



## Urban Agenda Platform

*The global platform for sharing progress, action and knowledge on the implementation of the New Urban Agenda to achieve sustainable urban development.*

# T PARK

## Award Scheme

### Sustainable Development Goals

## Guangzhou Award

### Goal 11 - Make cities and human settlements inclusive, safe, resilient and sustainable

## Summary

T PARK represents Hong Kong's vision to embrace the concept of "waste-to-energy" and to transform people's attitude towards waste management. As one of the most technically advanced facilities of its kind in the world, T PARK combines a variety of advanced and self-sustained technologies into a single complex: sludge incineration, power generation, seawater desalination and wastewater treatment.

## Background and Objective

It also has various recreational, educational and ecological facilities for the public, including an Environmental Education Centre where the public can learn and explore the benefits of sustainable "waste-to-energy" management, recycling and environmental protection. In Hong Kong, it is expected that the volume of sludge generated every day will increase to 2,000 tonnes by 2030. As such, the disposal of such a vast quantity of sludge to landfills is not sustainable. T PARK treats sludge through incineration and cuts the volume of waste by up to 90 percent. Heat energy generated is transformed into electricity that fully meets the energy needs of the entire facility. When running at full capacity, T PARK is able to handle up to 2,000 tonnes of sludge per day and produces approximately 2 megawatts of surplus electricity that can power up to 4,000 households. T PARK achieves "zero wastewater discharge" in total water management. Both potable water and process water for the facility is generated on-site through a seawater desalination plant. Rainwater is collected for non-potable use, and wastewater from the entire facility is treated and reused for irrigation, flushing and cleansing purposes.

**BACKGROUND INFORMATION** From the starting of a strategy study in 1996 to eventual signing of the Contract for its design, construction and operation, the HKSAR Government has spent close to 20 years of relentless effort to develop the Sludge Treatment Facility (STF). Construction of the STF was started in late 2010 with completion by early of 2015. The STF represents a classic example of art and technology integration and a monumental feat of Hong Kong's engineering achievement. **ORIGINS** Hong Kong's sewage treatment facilities generate a large amount of sludge which needs to be disposed of in an environmental manner. In the past, sewage sludge was disposed of at landfills only. Due to its high water content, sludge has to be co-disposed with municipal solid waste and construction waste. Excessive disposal of sludge would lead to slope failure at landfills, thereby causing severe disruption to operation and even closure of landfills. Disposal of this biodegradable waste at landfill is also not in line with international trend as it produces more greenhouse gases and is not considered sustainable in the long term. A purposely-designed incineration facility offers the best alternative for sludge disposal as it entails the highest volume reduction (up to 90%) and helps preserve our scarce landfill space for other types of unavoidable waste. The landfill life can be extended. The thermal process also ensures that the sewage sludge is treated in an environmental manner. Through a Design-Build-Operate (DBO) model, T PARK aims to be the new state-of-the-art sludge treatment facility located in Tsang Tsui of Tuen Mun. The "T" stands for "transformation" which reflects the vision to embrace the concept of "turning waste to energy" and "driving positive change in people's attitude and behaviour towards greener lifestyles".

## Outcomes and Impacts

Environment Bureau initiates 'Hong Kong Blueprint for Sustainable Use of Resources 2013-2022', the action agenda to reduce waste and relieve pressure on landfills is built upon enhanced social mobilization coupled with the right policies and legislation, as well as providing the necessary waste infrastructure to deal with different types of waste. We will continue to use the internationally-accepted multi-tiered waste management hierarchy to guide our policies and measures. The construction of Sludge Treatment Facility (STF) supplements one of the major missing elements in Hong Kong's waste infrastructure to deal with sewage sludge by turning waste to energy. Some of the desired outcomes are shortlisted as below: Improved efficiency and effectiveness for a more sustainable way to sludge treatment T PARK handles sludge from 11 major sewage treatment works in Hong Kong, comprising 99% of the total sludge in the territory. Volume of sludge is reduced by 90% and this helps preserve our scarce landfill space for other types of unavoidable waste. Alter public perception on sludge treatment facility and Raise public awareness on environmental protection issues T-PARK is designed to foster community understanding and transformation, ranging from education to recreation. We invite all visitors to experience first-hand, the monumental drive needed to transform a humble idea into our grand T-PARK facility, through the enlightening exhibition. Displayed within the purpose-built T-HALL, the exhibits give visitors a deeper understanding of our 'waste-to-energy' process, while the T-GALLERY allows visitors to delve deep into T-PARK's sophisticated daily operations. T-PARK includes a number of recreational features designed to encourage visitors to enjoy the benefits gained from the 'waste-to-energy' facility. Since the opening in 2016, T PARK has received over 170,000 visitors as of Aug-2018. Positive feedbacks are



