

# The development of innovative technology at ZJU for the treatment of heterogenous solid waste

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Due to the boosting economic and fast urbanization, millions of tons heterogenous solid waste has been discharged every day in China from residence communities, central business district, restaurants, hospital, industrial factories. In 2018, the generation of municipal solid waste and sewage sludge has reached 230 million tons from 660 big cities. Waste incineration or waste-to-energy technology has been considered as the most efficient solution to such massive land-occupying waste for its fast and maximum volume reduction capability. However, Due to the relatively poor organized collecting and sorting system, Chinese municipal solid waste features low chemical heating value, high moisture content. To converting such low-quality solid waste into clean energy or electricity, the research team at Zhejiang university has developed very unique incineration technology and build whole engineering design for commercial waste-to-energy plants under the support of local companies since 1990s. In this paper, current situation of waste treatment in China will be introduced along with the solid waste properties including ultimate and approximate analysis results. Then the fluidized bed and rotary pyrolysis-incineration technology developed at ZJU will be presented detailedly. Over twenty years experiences has proved that, our unique low circulating rate fluidized bed incinerator can handle shredded MSW with moisture up to 50% and LHV(low heating value) down to 4500kJ/kg. The capacity of the CFB incinerator ranges from 200 t/d to 800 t/d with a combustion boiler efficiency of 80%. For sewage sludge treatment, ZJU has developed stirring indirect drying technology which can efficiently reduce the sludge moisture ratio from 85% to 40% with very low energy consumption by solving sludge viscosity problem through optimizing dryer blades angle. For various hazardous waste incineration, ZJU built a new multi-stage incineration system by pyrolyzing waste first in a rotary kiln. Then, the volatize and bottom residues are burned in second combustion chamber and on rotating grate respectively. Till 2018, there are over 50 plants using ZJU technology and around 500,000 kwh electricity has been generated from there plants. The by-product pollutants during incineration have been well controlled and the notorious dioxins are below the emission limits of EU directive. In the final part, the first industrial scale system for fast *in-situ* monitoring of dioxin TEQ (toxic equivalence ratio) will also be introduced. ZJU has put this system into commercial test now.

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