

**Advisory Council on Food and Environmental Hygiene
Application of Technologies in Enhancing
Environmental Hygiene and Pest Control**

Purpose

This paper briefs members on the measures explored by the Government for application of technologies in enhancing environmental hygiene and pest control.

Background

2. The Government has been proactively applying technologies in its daily operation. The Chief Executive announced that the Government will adopt a multi-pronged approach to enhance environmental hygiene and cleanliness in the 2018 Policy Address, including the application of technologies in cleansing through the use of machines and automation as well as providing better municipal services.

Pest Control Technologies

3. As regards the Government's pest control measures (a summary at **Annex**), the Food and Environmental Hygiene Department (FEHD) is conducting in-depth studies and tests on various technologies to see if they are suitable for applying in Hong Kong. Upon the Department's invitation, an expert from the World Health Organization (WHO) visited Hong Kong and offered advice in February 2019.

Enhanced Surveillance

4. The ovitrap indices have been adopted for monitoring the prevalence of *Aedes albopictus* in various areas since 2003. FEHD is conducting studies to improve the design of the ovitrap with a view to obtaining real-time quantitative data on *Aedes albopictus* through the collection of information of egg-laying

adult mosquitoes in order to avoid delays due to the time needed for incubation of the eggs into larvae. With use of the technology, direct surveillance of the adult mosquito density is made possible. Control work can be stepped up at targeting locations with high adult mosquito density. The field trial of the above technology is expected to be carried out in August 2019.

5. Since 2000, FEHD has made use of the rodent infestation rate (RIR) survey to monitor the general situation of rodents in public areas. To increase the sensitivity of the RIR surveys, the Department is conducting tests on new rodent bait products that are more effective in luring rodents and non-poisonous. Besides, FEHD has engaged a contractor to conduct studies on the use of night vision or thermal imaging cameras to capture video images with the use of artificial intelligence to monitor the extent of rodent activities:

- (a) A three-month trial test for night vision camera surveillance programme will be conducted at municipal services buildings and rear lanes from March 2019 to test its feasibility and actual operation (e.g. the number, locations and positions of the cameras installed) in indoor and outdoor settings. The test will also assess the accuracy of the artificial intelligence system in identifying rodents under different environments, and study how to make use of the information to strategically assist actual rodent prevention and control work. The trial test is expected to be completed in May 2019. Thereafter, FEHD will assess the technology and consider launching a pilot scheme to extend it to other suitable areas.
- (b) FEHD has also engaged a technology company to use thermal imaging cameras and develop an artificial intelligence system for rodent surveillance. It is expected that a three-month trial will be conducted from March 2019 to have a preliminary test on the system operation and make adjustments for assessing the feasibility and effectiveness of the technology.

Enhanced prevention and control

6. Regarding mosquito control, FEHD is testing a new mosquito trapping device which involves the carrying of growth regulators by female mosquitoes to other water bodies where they lay eggs. The regulators prevent larvae in

those water bodies from developing into adult mosquitoes, thereby facilitating mosquito prevention and control. The Department is conducting laboratory tests to evaluate the effectiveness of the new mosquito trapping device in preventing larvae from developing into adult mosquitoes. Field tests will also be conducted in suitable environments in mid-2019 to evaluate the device's impact on the density of adult mosquitoes. If the technology is found to effectively reduce the density of adult mosquitoes, its use will be extended to suitable environments across the territory.

7. As for rodent control work, habits of rodents vary in different environments. Certain habits of rodents in overseas environment may be different from the habits of rodents living in an urban environment. Some rodent trapping devices may target those habits of rodents that are not applicable in Hong Kong. Therefore, it is necessary to conduct field tests to ascertain their effectiveness in rodent prevention and control, as well as to make appropriate adjustment in their application. New rodent trapping devices driven by pressurised gas (A24) were placed in Pei Ho Street Market in Sham Shui Po, Tai Shing Street Market and Ngau Chi Wan Market in Wong Tai Sin District in November 2018 for a three-month test. Further tests on the effectiveness in different market settings would be conducted in Yeung Uk Road Market and Tsuen Wan Market in March 2019. If the test results are satisfactory, consideration will be given to extend the pilot scheme of these devices to the whole territory.

