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Panel on Environmental Affairs

Meeting on 24 June 2024

**Background brief on
Development of modern waste-to-energy incinerators in Hong Kong**

Purpose

This paper provides background information on the development of modern waste-to-energy (“WtE”) incinerators in Hong Kong. It also gives a brief account of the major views and concerns expressed by Members when related issues were discussed by relevant committees of the Legislative Council (“LegCo”) in recent years.

Background

Development of waste-to-energy facilities

2. For the past years, Hong Kong has been handling municipal solid waste (“MSW”) by means of landfilling. However, as the waste amount continues to rise with the economic development and population growth, long-term reliance on landfilling is not a sustainable mode of waste management. In 2021, the Government announced the “Waste Blueprint for Hong Kong 2035” (“the Waste Blueprint”), setting out the vision to move away from the reliance on landfills for handling MSW by around 2035. Apart from striving to promote waste reduction at source and waste recycling in the upstream, the Government is now developing a network of WtE facilities, including advanced and highly efficient modern WtE incinerators and food waste recycling facilities, as follows:

- (a) Integrated Waste Management Facilities Phase 1 (“I-PARK1”), which is currently under construction near Shek Kwu Chau, is expected to commence operation in 2025 for handling 3 000 tonnes of MSW per day;
- (b) Integrated Waste Management Facilities Phase 2 (“I-PARK2”) at Tsang Tsui, Tuen Mun, for which the investigation, design and environmental impact assessment study is being conducted, will have an expected MSW handling capacity of about 6 000 tonnes per day;
- (c) Organic Resources Recovery Centre Phase 1 (“O-PARK1”) commenced operation in 2018 and can handle 200 tonnes of food waste each day, while Organic Resources Recovery Centre Phase 2 (“O-PARK2”) commenced operation in March 2024, with a design handling capacity of 300 tonnes of food waste each day; and
- (d) anaerobic digestion facilities in the Tai Po and Sha Tin Sewage Treatment Works for implementing the Food Waste/Sewage Sludge Anaerobic Co-digestion Trial Scheme, which came into operation in 2019 and 2023 respectively, can handle 100 tonnes of food waste in total each day.

3. As promulgated in the 2022 Policy Address, the Government will study developing more modern WtE incinerators in the Northern Metropolis to tie in with the future urban development of Hong Kong,¹ and at the same time to minimize the traffic impact, environmental nuisance and carbon footprints generated from cross-district transportation of waste.

Strategic landfills

4. Currently, the three strategic landfills, namely West New Territories (“WENT”) Landfill, South East New Territories (“SENT”) Landfill and North East New Territories (“NENT”) Landfill, are the key disposal sites for Hong Kong. Since January 2016, SENT Landfill receives only construction waste. At present,

¹ The Northern Metropolis Development Strategy proposed in the 2021 Policy Address put forward the planning concept of “Twin Cities, Three Circles” and formulated a development project from a cross-boundary perspective for the first time. The Strategy not only strengthens economic and housing development in the northern New Territories, but also promotes integration between Hong Kong and Shenzhen and enable Hong Kong to better integrate into the overall development of the country. The Northern Metropolis adjoins the “Shenzhen-Hong Kong Boundary Control Points Economic Belt” in Shenzhen, namely areas where the land boundary crossings of the Shenzhen side are located and their environs.

the remaining capacity of NENT and WENT landfills is less than 20%. Based on the current daily waste intake, it is projected that these two landfills will be exhausted in 2026. Extension of the NENT and WENT Landfills are underway,² with a view to starting waste intake in 2026 to cope with the ultimate waste disposal need of the territory in the short to medium term.

5. The Administration's aim is to ensure that the capacity of existing landfills can cope with Hong Kong's needs up to 2026, thereby safeguarding a seamless operational transition between existing landfills and their extensions. During the transitional period, the Administration will endeavour to manage the landfills properly while minimizing the impact of landfills on their neighbouring residents. For instance, the Administration had progressively introduced a number of improvement measures at the NENT Landfill since mid-2021, as set out in **Appendix 1**.

