Doing more with our ASH

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Introduction to Meldgaard

- Recycled ASH from Waste-t-Energy plants since the 1980’s with 85% market capture in Denmark for ASH recycling.

- To date globally processed >12,000,000 tonnes ASH

- All of the ASH processed in Europe has been for construction purposes.
Meldgaard in the US

US operations in FL, MD and VA since 2013

- On site operation at RDF plant with mixed ash (190,000 Stons/year)
- On site operation for bottom ash directly out of boilers (120,000 Stons/year)
- Monofill operation with mixed ash (200,000 Stons/year)
- Landfill operation with mixed ash (210,000 Stons)

Total of 2,000t per day in the US
Circular Economy for ASH

1. Household Waste Collection
2. Waste Transported
3. Waste Incineration
4. Incineration Ash
5. Recycled Ash Aggregate at Construction Site
6. Transport
7. Ash Aggregate
8. Meldgaard Ash Recycling Plant
9. Metals
10. Non-Ferrous Metals
11. Ferrous Scrap Metal
12. New Steel
13. Smelting Plant
14. Heavy Metals Plant (Kolding Plant)
15. New Metals Products
Approximately **1.5 million tons** of ASH per year......

- Majority going to landfill
- High disposal costs
- Lost opportunities for a recycled material
- Lost opportunity for a revenue stream
Sorting and Recycling
Non Ferrous Separation
Clean Ash Aggregate
Ash Aggregate

Ash aggregate for road construction

Ash aggregate for hard standing
Ash Aggregate

Ash aggregate for embankments

Ash aggregate for road construction
Ash Aggregate

Ash aggregate for hard standing
Ash mining 120,000t for metals extraction & ash aggregate
Ash mining 120,000t for metals extraction & ash aggregate
Hillsborough Research Project

Hillsborough County proactive approach for Ash recycling:

- Researching beneficial use of incinerator combined ash for road base aggregate in lieu of land filling - material will be used in construction of new road

- Meldgaard recycling 30,000 tons of incinerator ash from the waste-to-energy plant at Hillsborough County Resource Recovery Facility
Hillsborough Research Project

Hillsborough County proactive approach for Ash recycling:

- Extraction of metals and screening to a range of sizes so that the ash aggregate can be beneficially used as a road base for a county project
- Commence and complete in 2018 with Meldgaard mobile ash recycling solution
- Long term benefits of approximately 75% reduction of Ash going to landfill
Hillsborough Research Project

Hillsborough County proactive approach for Ash recycling:

- University of Florida materials laboratory will be testing the ash materials for different uses

Screened sizes:

- $<\frac{1}{4}''$ (0-6mm) ash
- $\frac{1}{4}'' - 1\frac{1}{2}''$ ash (6-40mm)
- $\frac{1}{4}'' - \frac{3}{4}''$ ash (6-20mm)
Challenges to recycling ASH

Key challenges:

- Combined ASH vs Bottom ASH
- Quality combustion at WtE plant to provide a clean ash aggregate
- Enabling maturation period of the ash before processing/recycling to maximise metals removal
- Ensuring location of application is low risk
- Providing confidence to the engineers that it works...and they can get insurance & sign off

Example of Danish Declaration for the use of recycled ash aggregate in a construction application
Ash Recycling in Europe

Throughout Europe approximately 18 million tonnes of **Bottom** ash per year:

- **Denmark** - Legislation has allowed bottom ash to be used in road construction for decades and now around 99% of bottom ash is recovered
- **Italy** - Gravel from bottom ash crushed and used as aggregate for concrete manufacturing
- **The Netherlands & Germany** - Bottom ash aggregates used in construction of roads, flyover for highways and noise barriers
- **Switzerland** - Finer fraction of bottom ash used as cement substitute in fly ash stabilisation
- **United Kingdom** - Bottom ash aggregate in road construction and other applications i.e. 30,000 tonnes of bottom ash used as backfill for Olympic Park & 2,000 tonnes pavement capping
- **Belgium, France, Portugal, Spain** - all use Bottom ash aggregate in road construction

*Source: CEWEP 2017*
Ash Recycling in Europe

Throughout Europe approximately 18 million tonnes of Bottom ash per year:

The Netherlands - All operators of Waste-to-Energy plants signed a “Green Deal Bottom Ash” with the Dutch Government:

1) More than 75% recovery of all non-ferrous metals > 6 mm present in the bottom ash
2) From 2020 granulates must be so clean that they can be 100% applied for useful purposes.

Good example for Public-Private partnership enabling Dutch Government and Waste-to-Energy operators strive for clean and 100% applicable secondary building material.

Used in road construction, bridge and flyover embankments, sound walls, concrete products such as bricks, kerbstones, etc.

Source: CEWEP 2017
meldgaard plant on its way....

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