

Technical Report from China visit of Dr. Efstratios Kalogirou from Earth Engineering Center, Columbia University and President of Synergia (WTERT Greece, [www.wtert.org](http://www.wtert.org), [www.wtert.gr](http://www.wtert.gr)), 02-07 August 2010

## **General information for WTE in China.**

There are approximately 90 WTE Plants in China. The rapid development of WTE has been aided greatly by the Renewable Energy policy of the country. There is a preparation for around 140 WTE plants within the next 5 years. The gate fee ranges from 10-30 Euro/tonne of MSW. Recently there is a new legislation for the emissions in order to conform with the EU limits.

The rapid growth of the WTE industry has also been helped by the relatively low capital cost. There are 4 major local companies, Sanfeng Covanta, Shanghai Environmental, Everbright Shenzhen and Shenzhen Energy. It is important to mention that the moisture is high at 50-55% and the average calorific value is around 5-6 MJ/kg. The main operating problem is the handling of the leachate (around 30%) due to high moisture of MSW.

WTE plants in China are of two main types: Stoker grate, which is the dominant technology and Circulating Fluidized Bed. Generally, the Waste Management in China is based on landfill (75%) and WTE (25%)

### **1. Shanghai Pucheng Thermal Power Energy Co., Ltd , Pudong Yugiao Waste to Energy (WtE) Plant**

Dr Efstratios Kalogirou from Earth Engineering Center, Columbia University and the President of Synergia (WTERT Greece) visited the Yugiao WtE Plant in Pudong which was first put into operation in September 2002.

#### **Main Technical Details:**

- The Plant is equipped with three incineration lines feeding with MSW from part of Pudong district with each daily capacity of 330tons. The total area of the Plant is 80,000 m<sup>2</sup> (20 acres). 7500 hours of operation annually.
- The grate technology used is the SITY 2000 technology that is owned by Martin GmbH
- There are three gravity circulating water-wall boilers and each incineration-boiler line is coupled with a Flue Gas Cleaning System with semi-dry scrubber, bag filter and activated carbon injection system.
- Steam produced from two turbine-generators with each normal capacity of 8.5 MW, so the nominal capacity of the two turbines is 17 Megawatts.

- Bottom ash produced after incineration of MSW is reused as material for bricks after special treatment.
- Fly ash is transported to Shanghai Solid Waste Treatment Center for security special waste landfill.
- The thermodynamic characteristics of produced steam are 400°C and 40 bar pressure.
- The gate fee is around 240RMB (28€)/ton
- The total investment was 670 million RMB
- The selling price for the electricity is 500 RMB/MWh
- Plant is equipped with continuous emission monitoring devices on flue gas emissions which calibrated according to the European standards (directive 2000/76).

## **2.Visit of Chongqing Sanfeng Covanta Environmental Industry Co., Ltd.- technical report on the Chnoggqing Tongxing WtE Plant**

The WtE Chnoggqing Tongxing WtE Plant Plant in Chongqing was first put into operation in March 28, 2005. It is a joint venture headed by Chongqing Steel which includes Sanfeng Covanta, one of many subsidiaries of Chongqing Iron & Steel Co. The plant is using the Alstom SITY2000 design of Martin GmbH. Nearly all the equipment was fabricated locally to Martin specifications. The plant handles 50% of the waste generated in the Chongqing municipality.

### **Main Technical Details:**

- The company has three aspects: EPC contracts, Core technology and equipment & operation of the project.
- Chongqing Sanfeng Covanta Environmental Industry Co., Ltd has constructed and operated 25% of the WTEs in China.
- The technology adopted by Sanfeng Covanta is suitable for high water content, low heating value municipal waste which could burn steadily without pre-selection and auxiliary fuel.
- It has the capacity of 1200ton per day with SITY2000 inclined reverse grate. It is the model project of the waste to energy for high water content and low heating value municipal solid waste.
- High efficiency incineration with residence time over 2 seconds, gas temperature above 850 °C.
- The project used two sets of 58.39t/h steam boiler, natural circulating system, 130 °C feeding water, 210 °C induced draft, 4.0 MPa steam pressure, 400 °C steam temperature.
- Waste heat from burning of waste is used for power generation from 220 kWh to 250 kWh power generation from each ton of waste and power to grid is about 250.000 kWh and supplies for 40.000 household uses.
- Previously, the dioxin limit in China was 1.0 ng/Nm<sup>3</sup> but now it has been reduced according to EE 2000/76 directive to 0.1 ng/Nm<sup>3</sup>. Dioxin and furan emissions from the plant are at only 0.05 ng/Nm<sup>3</sup>.

- The bottom ash (25% of feed MSW) is used for road constructions and fly ash (3% of the feed MSW) becomes inert after on site solidification with cement.
- The bottom ash is used for building material and waste water will be recycled and after treated by three levels will be used for watering the plant flowers.
- Gate fee is around 80RMB (10 €/ton)
- The total investment was 370 million RMB

### **3. Visit of Dr. Efstratios Kalogirou in WTERT China**

Dr. Efstratios Kalogirou, visited also the sister organization of WTERT Chongqing (China) and met Dr. Kong Songtao and associate professor Ding Youqing, former president of WTERT (China) .

During the meeting, both sides presented their operation mode of respective centers and discussed some of their basic goals, promoting the communication between the sister organisations of WTERTs around the world.

WTERT China, in cooperation with CQUST (Chongqing University of Science & Technology) consists of five departments, 30 employees and three professors from Chenghu University. WTERT is currently running a Scientific Research Programme, supported by the Chinese Government, about the elementary analysis of waste for more than 60 cities .

Recently, WTERT China upgraded its website ([www.wtert.cn](http://www.wtert.cn)) and the team tries to keep it updated and improve it day by day, in close collaboration with the international WTERTs network.

Dr. Kalogirou after informing both Dr. Kong Songtao and professor Ding Youqing about WTERT Greece (SYNERGIA), proposed to co-organize an international conference for WTERT branch of participation in the near future in Chongqing. This conference would introduce the latest technologies and achievements of WTE to Chinese scholars and government agencies. The conference would eliminate and reduce the misunderstanding and fear in WTE to public.