



Recovery of resources in Bottom Ash – Semi Dry Concept

Expert Forum, Removal, Treatment and Utilization of waste incineration bottom ash, Vienna, 3rd October 2018

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Overview

1. About Afatek
2. The key to recover fine metals
3. Next generation metal sorting plant
4. Minerals used in Road Construction
5. Conclusion – Where are we in the Circular Economy?

About Afatek

- Owned by 5 public waste companies
- 6 WtE plants = 250.000 tons of Bottom Ash = 40 % of the DK market (East Denmark)
- 3 sites for treatment of BA



The semi dry ash concept

Wet Bottom Ash can be dried down to level 10–15 % H₂O → Recovery of fine metals

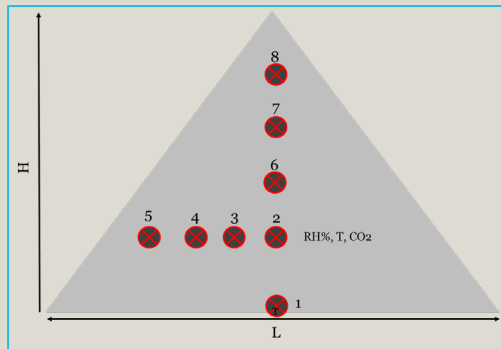
- Fine metals can be recovered from Bottom Ash – only if the water content is as low as 10 – 15 %
- We tested the screening
- We tested the metal separation
- We studied how the Bottom Ash dries out



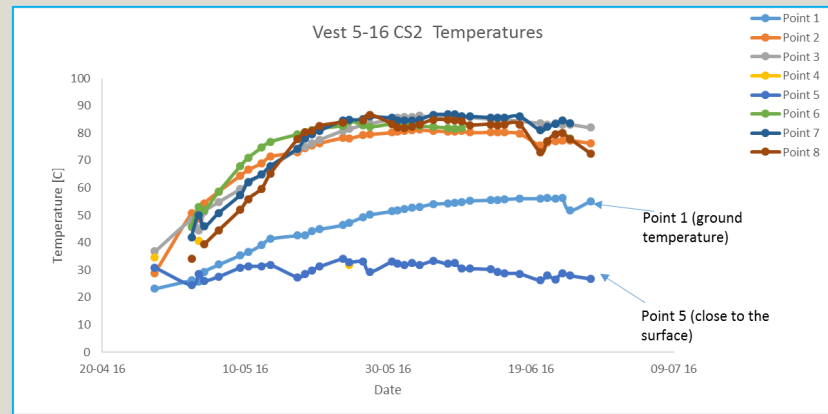
Natural ageing of Bottom Ash produce dry ash

Tests showed that dried up ash of about 10 - 15 % water can be screened down to 0,5 mm

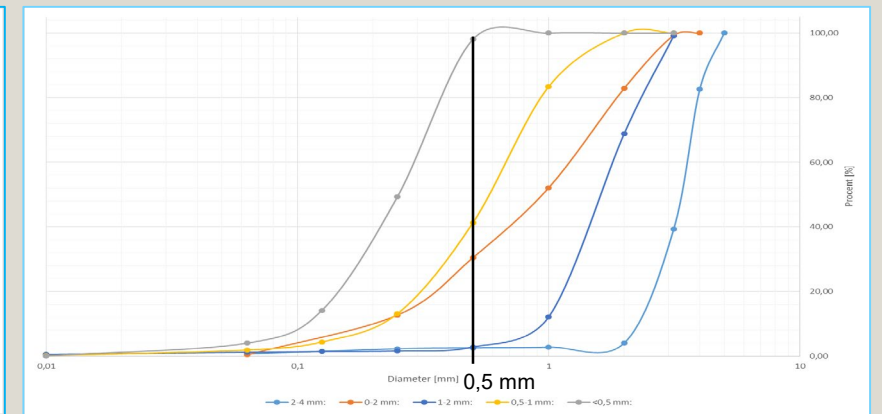
A maturation model was established - Chemical and Thermal