Major views and concerns expressed by Members

6. Members' major views and concerns are summarized in the ensuing paragraphs.

Modern waste-to-energy incinerators

Environmental benefits and impacts

7. Members supported the policy direction to turn locally generated MSW into resources or energy through WtE facilities as far as practicable and requested the Administration to ensure that the operation of such facilities, in particular modern WtE incinerators, would not cause pollution and other adverse impacts to the environment.

8. The Administration advised that it had been proactively driving the development of WtE facilities to facilitate the transformation of waste into energy. The moving grate incineration technology adopted by I-PARKs was commonly used in the Mainland and other advanced regions. The technology employed high temperature (over 850 °C) to combust the waste under high turbulent condition with flue gas residence time of at least 2 seconds to ensure the complete

² Funding for the extension works of the NENT Landfill was approved by the Finance Committee ("FC") of LegCo in December 2014, and related site formation and construction works commenced in December 2022. Funding for the extension works of the WENT Landfill was approved by FC in September 2021. The contract for the design, build and operation of the WENT Landfill Extension was awarded in September 2023 and the design work is in progress.

destruction of organic pollutants, such as dioxin. Metal materials would be recovered from the incineration residues. The Administration had also engaged a local university to explore the beneficial uses of incinerator bottom ash into construction materials, such as cement making and aggregate materials.

Development timeframe

9. Members called on the Administration to study ways to shorten the project timeframe for developing I-PARK2 by drawing reference from the development of similar facilities in the Mainland, and actively explore the possibility of expanding the treatment capacities of I-PARK1 and I-PARK2 and implement other measures to further reduce waste at source, with a view to minimizing the need for a third modern WtE incineration plant.

10. The Administration advised that:

- (a) to shorten the construction time of I-PARK1, prefabricated components were used as far as possible in place of onsite construction, and low-noise construction activities were carried out round the clock;
- (b) for the development of I-PARK2, the environmental impact assessment study of the project would be conducted in tandem with various tasks of preconstruction works such as public consultation, ground investigation, coordination for interfacing issues with other projects, preparation of tender documents for the works contract;
- (c) the Administration was also proactively exploring alternative development options, such as public-private partnership, with a view to expediting the development programme for I-PARK2. Feasibility of increasing the design treatment capacity of I-PARK2 would also be explored;
- (d) apart from developing I-PARKs and other WtE facilities, the Administration would continue to strengthen its overall waste reduction and recycling measures. The Administration would keep in view the effectiveness of these measures in driving waste reduction; and
- (e) given the uncertainty at this stage as to whether Hong Kong would need a third modern WtE incineration plant to achieve the zero landfill goal, the Administration would plan ahead and explore the possibility of reserving a site in the Northern Metropolis and consult the public and LegCo on the potential site(s) in due course.

Compatibility of waste-to-energy facilities with other developments in neighbouring areas

11. Some Members expressed concern about whether the construction of I-PARK2 at Tsang Tsui, Tuen Mun was in line with national policies, in particular the development of the Guangdong-Hong Kong-Macao Greater Bay Area (“GBA”) and the Qianhai Shenzhen-Hong Kong Modern Service Industry Cooperation Zone. As the Northern Metropolis was positioned as a new engine for growth with an industry-oriented approach as policy priority, some Members queried whether the planning of a third modern WtE incinerator thereat would be compatible with other developments. The Administration was requested to conduct extensive public consultation in this regard while stepping up publicity to allay the concerns of local residents about the environmental impact of such facilities.

12. The Administration advised that in some Mainland cities and other places, modern WtE plants were located in proximity to residential and commercial zones with negligible adverse effects, and could be harmonized with neighbouring areas. It was a national policy to adopt modern WtE technologies for waste management, and the Shenzhen authorities had expressed support for the development of I-PARK2 at Tsang Tsui. The Administration would conduct extensive public consultation for the development of I-PARKs and other major WtE facilities. The Administration would also endeavour to minimize the visual impact of I-PARK2 on the surrounding areas and Shenzhen. If there was a need to construct a waste incineration plant in the Northern Metropolis, there should not be any concern about a mismatch between the plant and the overall development strategy for the Northern Metropolis.

Impact on waste recovery initiatives

13. Members sought the Administration’s views as to whether the development of modern WtE incinerators might dampen waste reduction and recycling efforts in the community, resulting in high incineration rates but low recovery rates.

