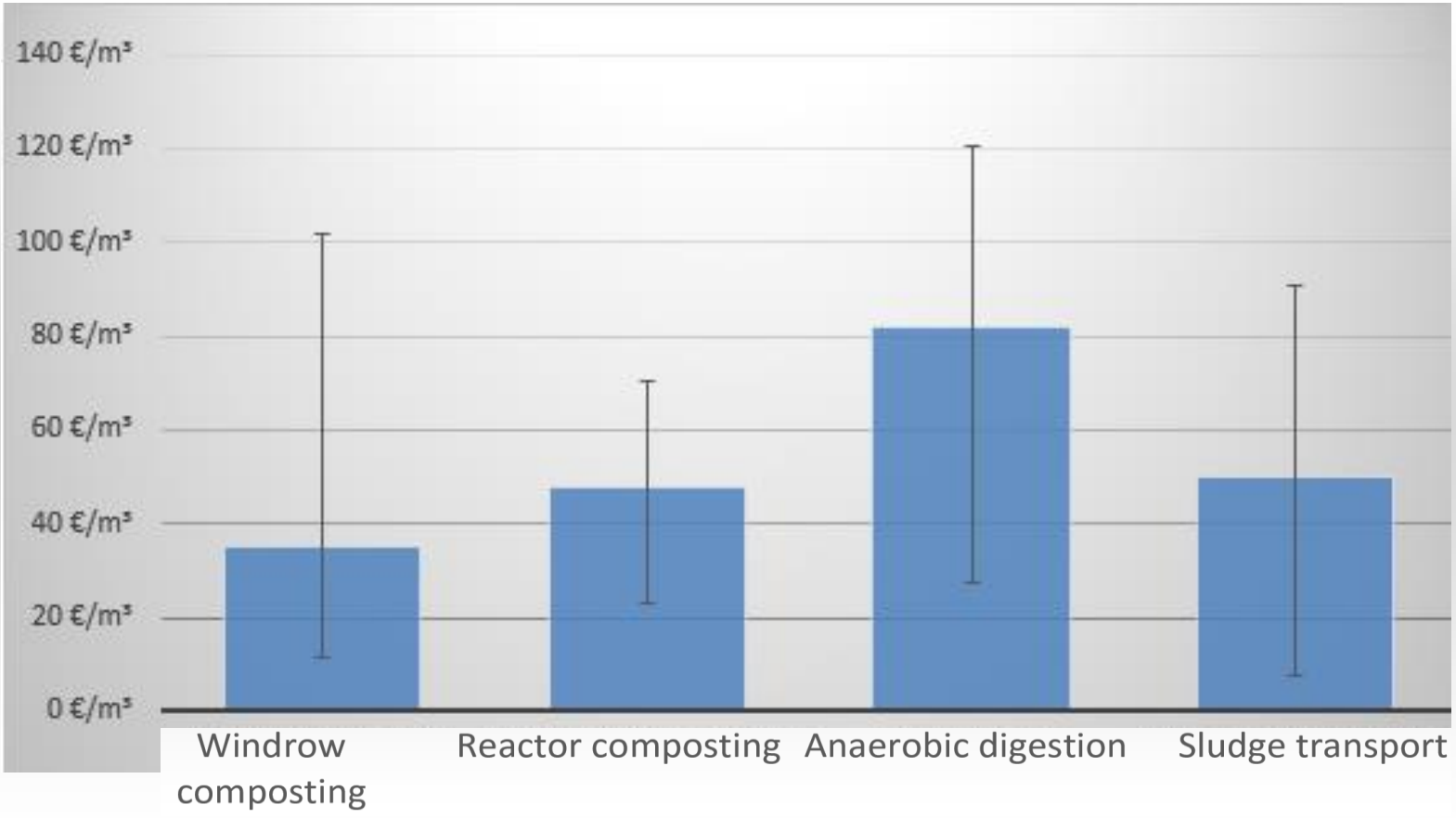


Conclusion of 2015y sludge treatment status





Conclusion of 2015y sludge treatment



Potential users?