Environmental Hygiene Technologies

Internet Protocol (IP) Cameras

8. Since June 2018, FEHD has installed IP cameras at 115 illegal refuse deposit blackspots over the territory to curb illegal deposits of refuse. All footage captured will go through artificial intelligence image analysis whereby illegal acts of refuse deposit can be identified. Manual review of all video records, which is time-consuming, is no longer required. As the accuracy rate of artificial intelligence is over 99%, FEHD can rely on the footage captured to collect evidence and institute prosecution against fly-tippers. Moreover, officers can analyse the timing and patterns of the illegal acts to formulate more effective enforcement operations. Meanwhile, the Department also closely monitors the targeted locations and suitably adjusts action plans, including

changing locations of the IP cameras to enhance the effectiveness of enforcement actions.

9. From the time of introduction of the scheme until January 2019, FEHD issued 340 fixed penalty notices against offenders for illegal dumping of waste at blackspots, and instituted 120 prosecutions against owners of vehicles used for illegal dumping of refuse based on the footage captured.

10. District Councils (DCs) reflected that significant improvement on the hygiene condition of blackspots was noticed after installation of IP cameras. Therefore, FEHD intends to extend the scheme for two years in consultation with DCs. FEHD will progressively increase the number of locations for installation of IP cameras to over 300 with consideration given to locations and priorities proposed by DCs. Under the scheme, IP cameras are to be installed at some 100 and 50 refuse deposit blackspots over the territory in phases I and II respectively, which amounts to some 150 IP cameras to be installed in two phases. If illegal dumping of refuse is abated at individual locations, FEHD will relocate the IP cameras and gradually extend the scheme to more than 300 locations.

Solar-powered Aluminium Refuse Collection Points (RCPs)

11. FEHD is considering the introduction of solar-powered aluminium RCPs in rural areas on a trial basis. The scheme will include installation of solar panels for energy supply and sensor-operated openings of the RCPs. Ventilation, illumination and fly-killing facilities will also be installed to improve the hygiene condition at the RCPs. The trial scheme is expected to be carried out from April 2019. If the DCs reflect that the new design can improve refuse dumping situation in rural areas, consideration will be given to its wider use at other RCPs in rural areas.

360 Degrees Cameras

12. FEHD conducted a pilot scheme from February to July 2018 on the trial use of 360 degrees cameras¹ to monitor the accumulation of marine refuse in three coastal sites (namely Shui Hau, Pui O and Yim Tin Tsai) in Islands and

¹ Images of 360 degrees landscape are captured every 30 minutes in day time and uploaded to a central server automatically via 4G data transmission for review. The system is powered by rechargeable battery making use of solar energy through solar panels.

Tai Po Districts. The Department's staff can monitor the condition of the sites remotely and adjust clean-up frequencies according to the actual situation, particularly for some remote coastal sites. Upon implementation of the pilot scheme, marine refuse were cleared more timely and effective deployment of cleansing manpower were deployed more effectively. FEHD is carrying out a privacy impact assessment as recommended by the Office of the Privacy Commissioner for Personal Data. Upon completion of the assessment, FEHD will consult the relevant DCs on the installation of 360 degrees cameras at 15 priority sites where accumulation of marine refuse is relatively serious.

Mini-mechanical Sweepers

13. Since April 2017, mini-mechanical sweepers² have been used in cleansing the village areas of Tai Mei Tuk, Tai Po. They have also been put into service in Tung Tau Industrial Area, Yuen Long since December 2018. The sweepers can save time in clearing refuse accumulated on kerbsides and thus enhancing cleansing efficiency. As mini-mechanical sweepers are only suitable to be used on roads with low traffic, FEHD is closely liaising with the Transport Department to identify other suitable places where they can be used to enhance the cleansing efficiency.

Pressure Washer Surface Cleaners and Leaf Blowers

14. FEHD has introduced pressure washer surface cleaners to streamline manual cleaning procedures and remove stubborn stains in a short time. Leaf blowers are also introduced to facilitate cleansing of areas that are hard to be reached or swept. Since July 2018, clauses requiring contractors to provide the above said equipment have been incorporated into street cleansing services contracts upon renewal. Since December 2018, additional cleansing service contractors have been hired to provide street cleansing services with the use of pressure washer surface cleaners in all districts.

Solar-powered Compacting Refuse Bins (Compacting Bins)

15. FEHD conducted a trial use of compacting bins for household waste collection in February 2018. This technology increases the capacity of the compacting bins and discourages unscrupulous dumping resulting from

² The use of mini-mechanical sweepers requires a movement permit from the Transport Department.

overloaded refuse bins. In response to the initial trial results, an enhanced version of compacting bins equipped with indicators and a transparent front panel has been put on trial for use starting from June 2018. Taking into account users' feedback, the Department has identified a suitable technology company to address the deficiencies of compacting bins by a more effective waste compaction system and an enhanced inlet design. Upon completion of the development, a new design will be put on trial from April 2019.

