RAW MATERIALS and RECYLING

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EXAMPLES (1/4)

Bottom ash from incineration plants, slag from steelwork industries and road sweeping waste represent a source of “recyclable” raw materials.

The amount of these kind of waste are interesting and the technology for the recovery are well established.

EXAMPLE - BOTTOM ASH (2/4)

From the Waste (MSW) to Energy plant approximately 20-25% w/w of the incinerated waste ends up as bottom ash.

Non ferrous material

Ferrous material

Inert fraction

EXAMPLE - SLAG (3/4)

Slag from steel industry represents 25% w/w of steel production.

EXAMPLE - ROAD SWEEPING WASTE (4/4)

Road sweeping waste accounts for an average of 4-5 % (w/w) of all municipal solid waste produced (Italy).

Refereeing to Italian statistic an average production is about 15 kg/ab*year.

This waste is still mainly disposed of in landfill sites as unsorted waste or incinerated.

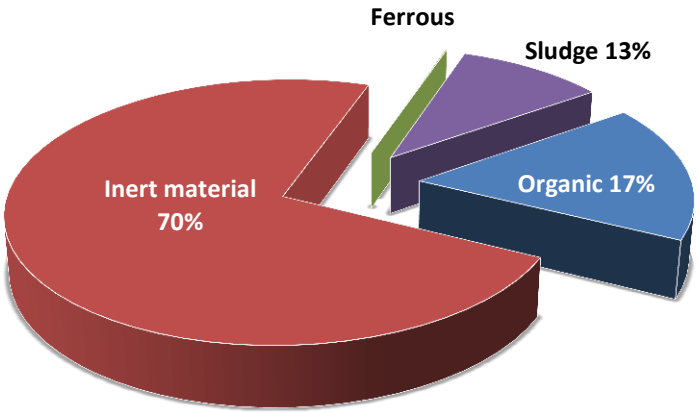
PURPOSE OF THE PRESENTATION

This technical presentation deals of road sweeping waste recovery plant and related environmental and economics advantages.

These kind of plants can also treat other wastes such as: gully waste, dirty sand and beach sand.

Waste recovery in these plants allows to reach the target imposed by local government (i.e. leaching test).

ROAD SWEEPING WASTE COMPOSITION



Low heating value
6.000 kJ/Kg

Waste is not suitable for incineration

REASONS FOR RECOVERY (1/2)

The objectives highlighted in the European legislation clearly affirm:

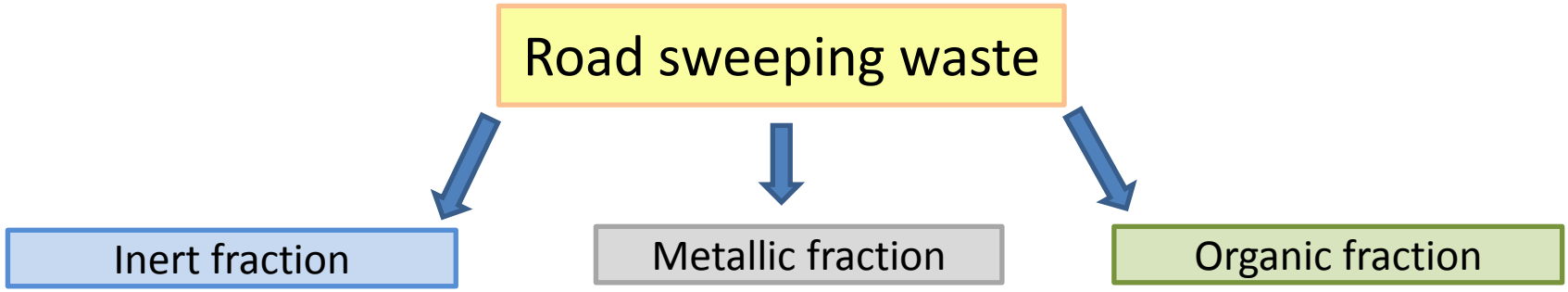
- Protection of natural resources through recovery: in the long-term, the EU must aim to become a recycling society that seeks to avoid waste and uses the latter as a resource.
- Decrease of landfill disposal: the actions planned by the Thematic Strategy will help to continue on the path already started by subtracting the flow of waste to landfills. Greater attention to the implementation and promotion of economic instruments contributes to raising the costs of landfill, which should reflect the real environmental impact of this operation, with the result that the amount of refuse sent to landfill should be reduced.

REASONS FOR RECOVERY (2/2)

To help achieve these objectives, the EU Directive provides that member States should encourage the use of recycled materials, and must not promote, where practicable, landfilling or incineration of these recyclable materials, but should instead favour the recovery of refuse and the use of recovered materials to preserve natural resources.

