Wet Separation Techniques
The current status & overall perspective in Europe

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SUEZ SOIL REMEDIATION
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Basic Building Stones of Wet Separation Technology
Differences in properties allows separation, decomposition & recomposition

Process based on physical separation
Separation based on difference in physical characteristics:
- data: density, grain size, ratio density/surface area, ...
- Sieves, drums, jigs, hydrocyclones, spirals, thickeners, beltpress or chamber press, ...

Process based on chemistry
Chemical properties & chemical breakdown:
- Flocculation (VanderWaals forces)
- Acidic decomposition
Commodities market
For centuries wet separation techniques have been used for commodities

Washing technologies and plants

Source: www.javelinassociates.com – BHP Billiton Black Water Coal Plant

Source: http://kerkosand.quarzwerke.com

Coal and sand recovery
Contaminated Land market
Recovery of sand and stones

Sand recovery based on a landfill ban or high landfill taxes interval

Sand recovery to protect scarce hazardous landfill resources
Soil Related Waste Market
Different industries use sand as production medium or sands gets mixed in the other waste streams

Casting Sands, C&D wastes and Shooting range sands
Waste stream containing sand as add-on for existing soil washing plants

- Sand beds, filtering sand, shooting ranges sand are all media that are meant to capture other wastes
- While collecting construction and demolition wastes, sands gets mixed with other wastes

Roadsweepings
Waste streams with high organics and sand, for recovery due to re-use relaxation and increasing landfill taxes

- Leafs, branches, candy paper, cans, carparts, lighters, ....
- Light fraction (organic, candy paper), heavy sandy fraction, magnetics (ferro metal),
  Coarse fraction larger pieces (bins in the storage) ....

Recovery of sand from various application in Defence, Industry and Municipal origin

Source: www.pulisabbie.it
Geographical spread of recovery in Europe
From early adaptors to current fast roll-out across corners of the continent

Early adaptors (Belgium, The Netherlands, Switzerland, Italy, ...)

Market driver - contaminated soils legislation
(inventory and deadlines in investigation and clean-up)

- Contaminated land industry – impossible to clean all soils
- Tools and practices to assess re-use possibility of light and medium impacted soils.

Fast roll–out of recovery from waste (landfill tax and re-use practise)
(UK, Italy, ...)

Economical driver based on sole financial incentives

- Recover sand for re-use (Tuscany as a ‘puller’-role, UK = increasing landfill tax – tax administration)
- Defence working cost considerate

Recovery from Micro market to Macro market in small applications
The European market for Roadsweepings

Two countries at high paced development - United Kingdom and Italy

List of locations with operating roadsweepings recovery plant

**United Kingdom**
- SITA UK – *Neachells Lane*
- Blue Haze Landfill Site
- Horsham Landfill Site
- Ewelme landfill site

**Italia**
- Ecoliguria (LG)
- Gruppoesposito (BG)
- EXE SpA (FRI)
- RMT (UM)
- Pulisabbie (TN)
- Teseco (TOS)
- Pbr-intergreen (BS)

A success story recovery of sand from roadsweepings
Recovery of metals from the Aluminium industry
Success to Failure

Pure economical driver as in commodities market
All recovery fraction need to have a value:

- Aluminium metals
- Serox (mineral wool market application)
- Salts to aluminium industry
- Ammonium sulfate

Interesting similarities with history of contaminated soil treatment
- Started out as mobile treatment (Canada)
- ramped up during same period

Bust due to economical down-turn

From Gerhard Merker, ALSA paper, 14th bauxite and alumina seminar Miami 2008

Closing the loop until it breaks
Recovery in the Municipal Waste Market
Urban Mining through recovery of metals from incinerator bottom ashes

Combination of dry and wet processes:

- Magnetics & eddy-current separation (SITA Valomac (B), LHJ Group (FI))
- Wet Separation (soil washing) (HVC (NL), MVO (NL))

Enhanced recovery of different kinds of metals

- Enhanced wet separation with heavy waters (Dolphin Metals (NL))

Closing the loop through a cross-border network of companies

Source: www.mvogroep.nl
Source: voortgangsrapportage Boskalis mid 2015 nederlands.boskalis.com
Recovery through hot water application
Pushing the capabilities of wet separation technology – full scale applications

**Recovery through wet separation of Iron works residues**

**Iron scraps, iron-oxides, WTTP sludges, dusts etc**
Recovery of iron and iron oxides from waste for re-use
- Hot water to cope with high % of oil in water

**Recovery through wet separation of Oil sludge of heavy oils**
Recovery of sand and combustible filter cake residue (cement plant)
- Hot water to cope with high % of oil in water & to lower viscosity of the oil in the sand
- Filter cake as energy source

Temperature to increase effectiveness
Wet Separation – Conclusions & outlook
Legislative & economical stimuli – general recovery and water recycling trend

Recycling & Recovery Utopia

Legislative frameworks condition for a performant market
Trade-off’s to be made
 Landfill surfaces (real-estate vs void) – export money in country

Networks (cross-border) of Circular economy
Success and failure - future perspective
 Networks reaching economical stability & developing new ventures
 Economics can be a driver (even though fluctuation might prevail)

Outlook
 Transformation of the energy sector (conventional & radio-active)
 Practices and innovation for Plastics & WEEE (rare earth metals)