14. Referring to the strategies, goals and measures to tackle the challenge of waste management up to 2035 in the Waste Blueprint, the Administration advised that its aim was to gradually reduce the per capita MSW disposal rate by 40% to 45% and raise the recovery rate to about 55% by implementing waste reduction measures, and would develop adequate WtE facilities to move away from the reliance on landfills in the long run, so as to achieve the vision of “Waste Reduction·Resources Circulation·Zero Landfill”. The Administration would continue to promote waste reduction and recycling, including launching

producer responsibility schemes for more products, regulating disposable plastic products, continuously expanding the community recycling network GREEN@COMMUNITY and providing outreaching recycling support services in the community through the Green Outreach, etc. Developing modern WtE incinerators would not affect the progress of these initiatives.

Zero Waste Bay Area

15. Members opined that a holistic approach to pollution prevention and control should be adopted in GBA to enhance the effectiveness of waste management. Hong Kong and Mainland cities of GBA should continue to strengthen exchanges of technology and experience in this regard. As some neighbouring Mainland cities had WtE capacities that exceeded their current needs, some Members suggested that the Administration should explore capacity sharing with those Mainland places, so as to reduce the need for landfilling pending the commissioning of I-PARK2.

16. The Administration advised that grasping the opportunities brought by building a “Zero Waste Bay Area”, Hong Kong continued to work with the GBA cities to deepen exchanges and co-operation on “Zero-waste City” and resources circulation, and explored developing GBA’s capacity and pattern of regional circular economy, in order to elevate regional capability in handling emissions and carbon reduction of solid waste as well as safety storage. Hong Kong could proactively participate in the GBA development on circular economy, further strengthen mutually beneficial cooperation in GBA’s environmental industry and give impetus to green transformation in the area. As Hong Kong had to abide by import and export controls related to MSW between Hong Kong and the Mainland, the Administration would discuss with relevant Mainland ministries whether sharing of waste management capacities between Hong Kong and Mainland cities would be feasible.

North East New Territories Landfill

17. Members expressed concern that the continued use of NENT Landfill and the implementation of the NENT Landfill expansion project might hinder the development of the Northern Metropolis and the Shenzhen-Hong Kong Boundary Control Points Economic Belt, as well as the formation of an ecological corridor between Hong Kong and Shenzhen.³

³ The Agricultural, Fisheries and Conservation Department is collaborating with the Shenzhen Municipal Planning and Natural Resources Bureau to formulate a joint work plan for the “Wutong Mountain - Robin’s Nest Ecological Corridor”, with a view to enhancing ecological connectivity and integration between the two places.

18. The Administration advised that it had advanced final restoration and greening works of NENT Landfill to improve its visual appearance progressively. Operational areas where landfilling had been completed were capped with permanent impermeable liners, which would be followed by restoration works (such as the installation of drainage systems) and plantation. While the visual appearance of recently carried out plantation might be different from other restored/greened areas, grass sprigs would be temporarily planted by way of hydroseeding at some locations to achieve a quick greening effect. In the long run, a visually harmonious natural landscape would be formed on the site after the landfill's closure. It was envisaged that the final restoration and greening of NENT Landfill could complement the establishment of Robin's Nest Country Park, which would be a part of the Hong Kong-Shenzhen ecological corridor.

Latest development

19. On 24 June 2024, the Administration will brief the Panel on Environmental Affairs about the development of modern WtE incinerators in Hong Kong as well as the operation and management of the NENT Landfill.

Relevant papers

20. A list of relevant papers is set out in **Appendix 2**.

Council Business Division 1 and Public Complaints Office
Legislative Council Secretariat
19 June 2024

Improvement measures for the North East New Territories Landfill

The measures introduced by the Administration since mid-2021 to mitigate the environmental impacts of the North East New Territories (“NENT”) Landfill are as follows:

