Abhishek Asthana

Sheffield Hallam University, UK

Techno-economic feasibility study of waste to energy tri-generation plants in developing countries

Under the "Clean India Mission", the Ministry of Urban Development (MoUD) of India is investing US$ 9 Billion to clean up 75 largest cities in India. Waste to Energy (WTE) plants will be a key to its implementation. A new state-of-the-art WTE plant in New Delhi is planned for this purpose to set an example for other cities to follow. Delhi generates 8,400 tons per day (TPD) of Municipal Solid Waste (MSW), which is expected to double in the next 15 years. The current capacity of waste processing plants in Delhi is only 8,000 TPD. It is estimated that by the year 2050, Delhi would require 100 km_2 of landfill area, which is 7% of the total land area of the capital for waste disposal unless a new WTE plant is commissioned. The existing landfill sites in Delhi have dangerously exceeded their capacity already. WTE projects have been running successfully in many countries but have produced only mixed results in India and have often been plagued with controversies. This is due to various technical, financial, environmental, political and social factors involved. Hallam Energy at Sheffield Hallam University was commissioned by the Government of India, to conduct a detailed independent investigation into the techno-economic feasibility of such a WTE project in Delhi. The goals of this study were (i) to make an informed decision on whether the proposed WTE facility for Delhi will be technically and financially viable, and (ii) to gain a reasonable understanding of the costs and resources involved in this investment. This work looks at the various challenges associated in setting up WTE plants in developing countries and address key findings including: The capacity of the plant; The capital cost; The electrical power output; Land area requirement; Site selection for the plant; The choice of processes and pre-processing of the feed; Feasibility of tri-generation or CHP; Choice of technologies and equipment; Financial models; Emissions of pollutants and the lessons learnt from past WTE projects in India.

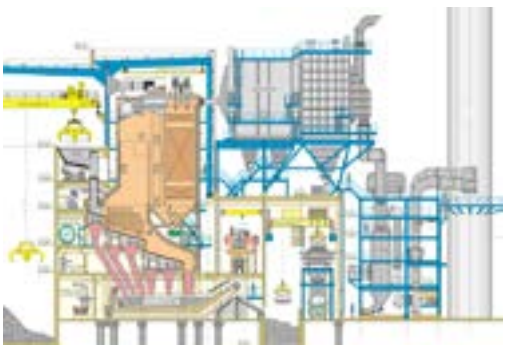

Figure 1: Proposed waste to energy plant

Biography

Abhishek Asthana is the Director of Hallam Energy, the energy research group at Sheffield Hallam University. In 2009, he co-founded Hallam Energy and has led and delivered 55 projects of industrial energy research, consultancy and knowledge transfer. He has won £3.5 million funding for SHU, co-authored 37 scientific papers and 1 book, invented 4 patents and developed 5 commercial software packages. He is the Course Director for BEng Energy Engineering and MEng and BEng Chemical Engineering programs at the university. In 2015, he has established a Doctoral Training Alliance (DTA) in Energy to train PhD students conducting energy research. The DTA has now grown to 120 PhD students and 200 Supervisors across 19 British Universities in the University Alliance, UK, and he is currently the Deputy Director of DTA. He also recently led the alliance to success in winning €6.5 Million funding from the European Commission's Marie Skłodowska-Curie Actions COFUND to further expand the DTA program.

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