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18 June 2019

Ms Doris LO
Clerk to the Public Works Subcommittee
Public Works Subcommittee
Legislative Council Complex
1 Legislative Council Road
Central, Hong Kong
(Fax: 2978 7569)

Dear Doris,

Paper No. PWSC(2019-20)1
50CG - Provision of an Additional District Cooling System at the Kai Tak Development

At the meeting of the Public Works Subcommittee on 17 May 2019, when Members were considering 50CG – Provision of an Additional District Cooling System at the Kai Tak Development, they requested the Government to provide supplementary information. Our reply is set out below:

(1) How to Estimate the Cooling Demand per Square Metre of Building Floor Area

As floor area is not the only factor in determining the cooling demand, when planning the cooling capacity of the additional district cooling system (DCS), our estimate was not done solely on the basis of the cooling demand per square metre. Instead, we estimated the cooling demand of individual buildings, and also the entire DCS based on various factors, including the type of building usage as shown in the

proposed outline zoning plan, the gross floor area, the cooling demand projections provided by the parties in charge of the development projects, as well as climate factors like outdoor temperature, outdoor humidity levels etc.

(2) Floor Areas and the Cooling Demands of Kai Tak Sports Park, New Acute Hospital and other Commercial Buildings

Based on the estimation in 2017, the Kai Tak Sports Park (KTSP), New Acute Hospital (NAH) and other commercial buildings to be served by the DCS would have a total additional air-conditioned floor area of about 811 000m^2. Their estimated cooling demands and cooling demand intensities are listed below:

	Cooling Demand (MW)	Cooling Demand Intensity (W/m^2)
KTSP[1]	65.7	Approx. 270
NAH	93.9	Approx. 270
Total additional commercial floor area	60.9	Approx. 170

Note: Cooling demand intensity is defined as total cooling demand divided by total air-conditioned area of the building.

(3) Recurrent Cost and Breakeven

As provided in the District Cooling Services Ordinance (Cap. 624), charges and fees received for the provision of district cooling services are used to settle the operation and maintenance fees for a DCS operator as well as the utility costs for operating the DCS plants. Therefore, the estimated recurrent cost shown in the table below is the difference between the operating expenses and the charges and fees received in that particular year. It is estimated that starting from 2026-27, the charges and fees received would be sufficient to settle all the operation and maintenance fees for the DCS operator as well as the utility costs for operating the DCS plants.

[1] This does not include the office and hotel (with a total cooling demand of 7MW) which will be located on the same Site 2D1, as these are not government facilities.

Year	Estimated Recurrent Cost ($ million)
2022 – 23	18.3
2023 – 24	39.1
2024 – 25	37.7
2025 - 26	22.7

(4) Contingency Plan

To ensure system reliability, the additional DCS will incorporate back-up facilities in the design such as back-up chillers, 3-pipe chilled water distribution pipework design, and leakage detection system for underground pipework, etc. In case of system failure, the back-up facilities including back-up chiller plant, water pumps, distribution pipework will come into operation to maintain the chilled water supply service of DCS. Since commissioning, the existing DCS has attained system reliability of 99.99%.

Despite the reliable design of the DCS, EMSD has set up a customer liaison group to enhance communication with users. The group holds regular meetings with users to understand their views on the daily operation of the DCS. EMSD also notifies the users of the repair of the DCS and other situations through the liaison group, so that the users can make arrangements and take actions accordingly as early as possible. In case of emergency or other incidents regarding the DCS, we will notify the affected users according to the established emergency information and communication mechanism (including the use of instant messaging software) to facilitate their timely response. EMSD will also conduct regular drills for emergency situations at the DCS, and invite users to participate.

(5) Cooling Demand of Kai Tak Sports Park

In planning and estimating the total cooling demand of the existing DCS in 2008, KTSP was still in its early conceptual stage, and was known to have a retractable roof design for the main stadium. At that time, EMSD mainly relied on the available preliminary planning parameters, such as building type and estimated gross floor area to arrive at an estimated cooling demand for KTSP. EMSD has since closely liaised with the relevant bureau/works departments to confirm the cooling demand requirements of the new developments (including KTSP), and monitored the progress

of the developments so as to review whether the cooling capacity of the existing DCS would be adequate.

(6) Energy Efficiency of the Existing DCS

The statistics of the electricity consumption and tariffs of the existing DCS, as well as the electricity saved for users are as follows:

Year	Electricity Consumption (kWh)	Tariff ($)
2012-2013	30 727	33,800
2013-2014	4 331 279	4,894,345
2014-2015	6 441 395	7,729,674
2015-2016	9 046 109	10,312,564
2016-2017	9 339 685	10,927,431
2017-2018	12 081 399	14,256,050
2018-2019	22 389 734	26,867,681

Since the commencement of operation of the DCS in 2013 till 2018-19, the total estimated electricity saved is about 10.8 million kWh.

(7) Reference Information on Energy Efficiency of District Cooling Systems in Other Places

We mentioned in our reply to the Legislative Council dated 1 April 2019 a report released by the United Nations Environment Programme in 2015 entitled "District Energy in Cities" (the UNEP report)[2]. The UNEP report analysed the "levelized unit cost of cooling production" of various district cooling systems, which takes into account the total capital costs and the project life operating costs in terms of cost per unit Megawatt hour ($/MWh). According to the UNEP report, the levelized cost of DCSs in general was about HK$530/MWh (or US$68/MWh) in 2013. The difference between that and the unit cost of the additional DCS (in terms of $/MWh) at the Kai Tak Development in 2013 prices is less than10%.

[2] The UNEP report can be downloaded at web.unep.org/ourplanet/october-2016/unep-publications/district-energy-cities

That said, it should be stressed that the DCSs surveyed in the UNEP report have different cooling technologies, scope of works, distribution network, service levels complexity and operating environments. As they are located in cities at different stages of development, the cost factors, inflation, and other economic variables, which will affect the levelized cost, also vary significantly. The findings of the report therefore have to be interpreted with caution.

Yours sincerely,

(Desmond CHENG)

c.c. Secretary for Financial Services and the Treasury (Attn: Mr Denny HO)
Director of Electrical and Mechanical Services (Attn: Mr VY Ek Chin)