

## LCQ15: Management of water resources

Following is a question by the Hon Yung Hoi-yan and a written reply by the Secretary for Development, Ms Bernadette Linn, in the Legislative Council today (June 26):

Question:

It has been reported that the Water Supplies Department (WSD) is studying the adjustment of water charges, which has aroused concerns among various sectors of the community. Regarding the management of water resources, will the Government inform this Council:

- (1) whether it has considered options other than adjusting water charges to improve the operating conditions of the WSD; if so, of the details; if not, the reasons for that;
- (2) of the criteria based on which the WSD determines the rate of adjustment of water charges;
- (3) of the following information on flushing water in each of the past five years:
  - (i) the daily per capita flushing water consumption (set out by sea water and fresh water for flushing);
  - (ii) the respective proportions of the population using sea water and fresh water for flushing;
  - (iii) the respective costs (per cubic metre) of using sea water and fresh water for flushing;
  - (iv) the daily per capita unaccounted-for flushing water; and
  - (v) the expenditures on the construction, expansion, upgrading and maintenance of sea water flushing supply infrastructure and details of the relevant projects;
- (4) of the following information on the supply and consumption of fresh water:
  - (i) the daily per capita domestic fresh water consumption in each of the past five years (set out by Dongjiang water and local yield);
  - (ii) the respective total amounts and proportions of fresh water supplied from Dongjiang and local yield in the past year;
  - (iii) the respective costs (per cubic metre) of fresh water supplied from Dongjiang and local yield in each of the past five years;
  - (iv) the respective proportions of the expenditures on purchasing and processing Dongjiang raw water to the cost of fresh water supplied from Dongjiang in each of the past five years; and
  - (v) the annual quantity of overflow from reservoirs since 2022;
- (5) of the following information on unlawful taking of water in each of the past five years:
  - (i) the respective numbers of reports and complaints received by the Government;

(ii) the number of convicted cases;  
(iii) the amount of water involved in those convicted cases where water was unlawfully taken; and  
(iv) the amount of fresh water contaminated as a result of unlawful water taking;

(6) since the commissioning of the first stage of the Tseung Kwan O Desalination Plant (TKODP) on December 22 last year, of (i) the actual daily fresh water production capacity of the TKODP, (ii) the proportion of the relevant production capacity to Hong Kong's overall fresh water demand, and (iii) the actual average cost per cubic metre of fresh water produced by the TKODP;

(7) of the total length of water mains in Hong Kong which have been in use for more than 30 years at present; (i) the expenditures on the construction, upgrading and maintenance of water mains and the details of the relevant projects, and (ii) the leakage rate of fresh water mains and the amount of fresh water loss involved, in each of the past five years;

(8) of the number of cases of water mains anomalies detected by WSD's Water Intelligent Network (WIN) and the associated amount of fresh water loss, as well as the number of cases of water mains anomalies misreported by WIN, in each of the past five years; and

(9) whether the Government has plans to further reduce water mains leakage and bring down the cost of fresh water; if so, of the details; if not, the reasons for that?

Reply:

President,

The Water Supplies Department (WSD) has all along been committed to providing the public with reliable, adequate and wholesome water. The WSD strives to control cost of water supply through continuous improvement in asset management and use of technology. In addition, the WSD has been implementing the Total Water Management Strategy since 2008. On one hand, it focuses on containing growth of water demand including strengthening water conservation through public education. On the other hand, it supports exploiting new water resources to build resilience in fresh water supply in Hong Kong.

The reply to various parts of the Hon Yung's question are as follows:

(1) The WSD has always been committed to controlling the cost for improving the waterworks operating conditions. An important factor is to reduce the demands for water supply facilities, thereby lowering the operational, maintenance, and depreciation expenses associated with water supply through controlling water consumption. This helps attain improved cost-effectiveness. To achieve this, the WSD has been actively implementing various water-saving measures and promotions. In February this year, a new round of water conservation campaign "Save Water Today for a Sustainable Future" was

launched. Through a series of activities, including composing a water-saving theme song, broadcasting of the Government's new Announcements in the Public Interest, organisation of water conservation carnival and online public activities, etc, the WSD aims to raise the public awareness of water conservation and change their water-using habits.

Besides, the WSD has implemented a series of measures to enhance the cost-effectiveness of waterworks facilities, including (i) establishing Water Intelligent Network (WIN) to monitor leakage in the networks and replacing or rehabilitating specific sections of the higher risk water mains, thus reducing the risks of burst or leakage of water mains; (ii) controlling private water main leakage and installing smart water meters to reduce water loss; and (iii) upgrading the WSD's energy management system to cover the entire water supply chain, including collection, storage, transportation and raw water treatment, supply and distribution of fresh water and salt water as well as developing large scale floating solar farm in Hong Kong reservoirs to generate renewable energy, etc, in order to save the energy cost.