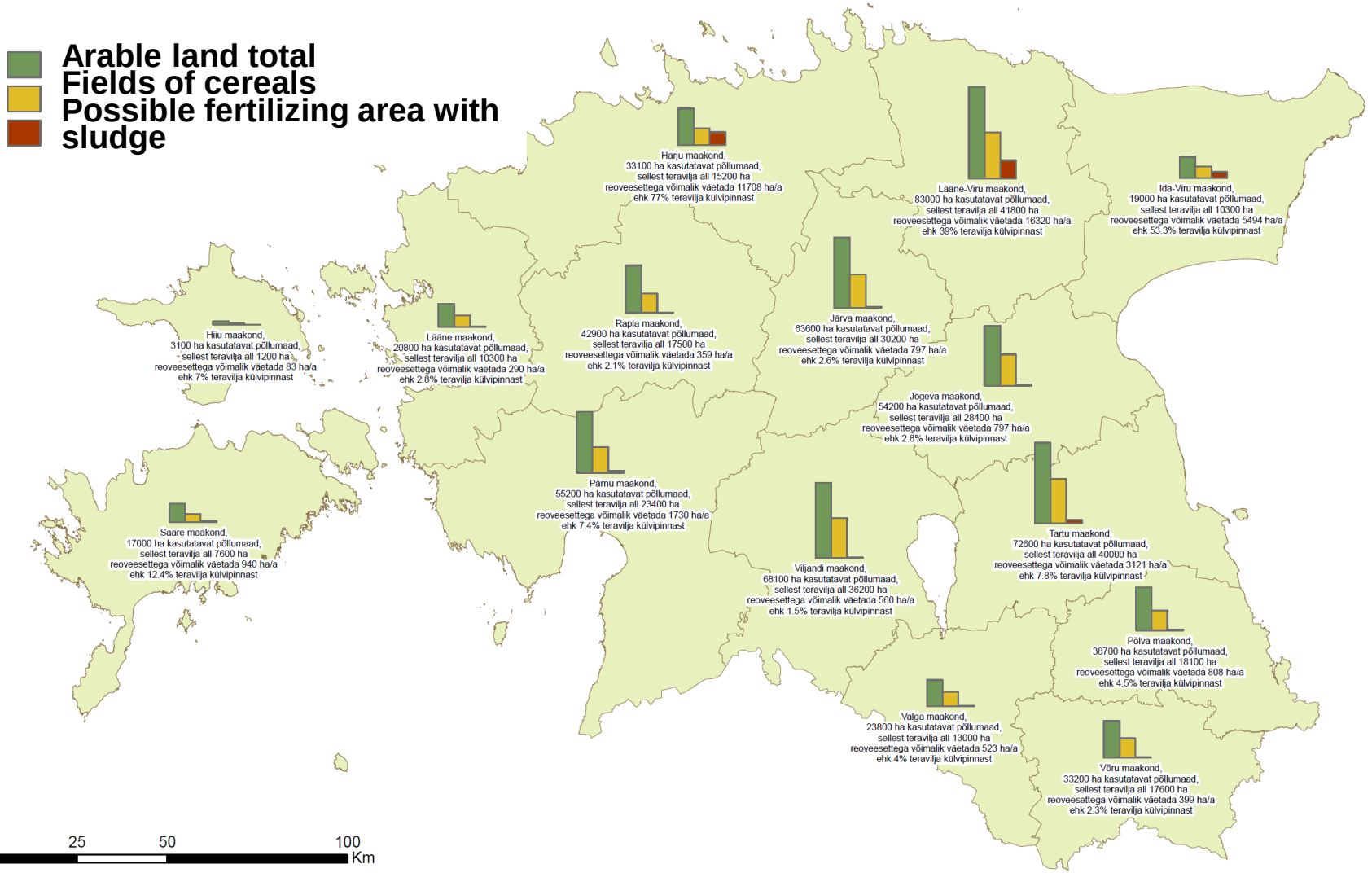
- Greenery
- Recultivation
- Forestry
- Agriculture
- Others

Media has large impact to possible users!

Citations

- „Usage like this is completely forbidden in all over the world, it contains **bacteras** and **heavy metals**„

Potential as fertilizer in agriculture



Geoandmete töötlus Geoweb OÜ
www.geoweb.ee geoweb@geoweb.ee

Maakondade piirid Maaamet 2016
Reoveepuhastite andmed Aqua Consult Baltic OÜ 2015

Sludge quality – what is the current quality?

- **Stabilisation**
  - Content of organics

ESTONIAN SLUDGE LEGISLATION

- **Hygienisation**
  - Content of pathogens

ESTONIAN SLUDGE LEGISLATION

- **Anthropogenic inorganic contaminants**
  - Heavy metals (Cd, Hg, Ni, Zn, Cu, …)

ESTONIAN SLUDGE LEGISLATION

- **Anthropogenic (toxic) non-biodegradable organics**
  - Drugs, antibiotics, hormones, PCB, …

NOT IN EVALUATION

NO AVAILABLE DATA

Heavy metals – Legislation EU / Estonia

COUNCIL DIRECTIVE

of 12 June 1986

on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture

(86/278/EEC)

- Limits for heavy metals in Estonian legislation are accordance with EC directive 86/278/EEC
- Limits apply for sludge usage in **agriculture, greenery and recultivation**

Heavy metal		Limit
		mg / kg TS
Cadmium	Cd	20
Copper	Cu	1000
Nickel	Ni	300
Lead	Pb	750
Zinc	Zn	2500
Mercury	Hg	16
Chromium	Cr	1000

Heavy metals – levels in Estonia

- Study of Estonian wastewater sludge by Etonian Central Lab
- 8 wastewater treatment plants, total 80 sludge analyses
- Proportion of samples which are nonconforming with the respective limits

	Cd, mg/kg	Cr, mg/kg	Cu, mg/kg	Hg, mg/kg	Ni, mg/kg	Pb, mg/kg	Zn, mg/kg
Limits in tne Estonian legislation - 30.12.2002 nr 78	**20**	**1000**	**1000**	**16**	**300**	**750**	**2500**
- UNTREATED sludge - nonconforming analyses	0%	2%	0%	0%	0%	0%	1%
- TREATED sludge - nonconforming analyses	0%	0%	0%	0%	0%	0%	0%

What about EOW?

