MMXII

ASH
2012

Hazard evaluation of ash under the new waste framework directive (2008/98/EC)

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TEKEDO

New framework directive – a clearer definition of waste

Recycling

a *"the substance or object is commonly used for specific purposes;*

b *a market or demand exists for such a substance or object;*

c *the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and*

d *the use of the substance or object will not lead to overall adverse environmental or human health impacts."*

By-product

"a further use of the substance or object is certain

b *the substance or object can be used directly without any further processing other than normal industrial practice;*

c *the substance or object is produced as an integral part of a production process; and*

d *further use is lawful" …*

Implications of the new directive and the clearer definition of waste / non-waste

Waste

- Implementation into national legislation of the waste framework directive
  - Including the classification of waste into hazardous and non-hazardous
  - The classification will build on the new EU regulation on labelling etc of chemical products, CLP
  - But still now, the implementations build on the previous legislation under the DSD/DPD directives

Not waste

- Labelling according to the legislation on chemical products
  - A single substance ⇔ CLP
  - A mixture ⇔ CLP
  - Alternatively, a mixture ⇔ DPD until mid-2015
- REACH
  - If not exempted
  - Registration
  - Constituent(s) in recovered waste should have identifiable registration(s)
  - Possibly, requirement on a safety data sheet (for substance or mixture)

Symbol of danger, e g	
Indication of danger	Explosive Oxidizing Flamable Toxic / Very toxic Corrosive / Harmful / Irritant Dangerous for the environment
Risk phrase	R¤¤
Safety phrase	S¤¤

Hazard pictogram for hazard class, e g	
Signal word	Danger Warning
Hazard statement	H¤¤¤ EUH¤¤¤
Precautionary statement	P¤¤¤

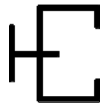
One or more substances?

Vitamins

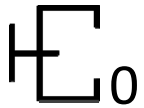
- Are divided into
  - Fat soluble and
  - Water soluble
- It was found that vitamins
  - the fat soluble vitamins comprise
    A, D, E and K, and
  - The water soluble B and C
- It was also found that there is further subdivison,
  e g there are B_1, B_2 … B_{12} vitamins

Ash

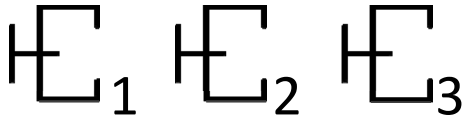
- According to Wallerius 1759, ash is a substance with the following symbol



- But should we regard ash as a blend of some basic ash



with further constituents or impurities



etc?

Substances vs mixtures (preparations)

