

Reusing Refuse

Delhi to get its first WtE facility

By Shruti Tagra

Municipal solid waste (MSW) volumes have been increasing in the country owing to rapid urbanisation and industrial development. With limited land available for waste disposal, generating energy from waste provides a solution to the twin problems of power shortage and overflowing landfill sites. While approximately 900 waste-to-energy (WtE) plants are operational around the world, including in many Asian countries such as Taiwan, Singapore, Japan and Korea, only eight small WtE plants, with a total installed capacity of 22.5 MW, currently operate in India. This scenario is, however, set to change with the country's first large-scale, commercial, fully integrated WtE facility likely to be commissioned at Timarpur-Okhla by end-2011.



Waste-to-energy advantages

WtE technology converts MSW into renewable energy in a controlled procedure. Post treatment, the volume of MSW is reduced to about 10 per cent of the

original. The process involves recovering 72 per cent of the raw energy from MSW, which is converted into steam or hot water. About 29 per cent of this steam is then converted into electricity. Thermal treatment of 1 tonne of MSW produces as much energy as would be generated by one barrel of oil or a quarter tonne of coal. The by-product of producing electricity from waste is ash, which can be recycled. Besides, it also helps in recycling metal that would otherwise be lost in landfills and would have the potential to contaminate ground water.

Timarpur-Okhla WtE project

The 20.9 MW Timarpur-Okhla WtE project is being developed by the special purpose vehicle, Timarpur-Okhla Waste Management Company Private Limited (TOWMCL). It is being undertaken on a private-public partnership basis by Jindal ITF Ecopolis (JITF Ecopolis) and the Delhi government. TOWMCL has been awarded a 25-year concession period by the Government of the National Capital Territory of Delhi to design, engineer, finance, construct, operate and manage this project on a build, own, operate and transfer basis. The average plant load factor of the plant would be 97 per cent on the basis of 330 days of operation (and approximately 90 per cent on the basis of 365 days of operation).

The structuring of the project, evaluation of various technologies, project development activities and the selection of suitable developers was entrusted to the IL&FS Infrastructure Development Corporation. The Timarpur-Okhla WtE project is the first renewable energy pro-

ject to be awarded through the competitive tariff bidding process. Allard M. Nooy, chief executive officer, JITF Ecopolis, says, "The Timarpur-Okhla project is slated to become one of the ten largest WtE projects in Asia in terms of MSW treatment capacity."

Progress so far

The project was conceived by the Government of Delhi and IL&FS in 2005. Though the initial commissioning date of the plant was June 2010, construction began only in July 2010 after clearances were obtained from the various regulatory bodies involved (the Ministry of Environment & Forests, Delhi Pollution Control Committee, Central Ground Water Board, Town & Country Planning and the Delhi Development Authority).

The project faced a number of hurdles in the initial phase. About 4,000 trucks were deployed to remove the waste that had been dumped on the land made available for constructing the plant. There was a high-voltage overhead line across the site and pipelines underneath the area, which had to be re-directed, thereby causing delays in the commencement of the project.

Currently, the project is facing opposition from the residents of Sukhdev Vihar in south Delhi, 150 metres away from the plant. The residents of the area are wary of the environmental and health hazards of the upcoming plant. They allege that the project will lead to the emission of toxins and result in traffic congestion on account of the movement of a large number of trucks. Besides, the project may also threaten the livelihoods of a large part of the city's recycling workers. The Delhi government has, however, filed an affidavit in the Supreme Court stating that the concerns are baseless, and is going ahead with the project.

The construction of the project is almost complete. The facility will be commissioned in three stages ending in the fourth quarter of 2011.

Financing

The total estimated cost of the project, to be developed on 15 acres of land, is over Rs 2.04 billion. The costs pertain to site development, plant and machinery, financing as well as preliminary and pre-operative expenses, and contingency provisions. The project is being financed through a mix of debt and equity in a 70:30 ratio. It achieved financial closure in May 2008. Axis Bank acted as the lead bank for the Rs 1.42 billion debt component.