The recovery of waste from road sweeping, bottom ash and slag follows the European philosophy, contributing to the creation of a recycling society and the preservation of natural resources.

RECOVERY OF ROAD SWEEPING WASTE



These fractions can be reused after separation

For example, the inert fraction can be reused as:

aggregate for concrete,

aggregate for civil engineering work,

aggregate for asphalt.

WET TREATMENT TECHNOLOGY

In wet treatment plants the technology applied for the removal of contaminants is typical of "soil washing", already successfully used in polluted soil remediation.

The size classification, solid materials washing, solid-solid and solid-liquid separation, use well established technologies of mineral processing.

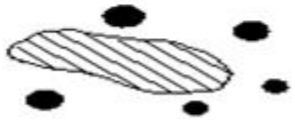
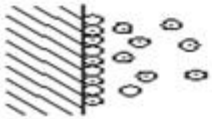
These technologies provide treatment facilities with high efficiency and high quality of recovered materials, combined with low environmental impacts, which are obtained through optimization of treatment cycles and careful use of natural resources.

WET TREATMENT PROCESSING STAGES

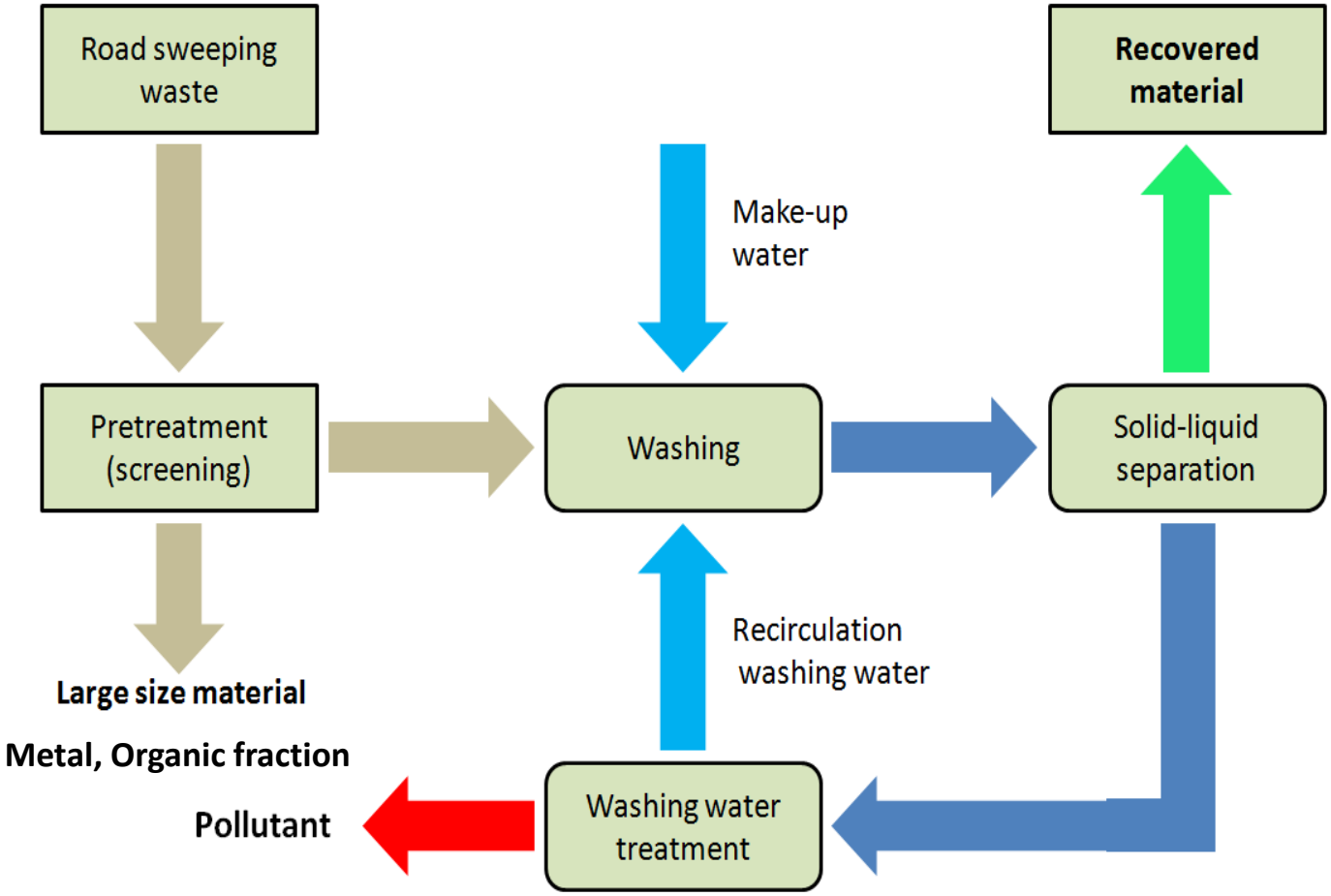
The main phases of the selection, washing, separation and recovery process, can be schematized as follows:

1) separation of solid fractions by selection processes (inert, metal, organic);
2) Washing of inert fraction and separation of contaminated silt or clay fraction;
3) physical - chemical treatment of the slurry containing silt/clay and pollutants, recirculation of treatment water;
4) transfer of pollutants from particles of materials to water;
5) removal of contaminants transferred from the particles to water by chemical and physical processes of precipitation, coagulation, flocculation and sedimentation.

WET TREATMENT WASHING MECHANISM

Type of contaminations	Washing mechanism	Phisical form of the separated contaminants
Agglomerate 	Tangential rubbing 	Suspension 
Deposits on large grain 	Impact 	Dispersion 
Deposits on small grain 	Grain friction 	Dispersion 
Oil veil 	Desorption 	Emulsion 
Chemical bond 	Solubilization 	

WET TREATMENT UNIT OPERATION



RECOVERED MATERIALS (1/5)

A road sweeping waste treatment plant is able to recover about 70% of the incoming material into high quality differentiated raw materials. Basically in the output the following materials will be detected:

SAND, GRAVEL and FINE GRAVEL (~ 70% w/w), CE certified, in accordance with leaching tests and analysis referred to Italian D.M. 186/2006 and technical standards of the European Union for the reuse in concrete and bituminous aggregates production;

FERROUS MATERIALS (~ 0,10% w/w), for recovery in metallurgical plants;

ORGANIC WASTE (~ 10% w/w), to be sent to energy recovery or disposal;

MIXED WASTE (~ 7% w/w), to be disposed in authorized plants such as landfills or incinerators;

DEWATERED SLUDGE (~ 13% w/w), non-hazardous waste recoverable in authorized plants or disposal.

RECOVERED MATERIALS (2/5)

Road sweeping waste

Recovered material

RECOVERED MATERIALS - SAND (3/5)

RECOVERED MATERIALS - FINE GRAVEL (4/5)

RECOVERED MATERIALS - GRAVEL (5/5)

ENVIRONMENTAL ASPECTS (1/2)

Wet recovery plants can be designed to ensure minimal environmental impacts.

These plants are able to allow a save of important amount of natural resources and raw materials.

To this regard, the objectives determining the design of these plants, are:

- minimize the environmental impact through the adoption of design criteria that allow the limitation of emissions and odours, noises to the outside, the risk of pollution of groundwater and surface water bodies;
- ensure the safety and healthy work environment, through the adoption of design criteria in full compliance with all applicable regulations regarding safety and accident prevention and the Machinery Directive;
- maximize the recovery and reuse of materials, products and minimize waste production.

ENVIRONMENTAL ASPECTS (2/2)

In particular, thanks to the established knowledge in this field based on years of experience, work and research, it is possible to minimize the use of washing waters and turn the plant into a self-sufficient plant, through the use of renewable energy.

WASHING WATER

On the basis of industrial experience for each ton of treated waste, about 6 tons of washing water are employed.

The presence of a chemical-physical and biological unit allows the purification of washing water and recirculation of 80% of the latter. The remaining 20% is discharged into the sewer system and sent to the consortium purifier to be subjected to further treatment. From here the water is re-entered into the industrial aqueduct from which the plant once again picks up the water. The washing water used in the plant is therefore fully reused.

ENERGY SUPPLY

The installation of photovoltaic panels on the roof of the building which houses the plant, is capable of providing a quantity of electrical energy sufficient to satisfy the entire energy requirement of the structure, making the plant autonomous and independent from the use of fossil fuels and avoiding the release of carbon dioxide into the atmosphere.

100% energy self-sufficient

CONCLUSIONS (1/2)

Materials of good quality can be recovered by bottom ash, slag and road sweeping waste avoiding landfill disposal.

Technology has a very low environmental impact.

Washing water can be recycled 100% and using photovoltaic panels the plant is energy self-sufficient.

Recovery of these wastes presents an economic advantage respect to landfill disposal using these technologies.

CONCLUSIONS (2/2)

The management of road sweeping waste in this way follows the European legislation and permits to increase of about 5% the percentage of Municipal Solid Waste recycled.

A LCA approach demonstrated that treating the waste in this way it is saved 176 kg of CO_2 for each ton of waste treated.