CLP and waste directive

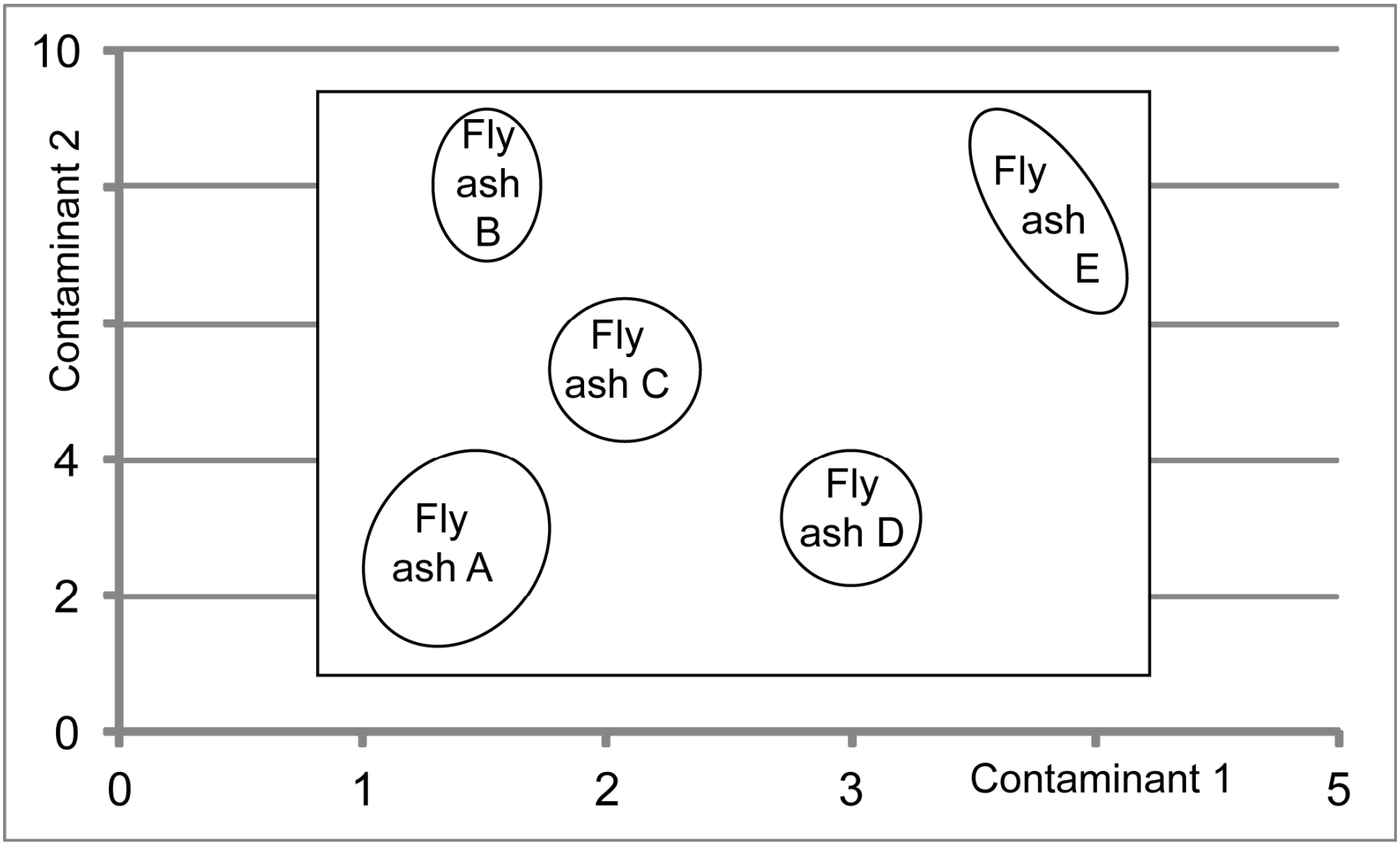
- Substances as well as mixtures (preparations) can be evaluated
- Tests can be carried out on substances as well as on mixtures of substances
- Mixtures can be evaluated using test data from the constituent substances
- Ash has been classified as hazardous / nonhazardous regarded as a mixture (Värmeforsk method)
- Waste directive builds on but is not the same as CLP

REACH

- Only substances can be registered
- Ash has been registered as a substance under REACH
- Exception: safety data sheets can be prepared under REACH for substances as well as for mixtures

Does it matter?

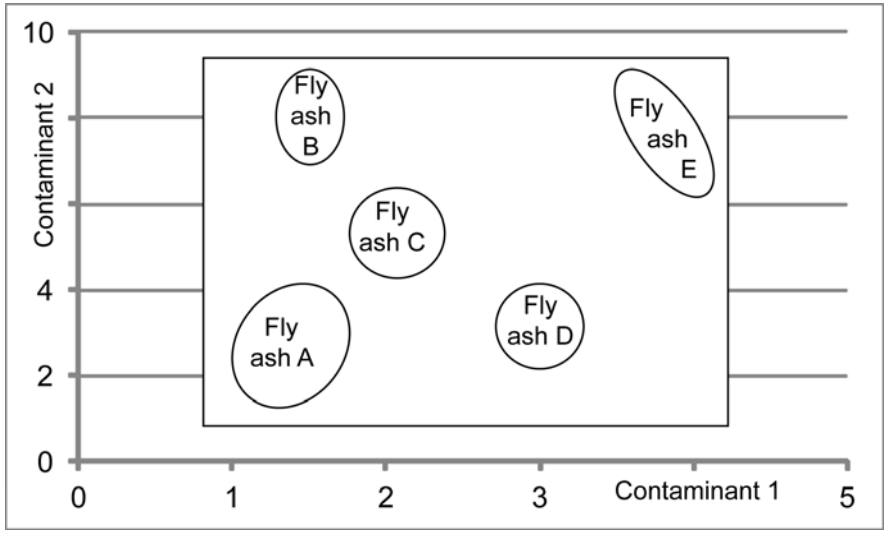
Rectangular area illustrates the intervals that have to be included in a REACH registration that covers the ashes A - E