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received among local and overseas government representatives, the community, the business sector and academia. Going beyond from visiting the Environment Education Centre (EEC) physically, we are reaching out to the community through social media, i.e. Facebook and Instagram channels and our outreach programmes. We hope that EEC will not be only an education centre, through transformation, it will become a platform for environmentally-conscious groups to exchange ideas and an innovative hub to promote eco-living to the society.

## Innovative Initiative

T PARK is an evolutionary construction that represents Hong Kong's vision to embrace the concept of "waste-to-energy" and to transform people's attitude towards waste management. As one of the most technologically advanced facilities of its kind in the world, T PARK combines a variety of advanced and self-sustained technologies into a single complex: sludge incineration, power generation, seawater desalination and wastewater treatment. It also has various recreational, educational and ecological facilities for the public, including an Environmental Education Centre where the public can learn and explore the benefits of sustainable "waste-to-energy" management, recycling and environmental protection. The implementation of the project also met some obstacles: Opposition from District Council and locals Strong opposition was received from locals in Tuen Mun on the construction plan of excessive obnoxious facilities in the western part of Tuen Mun, including the Extension of West New Territories Landfill and the construction of Sludge Treatment Facility (STF). In order to address their concerns over the impact on the surrounding environment and their health, we had conducted Environmental Impact Assessment (EIA) and extensive public consultation during 2007-2008. A liaison group was also set up to strengthen the communications among stakeholders. List of consolidated feedbacks was incorporated into the design of STF. To address any potential concern on local air quality issues related to the operation of the STF and for collecting objective air quality data of the district, an Air Quality Monitoring Station (AQMS) has been set up at the roof of the Tuen Mun Public Library since 2013. Complex Construction & Techniques Challenges at a remote site In terms of environmental, engineering, operational, financial and planning considerations, the ash lagoon site at Tsang Tsui, near Nim Wan is selected through a stringent exercise. Due to the site's unique and remote location, an immense amount of piling for foundations is required. Modular and prefabricated building is preferred while small and complex components were pulled together by large amounts of special welding works on site. T PARK would have to be self-sufficient and able to generate potable and process water on-site through a seawater desalination plant. Rainwater is collected for non-potable uses. All wastewater from the facility is treated and reused for irrigation, flushing and cleansing purposes to achieve "zero wastewater discharge" in total water management.

## Conclusion

For other cities: A showcase of self-sufficient facility features a variety of advanced technologies and education centre combined into a single complex: sludge incineration, power generation, seawater desalination, wastewater treatment. For the public: Not only the sludge treatment facility operates with the 'waste to energy' and 'wise use of resources' concept, we have embraced this idea within ambient environment at Environment Education Centre (ECC), samples are illustrated as below: Furniture with upcycling twist All wooden furniture in T•CAFÉ are upcycled from the unwanted fender wood of the old Wanchai Pier, including the counters tables and diners' chairs. Dilapidated school chairs are renovated with the help of sheltered workshop. Self-served T•CAFÉ A distinctive feature for diners to clean their own dishes and garbage at T•CAFÉ. The innovative idea aims at promoting positive moral attitudes and be responsible for the waste produced. Instead of using detergent, 'eco-enzymes', an environmental-friendly product from the fermentation of food waste and sugar, is used as cleaning agent for dishes and hands washing. Potable water generated by the in-house desalination plant is available for all visitors. Use of re-designed 'I'm perfect' mugs to remind the public to treasure resources before dumping. RELEVANCE TO SUSTAINABLE DEVELOPMENT GOALS Goal 6: Ensure availability and sustainable management of water and sanitation for all Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable Target 9: Improving resource efficiency, mitigation and adaptation to climate change, resilience to disasters and implement holistic disaster risk management Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions for all Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development