To control the cost of water supply more effectively, the WSD is formulating an overall digital transformation roadmap to strengthen its digital infrastructure and establish a system of data management standards, and implement a series of digitalisation projects and measures in phases, including the establishment of the WSD's Central Operation Management Centre, Internet of Things platform, cloud data centre, digital twin and hydraulic model applications, etc, to improve the operational efficiency and stability of water supply, and reduce electricity consumption.

(2) The water tariff policy of the Government adopts the principles of "user pays" and "service cost recovery". The WSD reviews the Waterworks Operating Accounts (WOA) and the level of water charges annually in accordance with the established policy and mechanism. Water tariffs have not been adjusted for nearly 30 years since February 1995. The WOA have recorded deficits since 1998/99 and the cost recovery rate of the latest WOA has decreased to a record low of under 80 per cent level. When conducting water tariff review, we will take in account a basket of factors including the policy principles, the public affordability, economic conditions and the performance of the WOA, as well as the views of stakeholders.

(3) (i), (ii) and (iii) Salt water for flushing has been adopted in Hong Kong since the 1950's. Over the years, the WSD has gradually expanded its salt water supply network which, nowadays, has covered about 85 per cent of Hong Kong's population. The WSD will continue to actively encourage consumers covered by the existing salt water supply network to switch to salt water for flushing. The WSD is also actively promoting the use of recycled water for flushing and other non-potable purposes, thereby further increasing the proportion of salt water and recycled water for flushing to over 90 per cent. In the past five years, the per capita annual water consumption and costs of salt water and fresh water for flushing are as follows:

Year	Per capita flushing water consumption (litres/day)		
	Salt water	Fresh water	Total (salt water and fresh water)
2018/19	69.2	24.1	93.3
2019/20	75.0	18.4	93.4
2020/21	77.1	19.9	97.0
2021/22	75.8	20.2	96.0
2022/23	73.0	18.4	91.4

Year	Cost of flushing water consumption (\$/cubic metre)	
	Salt water (Note 1)	Fresh water (Note 2)
2018/19	4.3	9.6
2019/20	4.2	9.9
2020/21	4.2	9.8
2021/22	3.9	9.6
2022/23	4.1	9.6

Note 1: Include costs of salt water collection, treatment, distribution and customer services.

Note 2: Include purchase and collection of fresh water, treatment, distribution and customer services.

(iv) and (v) The WSD does not keep records of water loss for flushing. The expenditure on the construction, expansion, upgrading and maintenance of salt water for flushing supply infrastructure and details of the relevant projects are as follows:

Year	Construction, expansion or upgrading (Note)		Maintenance
	Number of relevant projects	Expenditure (\$ million)	Expenditure (\$ million)
2019/20	258	501.1	84.6
2020/21	285	604.4	85.5
2021/22	310	628.8	96.8
2022/23	301	738.7	105.6
2023/24	384	737.4	126.5

Note: Including Category A and Category D public works projects under the "Replacement and Rehabilitation Programme of Water Mains" and the "Risk-based

Improvement Programme of Water Mains" programmes.

(4) (i) The daily per capita domestic fresh water consumption in each of the past five years is as follows:

Year	Per capita domestic fresh water consumption (litres/day)
2018/19	134.1
2019/20	137.5
2020/21	152.6
2021/22	148.1
2022/23	141.7

(ii) In 2023, total water consumption of Hong Kong was 1 068 million cubic metres, of which the supply of water from Dongjiang and local yield were 820 million cubic metres (77 per cent) and 248 million cubic metres (23 per cent) respectively.

(iii) and (iv) The cost of supplying Dongjiang water includes costs of purchasing Dongjiang water, treatment, distribution and customer services. In the past five years, the expenditure on purchasing Dongjiang water accounted for about 55 per cent of the overall average cost of supplying Dongjiang water. The annual costs of Dongjiang water and local yield are as follows:

Year	Dongjiang Water (\$ per cubic metre)	Local Yield (Note) (\$ per cubic metre)
2018/19	10.6	4.8
2019/20	11.0	5.1
2020/21	11.0	5.1
2021/22	10.9	5.0
2022/23	11.1	5.0

Note: Include costs of raw water collection, treatment, distribution and customer services.