Värmeforsk method for classification under the directive of waste

- Refers to simple oxides and similar (reference substances) with properties listed in data bases
- (As well as already registered under REACH)
- => assessment can be carried out based on
  - Knowledge on chemical speciation in the ash
  - Analysis of elemental composition
  - Knowledge of the classification of the reference substances

But testing of individual ashes may be warranted or required



- For validation of methods based on the concept of mixture
- For so-called bridging (C ≈ average of B and D)
- For ecotoxic testing considering
  - The salinity and special K/Na ratio in ash
  - The problem of contacting 100 mg ash with 1 litre of water
- Testing of mixture > mixture of tested comstituents
- Important to consider whether substance or mixture

Conformity and coherence requirements in testing under CLP

CONSOLIDATED VERSION OF THE TREATY ON EUROPEAN UNIONEN

Article 11.3: ”*The European Commission shall carry out broad consultations with parties concerned in order to ensure that the Union’s actions are coherent and transparent*.”

Article 17.2: “*Union legislative acts may only be adopted on the basis of a Commission proposal*” …

Conformity requirements

- => Coherence not only between countries but also between different acts of legislation
- Testing largely to be carried out according to regulation 440/2008/EC which is the basis for CLP / REACH
- This is also the basis for a number of areas
- Conforms with GHS of the United Nations

Leeway in testing

Under CLP / REACH / GHS

- Relatively large freedom in
  - Preparation of leachant to be tested
  - Selection of organisms
  - Conditioning of the test organisms before testing
  - Compensation for deviating K/Na balance
- Perhaps a possibility to use the GHS *"Guidance on transformation/dissolution of metals and metal compounds in aqueous media*"

