

29. Keppel Seghers Waste-to-Energy Plant, Singapore



Photo Credit⁶⁴

Background

Between 1970 and 2000, Singapore experienced significant growth and urbanization. As a result, the city-state's solid waste generation grew at 8 to 10 percent every year, from an estimated 1,200 tons per day in the 1970's to 7,700 tons per day at the turn of the century. After considering a variety of technologies, including composting, baling, and others, the government decided on mass-burn incineration to dispose of solid waste.

The decision to invest in mass-burn incineration was driven primarily by four characteristics of this technology: (1) up to 90 percent waste volume reduction; (2) electricity generation capacity; (3) bottom-ash and fly-ash recycling; and (4) scrap metal recovery.

Following the construction of Singapore's first Waste-To-Energy (WTE) plant in 1979, the Singapore government would go on to construct three more WTE plants for the country under Design-Build (DB) contracts with the private-sector. This left the government responsible for the financing and operational risk, which was also capital intensive in construction and operation.

Project Structure

With the lifecycle of the first WTE plant winding down, the Singapore government decided to develop a fifth site for its waste management system. However, instead of using the DB-method as with the previous four, the country opted to pursue a different PPP model in the hope of increasing competition in the waste incineration sector.

In 2001 the government tendered the development of the new plant with a focus on having the private sector partner take on the financial, design and demand risks associated with the project. It was not well-received by the market and only one, non-compliant bid was received. The lack of interest was believed to stem from developers being unwilling to bear the demand risk due to the uncertainty of

waste growth and the lack of guarantees around the facility's waste streaming.

Following the failed tender, the Singapore government commissioned a study to investigate the waste incineration industry. The outcome of this research yielded the following recommendations:

- Adopt a DBOO (Design, Build, Own, Operate) scheme with full 'take-or-pay' approach;
- The government should enter into 'take-or-pay' agreement with the developer to buy 100 percent of incineration capacity at a price determined through the tender;
- The government should bear demand risks by giving the operator full capacity payment, regardless of the plant's actual utilization rate.

The government reopened the call for proposals, this time electing to offer a 25-year concession contract with 'take-or-pay' approach. This led not only to more market engagement but also to a successful procurement process, with Keppel Seghers being awarded the concession in late 2005 and opening the site for commercial operations in 2009.

Lessons Learned

Singapore now has four WTE plants in operation (the first plant was decommissioned in 2009), which handle all incinerable waste collected. Two of the plants are owned and operated by Keppel Seghers, which handles about 50 percent of the daily collection. The others are operated by Singapore's National Environment Agency (NEA).⁶⁵

This project highlights the importance of engaging with and understanding the needs of the market in pursuing a PPP. A failed tender may be the result of a failure to design a project structure sufficiently in line with industry standards and the needs of private sector investors. Careful study of and engagement with market actors to determine the right balance of risks and incentives can be key to the successful delivery of a PPP.

⁶⁴ Maksym Kozlenko (https://commons.wikimedia.org/wiki/File:Keppel_Viaduct,_Singapore.jpg),

<https://creativecommons.org/licenses/by-sa/4.0/legalcode>

⁶⁵ Tuan, Loh Ah. 2016. *Waste-to-Energy Plants – Public-Private Partnership Singapore*. Accessed December 3, 2019. https://d2oc0ihd6a5bt.cloudfront.net/wp-content/uploads/sites/837/2016/03/B4_2_TUAN-Loh-Ah_Keppel-Seghers-Engineering-Singapore.pdf.