Enhanced Institutional Support

16. In order to apply technologies in a more effective and timely manner, FEHD plans to assign designated staff to keep abreast of the development of various technologies and assess the feasibility of applying them in Hong Kong with reference to recommendations from the WHO. They would be responsible for conducting studies and trial runs on the technologies and also monitor the implementation progress as well as effectiveness of their application.

Conclusion

17. FEHD is actively exploring the application of suitable technologies in collaboration with the Hong Kong Science and Technology Parks Corporation and other technology companies. It will also extend the use of technologies which have been proven effective, including the use of IP cameras, to all districts in Hong Kong. Moreover, measures³ are taken to enhance the quality and efficiency of public cleansing and pest control services.

18. Long term improvement of environmental hygiene depends on sustained co-operation between the public and the Government. Meanwhile, the Government will step up public education and publicity by various means in the community to encourage public's active participation in keeping Hong Kong clean.

³ These measures also involve the assessment criteria of cleansing services contracts. To improve the employment terms and conditions of non-skilled employees engaged by government service contractors, the Government has reviewed such measures including increasing the technical weighting in marking schemes in assessing tenders to no less than 50%, raising the weighting for "wage level" in technical assessment to no less than 25% and enhancing the employment benefits of non-skilled employees (including entitlement to a contractual gratuity, statutory holiday pay upon employment for not less than one month and additional remuneration for working when Tropical Cyclone Warning Signal No. 8 or above is in force). These improvement measures will be implemented for government service contracts put out for tender with effect from 1 April 2019.

Advice Sought

19. Members are invited to note the content of this paper.

Food and Health Bureau

Food and Environmental Hygiene Department

March 2019

Summary of Government's pest control work

Apart from exploring the introduction of various technologies, the Food and Health Bureau and FEHD have proactively liaised with relevant government departments to synergise efforts in mosquito and rodent prevention and control work. The Pest Control Steering Committee convened its first meeting in January 2019 to enhance the Government's overall response strategies for the year.

2. The Government has adopted an integrated approach in pest management for its basic prevention and control work. Key measures include removing sources of mosquito breeding and implementing targeted measures to eliminate the fundamental survival conditions of rodents, namely food, harbourage and passages. Efforts are made to eliminate the food sources and hiding places of rodents as well as block their dispersal routes. To achieve better results, these measures are supplemented by various elimination methods to reduce pest population, such as applying pesticides and placing trapping devices.

3. On the prevention of mosquito breeding, we will adopt early preparatory measures and maintain close liaison with stakeholders in the community. Mosquito prevention and control work targeting mosquito breeding places would be strengthened before the rainy season. When the rainy season comes, relevant departments will mobilise their staff to carry out enhanced fogging operations to eradicate adult mosquitoes. They will also co-operate with the DCs and local communities to contain the mosquito problem as early as possible.

4. The Housing Department (HD) has strengthened prevention and control work in public housing estates in order to tackle the rodent problem. According to the HD, anti-rodent campaigns were conducted in 30 public housing estates in 2018, and a total of 816 rodents were caught. To curb rodent infestation in public housing estates, HD, in collaboration with FEHD, launched a three-month anti-rodent operation target areas in two public housing estates on a trial basis in December 2018. The operation aimed at co-ordinating the anti-rodent efforts of HD, the Link and FEHD and carrying out rodent prevention and control work through the adoption of multi-pronged strategies, including stepping up cleansing work, rodent disinfestation and enforcement action. After examining the

effectiveness of the trial scheme and gaining relevant experience, HD may extend this mode of rodent disinfestation to other public housing estates.

5. FEHD launched a special operation at hygiene blackspots at rear lanes in various districts between December 2018 and January 2019, targeting hygiene problems caused by illegal disposal of food waste and refuse by food premises at rear lanes. The operation began with a two-week education and publicity programme, followed by enhanced enforcement actions and prosecutions in the ensuing three weeks so as to sustain the results of anti-rodent operations in designated target areas.

6. To enable the staff of various departments to have a better understanding of pest control, FEHD has organised pest control training courses/talks for the staff from different government departments such as the Education Bureau, HD, the Leisure and Cultural Services Department (LCSD) and the Water Supplies Department. A number of talks were held for about 450 senior and middle managerial staff from HD and LCSD in August 2018 and a 4-day training course on pest control was organised for about 50 middle managerial staff from HD and LCSD in December 2018. Besides, FEHD has organised pest control talks for the Hospital Authority, the property management industry, the construction industry, schools, etc. to increase their knowledge about pest control and to help them better manage the venues within their purview and pest control work done by their contractors.