Other methods

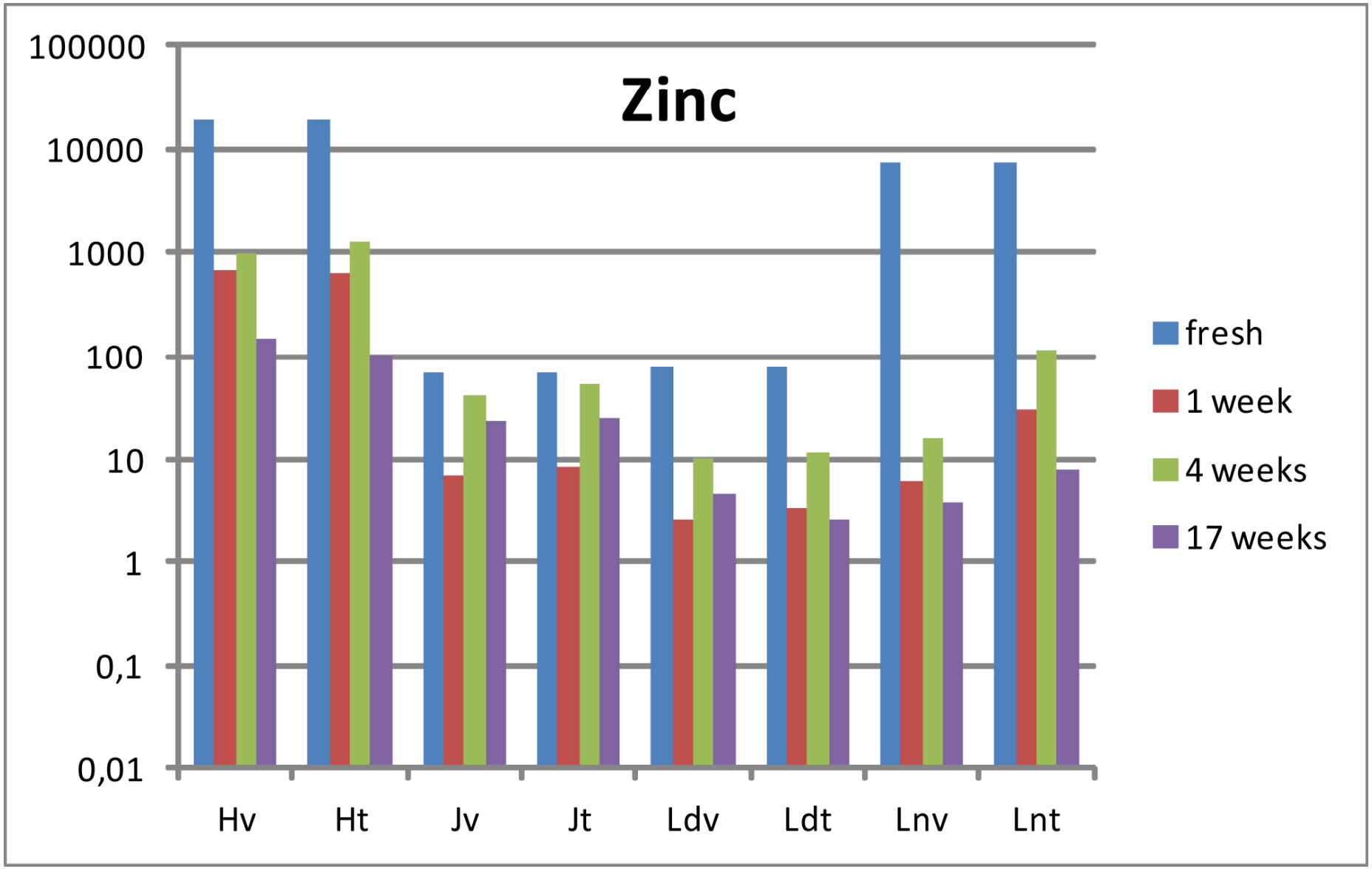
- To attempt to show that the test methods under CLP are not suitable for waste ⇔ proportionality principle
- To prove the advantages of alternative methods

On preparation of water for the organisms for testing of ecotoxicity

Often assumed	**Observed**
Higher liquid to solid ratio implies a higher leaching	Do we know? Is this always the case?
Diminution increases the leaching	The opposite has been observed at Chalmers
Leaching increases with contact time	The opposite has been observed at Tekedo

Obviously, we need to determine
how the test water should be prepared!

In four fly ashes, the leaching of zinc decreases with increased contact time with pore water



Present status of DSD/DPD => CLP as basis for classification hazardous / non-hazardous waste

- Consultation on the review of the Hazardous Properties circulates by the EU *Working group (WG) on the review of the List of waste*
- Document name: *Technical proposal*
- Comments submitted by *Svenska EnergiAskor AB*
- Different options with very different consequences
- Pure bioash always non-hazardous?
- Ash always non-corrosive similar to concrete?
- Transitional period?
- Not in force until after mid-2012

What can we expect for the future?

- Rules for classification (hazardous – non-hazardous) can be expected to become stricter
- How much stricter remains to be decided
- The Värmeforsk classification method is equally applicable under the new and revised rules
- There is a great advantage of using reference substances with known properties together with elemental composition. This is expected to remain so.
- In this way, a lot of expensive testing on individual ashes may be avoided
- This is particularly advantageous for ashes that fall in many different qualities and in moderate volumes for each quality