Sludge legislation - EU

COUNCIL DIRECTIVE

of 12 June 1986

on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture

(86/278/EEC)

WORKING DOCUMENT
SLUDGE AND BIOWASTE
21 SEPTEMBER 2010, BRUSSELS

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
ENVIRONMENT
Directorate C - Industry
ENV.C.2 - Sustainable Production and Consumption

This Working Document is intended as a basis for discussions with stakeholders. It does not necessarily represent the position of the Commission.

Baltic Marine Environment Protection Commission

Group on Sustainable Agricultural Practices — AGRI 1-2014
Copenhagen, Denmark, 20-21 November 2014

Document title	Drafting of HELCOM Recommendation on sewage sludge handling
Code	9-2
Category	INF
Agenda Item	9 – Phosphorous recycling
Submission date	17.11.2014
Submitted by	Sweden and Germany
Reference	2013 Ministerial Declaration

Parameter	Concentration (mg/ kg DS)	Concentration (mg/kg P)
Cd	~~1~~1,5	40
Cu	900	21 400
Ni	~~50~~80	1 400
Pb	~~100~~150	1 600
Zn	~~2 500~~5000	800
Hg	1	40
Cr	300	2 100
~~Ag~~	~~5~~	~~180~~
As	~~18~~40	-
~~Tl~~	~~1,5~~	~~-~~
~~U~~	~~-~~	~~50 mg Uran/ kg P2O5~~
~~B(a)P (Benzo(a)pyren)~~	~~1~~	~~-~~
~~PCB (Polychlorinated Biphenyls)~~	~~0.1~~	~~2~~
PCDD/F (Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans)	30*	700*

Estonian EOW biowaste compost legislation 13.04.2013

ECN-QAS

Summary

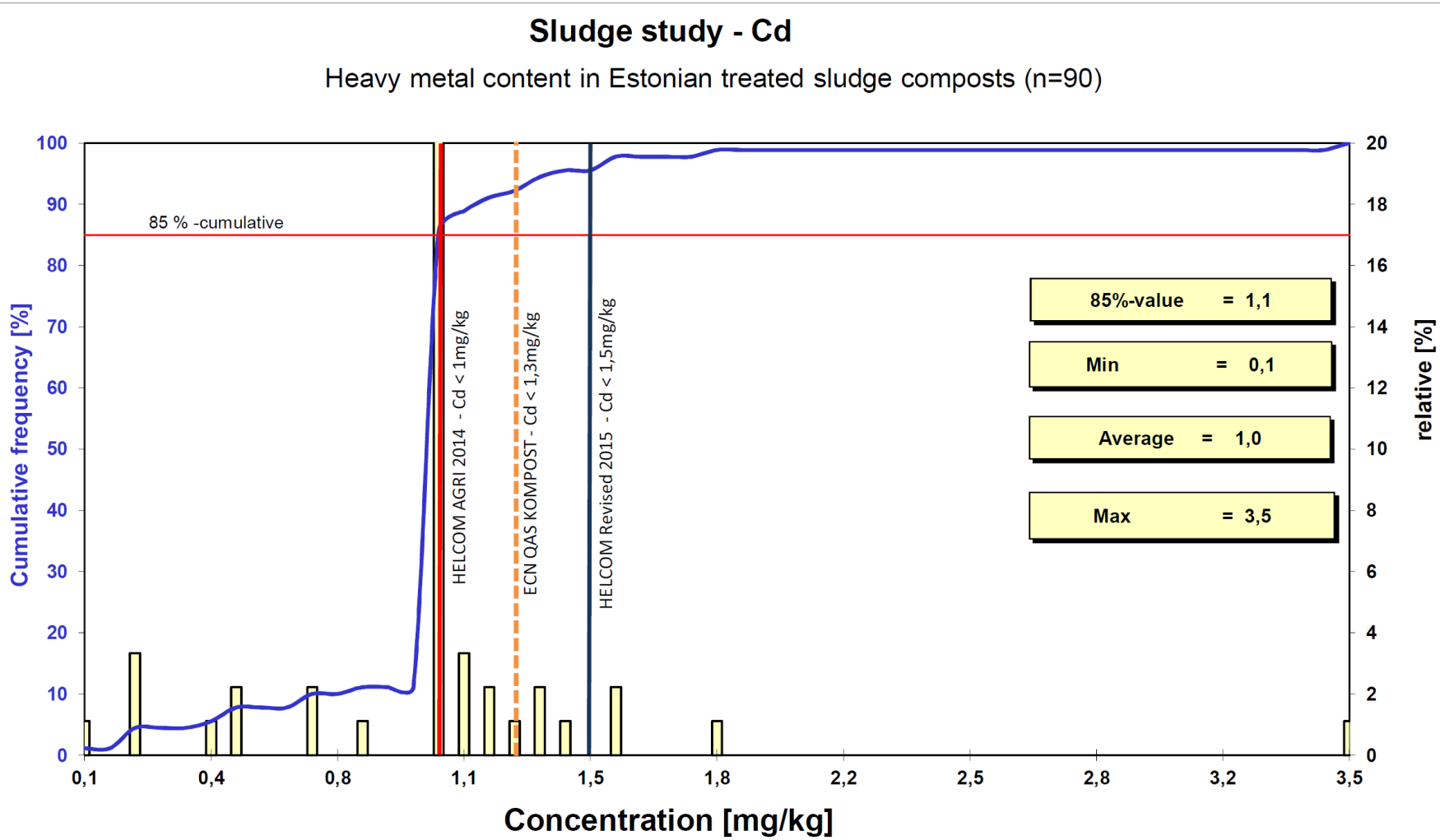
Table 2: Precautionary requirements on the protection of environment and consumers		
	Parameter	**Assessment**
Hygienic aspects	Salmonellae	0 in 25 g DM
Undesired ingredients	Impurities (glass, metals, plastics)	≤ 0.5 % DM
	Weed seeds	≤ 2 per litre
Harmful matter	**Heavy metals**	**mg / kg DM**
Precautional limit values[1)]	Lead (Pb)	130
	Cadmium (Cd)	1.3
	Chromium (Cr)	60
	Copper (Cu)[2)]	300[3)]
	Nickel (Ni)	40
	Mercury (Hg)	0.45
	Zinc (Zn)[2)]	600[3)]