In addition, the company will receive a capital subsidy from the Ministry of New and Renewable Energy, which will be utilised for repayment of debt. The project has also been registered with the United Nations Framework Convention on Climate Change and will earn 2.6 million certified emission reductions over a period of 10 years. It is expected to achieve 262,791 metric tonnes of carbon dioxide equivalent reductions per year.

Benefits of the project

The integrated facility at Timarpur and Okhla in Delhi has been developed on the "zero waste concept" to prevent the dumping of MSW at the Bhati mines.

The project comprises a refuse derived fuel (RDF) plant at Timarpur and Okhla that is capable of processing 1,350 tonnes of MSW per day, (which would go up to 1,950 tonnes of MSW once the plant is completed). This is equivalent to one-third of the municipal waste generated in Delhi. The treated sewage will be used as the main source of process water for the project. According to estimates, about 135 tonnes of ash will be produced post combustion, which can be used in the construction of roads, pavements, etc.

Technology

The Timarpur-Okhla project is based on the stoker technology of treating waste, which does not require any additional fossil fuel to generate heat from the waste. Both the Municipal Corporation of Delhi (MCD) and the New Delhi Municipal

Corporation will supply MSW for the plant. The waste will enter the facility through an enclosed area having negative pressure, which will take away its foul odour. Next, pre-segregation will take place through a mechanical process, where large plastics and metals will be removed from the waste. Thereafter, MSW will be mixed and pressed by hydraulic cranes, which will remove the humidity and transform the waste into condensed, homogeneous matter. The waste will then undergo a controlled combustion process that will release heat, which will generate steam (using boilers) to drive the turbines. The ash residue can be reused for road construction, manufacturing of bricks, etc.

The entire RDF produced by the pre-processing plant will be used for power generation. No biogas will be generated from the MSW. All the steam generated from the boilers will be used for commercial power generation, except for an insignificant quantity that will be used for sealing the glands of the condensing turbine and for the evaporator dryer of the leachate treatment system.

Further, according to Nooy, half of the company's investments (on the project) and plant area have been dedicated towards pollution control. The harmful molecules of the gases that are produced in the combustion process will be encapsulated with the help of activated carbons and lime. Thereafter, the gas will be filtered, and hot air (at a temperature of 130-140 degrees celsius) will be finally released into the atmosphere.

Sale of power

The plant will also generate 20.9 MW of renewable power, which will have the capacity to serve 600,000 homes. The electricity generated will be the main source of revenue for the company. In January 2010, BSES Rajdhani Power Limited signed a 25-year power purchase agreement with TOWMCL for purchasing electricity from the Timarpur-Okhla facility. According to the agreement, of the total



122 MUs generated, 60 MUs are to be sold to BSES at the rate of Rs 2.49 per kWh for the first year, and at a levelised tariff of Rs 2.83 per kWh thereafter. The agreement enables the promoters to sell the remaining electricity generated through a suitable open access mechanism.

Besides sale of power, the sale of recyclables like plastics, aluminum and iron collected during pre-processing, and the ash produced after combustion, may also generate revenues for the plant.

Conclusion

With limited renewable energy generation options available in Delhi, there is no doubt that WtE projects will emerge as one of the single largest sources of meeting the renewable purchase obligation for the city. Also, most of the wastes generated find their way into land and water bodies without proper treatment, causing severe water pollution. By enabling the treatment and processing of wastes before their disposal, WtE technologies can help mitigate the problems caused by solid and liquid wastes.

Realising this, MCD0 is setting up two other plants – at Gazipur (10 MW) and Narela-Bawana Road (36 MW) – in Delhi. The success of this initiative, however, largely depends on the financial viability of the Timarpur-Okhla project. If TOWMCL is able to generate the projected revenues and earn profits, more private players will be attracted to the sector and set up WtE plants in Delhi and in other places. ■