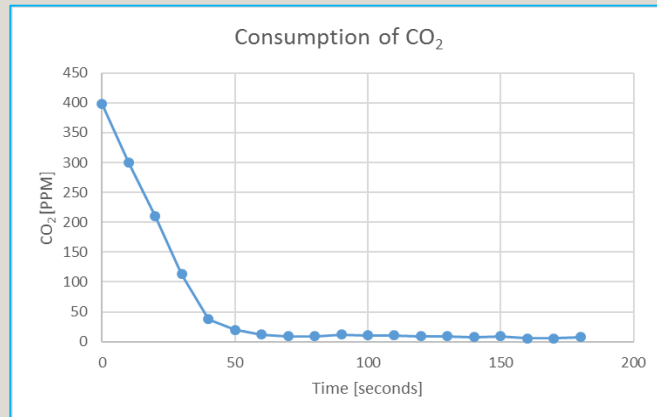
Temperature – drives out moisture



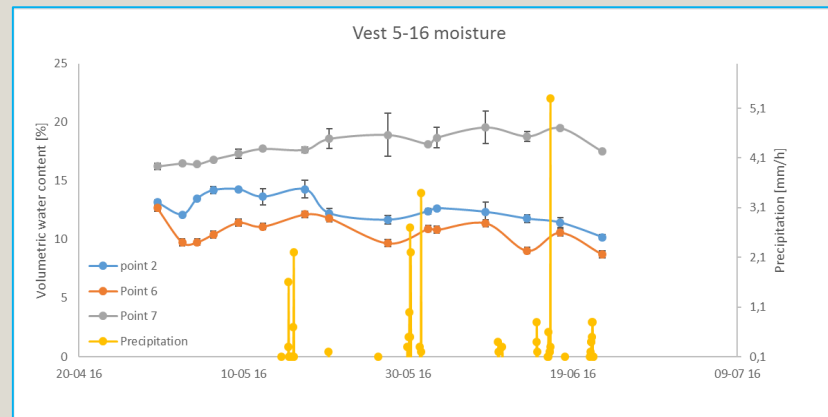
Screening efficiency



CO₂ consumption – limiting factor?