[1)] Amlinger, F. et al. 2004: Heavy metals and organic compounds in waste used as organic fertilisers.

[2)] Copper and zinc are classified as essential nutrients. Values over 110 mg Cu kg^{-1} DM and over 400 mg Zn kg^{-1} DM must be declared.

[3)] These values are classified as benchmarks.

Evaluation of data- example Cd



Heavy metals – Result in current EOW legislation

Heavy metals	Estonia Sludge as WASTE [mg/kg TS]	**Estonia EOW** related to TS [mg/kg TS]	ECN-QAS [mg/kg TS]	HELCOM [mg/kg TS]	**Estonia EOW** Related to P [g/kg P]	Limits in soil		
						good condition mg/kg	residental land mg/kg	Industrial area mg/kg
Mercury (Hg)	16	**1**	0,45	~~1~~ 1,5	**0.1**	0,5	2	10
Cadmium (Cd)	20	**2**	1,3	1	**0.15**	1	5	20
Lead (Pb)	750	**130**	130	~~100~~ 150	**7.5**	50	300	600
Zinc (Zn)	2 500	**2500**	600	~~2500~~ 5000	**125**	200	500	1000
Nickel (Ni)	300	**40**	40	~~50~~ 80	**4**	50	150	500
Chromium (Cr)	1 000	**60**	60	300	**15**	100	300	800
Copper (Cu)	1 000	**200**	200	900	**45**	100	150	500

Sludge quality at EOW criteria

- **Stabilisation**
  - Content of organics

SPECIFIED

- **Hygienisation**
  - Content of pathogens

SPECIFIED

- **Anthropogenic inorganic contaminants**
  - Heavy metals (Cd, Hg, Ni, Zn, Cu, …)

SPECIFIED

- **Physical residues**
  - Particles , garbage , unwanted seeds etc…

SPECIFIED

- **Anthropogenic (toxic) non-biodegradable organics**
  - Drugs, antibiotics, hormones, PCB, …

