Advances in the Inashco metals recovery process

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• Inashco company profile
• The process & the products
  – Metals
  – Minerals
• Ash recycling in the Netherlands
• Inashco projects
In the US with a Strong Foundation

- Waterland: Private equity, $4 billion AUM
- Fondel: trading company, approx. $1.5 billion
- Delft University of Technology, IP provider
- Inashco BV in the Netherlands, 2008, parent, $130 million turnover, ~250 FTE
- Ballast Phoenix, Ash Recycling, 80% UK, 20 yrs, 10 sites, $26 turnover, ~82 FTE
- Boskalis, 1910, $3.5B, ~14,000 FTE, Cooperation Agreement, Minerals expertise
- Inashco North America, 4 yrs, subsidiary company, ~20 FTE
- ERS JV, 2+ yr, 20 FTE, 2 ADR-projects, 1 Central Upgrading Facility under design
2015: >5 million tons ash processed by Inashco world wide
Abstract

“Inashco recovers metals from Waste-To-Energy combined ash and prepares the minerals for future re-use”

ADR = “concentrator”

100%

Mineral re-use

Mineral re-use

Loose the sticky fines…!

Landfill

Smelters

Coarse (Non-) Ferrous scrap

Fine (Non-) Ferrous scrap

Mineral aggregates

Highway road construction

Laboratory

Central Upgrade Facility

Inashco recovers metals from Waste-To-Energy combined ash and prepares the minerals for future re-use.
Mineral fine/moist 0-2 mm

ADR Concentrate to ECS

Minerals NF

Ballistic concentration explained (ADR)
ADR & ECS are complementary technologies

Input 0-12 mm Combined Ash

Accelleration Separation on weight and shape

= Larger minerals
= High moisture sticky fine minerals
= Larger non-ferrous metals
= Fine non-ferrous metals
= Embedded NF in clogged minerals
= Eddy Current Separator
**Recovered Products**

- **Fine minerals**
  - (0 – 2 mm)

- **Mineral aggregates**
  - (2 - 50 mm)

- **Non-ferrous concentrate**
  - (1 - 12 mm and 12 - 50 mm)

- **Ferrous concentrate**
  - (12 – 50 mm and above)
Non-ferrous products

Aluminum scrap product

• 1 – 12 mm
• 75 - 80 % pure metal scrap

Heavy non-ferrous scrap

• 1 – 12 mm
• 95-99 % pure metal scrap
The Dutch “Green Deal”

- The Netherlands (Holland)
- 17 million people
- 16,000 sq miles (1/3 NY)
- 40% ↓ sea level

- Government support
- Sustainable economic growth
- Stakeholders
- Resolution of Regulatory hurdles
- Legislation, market, incentives, R&D
- GD 076
  - > 2017 : 50% un-contained minerals
  - > 2020 : 100%
The value chain goal:

- **Waste-to-Energy**
  - Fe and NF Metals

- **Ash Upgrading**

- **Continuous Technology Development**
  - Cu/Zn Scrap
  - Al Scrap
  - Concrete Products
  - Cement

- **Road Construction**
- **Landfill**
Reusing the ash minerals

Courtesy of Wheelabrator Technologies
Testing of products
• The advantages
  – Porosity:
    • Not for compressive strength (e.g. constructive)
    • Beneficial for low water-cement ratio applications (internal curing)
    • Low density: large volumes per load
  – Pavers with 20%-50% minerals:
    • Higher thaw-frost cycle resistance
    • Higher tensile strength
    • Higher abrasiveness resistance
  – Particle Size Distribution
  – Marketing the sustainable character
  – Cost vs primary aggregates
  – >> Expectations 2018: 80/90% mix of IBA-minerals and crushed concrete
The Inashco test projects with partners:

- 110 ST batch pilot
- 165 ST batch pilot
- 1650 ST test
• Nauerna Amsterdam, full scale 660,000 ST, barge-supply of ash, wet process, Green Deal proof, metals and minerals
ADR installation at AEB Amsterdam
Central Upgrading Facility #1
Sluiskil, the Netherlands
Central Upgrading Facility #2
Maastricht, the Netherlands
Semi-Mobile ADR
Richmond, VA
Central Upgrading Facility
Sluiskil, the Netherlands
ADR plant Putnam, Connecticut
ADR plant Shrewsbury, Massachusetts
• Extensive ash **recycling** is happening
• Dense heavily populated areas can practice and benefit from **responsible ash-management**
• WTE should be judged over its entire **value-chain**
• A well-orchestrated **stimulus package** : society education, government facilitation, review of Rules&Regulations, incentives and R&D
• Inashco: the **opportunity** of proven technology, a strong track-record, wide US operational experience and constant R&D

*Don’t waste your ash!*
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