Water content – decrease over time

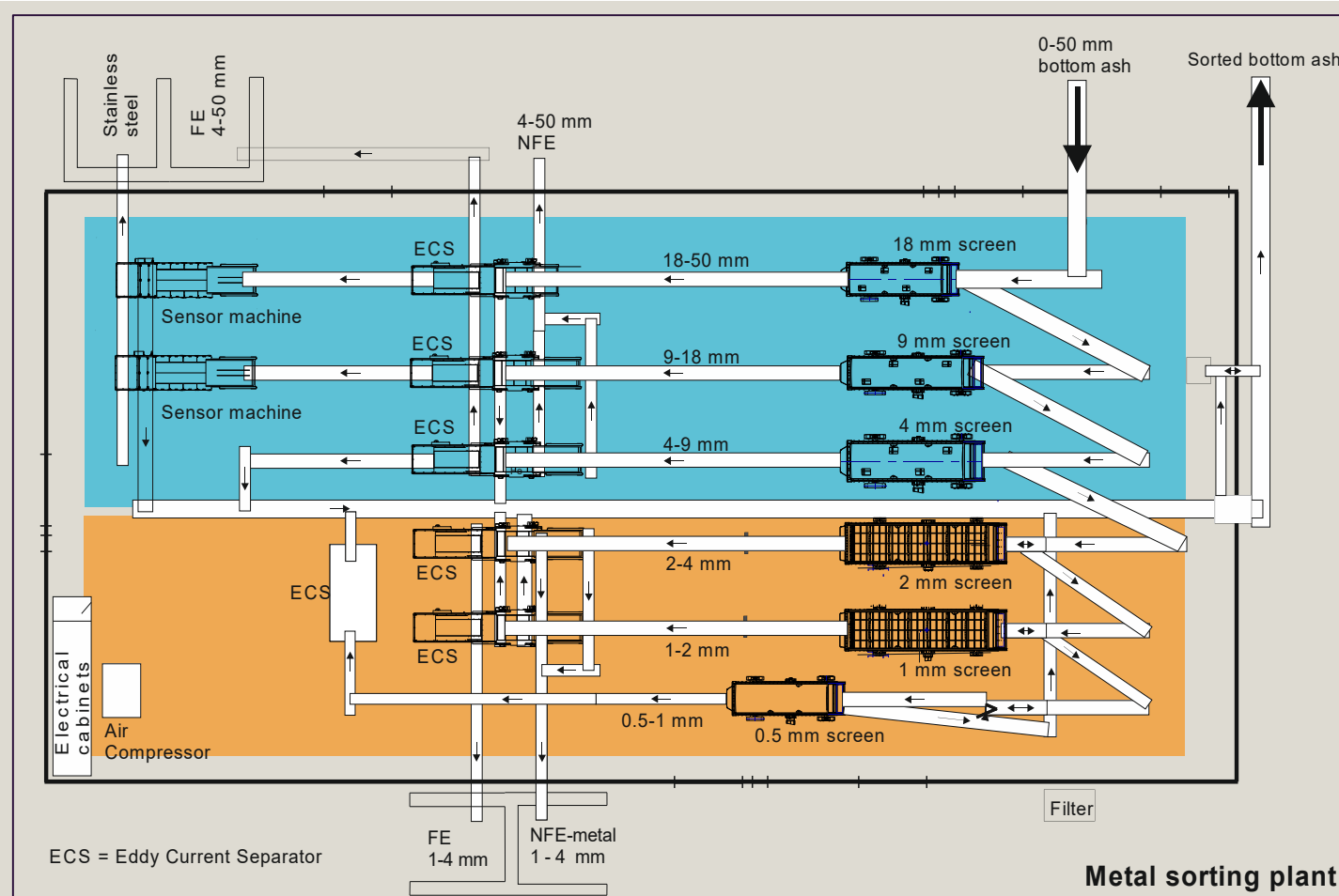


Clean cut screening - grainsize 2-4 mm



Next Generation Sorting Plant