- (a) stepping up the application of Posi-Shell covers to safeguard environmental hygiene and reduce odour emission;
- (b) advancing the process of covering the landfill operational areas with clean soil cappings to reduce the size of such areas by 40% to 50% as far as practicable;
- (c) shortening the time for waste reception at the landfill site by 1 hour by advancing the closing time of waste reception from 7:00 pm to 6:00 pm;
- (d) installing additional deodourizers, covering the leachate storage lagoons and enhancing the monitoring of odour emission, etc;
- (e) advancing the final restoration and greening works of the NENT Landfill, originally scheduled for 2026 upon completion of its landfilling operation, to end-2021, so as to expedite the environmental improvements to the NENT Landfill and minimize the visual and odour impacts arising from the landfill on nearby residents;
- (f) carrying out, as scheduled in end-2023, the restoration and greening works for 80% of the operational areas where landfilling is completed. Restoration and greening of the remaining operational areas where landfilling is completed will continue to be advanced in 2024;
- (g) progressively extending the use of impermeable plastic liners for capping the landfill operational areas and installing gas extraction facilities underneath the liners or additional extraction pipes at suitable locations. This will speed up the connection of gas extraction facilities to the existing landfill gas collection system, resulting in better odour control at the NENT Landfill;
- (h) transferring pig waste to other sites for treatment by using anaerobic digestion technology in 2023, on a trial basis, to minimize the potential odour problem arising from livestock waste treatment at the NENT Landfill. The Administration’s target is to gradually transfer livestock waste for treatment with anaerobic digestion technology at Organic Resources Recovery Centre Phase 2 (i.e. O-PARK2);

- (i) spraying biological agents in the livestock waste pits during their operation at the NENT Landfill. Odour from disposal of livestock waste is either absorbed or dissolved by the microorganisms in the biological agents; and
- (j) installing openable metal covers on the livestock waste pits that are in operation. The metal covers will be opened only when disposal of livestock waste is required, for the purpose of minimizing the possibility of odour emission.

2. According to the Administration, following the implementation of the various improvement measures, data obtained from independent monitoring exercises carried out at the Liantang/Heung Yuen Wai areas and the nearby local villages by an independent professional body commissioned by the Environmental Protection Department (“EPD”) revealed that the levels of hydrogen sulphide measured in 2023 in areas close to the Hong Kong-Shenzhen boundary and villages in the vicinity of the landfill remained low and complied with the national standard. Besides, the number of complaints concerning the NENT Landfill received by EPD in 2023 has decreased by about 80% when compared with the same period in the preceding year.

[Source: Adapted from the written reply of the Environment and Ecology Bureau to a Member’s question on the Estimates of Expenditure 2024-2025 (Reply Serial No. EEB(E)058)]

Development of modern waste-to-energy incinerators in Hong Kong

List of relevant papers

Committee	Date of meeting	Paper
Subcommittee to Study Policy Issues Relating to Municipal Solid Waste Charging, Recovery and Recycling	8 November 2022	Agenda Item I: Development of waste-to-energy/resources infrastructure Minutes
Panel on Environmental Affairs	25 April 2022	Agenda Item IV: Progress of the implementation of Waste Blueprint for Hong Kong 2035 Minutes
	31 October 2022	Agenda Item I: Briefing by the Secretary for Environment and Ecology on the Chief Executive's 2022 Policy Address Minutes
	30 January 2023	Agenda Item III: Improvement measures for North East New Territories Landfill Minutes
	19 October 2023*	Report of the duty visit to Mainland cities of the Greater Bay Area
	30 October 2023	Agenda Item III: Briefing by the Secretary for Environment and Ecology on the Chief Executive's 2023 Policy Address Minutes
Finance Committee	13 April 2023	Administration's written reply to Members' initial question on the Estimates of Expenditure 2023-2024 (Reply serial numbers: EEB(E)041, 057, 060, 061, 062, 068 and 101)

Committee	Date of meeting	Paper
	17 April 2024	Administration's written replies to Members' initial questions on the Estimates of Expenditure 2024-2025 (Reply serial numbers: EEB(E)058, 059, 106, 139, 230, 238 and 252)

*date of issue of the paper

Council meeting	Paper
13 July 2022	Council question 2 : Disposal of municipal solid waste
24 January 2024	Council question 12 : North East New Territories Landfill
	Council question 19 : Modern waste-to-energy incinerator

Other relevant document:

Government Bureau	Document
Environment and Ecology Bureau	Waste Blueprint for Hong Kong 2035