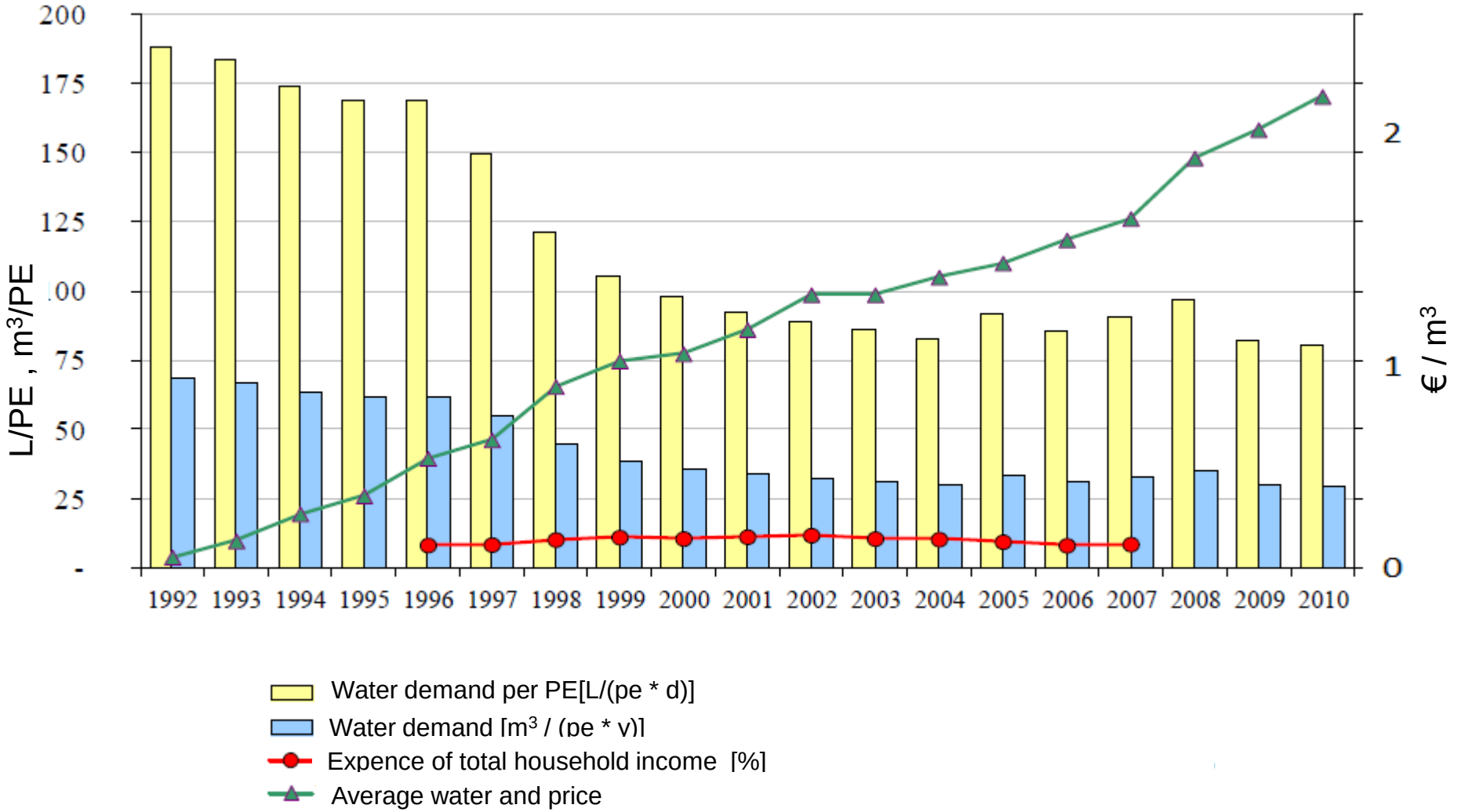
NOT IN EVALUATION

NO AVAILABLE DATA

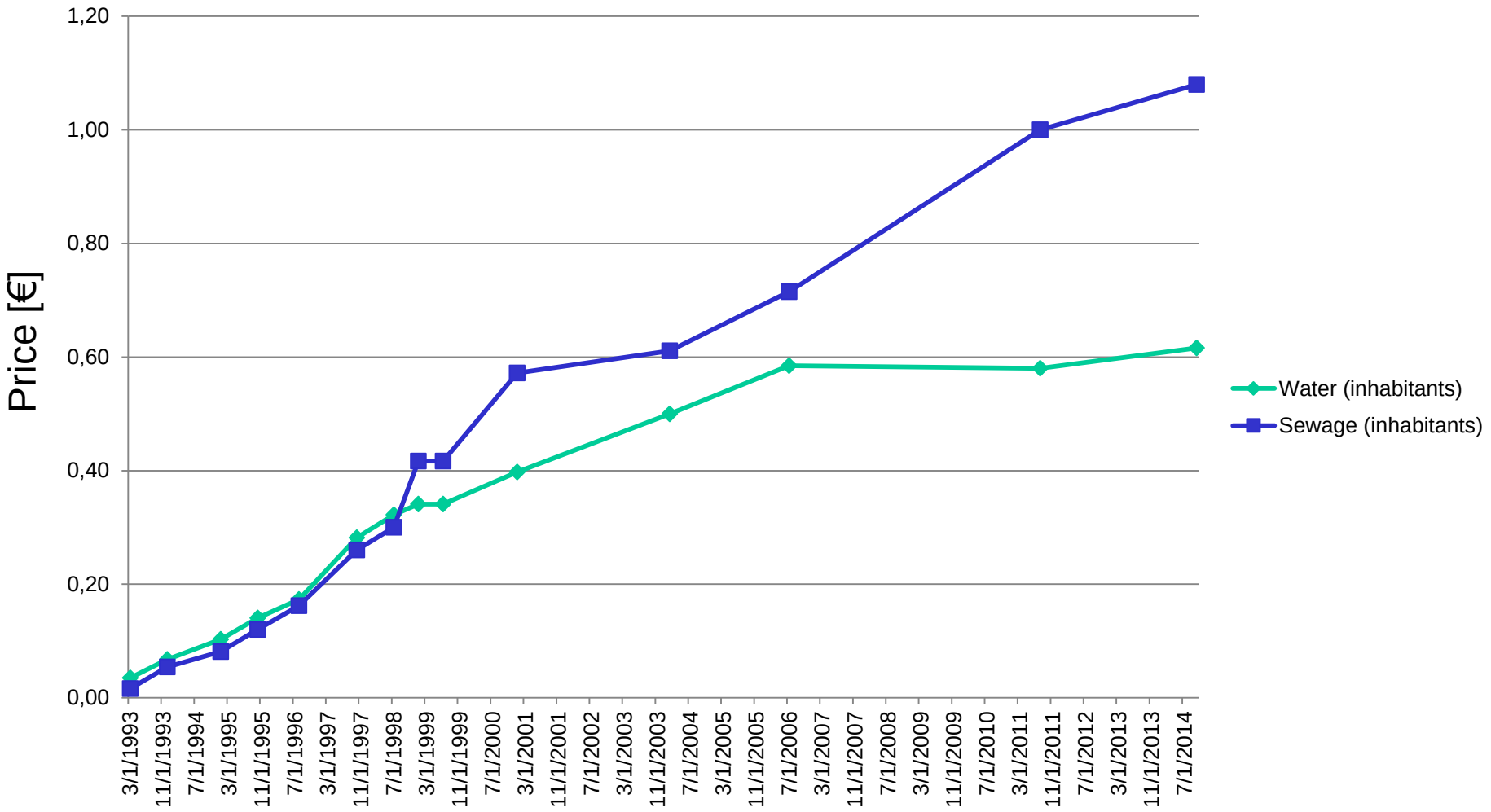
…….