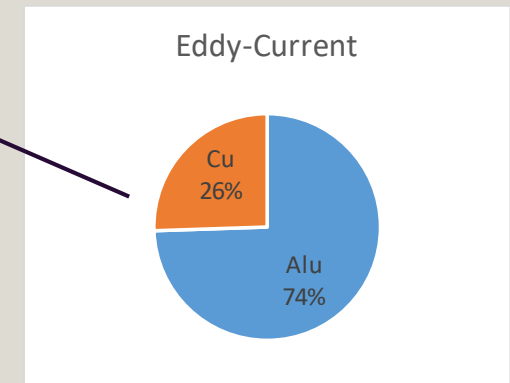
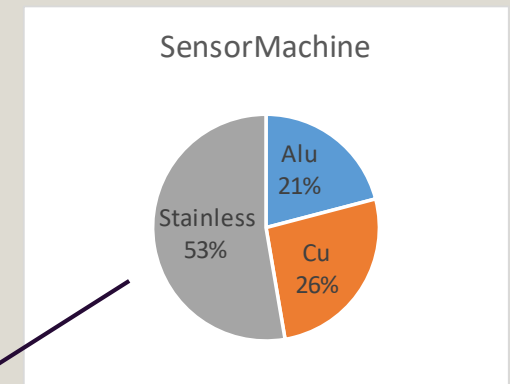
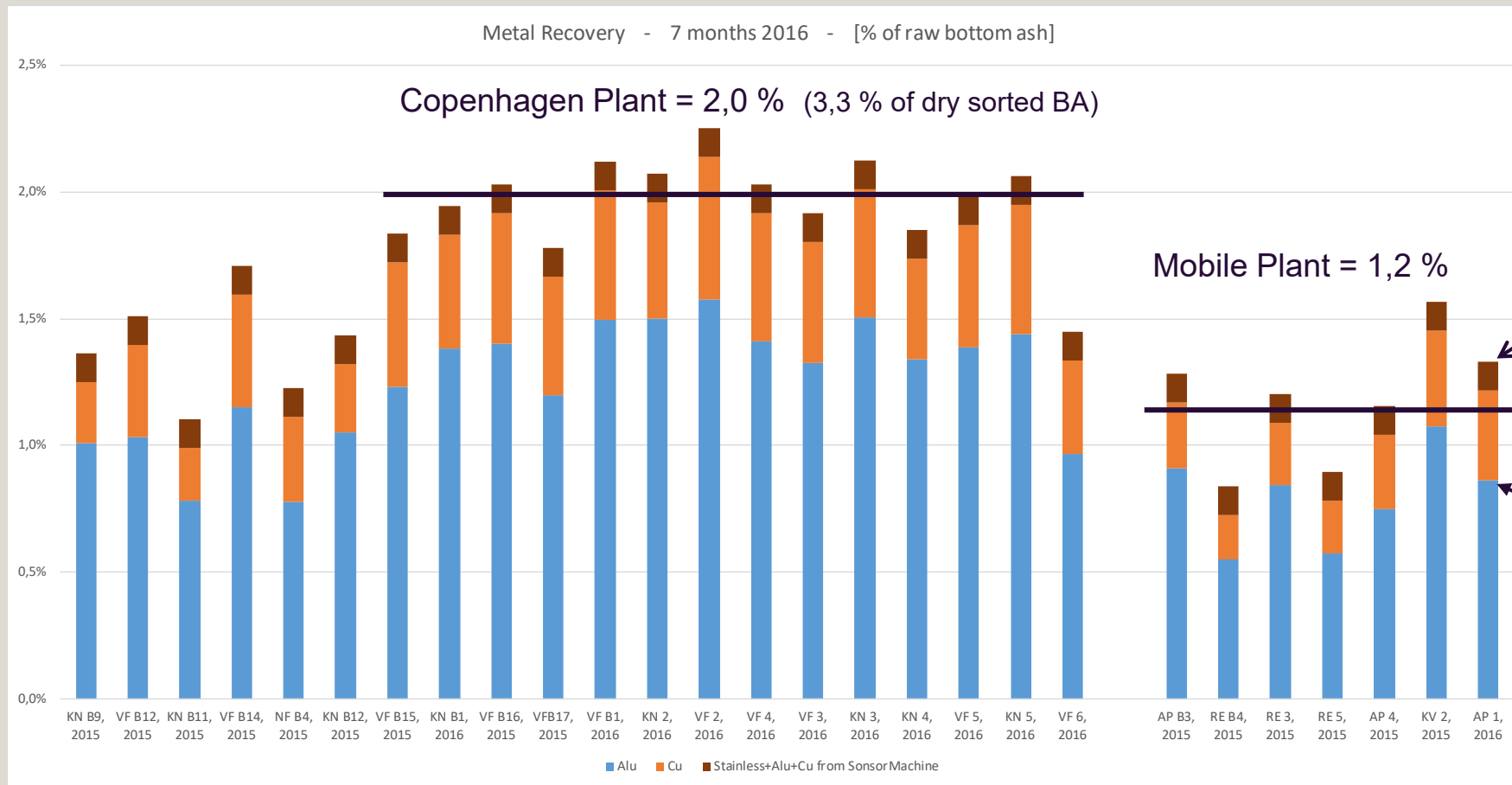
The Metal Sorting Plant – 2nd generation