(v) The overflow from impounding reservoirs in Hong Kong occurred in small and medium impounding reservoirs built between the 19th century and the mid-20th century, including Pok Fu Lam Reservoir, Aberdeen Reservoir, Lower Shing Mun Reservoir, Tai Tam Reservoir and Shek Pik Reservoir. As these impounding reservoirs were designed to meet the water demand at that time, they have relatively small storage capacities. They are prone to overflow when the rainwater collected exceeds their capacities during heavy rainstorms. As the above reservoirs are not used to store Dongjiang water, all overflow from impounding reservoirs was natural rainwater instead of

imported Dongjiang water.

Under the "Package Deal" approach adopted in the current Dongjiang water supply agreement for purchasing Dongjiang water, the WSD determines the quantity of Dongjiang water to be imported from the Guangdong side on a monthly basis based on actual water demand, thereby effectively reducing the risk of overflow. Nevertheless, the WSD has been taking measures to reduce overflow, such as adjusting the amount of water delivered to water treatment plants from reservoirs to reserve sufficient reservoir capacity to collect rainwater during the rainy season. However, the actual quantity of overflow depends largely on the annual rainfall and its distribution. From 2022 to now, the quantities of overflow of Hong Kong's reservoirs are tabulated below:

Year	Annual quantity of overflow from reservoirs (million cubic metre)
2022	12
2023	47 (Note)
2024 (Up to May)	0

Note: Higher overflow occurred in 2023 was mainly due to extreme rainfall in September 2023.

(5) The information on unlawful taking of water (Note) in each of the past five years is as follows:

Year	Number of report and complaint cases	Convicted cases	
		Case	Unlawful taking of water (cubic metres)
2019	402	102	9 085
2020	316	62	334
2021	351	109	9 728
2022	254	54	15 316
2023	234	36	588

Note: The reports and complaints of unlawful taking of water received by the WSD has been included in the above table. In addition, since it takes time to conduct investigations and collect evidence, the "convicted cases" of a particular year may not necessarily be the "reports and complaints" received in that year.

Common cases of unlawful taking of water include taking water through a fire service for any purpose other than for firefighting (such as car washing) or taking water from water supply system which is not measured by a meter, etc. The risk of potable water contamination caused by such behaviour

is relatively low, and the WSD has not found that the above cases have caused potable water contamination.

(6) The first stage of the Tseung Kwan O desalination plant has started to supply potable water since December 22, 2023. The current maximum water production capacity is about 135 000 cubic metres per day. It can supply about 5 per cent of potable water consumption in Hong Kong. The unit production cost of the WSD's desalination is about \$13 per cubic metre including depreciation costs, operating costs, distribution costs and customer services expenses.

(7) As at May 2024, the total length of fresh water and salt water main in Hong Kong is about 8 400 kilometres, of which about 2 100 kilometres of water mains are more than 30 years old. To achieve cost-effectiveness, the WSD adopts a "risk-based asset management programme for water mains" by introducing factors such as age of use, materials, past records of bursts or leaks, surrounding environment and consequence resulting from bursts or leaks, for assessing the risk of water mains so as to replace or rehabilitate specific sections of water mains with higher risk progressively with a view to reducing the risks of water main bursts or leaks.

(i) The expenditure on the construction, upgrading and maintenance of water mains and the details of the relevant projects are as follows:

Year	Construction or upgrading		Expenditure on maintenance (\$ million)
	Number of relevant projects	Expenditure (\$ million)	
2019/20	427	1,365.4	89.5
2020/21	487	1,578.0	96.3
2021/22	562	2,070.0	98.9
2022/23	555	2,023.7	90.6
2023/24	680	1,337.3	109.2

(ii) The leakage rate of fresh water mains and the amount of fresh water loss involved in each of the past five years is as follows:

Year	Water mains leakage rate	Amount of water loss (million cubic metres)
2019	15.2%	150
2020	14.8%	150
2021	14.6%	149
2022	14.4%	148
2023	14.0%	144

(8) In the past five years, no water mains anomaly misreported by the WSD's WIN. The number of cases of water mains anomalies detected by the WIN successfully and the associated amount of fresh water loss recorded are as follows:

Year	Number of anomaly cases of fresh water mains detected by the WIN	Amount of daily water loss (10 000 cubic metres)
2019	400	3.5
2020	520	2.2
2021	660	3.3
2022	880	6.3
2023	1 037	7.5

(9) Overall, in conjunction with the implementation of risk-based water pipe improvement works, the WSD has also been establishing the WIN to successfully identify leaking areas and conduct rapid repairs for leaking water pipes, thus reducing leakage and burst cases. Relevant measures are gradually achieving effective results. In this direction, we strive to achieve the goal of reducing the water pipe leakage rate to less than 10 per cent by 2030.

As mentioned in item (1), the WSD aims to strengthen control and reduce water supply costs through optimising the management and operation of waterworks facilities.