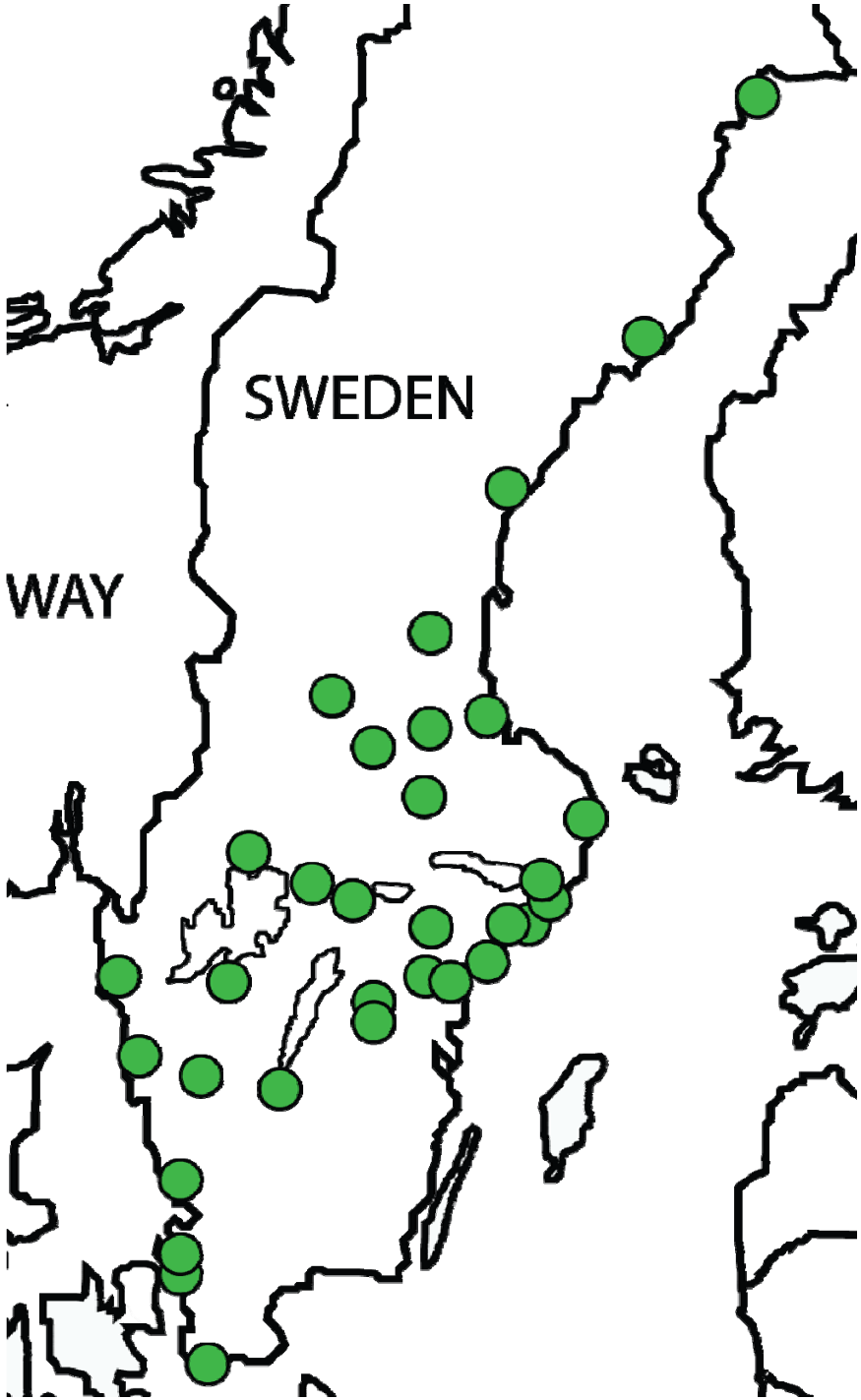
To prepare for the change

For operators

- Keep your present classification (hazardous / non-hazardous) well updated
- There ought to be a transitional period intended at least for those who have fresh classifications
- Support Värmeforsk in its related research with your personal time as well as with funding

For researchers / consultants

- Determine how the Värmeforsk method should be designed under CLP (this will take a bit of work since all intervals are different)
- Publish findings internationally to get QA, feed-back, supplementary support & acceptance
- Develop ecotoxic testing under and/or outside the CLP umbrella



Examples of industrial plants that have used the Värmeforsk method for classification of ash (and slag) as hazardous and non-hazardous.

Cases in which Tekedo AB has been involved only.

This work will be presented later today.

Thank you for your attention!

See also www.klassning.se