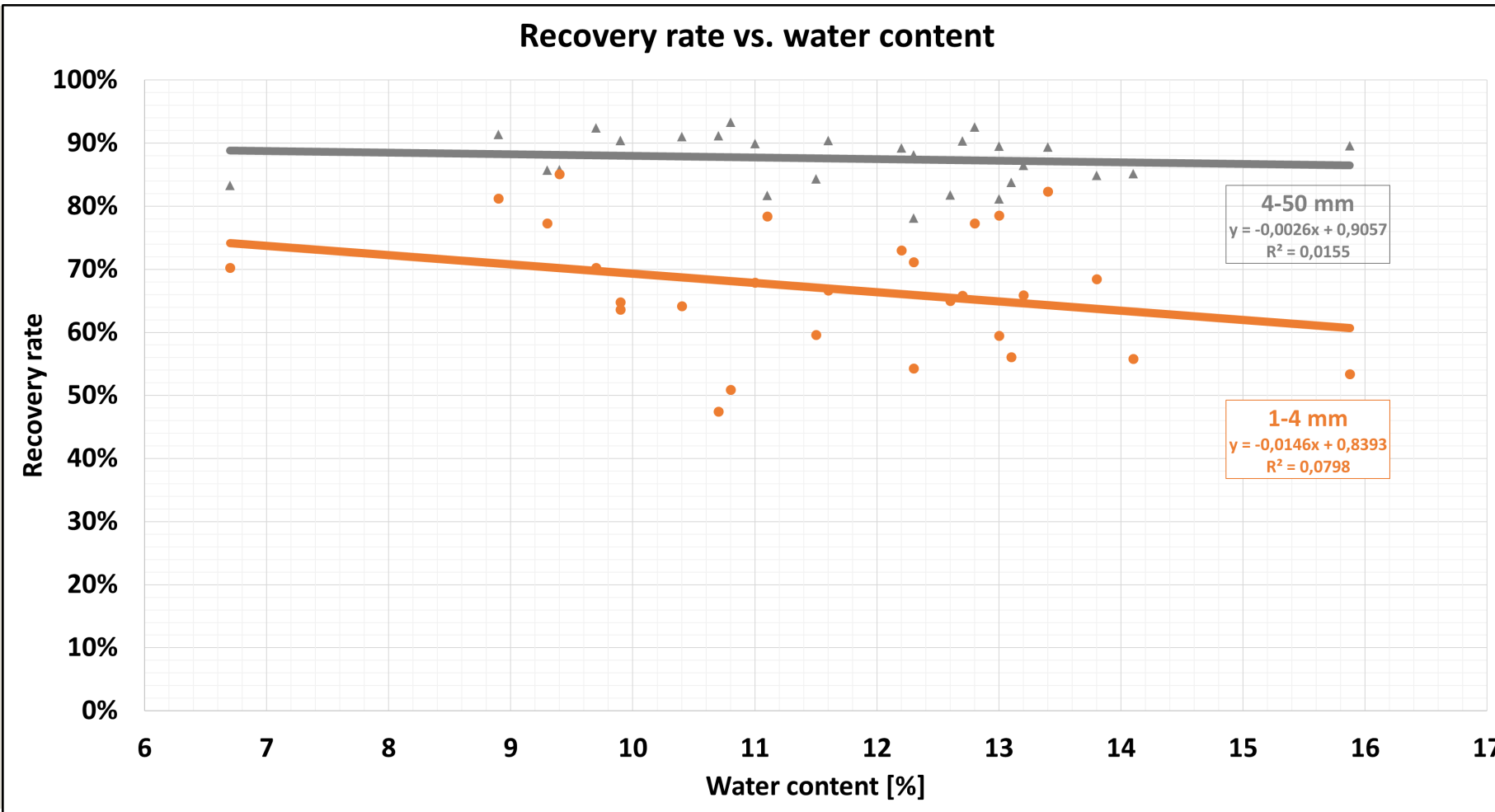
- New metal sorting plant in operation 1.1.2016
- 0,5 – 50 mm in 6 lines
- Wet Bottom Ash – aged and dried
- Input: 180.000 – 250.000 tons/y
- Investment: 8 mill EUR

