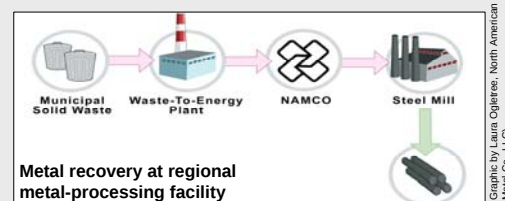


Increasing the Quantity and Quality/Value of Metals Recovered in Mass Burn WTE Units

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Industry-Academia joint project in planning stage with objectives

- ➔ Increase the recovery of metals from Waste-to-Energy ash
- ➔ Increasing the quality and market value of metals recovered either at the WTE-Site or at regional metal-processing and sorting facilities
- ➔ Develop physical and chemical standards for WTE metal scrap, as it has been done for other recycled metal residues



Background

1. Potential for increasing metal recovery

On basis of IWSA directory (2004) and assuming that U.S. MSW contains 5% ferrous metals, only one half of the input metal in MSW combusted is presently recovered. The corresponding metal that may be lost to landfills is 600,000 tons. This entails:

- ➔ Environmental penalties (loss of non-renewable resources and unnecessary use of landfill space)
- ➔ Economic handicaps (unnecessary tipping fees, loss of potential revenues).

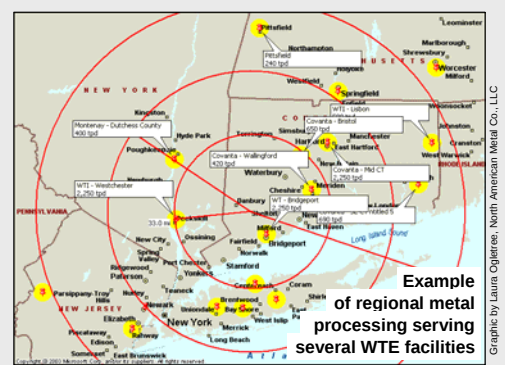
2. Potential for improving quality of recovered metals

Most of the MSW is fed without any pre-processing to combustion (mass burn):

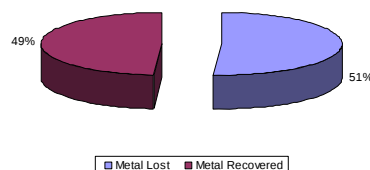
- ➔ The metals (Fe, Al, Cu, etc.) are mixed in the bottom ash
- ➔ The metals are contaminated with ash, other metals, coatings, heavy metals
- ➔ Further treatment can improve quality and market value.

3. Potential for characterization of various grades of WTE metals

- ➔ Depending on size and impurity concentration, the recovered metals should be characterized
- ➔ Grade characterization, if accepted in the secondary metal market, will improve the marketability.



Metals Recovered from U.S. WTE-Plants



Methodology

1. Survey of metal recovery in existing WTE operations and critical analysis of the literature

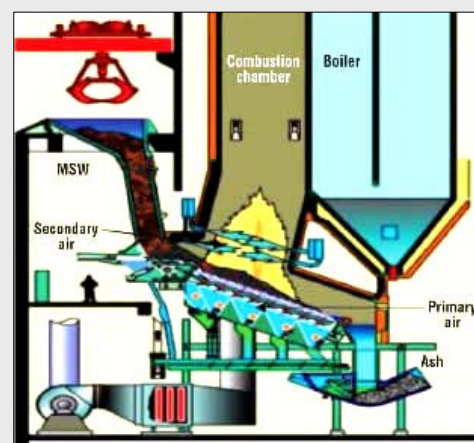
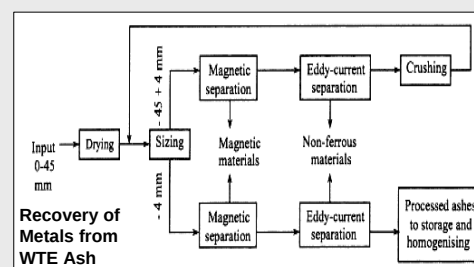
- ➔ State-of-the-Art mass burn WTE operations/technologies
- ➔ BAT for processing metal recovered from bottom ash and quality standards of WTE metals marketed in U.S. and selected EU-Nations.

2. Visits and analysis of selected operations

- ➔ Contact and visit WTE facilities, processors of WTE metal and scrap from other industries (e.g., automotive) to obtain first hand information
- ➔ Establish capital and operating costs for installing metal separation equipment

3. Develop and implement a sampling and analysis protocol

- ➔ Determine existing sampling procedures used by WTE and other scrap processors and develop a protocol that results a representative sample
- ➔ Determine/develop a list of chemical and physical properties/constituents of WTE metals which affect its price and develop standard methods for analysis
- ➔ Sample on-site, analyze metal composition, arrange for bath melting tests and chemical analysis to determine range of impurities.



Expected benefits

- ➔ By processing and characterizing better grades of WTE metals, increase their marketability and market price
- ➔ Higher market prices will encourage WTE facilities that are not recovering metals to install metal separation facilities
- ➔ Higher collection rates and market prices may encourage the implementation of regional plants that process metals from several WTEs