RISK

Feasibility-influence of household income

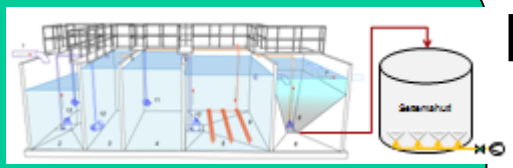


Water price developent in Tartu



Alternatives of feasibility (for final use):

A and A+B



Local dewatering and transport to largerr plant

Reactor composting

Anaerobic digestion

Windrow composting

A- Sludge treamtent centres for complete Estonia

A+B- Achieving EOW criteria

Alternatives of feasibility (for final use):

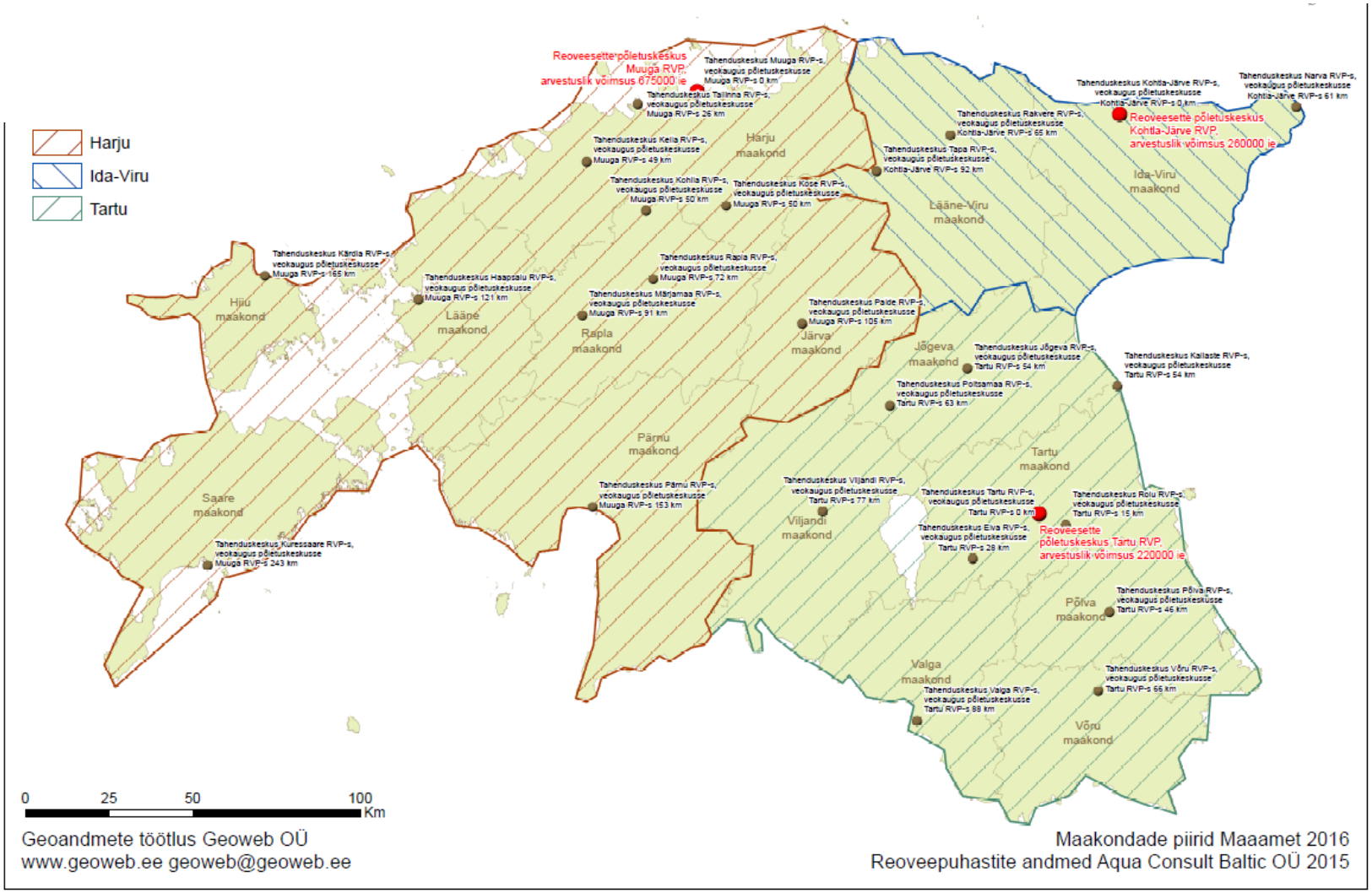
C and D

C- One incineration centre

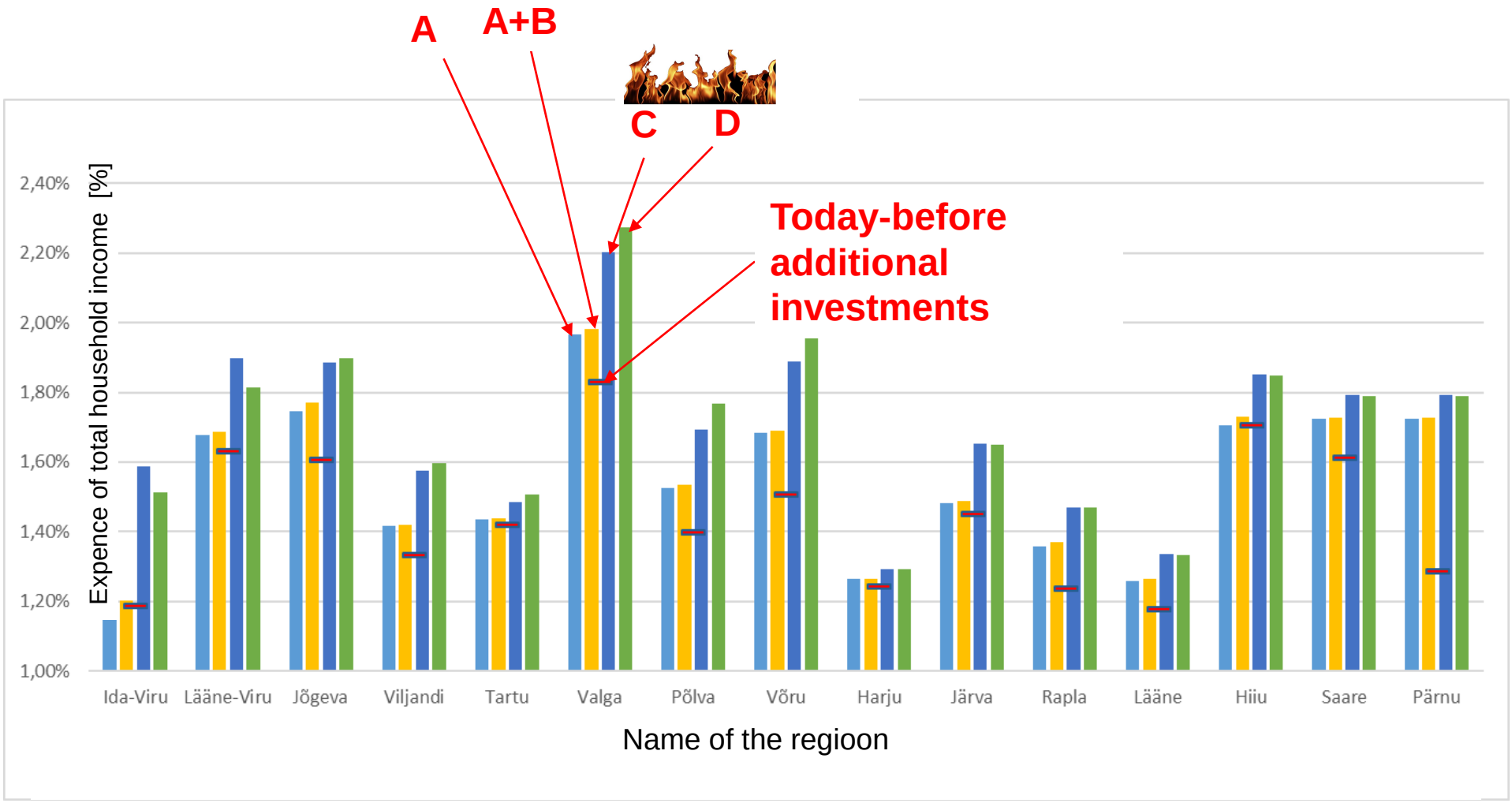
D- Three incineration centres

Perspective incineration centres