- 3 lines for coarse bottom ash: 4 - 50 mm
- 3 lines for fine bottom ash: 0,5 - 4 mm

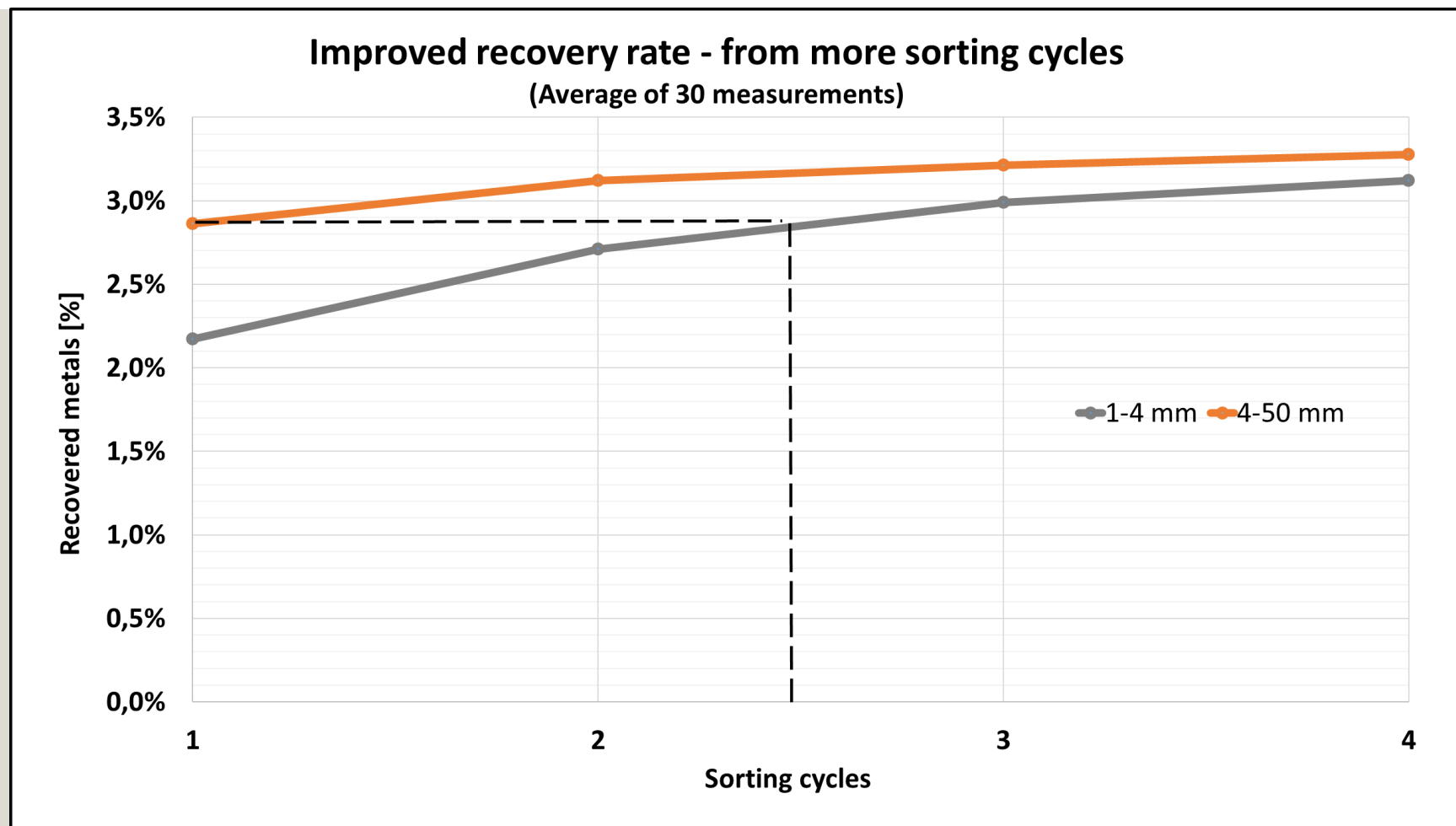
Metals can be recovered with an efficiency of about 80 %
 - even from wet bottom ash



