

## NAWTEC16-1927

### DEVELOPMENTS IN THERMAL TREATMENT TECHNOLOGIES

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#### **ABSTRACT**

A 2007 WTER survey (1) showed that the global waste-to-energy capacity (WTE) increased in the period 2001-2007 by about 4 million metric tons per annum. By far, the principal technology used globally for energy recovery from municipal solid wastes is combustion of “as received” MSW on moving grates (“mass burn” or stoker technology). The three dominant grate technologies, by Martin, Von Roll, and Keppel-Seghers, represent about 75% of the total growth in capacity. In the same period, Japan and China built several plants that were based either on the direct smelting or on fluid bed combustion of solid wastes. In China, there have been some mass-burn new plants and also over forty circulating fluid bed WTEs, using technologies developed by the Institute of Thermal Power Engineering of Zhejiang University and by the Institute of Engineering Thermophysics of the Chinese Academy of Sciences. WTE technologies in China are actively supported by the national and local governments and many more plants are projected as sprawling cities are running out of landfill space. Japan is the largest user of thermal treatment of MSW in the world (40 million tonnes) and some of the newest plants use stoker technology, such as the Hiroshima WTE designed by the famous architect Taniguchi and the Sendai WTE that uses advanced oxygen enrichment technology. However, there are also over 100 thermal treatment plants based on

relatively novel processes. The Direct Smelting and the Ebara fluid bed technologies developed in Japan require pre-processing of the MSW, combust the resulting syngas to generate steam, and produce a vitrified residue. The Thermoselect Gasification and Melting technology, originally developed in Europe, has been adopted successfully in seven Japanese facilities by JFE, a company with extensive experience both in high temperature metal processing and with various MSW thermal treatment technologies, including mass burn. This paper also includes a brief report on the results of a study by WTER on ways to increase beneficial uses of WTE ash in the U.S.

#### **DEVELOPMENTS IN GLOBAL WTE**

##### **Global growth**

Thermal treatment facilities built since the beginning of this century have been based mostly on the grate combustion of “as received” MSW (mass burn of stoker technology). According to a 2007 WTER survey, the three major stoker technologies reported 2001-2007 capacity growth of 11 million tons (Martin), 6.4 million tons (A& AE VonRoll), and 5.1 million tons (Keppel-Seghers) (1). In terms of novel technologies, direct smelting (JFE, Nippon Steel), fluidized bed (Ebara), Thermoselect (JFE), and circulating fluidized bed (Zhejiang University; Chinese Academy of Sciences) have accounted for an additional estimated growth of