3 pc



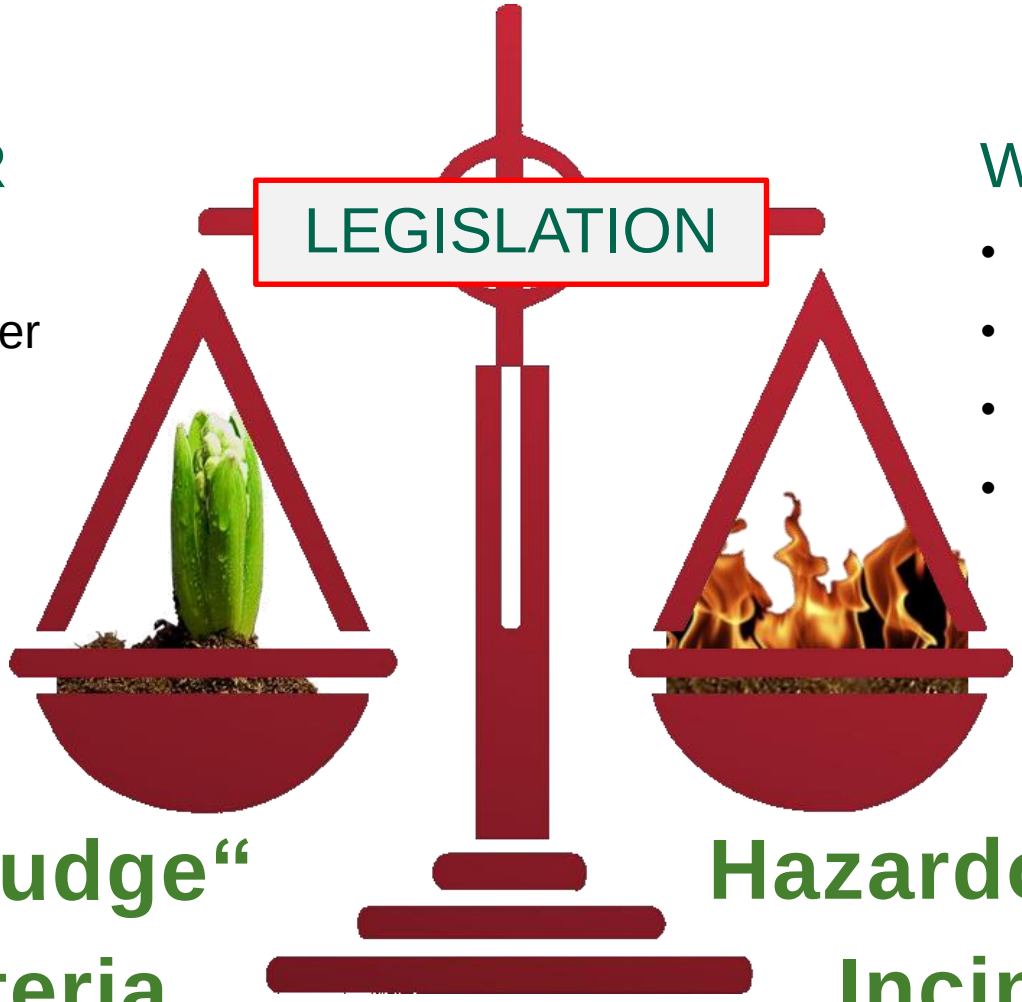
Conclusion of Feasibility



Fate of Sludge

FERTILIZER

- N, P, K, Mg, ..
- Organic fertilizer
- Cheap



WASTE

- Organics
- Pathogens
- Heavy metals
- Drugs, hormones

„Quality sludge“
EOW criteria

Hazardous sludge
Incineration

Conclusion

- Sludge is used as waste according to Directive 86/278/EEC

- EoW Legalisation
  - Biowaste compost 2013 (based on ECN)
  - Biowaste digestate 2016
  - Sewage sludge 31.07.2017

- Certification center
  - Biowaste compost 17.02.2016
  - Sewage sludge 31.07.2017

EESTI AKREDITEERIMISKESKUS
ESTONIAN ACCREDITATION CENTRE

EA MLA liige
EA MLA Signatory

AKREDITEERIMISTUNNISTUS
ACCREDITATION CERTIFICATE

Eesti Akrediteerimiskeskus kinnitab käesolevaga, et
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

Kristiina Saarniit
Juhataja *Director*

Käesoleva tunnistuse kehtivust ja akrediteerimisulatust saab kontrollida EAK veebilehelt www.eak.ee
Validity of the current certificate and accreditation scope can be checked from the EAK web site www.eak.ee

Thank you for your attention

Vallo Lemmiksoo

aqua consult baltic OÜ

vallo@aquaconsult.ee
www.aquaconsult.ee