Sorting Efficiency of new plant – dependency on water content

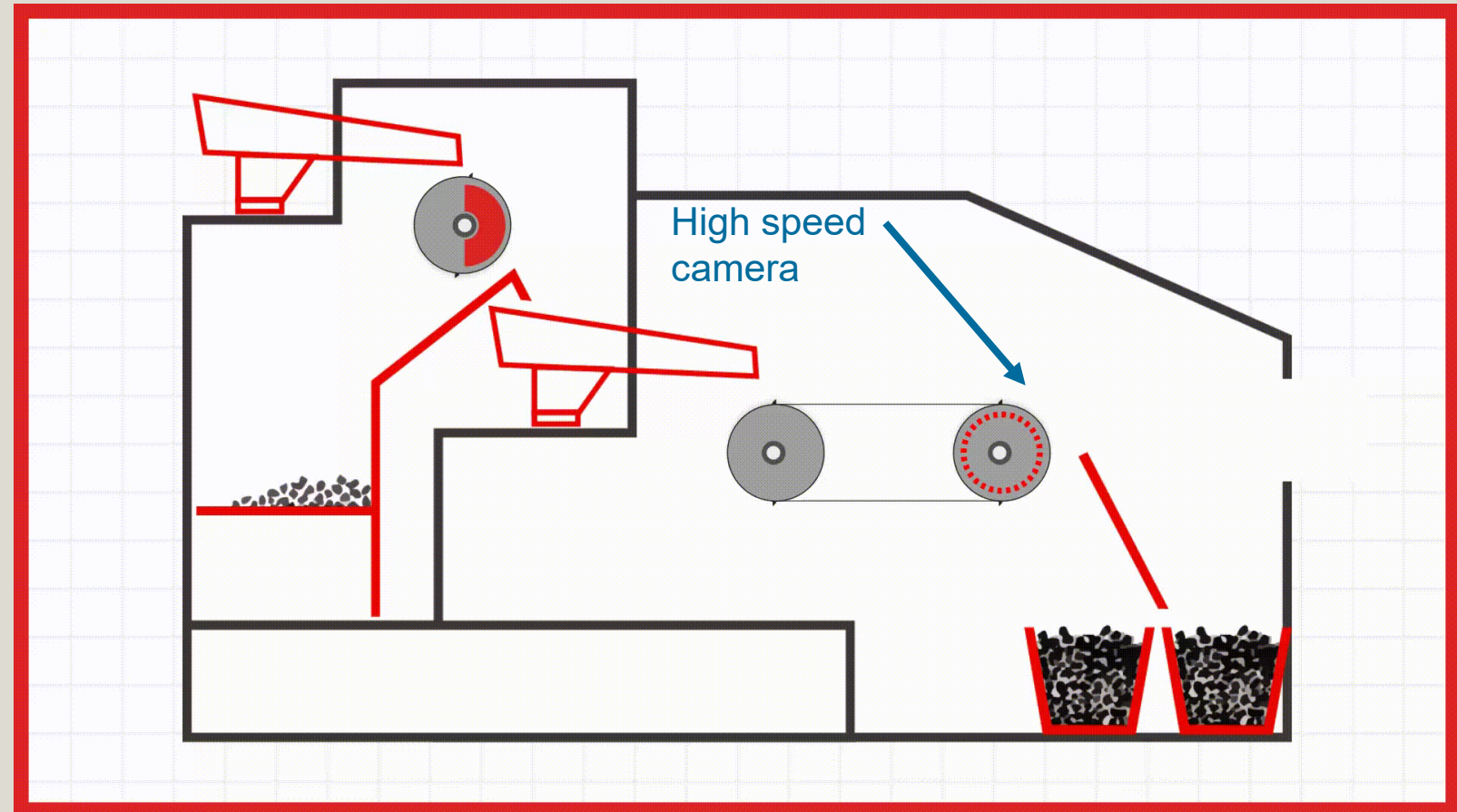


How much can we improve sorting efficiency?



Eddy-Current sorting technique + magnet taking fine iron

Fe: 1-4 mm (paper clips)



Eddy-Current sorting of Al and Cu-fraction (1-2 mm)



RECOVERY OF MINERALS

- develop the business and the environment

Use of Bottom Ash Gravel in Road Construction is approved by the state authorities, the Danish Road Directorate and the Government

Test road Nordhavn, Copenhagen

- Present: Limited traffic load
- Future: Unlimited traffic load
- Revision of standard for construction of roads, the Danish Road Directorate



Bottom ash substitute high quality gravel in road construction

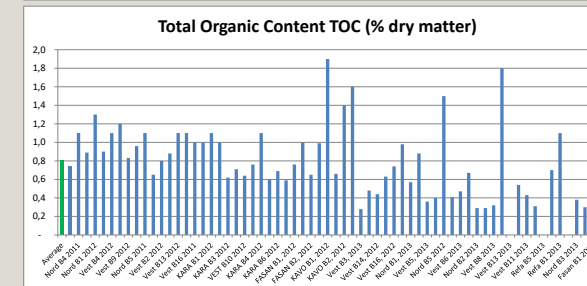
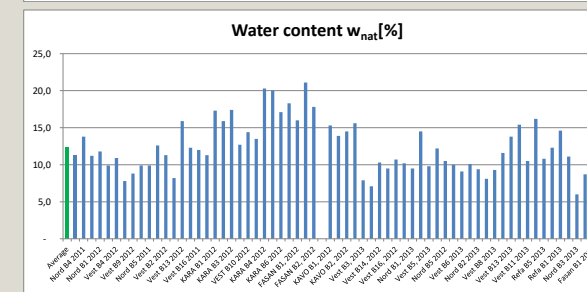
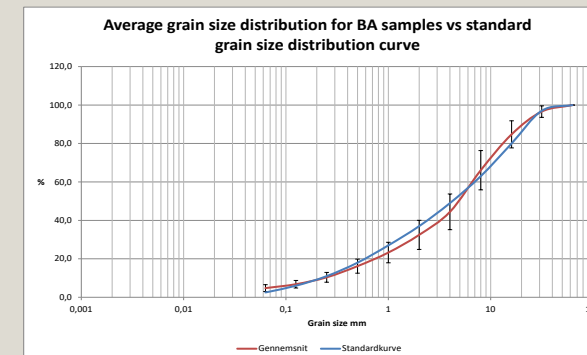
All bottom ash is tested and declared in accordance to mechanical and physical properties:

- Water content
- Particle size distribution
- Density and water content needed for efficient compaction
- Classification test for the constituents of coarse recycled aggregate
- Total Organic Content (TOC)

Result:

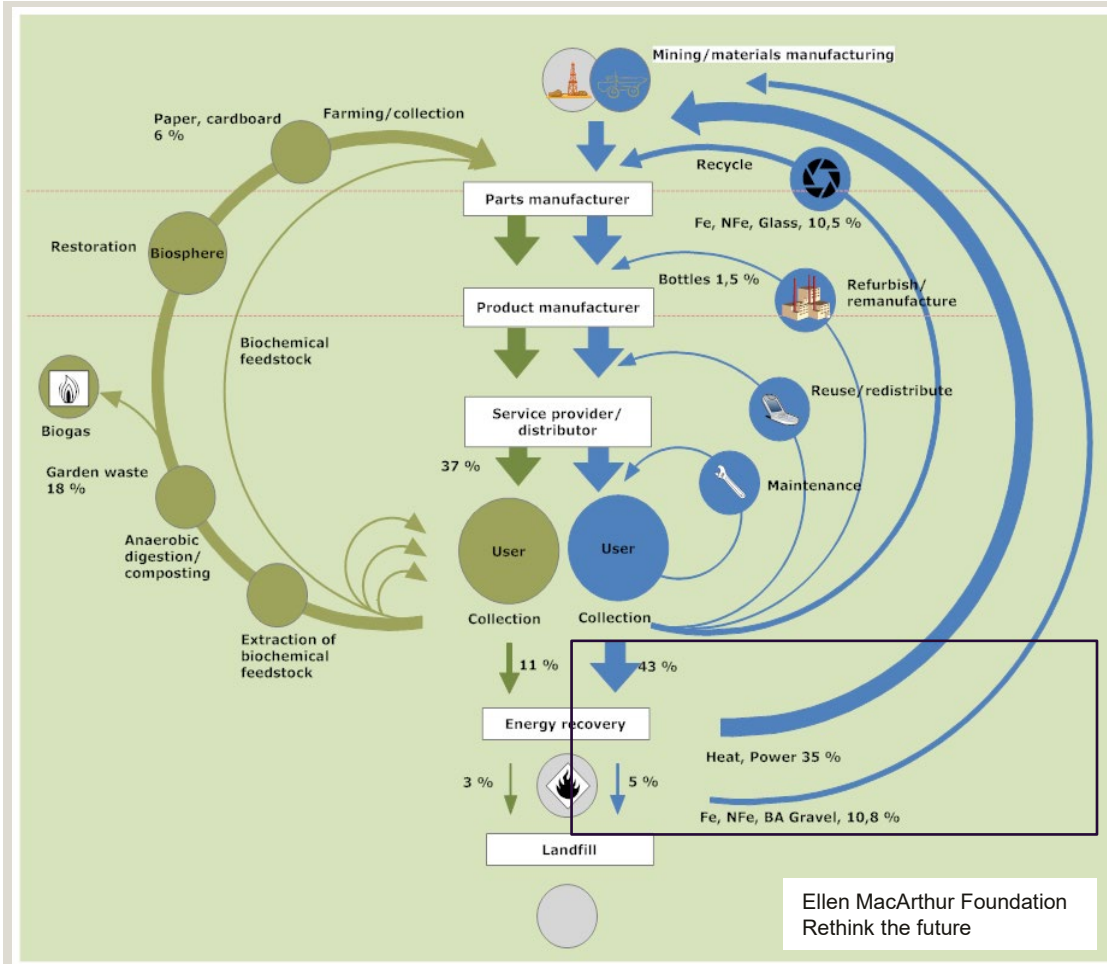
- Since march 2012 all supplies of BA gravel from Afatek is declared
- Information about the construction product is now available for both the constructor and the controlling authority
- The bearing capacity test of the road in Copenhagen, may lead to use of BA gravel in higher road classes

Denmark has a long tradition for using BA in road construction – due to a clear national policy of using residues to substitute valuable virgin material



CONCLUSION

The WtE & Bottom Ash Treatment prove its full potential when recovering metals from complex and small waste residues



- Efficient recovery system – when waste residues are combined products (paper+metal, plastic+metal, wood+metal)
- Efficient recovery system – when waste residues are too small to be recovered conventionally
- The minerals – Bottom Ash Gravel is an excellent product to be used in Road Construction - substituting expensive gravel, approved by the National Highway Authority
- Fact is, that we in Denmark recover all Bottom Ash (600.000 tons/year) – nothing is landfilled. Result of a national policy on recovery of residues
- Further research will be focused on improvement of metal recovery efficiency (incremental innovation) – a short pay back time of the investment allow us to take in newest technology

Access to further information:

Learn more about Afatek and our projects at www.afatek.dk - here you will also find access to our results and reports.

Contact

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The screenshot shows the Afatek website homepage. At the top, there is a navigation menu with links for 'Teknologien', 'Udviklingsprogram', 'Afsætning', 'Aktuelt', 'Cases', and 'Om AFATEK'. Below the menu is a search bar. The main content area features a large banner titled 'Udvikling og innovation' with a sub-headline 'Kun gennem forskning, udvikling og test får vi endnu mere ud af ressourcerne i slaggen.' and a call-to-action button 'Se udfordringen og løsningen'. Below the banner are three columns of content: 'Teknologien' (highlighting a 2011 waste sorting plant), 'Udviklingsprogram' (describing development through testing), and 'Teknologien i brug' (showing slag from waste incineration). The footer contains contact information, a news section with dates and titles, and a 'FA DEN NYESTE VIDEN' section with login links for a database and material list.